

# The fossil land gastropods from Capri Island

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## Abstract

The Pleistocene and Holocene land gastropods from Capri were investigated, mainly basing on new material from field research on the major fossiliferous outcrops in the island. Twenty-six species were identified, seven on which were previously unrecorded from the area (*Punctum pygmaeum*, *Discus rotundatus*, *Vitrea* cfr. *contracta*, *Rumina decollata*, *Leucostigma candidescens*, *Siciliaria paestana*, *Xerotracha conspurcata*). Ten species known from literature were not found, among which *Trochoidea caroni*. If confirmed, the occurrence of this species in the Early Pleistocene of Capri may suggest a colonization from the mainland. *Oxychilus* cfr. *draparnaudi* is recorded from the deposits of "Vascio 'o Funno" whereas the following species come from two heretofore uninvestigated sites: *Pomatias elegans*, *Oxychilus* cfr. *draparnaudi* and *Marmorana fuscolabiata* from "Grotta delle Felci", *Chilostoma planospira* and *Pomatias elegans* from "Porciello". Some fragmentary specimens from "Grotta Arcera", collected in the 1980s and housed at Museum of Paleontology of the Naples University Federico II, were identified as *Oxychilus* cfr. *draparnaudi*. Four fossil species, reported in literature, *Helicella* sp., *Marmorana platychela*, *Daudebardia rufa* and *Poiretia dilatata* are not known for the Recent land malacofauna of Capri.

## Riassunto

Sono stati studiati i gasteropodi terrestri pleistocenici ed olofenici dell'Isola di Capri. Lo studio si basa principalmente su raccolte di nuovo materiale eseguite nei principali affioramenti fossiliferi dell'isola. Lo studio ha permesso l'identificazione di 26 specie per il Pleistocene-Olocene, sette delle quali non risultano segnalate in precedenza per l'area (*Punctum pygmaeum*, *Discus rotundatus*, *Vitrea* cfr. *contracta*, *Rumina decollata*, *Leucostigma candidescens*, *Siciliaria paestana*, *Xerotracha conspurcata*), mentre nove specie sono confermate. Altre dieci specie note in letteratura non sono state rinvenute, tra queste *Trochoidea caroni* segnalata per il Pleistocene Inferiore. Se confermata la presenza di questa specie potrebbe indicare che essa ha colonizzato Capri dalla Penisola Sorrentina. *Oxychilus* cfr. *draparnaudi* è segnalata per il giacimento fossilifero di "Vascio 'o Funno", mentre le seguenti specie provengono da siti finora non investigati: *Pomatias elegans*, *Oxychilus* cfr. *draparnaudi* e *Marmorana fuscolabiata* dalla "Grotta delle Felci", *Chilostoma planospira* e *P. elegans* da "Porciello". Alcuni frammenti di esemplari provenienti dalla Grotta Arcera, raccolti negli anni '80 e conservati nella collezione del Museo di Paleontologia dell'Università di Napoli Federico II, sono stati identificati come *Oxychilus* cfr. *draparnaudi*. Quattro delle specie riportate in letteratura per il Pleistocene non figurano tra la malacofauna terrestre dell'isola: *Helicella* sp., *Marmorana platychela*, *Daudebardia rufa* e *Poiretia dilatata*.

## Key words

Land gastropods, Capri Island, Pleistocene, Recent.

## Introduction

The fossiliferous deposits of Capri Island were investigated since last century mainly in relation to the vertebrate fauna, while very few studies were carried out on the land gastropods.

To fill the gap, several samples were collected from the main fossiliferous beds of the island and resulting data were compared with those available from the literature.

## Material and Methods

A detailed investigation on the historical and current literature and a comprehensive study of Neapolitan public and private molluscan collections were preliminarily performed. From September 2002 to September

2004, field excavations were conducted at the Late Pleistocene – Holocene levels of the main fossiliferous sites of the island, namely "Grotta delle Felci", "Vascio 'o Funno" Cave and "Porciello" (Capri Municipality).

The site "Grotta delle Felci", situated on the eastern side of Solaro Mount at about 300 m above the sea level, is well known in the literature, but no research on land gastropods occurring in its deposits has ever been published. The gastropod level is located at about 4 m from the ancient treading floor of the cave and about 4 m above the *Cervus elaphus tyrrhenicus* levels. The age ranges from 70.000 years BP of *C. e. tyrrhenicus* (Capasso Barbatto & Gliozzi, 1998) to 5.000-5.500 years BP of Neolithic levels located about 4 m above the gastropod one. The level age ranges therefore from Late Pleistocene to Holocene.

“Vascio ‘o Funno”, a cave located on a sheer cliff on the sea at “Cala di Matermania”, was already studied with respect to the land gastropods (Cinque *et al.*, 1986; Barbera *et al.*, 1993). The gastropod level is located at about 1.5-2 m above the *Apodemus sylvaticus tyrrhenicus* levels (Cinque *et al.*, 1986; Barbera *et al.*, 1993) and about 10 m from the *C. elaphus* terminal levels (Capasso Barbato & Gliozzi, 1998). In this case, the age appears to be somewhat older than that reported for “Grotta delle Felci”, ranging from Late Pleistocene (70.000 years BP) to Early Holocene.

The fossiliferous level, cropping out in locality “Porciello”, consists of limestone blocks collapsed from the overhanging cliff. It is unknown so far in the literature. The age of gastropod level at Porciello is not well-definable lacking correlations to vertebrate faunas. The bed may be ascribed to the phase of accumulation of detritic deposits along the island sides in the Late Pleistocene-Holocene interval (Barattolo *et al.*, 1992).

In addition, we examined the samples collected at “Grotta Arcera” (Anacapri Municipality) during the 1980s, now housed at the Museum of Paleontology of the Naples University Federico II; this material, composed principally of mammalian remains, also includes some land gastropods from Holocene (Capasso Barbato & Gliozzi, 1998).

The field samples still covered by their calcareous matrix were first extracted by washing both in hydrogen peroxide at different concentrations and distilled water; later, mechanical methods as ultrasounds, dentist’s power drill with thin stylus, different kinds of paintbrushes and little chisels were employed. When necessary, samples of sediment were screened with calibrated sieves. The cleaned up material was examined under lens and/or binocular microscope to sort the smallest fraction. The specimens were then classified, photographed and catalogued.

The species identification was based on well-known dichotomic keys (Bech, 1990; Giusti *et al.*, 1995; Kerney & Cameron, 1999; Bank *et al.*, 2007). The systematic and nomenclatural arrangement follows Bodon *et al.* (1995), Manganelli *et al.* (1995) Ponder & Lindberg (1996), and Nordsieck (2002).

## Results

### Species collected on the field

Phylum MOLLUSCA Linnaeus, 1758  
 Classis GASTROPODA Cuvier, 1795  
 Subclassis ORTHOGASTROPODA  
 Ponder & Lindberg, 1996  
 Ordo NEOTAENIOGLOSSA Haller, 1892  
 Familia POMATIASIDAE J.E. Gray, 1852  
*Pomatias elegans* (O.F. Müller, 1774)

According to Segre (1959), *P. elegans*, reported as “*Ciclostoma elegans* Mull.”, was collected in “Calcarenite di Villa Jovis” (Lauro Mount, Capri Municipality), a calcareous rudstone dating Early Pleistocene (Barattolo *et*

*al.*, 1992). The species was also recorded from “Vascio ‘o Funno” Cave by Cinque *et al.* (1986) and Barbera *et al.* (1993). Some specimens, fragments of shells and opercula were collected on the field in the fossiliferous beds of “Grotta delle Felci”, “Vascio ‘o Funno” Cave and “Porciello”.

Ordo PULMONATA Cuvier in Blainville, 1814  
 Subordo STYLOMMATOPHORA A. Schmidt, 1855  
 Familia VERTIGINIDAE Fitzinger, 1833  
*Truncatellina callicratis* (Scacchi, 1833)

Recorded from “Vascio ‘o Funno” Cave by Cinque *et al.* (1986) and Barbera *et al.* (1993). Some specimens were collected on the field in the same fossiliferous deposit.

Familia PUPILLIDAE Turton, 1831  
*Lauria cylindracea* (Da Costa, 1778)

Recorded from “Vascio ‘o Funno” Cave by Cinque *et al.* (1986) and Barbera *et al.* (1993). Some specimens were collected on the field in the same fossiliferous deposit.

Familia PUNCTIDAE Morse, 1864  
*Punctum (Punctum) pygmaeum* (Draparnaud, 1801)

Some specimens were collected on the field in “Vascio ‘o Funno” Cave.

Familia PATULIDAE Tryon, 1866  
*Discus rotundatus* (O.F. Müller, 1774)

### Fig. 1

Some specimens were collected on the field in “Grotta delle Felci”.

Familia PRISTILOMATIDAE T. Cockerell, 1891  
*Vitrea cfr. contracta* (Westerlund, 1871)

Some specimens were collected on the field in “Grotta delle Felci”.

*Vitrea cfr. subrimata* (Reinhardt, 1871)

Recorded from “Vascio ‘o Funno” Cave by Cinque *et al.* (1986) and Barbera *et al.* (1993) as “*Vitrea subrimata* (Reinhardt)”. Some specimens were collected on the field in the same fossiliferous deposit and dubitatively ascribed to this species, being inaccessible the material studied by the above mentioned authors for further comparisons.

Familia OXYCHILIDAE P. Hesse, 1927 (1879)  
*Oxychilus cfr. draparnaudi* (Beck, 1837)

Bellini (1902, 1910, 1915, 1916) recorded this species as “*Hyalinia cellaria* Müller” as a subfossil from the Recent lake deposits of “Tragara Tuffs”. Barbera *et al.* (1993) also reported the species (as “*Oxychilus cellarius*”) from some tufaceous deposits in Capri. Some fragments of



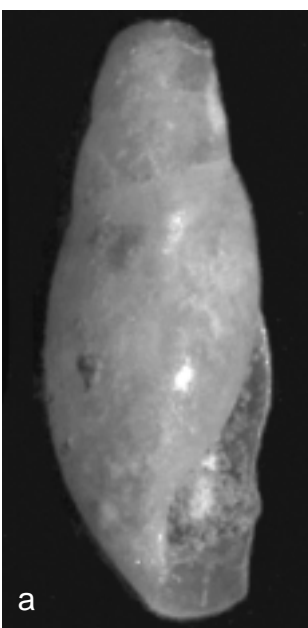
**Fig. 1.** *Discus rotundatus*, "Grotta delle Felci", Capri (Naples), diameter 4.9 mm: **a.** apical view; **b.** umbilical view.

**Fig. 1.** *Discus rotundatus*, Grotta delle Felci, Capri (Napoli), diametro 4,9 mm: **a.** visione apicale; **b.** visione ombelicale.

shells collected in "Grotta Arcera" in the 1980s and housed in the collection of the Museum of Paleontology of the Naples University Federico II are here identified as *O. cfr. draparnaudi*. Some specimens were collected on the field in "Vascio 'o Funno" Cave and "Grotta delle Felci".

Familia FERUSSACIIDAE Bourguignat, 1883  
*Cecilioides (Cecilioides) acicula* (O.F. Müller, 1774)  
**Fig. 2**

Recorded from "Vascio 'o Funno" Cave by Cinque *et al.* (1986) and Barbera *et al.* (1993). Some young shells were collected on the field in "Vascio 'o Funno" Cave and one specimen in "Grotta delle Felci".



**Fig. 2.** *Cecilioides acicula* "Vascio 'o Funno" Cave, Capri (Naples), length 3.2 mm: **a.** apertural view; **b.** adapertural view.

**Fig. 2.** *Cecilioides acicula* Grotta di "Vascio 'o Funno", Capri (Napoli), lunghezza 3,2 mm: **a.** visione aperturale; **b.** visione adaperturale.

*Ferussacia folliculus* (Gmelin, 1791)

Bellini (1915) recorded this species as "*Ferussacia gronoviana* Risso" as a subfossil from the Recent geological formations of Capri Island. Barbera *et al.* (1993) reported this species as "*Ferussacia follicula* (Gmelin)" and Cinque *et al.* (1986) as "*Ferussacia folliculus* (Gmelin)" from "Vascio 'o Funno" Cave. Some specimens were collected on the field in the same site.

Familia SUBULINIDAE P. Fischer & Crosse, 1877  
*Rumina decollata* (Linnaeus, 1758)  
**Fig. 3**

Some adult and juvenile specimens were collected on the field in "Grotta delle Felci".

Familia CLAUSILIIDAE J.E. Gray, 1855  
*Leucostigma candidescens* (Rossmässler, 1835)

Some young shells possibly referable to this species were collected on the field in "Grotta delle Felci".

*Siciliaria (Stigmatica) paestana* (Philippi, 1836)

Some specimens were collected on the field in "Grotta delle Felci".

Familia HYGROMIIDAE Tryon, 1866  
*Xerotricha conspurcata* (Draparnaud, 1801)

Some specimens were collected on the field in "Vascio 'o Funno" Cave.

Familia HELICIDAE Rafinesque, 1815  
*Chilostoma planospira* (Lamarck, 1822)

Bellini (1899b, 1900, 1902, 1910, 1915, 1916) recorded this species as "*Helix (Campylaea) planospira* (or "*Campylaea planospira*") var. *neapolitana* Paulucci" as a subfossil from



**Fig. 3.** *Rumina decollata* "Grotta delle Felci", Capri (Naples), length 21.7 mm: **a.** apertural view; **b.** adapertural view.

**Fig. 3.** *Rumina decollata* "Grotta delle Felci", Capri (Napoli), lunghezza 21,7 mm: **a.** visione aperturale; **b.** visione adaperturale.

the Recent geological formations in the caves near the locality "Marina Piccola" and from the Recent lake deposits of "Tragara Tuffs". Segre (1959) reported this species as "*Helicigona (Campylaea) planospira* Lamk." in detrital strata, with intercalated lapilli, volcanic tuffs and evaporitic calcareous crusts of Late Pleistocene in the Tragara descent and along the slope overlooking the locality "Marina Piccola". Cinque *et al.* (1986) and Barbera *et al.* (1993) quoted this species from "Vascio 'o Funno" Cave and Barbera *et al.* (1993) mentioned it as a fossil (as "*Helicigona planospira* cfr. *neapolitana* Paulucci") from other tuffaceous deposits. Some specimens were collected on the field in the sites "Porciello" and "Vascio 'o Funno" Cave.

***Marmorana fuscolabiata* (Rossmässler, 1842)**

Bellini (1899a, 1902, 1910, 1915, 1916, 1920) recorded this species as "*M. fuscolabiata*" and "*Iberus surrentina*" as a subfossil from the Recent lake deposits in the caves near the locality "Marina Piccola". Segre (1959) reported this species as "*Opica fuscolabiata* Rossm." in detrital strata, with intercalated lapilli, volcanic tuffs and evaporitic calcareous crusts of Late Pleistocene in the Tragara descent and along the slope overlooking the locality "Marina Piccola". Cinque *et al.* (1986) and Barbera *et al.* (1993) quoted this species from "Vascio 'o Funno" Cave and Barbera *et al.* (1993) mentioned it as a fossil from other tuffaceous deposits. Some specimens were collected on the field in the sites "Grotta delle Felci" and "Vascio 'o Funno" Cave.

**Species exclusively known from the literature**

Familia ACICULIDAE J.E. Gray, 1850  
***Platyla* cfr. *polita* (W. Hartmann, 1840)**

Cinque *et al.* (1986) and Barbera *et al.* (1993) reported

this species as "*Acicula* cfr. *polita* (Hartmann)" from the lower layers of the fossiliferous deposit of "Vascio 'o Funno" Cave. As this species is regarded as doubtful or absent in Italian Peninsula, the record may be referable to *Platyla* cfr. *gracilis* (Clessin, 1877).

Familia PYRAMIDULIDAE Kennard & B.B. Woodward, 1914

***Pyramidula rupestris* (Draparnaud, 1801)**

Recorded from "Vascio 'o Funno" Cave by Cinque *et al.* (1986) and Barbera *et al.* (1993). The record may be referable to *Pyramidula pusilla* (Vallot, 1801) (cfr. Gittenberger & Bank, 1996).

Familia CHONDRINIDAE Steenberg, 1925

***Granopupa granum* (Draparnaud, 1801)**

Reported from "Vascio 'o Funno" Cave by Cinque *et al.* (1986) and Barbera *et al.* (1993).

Familia OLEACINIDAE H. & A. Adams, 1855

***Poiretia dilatata* (Philippi, 1836)**

According to Bellini (1899a, 1899b, 1900, 1902, 1910, 1915, 1916, 1920, 1922, 1924, 1926), this species, quoted as "*Glandina algira* Brug.", was recently become extinct from Capri, being present as a subfossil in only one site: the Recent lake deposits in the caves near the locality "Marina Piccola" (Capri). Cinque *et al.* (1986) and Barbera *et al.* (1993) reported this species as "*Poiretia algira*" from the lower layers of the fossiliferous deposit of "Vascio 'o Funno" Cave, confirming it to be extinct. Barbera *et al.* (1993) mentioned "*P. algira*" also from other tuffaceous deposits of the island.

Familia CHONDRINIDAE Steenberg, 1925

***Rupestrella* sp.**

Recorded from "Vascio 'o Funno" Cave as "*Rupestrella* sp." (Cinque *et al.*, 1986; Barbera *et al.*, 1993).

Familia OXYCHILIDAE P. Hesse, 1927 (1879)

***Daudebardia rufa* (Draparnaud, 1805)**

Recorded from "Vascio 'o Funno" Cave by Cinque *et al.* (1986) and Barbera *et al.* (1993).

Familia HYGROMIIDAE Tryon, 1866

***Trochoidea (Trochoidea) caroni* (Deshayes, 1830)**

According to Segre (1959), *T. caroni*, quoted as "*H. caronii* Desh." (F. Settepassi det.), was collected in "Calcarene di Villa Jovis" (Lauro Mount, Capri Municipality), a calcareous rudstone dating from Early Pleistocene (Barattolo *et al.*, 1992).

***Helicella* sp.**

Recorded from "Vascio 'o Funno" Cave by Cinque *et al.*



(1986) and Barbera *et al.* (1993). The record may be referable to any hygromid, as the genus *Helicella* A. Férussac, 1821 does not occur in Italian Peninsula.

Familia HELICIDAE Rafinesque, 1815

Cfr. *Marmorana (Murella) platychela* (Menke, 1830)

Morphotype "sicana" A. Férussac, 1822

Bellini (1922, 1926) reported this species as "*Helix sicana*" as living in Sicily and subfossil in Capri. Bellini (1920) stated that "*H. (Macularia) sicana* Feruss." found in Capri is a subfossil form very similar ("forma affinis-sima") to that living today in Sicily.

Familia LIMACIDAE Lamarck, 1801

*Limax* sp.

Recorded from "Vascio 'o Funno" Cave by Cinque *et al.* (1986) and Barbera *et al.* (1993).

## Discussion

The occurrence of 26 species of fossil land gastropods from Pleistocene to Holocene was herein attested. Seven of these (*P. pygmaeum*, *D. rotundatus*, *V. cfr. contracta*, *R. decollata*, *L. candidescens*, *S. paestana*, *Xerotricha conspurcata*) are recorded for the first time from the island of Capri. The presence of nine species reported in the literature is confirmed by our field investigation, while ten species are documented only through literature research. Extremely interesting is the record of *T. caroni*, the presence of which would date from Early Pleistocene, when Capri was part of Surrentine Peninsula (Segre, 1959; Barattolo *et al.*, 1992; Capasso Barbato & Gliozzi, 1995, 1998). If confirmed, these data may suggest that *T. caroni* colonized Capri directly from the mainland during the Pleistocene. At present, apart from Capri, the species lives in Sicily and is reported as a fossil from the Maltese Islands (Giusti *et al.*, 1995).

*O. cfr. draparnaudi* was also recorded from the deposit of "Vascio 'o Funno" Cave and from "Grotta Arcera". Some fragmentary material was, in fact, discovered to be kept in the collection of Museum of Paleontology of the Naples University Federico II.

Comparison between the Pleistocene and the Recent molluscan fauna reveals that all species collected on the field are species presently living on Capri. About data reported only in literature, four of the fossil species – *Helicella* sp., *D. rufa*, *P. dilatata*, and *M. platychela* – were never recorded among the Recent ones.

The differences between the present and the past molluscan fauna of Capri are possibly due to environmental changes occurred from Pleistocene to present times, a progressive habitat destruction by man.

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## References

- BARATTOLO F., CINQUE A., D'ALESSANDRO E., GUIDA M., ROMANO P. & RUSSO ERMOLLI E., 1992. *Geomorfologia ed evoluzione tettonica quaternaria dell'Isola di Capri*. Studi Geologici Camerti, Università degli Studi di Camerino, Dipartimento di Scienze della terra, Volume speciale (1992/1): 221-229.
- BARBERA C., CAPASSO BARBATO L., ESU D., GLIOZZI E. & KOTSAKIS T., 1993. Mammiferi e Molluschi continentali pleistocenici dell'Isola di Capri (Campania, Italia). In: *Almanacco caprese*. La Conchiglia, Capri (NA), 6: 23-31.
- BANK R.A., BOUCHET P., FALKNER G., GITTENBERGER E., HAUSDORF B., VON PROSCHWITZ T. & RIPKEN T.E.J. Check List of European Continental Mollusca (CLECOM). <http://www.gnm.se/gnm/engelska/default.htm>. Query on 28<sup>th</sup> January 2007.
- BECH M., 1990. Fauna malacològica de Catalunya. Molluscs terrestres i d'aigua dolça. *Treballs de la Institució Catalana d'Història Natural*, Barcelona, 12.
- BELLINI R., 1899a. Appendice alla *Synopsis* dei molluschi terrestri e fluviali della provincia di Napoli. *Rivista Italiana di Scienze Naturali*, Siena, 19 (3-4): 1-3.
- BELLINI R., 1899b. Ulteriori osservazioni sui molluschi terrestri dei dintorni di Napoli. *Rivista Italiana di Scienze Naturali*, Siena, 19 (9-10): 1-8.
- BELLINI R., 1900. I molluschi extramarini dell'isola di Capri. *Bollettino della Società Zoologica Italiana*, Roma, (serie II, vol. 1), 19 (1-2): 29-55.
- BELLINI R., 1902. Alcuni appunti per la geologia dell'Isola di Capri. *Bollettino della Società Geologica Italiana*, Roma, 21 (1): 7-14.
- BELLINI R., 1910. Osservazioni geomorfologiche sull'Isola di Capri. *Atti della Società Italiana di Scienze Naturali*, Milano, 49: 244-260.
- BELLINI R., 1915. I molluschi extramarini dei dintorni di Napoli. *Bollettino della Società dei Naturalisti*, Napoli, 27/1914: 149-194.
- BELLINI R., 1916. Studio sintetico sulla geologia dell'Isola di Capri. *Atti della Società Italiana di Scienze Naturali*, Milano, 55: 73-88.
- BELLINI R., 1920. Osservazioni nell'Isola di Capri a conferma dell'antico stato della regione tirrena. *Bollettino della Società dei Naturalisti*, Napoli, 32: 125-140.
- BELLINI R., 1922. Nel campo della fauna dell'Isola di Capri. *Le pagine dell'Isola di Capri*, Capri (NA), (agosto 1922): 3-4.
- BELLINI R., 1924. La distribuzione geografica dei Molluschi terrestri e l'ipotesi della Tirrenide. *Rivista di Biologia*, Roma, 6 (6): 218-221.
- BELLINI R., 1926. Osservazioni a favore della «Tirrenide». *Bollettino della Società Geologica Italiana*, Roma, 45: 184-192.
- BODON M., FAVILLI L., GIANNUZZI SAVELLI R., GIOVINE F., GIUSTI F., MANGANELLI G., MELONE G., OLIVERIO M., SABELLI B. & SPADA G., 1995. Gastropoda Prosobranchia, Heterobranchia Heterostropha. In: MINELLI A., RUFFO S. & LA

- POSTA S. (Eds). *Checklist delle specie della fauna italiana*. Calderini, Bologna, **14**: 1-60.
- CAPASSO BARBATO L. & GLIOZZI E., 1995. Biochronological and palaeogeographical implications of a well-balanced late Middle Pleistocene fauna from Quisisana – Certosa (Capri, Southern Italy). *Bollettino della Società Paleontologica Italiana*, Modena, **34** (2): 235-261.
- CAPASSO BARBATO L. & GLIOZZI E., 1998. Fossil remains of *Cervus* from the middle Pleistocene-Holocene of the island of Capri (Southern Italy): palaeogeographical implications. *Bollettino della Società Paleontologica Italiana*, Modena, **36** (3): 399-406.
- CINQUE A., GLIOZZI E. & ESU D., 1986. Il riempimento della grotta "Vascio 'o Funno" a Capri. Primi risultati dello studio geomorfologico e paleontologico. *Pubblicazioni del Dipartimento di Scienze della Terra, Università di Napoli*, **33**: 105-116.
- GIUSTI F., MANGANELLI G. & SCHEMBRI P.J., 1995. The non-marine molluscs of the Maltese Island. *Museo Regionale di Scienze Naturali di Torino, Monografie*, **15**: 607 pp.
- GITTENBERGER E. & BANK R.A., 1996. A new start in *Pyramidula* (Gastropoda Pulmonata: Pyramidulidae). *Basteria*, **60** (1-3): 71-78.
- KERNEY M.P. & CAMERON R.A.D., 1999. *Guide des escargots et limaces d'Europe identification et biologie de plus de 300 espèces*. Delachaux et Niestlé, Paris: 370pp.
- MANGANELLI G., BODON M., FAVILLI L. & GIUSTI F., 1995. Gastropoda Pulmonata. In: MINELLI A., RUFFO S. & LA POSTA S. (Eds). *Checklist delle specie della fauna italiana*. Calderini, Bologna, **16**: 60 pp.
- NORDSIECK H., 2002. Contributions to the knowledge of the Delimini (Gastropoda): Stylommatophora: Clausiliidae. *Mitteilungen der Deutschen malakozoologischen Gesellschaft*, Stuttgart, **67**: 27-39.
- PONDER W.F. & LINDBERG D.R., 1996. Gastropod phylogeny: Challenges for the 90s. In: TAYLOR J. (Ed.). *Origin and evolutionary radiation of the Mollusca*. Oxford University press, Oxford: 135-154.
- SEGRE A.G., 1959. Isola di Capri, scala 1: 25000. *Carta Geologica d'Italia, foglio n. 196 (Penisola Sorrentina - Isola di Capri)*. Servizio Geologico Italiano, Roma.