

# A glacial mollusc fauna from Baronie seamount (off Eastern Sardinia)

by

PAOLO COLANTONI

Laboratorio di Geologia Marina, C.N.R., Bologna (Italia)

During the dredging cruises of the Laboratorio di Geologia Marina of Bologna in the Tyrrhenian Sea, a mollusc fossil fauna has been collected on the western side of the Baronie Seamount, about 20 miles off the Sardinia coast. The sample has been obtained through two dredgings carried out along about the same line at the depth of 817-525 meters (dredging T68-24) and 600-237 meters (dredging T 70-45) (Fig. 1).

There is a reason to believe that the fauna collected comes from the zone common to both dredgings, that is, from a depth of 600-525 m. This is also confirmed by the fact that, from the observation of the arrangement of the material in the dredge, it appears clear that fauna has been collected at the end of the first dredging and at the beginning of the second.

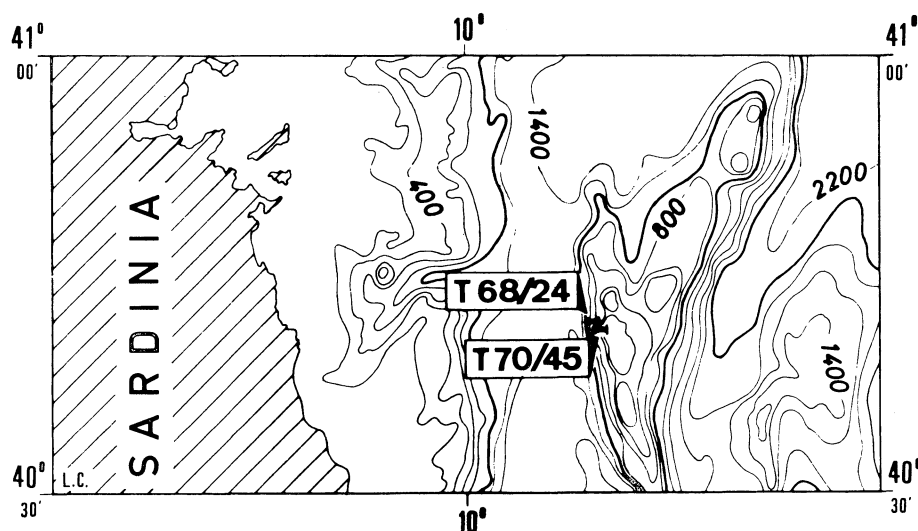


FIG. 1. — Dredging location.

The fauna contains several blackish specimens (this color is due to Fe and Mn deposits) and is covered, at intervals, by yellowish mud with recent Pteropoda. As shown in Table 1, among the forms identified are *Chlamys septemradiata*, *Panopaea norvegica*, *Arctica islandica* and *Mya truncata*. These are North-Atlantic species that migrated into the Mediterranean sea at the beginning of the Quaternary [*Immigrés du Nord*, according to GIGNOUX, 1913]. *Lima excavata* is another boreal form already found in the Southern Tyrrhenian Sea by SEGRE and STOCCHINO 1963, as a fossil form.

In order to emphasize the characteristics of the assemblage, the percentage of every single species with respect to the total population (that is its dominance) and their present geographical distribution is shown in the Table 1. As expected, the species with larger diffusion predominante. It is interesting, however, to make comparison between the number of species living in the various provinces. The Atlantic species are the most widespread; they are followed by Celtic species, and then by Mediterranean and Boreal (85-80-75-65 % respectively). If, on the contrary, we sum up the dominance values (thus conside-

S P E C I E S	T 68-74	T 70-75	T O T A L		MALACOLOGICAL PROVINCES				
	n	n	n	%	LUSITANIAN		CELTIC	BOREAL	ARTIC
					Medit.	Atlant.			
<i>Turritella biplicata</i> (BRONN)		1	1	1.33	*	*			
<i>Agrobuccinum giganteum</i> (LAM.)	3		3	4.00	*	*	*		
<i>Area tetragona</i> POLI		1	1	1.33	*	*	*	*	
<i>Glycymeris glycymeris</i> (L.)		1	1	1.33	*	*	*	*	
.. cor (Lam.)		1	1	1.33	*	*			
<i>Limopsis aurita</i> (BROCCHI)	1	1	2	2.67	*	*	*		
<i>Modiolus phaseolinus</i> (PHILIPPI)		1	1	1.33	*	*	*	*	
<i>Pecten jacobaeus</i> (L.)	1	1	2	2.67	*	*			
<i>Aequipecten opercularis</i> (L.)	1	3	4	5.33	*	*	*		
<i>Chlamys septemradiata</i> (MÜLLER)	1	1	2	2.67		*	*	*	*
<i>Lima excavata</i> (FABR.)	1		1	1.33			*	*	
.. tuberculata (OLIVI)		1	1	1.33	*	*			
<i>Ostrea gr. edulis</i> (L.)		1	1	1.33	*	*	*	*	
<i>Astarte sulcata</i> (DA COSTA)	21	6	27	36.00	*	*	*	*	*
<i>Arctica islandica</i> (L.)	2	1	3	4.00			*	*	*
<i>Venus casina</i> (L.)		5	5	6.67	*	*	*	*	
<i>Chione ovata</i> (PENN.)	7		7	9.33	*	*	*	*	*
<i>Saxicava arctica</i> (L.)	2		2	2.67	*	*	*	*	*
<i>Panopaea norvegica</i> (SPENGLER)	2		2	2.67			*	*	*
<i>Mya truncata</i> (L.)	3	5	8	10.67		*	*	*	*
amount of species	12	15	20		15	17	16	13	7
% of species					75	85	80	65	35
amount of species dominance					79	92	93	81	68

Tab. 1. — Amount of the collected species and their geographical distribution.

ring the massive number of individual of every single species), it appears clear that the first place is held by the Celtic species (93 %), followed by the Atlantic species (92 %), the Boreal (81 %), Mediterranean (79 %) and Arctic (68 %).

The above gives evidence, therefore, of a clear Atlantic and Boreo-Celtic influence on this fauna which, even though possessing peculiar characteristics, shows evident similarities to the faunas now living in the Celtic province. This would be indicative of the existence, in the Mediterranean sea, of a definitely cold climate similar to that now recorded in Northern Europe.

It should be noted that our sample does not contain any of those pliocenic forms that, though extinguishing during the Quaternary, are still present in varying amounts in the Calabrian and Sicilian layers. We are induced to believe, therefore, that our fauna is posterior to the Calabrian and Sicilian periods, and originated in a colder climate; we mean that it should be assigned to the glacial Quaternary [SELLI, 1967].

Other cold water fossil fauna has been found previously in the Mediterranean sea. The best known is that of Capo Creus (on the French-Spanish border) discovered by PRUVOT and ROBERT in 1897. There an abundant fauna was dredged between the depths of 90 and 340 meters; it was the subject of later investigation by MARS in 1958. Later, many other faunas with *Arctica islandica* have been discovered. Our sample however, coming from depth between 600 and 525 meters, is much deeper than all the faunas previously mentioned. It cannot have been reworked from shallow water, therefore, the problem of the deposit interpretation arises.

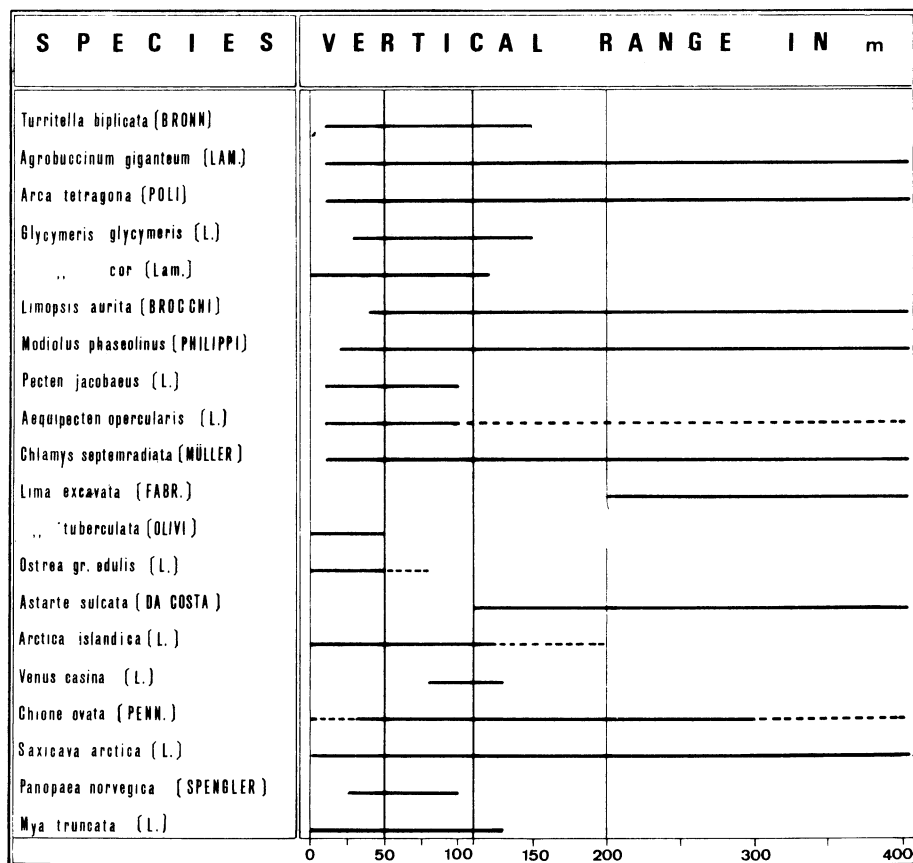


TABLE 2. — Bathimetric distribution of the collected species.

The depths at which the various species live at present are shown in Table 2. It must be mentioned that these data are not absolutely sure, due to the lack of reliable information on the matter and on account of the fact that the different ecologic conditions can determine a modification of the bathymetry of the single forms. However, we can state that on the whole our fauna is indicative of a depth included between approximately 50 and 110 meters.

Only *Lima excavata* seems to require a greater depth (at least 200 meters); but it is also true that this species has been collected only from the deeper dredging, and therefore might also come from higher depth than the other species.

Considering the minimum dredging depth (525 m) and the maximum depth indicated by the assemblage (110 or even 200 meters) it appears clear that if we accept an eustatic interpretation only, the sea level at the moment of the thanatocenosis formation should have been 415 or 325 ( $-525 + 110$  or  $+200$ ) under the present one.

However, such a significant eustatic lowering of the sea level during the glacial Quaternary is not plausible, even if the extreme values assumed are accepted (110-165 m according to SHEPARD, 1967). Therefore, there is a reason to believe that the zone in question has also undergone a tectonic lowering which, considering the maximum values assumed for the Würmian regression, might be around 200 meters ( $415-165 = 250$  m;  $325-165 = 160$  m).

In conclusion, the dredged fossil fauna has formed during a cold period (probably the Würm glacial period, as assumed by MARS 1958 for Capo Creus, but it may be also Riss) and the zone has later undergone a considerable tectonic lowering.

#### References

- GIGNOUX (M.), 1913. — Les formations marines pliocènes et quaternaires de l'Italie du Sud et de la Sicile. *Ann. Univ. Lyon, Sci. nat. (I.C.)*, **36**, pp. 1-686.
- MARS (P.), 1958. — Les faunes malacologiques quaternaires « froides » de la Méditerranée. Le gisement de Cap Creus. *Vie et Milieu*, **9**, 3, pp. 293-310.
- SEGRE (A.G.) & STOCCHINO (C.), 1969. — Nuove osservazioni sulla geologia e morfologia delle montagne submarine del Mar Tirreno. *Ist. Idr. Marina*, **1037**, pp. 1-15.
- SELLI (R.), 1967. — The Pliocene-Pleistocene boundary in Italian marine sections and its relationship to continental stratigraphies. *Progr. Oceanogr.*, **4**, pp. 67-86.
- SHEPARD (F.P.), 1967. — Submarine Geology. — New York, ed. Harper & Row. XVIII-557 p.