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STRATIGRAPHICAL AND GEOGRAPHICAL DISTRIBUTION OF
NASSARIUS CATULLOI (BELLARDI, 1982) (NEOGASTROPODA;
NASSARIIDAE) IN THE MEDITERRANEAN NEOGENE

KEY WORDS: Gastropoda, Nassariidae, Neogene, Mediterranean, Stratigraphical Distribution, Geographical Distribution

PALABRAS CLAVE: Gastropoda, Nassariidae, Neógeno, Mediterráneo, Repartición estratigráfica, Distribución geográfica.

Riassunto

Scopo di questo studio è quello di segnalare il ritrovamento di *Nassarius catulloi* (BELLARDI, 1982) in giacimenti geograficamente notevolmente distanti da quelli noti. Viene discussa la sua distribuzione stratigrafica e viene dato notevole risalto alle caratteristiche di dispersione della specie, in base alla morfologia della protoconca.

Resumen

El hallazgo de *Nassarius catulloi* (BELLARDI, 1982) en yacimientos alejados geográficamente de aquellos en donde ya se conocía su existencia, ha motivado el presente estudio. Se discute asimismo su repartición estratigráfica y se hace hincapié en las características de dispersión de la especie, en base a la morfología de su protoconcha.

Summary

The discovery of *Nassarius catulloi* (BELLARDI, 1982) in outcrops at some geographical distance from those at which its existence was already known is the reason for this study. Its stratigraphical distribution is also considered and special emphasis is placed on the species dispersion characteristics, on the basis of the morphology of its protoconch.

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Introduction

Certain species of Nassariidae of small size which were defined by BELLARDI (1882) in the Italian Neogene have rarely been mentioned in the subsequent literature. This is in part a result of their scarcity in the fossil record, and is in part due to the problems involved in identifying them. Consequently, their stratigraphical and spatial distributions are poorly known.

The following species *Nassarius catulloi* (BELLARDI, 1882), *Nassarius sculptus* (BELLARDI, 1882), *Nassarius textilis* (BELLARDI, 1882), and *Nassarius fontanesi* (BELLARDI, 1882), among others, form part of this group.

The most recent work to be published on this species was BERNASCONI (1983). In this study, *N. sculptilis* and *N. textilis* are considered to be synonym for *N. catulloi* on the basis of the biometric study of the teleoconch and of the analysis of the protoconch by means of the scanning electron microscope. BERNASCONI (op.cit.) separates *N. fontannesi* from the previously mentioned species, not on the grounds of quantitative values, which do not demonstrate any significant differences in comparison with the others, but because of the qualitative characteristics of the teleoconch.

In our opinion, such a conclusion seems justified and, in this work, *N. catulloi* will be considered as a taxon which includes the forms referred to in the bibliography that has been consulted under the species names of *N. catulloi*, *N. sculptilis*, and *N. textilis*.

Material studied

N. catulloi has been identified in the malacofauna from outcrops of the lower Pliocene (Zanclian) at Can Albareda (Baix Llobregat) and Cementiri Siurana (Alt Emporda) in Catalonia (north-eastern Spain), Nidolères and Millas (Roussillon, France) and in the upper Pliocene (Piacentian) at Castell'Arquato (Piacenza, Italy).

At none of these outcrops is it an abundant species; a total of 24 adult specimens and 17 young (protoconch and one whorl or slightly more of the teleoconch) were collected, distributed in the following way:

Can Albareda: 7 specimens (3 adults, 4 young).

Cementiri Siurana: 8 specimens (4 adults, 4 young).

Nidolères: 9 specimens (4 adults, 5 young).

Millas: 11 specimens (all adults).

Castell'Arquato: 6 specimens (2 adults, 4 young).

The protoconch of our specimens has the same shape as that described and illustrated by BERNASCONI (1983). The transition to the teleoconch is also identical (figs. 1-8,13). BERNASCONI (op. cit.) points out the existence of ornamentation consisting of small granulations located on the abapical sides on the first two whorls and covering all the third whorl. The lack of ornamentation in the centre of the whorl and adapically may have been due to erosion, since the abapical zone is best protected. It has proved possible to observe this distribution of ornamentation in other species of Nassariidae — for example *N. turbinellus* (BROCCHI, 1814), and, in the case of particularly well preserved specimens, it can be noted that it covered the

whole protoconch surface. In the case of the specimens considered here, even though they are in a similar state of preservation to those illustrated by BERNASCONI (op.cit.), no traces of ornamentation have been detected.

As regards the dimensions of the protoconch, the maximum diameter of the specimens considered here (table 1) is somewhat higher than that provided by BERNASCONI (op.cit.). In our opinion, the average value obtained by this author (0,69 mm.) must be an error since the measurements that can be deduced from the photographs that she publishes in her study are always in the region of 0,9 mm, a value which would make the average coincide with that obtained in the course of our own research.

As for the teleoconch (fig. 9-11) of the adult specimens studied, the number of whorls, the transversal and longitudinal ornamentation, the overall measurements, the shape of the mouth (fig. 12) the callosity etc. coincide completely with the description and measurements provided by BERNASCONI (op.cit.) for *N.catulloi*.

In the case of all the outcrops studied in this article *N.catulloi* is cited for the first time. This represents an expansion as regards both its geographical and its stratigraphical distribution.

Stratigraphical distribution

Taking into account all the forms which are included as *N.catulloi*, its stratigraphical location ranges from the middle Miocene (VAN VOORTHUYSEN, 1944 in BERNASCONI, 1983), through the upper Miocene (Tortonian) (BELLARDI, 1882; VENZO and PELOSIO, 1963; GLIBERT, 1963) to the lower Pliocene (BELLARDI, 1882; MONTEFAMEGLIO, et al. 1979; FERRERO MORTARA et al. 1981; BERNASCONI, 1983).

With the addition of the material studied here, the stratigraphical distribution of this species is extended to include the upper Pliocene (Piancentian). No references to specimens in more recent contexts have been traced, and so it might be supposed that it became extinct at the end of the Pliocene.

Geographical distribution

According to the bibliographical information that we possess, the area of distribution of *N.catulloi* includes the Miocene area of Holland (VAN VOORTHUYSEN, 1944 in BERNASCONI, 1983), the Tortonian areas of northern Italy—Tetti Borelli and Stanzano (BELLARDI, 1882), Colle de Vigoleno (VENZO and PELOSIO, 1964), Rometta (GLIBERT, 1963) — and those of the lower Pliocene, also in the north of Italy — Montafia and Savona (BELLARDI, 1882), Rio Torsero (BELLARDI, 1882; BERNASCONI, 1983), Monteu Roero, San Giacomo and Priocca (MONTEFAMEGLIO, et al. 1979).

The material studied in this article demonstrates the following points:
— *N.catulloi* was far more widely distributed during the lower Pliocene than hitherto considered; it was to be found in the greater part of

the Catalan coastal region (Spain) and in the littoral areas of Roussillon (France). This is demonstrated by the finds made at the above-mentioned outcrops.

— The true distribution of the species in the western Mediterranean during the Pliocene, in view of the nature of the basin in this period, may have been even wider (fig. 14) since the Italian and Catalan areas could only be connected by going round the strip of emerged land corresponding to the Italian peninsula towards its south. Be that as it may, there is no evidence for its presence in the intermediate area between the coast of Roussillon and northern Italy (Pliocene outcrops of the Rhône Valley and the Alpes Maritimes in France), nor in southern Italy, Sicily or on the coast of Africa (Morocco, Algeria or Tunisia).

The wide distribution which we have pointed to is supported by the larval ecology of the species, denoted by its protoconch (SHUTO, 1974; HANSEN, 1980; JABLONSKI and LUTZ, 1980). In fact, according to SHUTO (op.cit.) the value of the maximum diameter of the protoconch (dp.average = 0.94), the number of whorls (vol. average = 3.6) and the dp/vol index (average = 0.26), together with the presence of fine axial opisthodontic ribs in the transition to the teleconch indicate a planktotrophic larva. Planktotrophic larvae possess a considerable ability for dispersion and are typical of species of wide geographical distribution.

— Although the geographical distribution does not depend only on the larva's ability to disperse, for its tolerance of the environmental conditions of the area to be colonized are also significant, the gap mentioned in the geographical area could be largely due to a lack of studies carried out on the Neogene malacofauna in those regions rather than a true break in distribution.

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Table I

Summary of protoconch measurements (dp in mm)

| | vol. | dp. | dp/vol |
|--------------------|------|------|--------|
| Number | 20 | 20 | 20 |
| Max. value | 4 | 1.08 | .29 |
| Min. value | 3.25 | .83 | .23 |
| Average | 3.60 | .94 | .26 |
| Standard deviation | .21 | .07 | .02 |

Legende of the figures:*Nassarius catulloi* (BELLARDI, 1882)

Fig. 1. - Protoconch. Can Albareda (Baix Llobregat)

Fig. 2. - Protoconch. Can Albareda (Baix Llobregat)

Fig. 3. - Protoconch. Castell'Arquato (Piacenza)

Fig. 4. - Protoconch. Castell'Arquato (Piacenza)

Fig. 5. - Protoconch. Castell'Arquato (Piacenza)

Fig. 6. - Protoconch. Castell'Arquato (Piacenza)

Scale bar = 500 μ m*Nassarius catulloi* (BELLARDI, 1882)

Fig. 7. - Protoconch. Millas (Roussillon)

Fig. 8. - Protoconch. Millas (Roussillon)

Fig. 9. - Teleoconch. Siurana (Empordà)

Fig. 10. - Teleoconch. Millas (Roussillon)

Fig. 11. - Teleoconch. Millas (Roussillon)

Fig. 12. - Detail of the aperture Siurana (Empordà)

Fig. 13. - Protoconch. Siurana (Empordà)

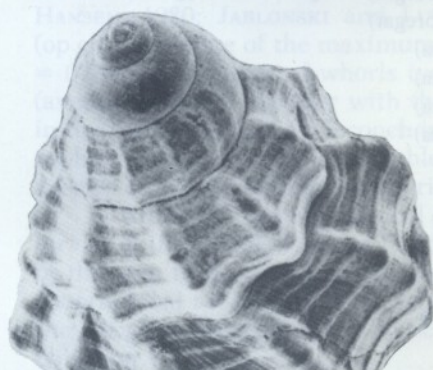
Scale bar = 500 μ m



1



2



4



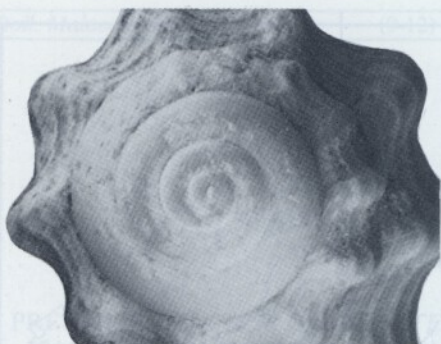
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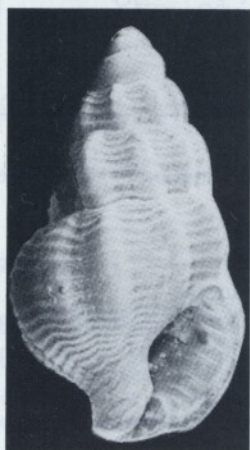
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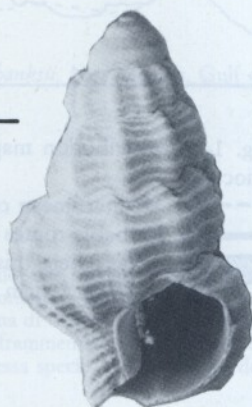
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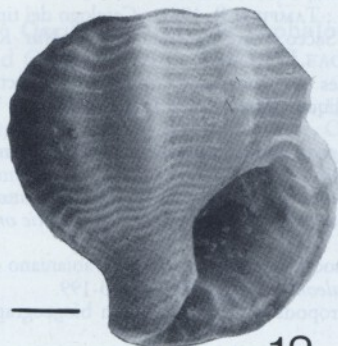
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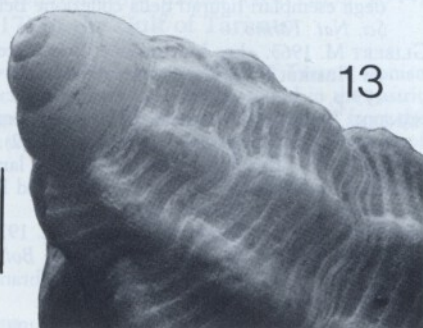
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12



13

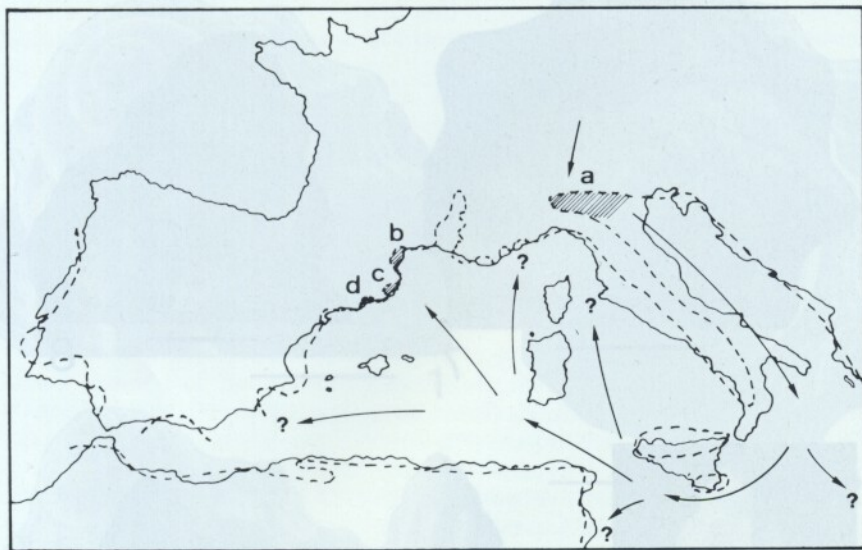


Fig. 14. - Distribution map of *N. catulloi* in the Western Mediterranean during the Pliocene.

- Mediterranean coastline during the Pliocene
- ➔ Probable routes of dispersion during the Neogene
- ▨ Areas where this species has been traced in the Pliocene
- a: North Italian outcrops; b: Roussillon; c: Alt Empordà; d: Baix Llobregat

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