

ON THE IDENTITY OF *CLIO RICCIOLII* (CALANDRELLI, 1844) (GASTROPODA: EUTHECOSOMATA) FROM THE PLIOCENE OF ROME, ITALY

ARIE W. JANSSEN

Leiden, The Netherlands

Janssen, A.W. On the identity of *Clio ricciolii* (Calandrelli, 1844) (Gastropoda: Euthecosomata) from the Pliocene of Rome, Italy. — Contr. Tert. Quatern. Geol., 32(4): 89-95, 3 figs. Leiden, December 1995.

The pteropod species *Clio ricciolii* (Calandrelli, 1844) was originally described from Pliocene deposits of the Monte Vaticano at Rome (Italy). In view of the fact that only the ventral side of the shell was then described and illustrated, and in the absence of type or topotypical material, as well as on account of the subsequent confusion with *Clio sinuosa* (Bellardi, 1873) in the literature, the present species has remained enigmatic ever since. New topotypical material has recently become available, enabling full description and designation of a neotype. *Clio ricciolii* is closely related to the similarly Mediterranean *C. braidensis* (Bellardi, 1873) (Serravallian-Piacenzian), but for the time being these taxa are considered to be separate species.

Key words — Mollusca, Gastropoda, Euthecosomata, Pliocene, systematics, neotype.

A.W. Janssen, Nationaal Natuurhistorisch Museum, Postbus 9517, NL-2300 RA Leiden, The Netherlands. E-mail: wp.pal@nnm.nl

CONTENTS

Riassunto	p. 89
Introduction	p. 89
History	p. 90
Systematic part	p. 91
Acknowledgements	p. 94
References	p. 94

RIASSUNTO

Clio ricciolii (Calandrelli, 1844) è uno pteropode che si rinviene nei sedimenti pliocenici di Monte Vaticano, a Roma (Italia). Poiché nella descrizione originale ne fu descritto e figurato solo il lato ventrale, in assenza di tipi o topotipi, e a causa della successiva confusione in letteratura con *Clio sinuosa* (Bellardi, 1873), *C. ricciolii* è rimasta enigmatica fin da allora. Il recente rinvenimento di materiale topotipico ha consentito di completare la descrizione di *C. ricciolii* e di designare quindi un neotipo. *C. ricciolii* è una forma molto affine a *C. braidensis* (Bellardi, 1873) (Serravalliano - Piacenziano); tuttavia, per il momento, queste due specie rimangono distinte.

INTRODUCTION

For a considerable time now the 'pteropod' *Cleodora Riccioli* Calandrelli, 1844 has remained an enigmatic taxon. As the original material from Pliocene marl of the Monte Vaticano at Rome (Italy) is lost, the species had to be interpreted on the basis of the first description and illustration. As recently as 1977, Robba (p. 603) could not but refer to this species as the 'fantomatica specie di Calandrelli'. The difficulties in interpreting *Clio ricciolii* mainly stemmed from the fact that conspecific specimens have never been seen subsequently (Janssen, 1995), and that the taxon was later confused with another pteropod species.

Calandrelli (1844, p. 14, fig. A-B lower) provided two fair illustrations, both of them showing the ventral side of the shell, with fig. A representing the negative and fig. B the positive imprint in the matrix. The dorsal side was not described, nor illustrated in the original paper. Calandrelli's illustration is reproduced here as Fig. 1.

In the same paper, Calandrelli (1844, p. 13, fig. A-B upper) introduced another species, *Cleodora Vaticana*, the illustrations of which similarly show the negative and positive imprints of the dorsal side, respectively (see Fig. 1).

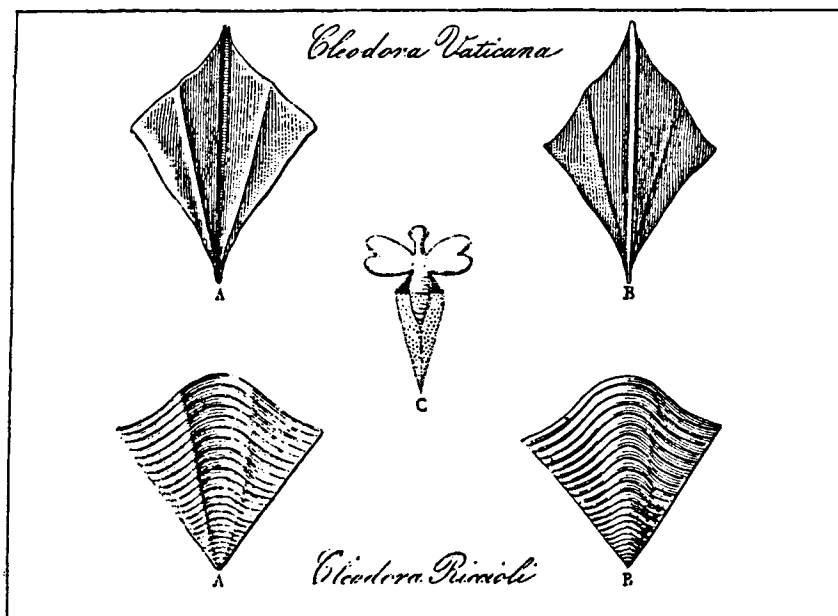


Fig. 1. Reproduction of Calandrelli's (1844) illustration, representing *Cleodora Vaticana* Calandrelli, 1844 (A-B upper figures) = *Clio pyramidata* Linné, 1767 forma *lanceolata* (Lesueur, 1813) and *Cleodora Riccioli* Calandrelli, 1844 (A-B lower figures) = *Clio riccioli* (Calandrelli, 1844). The central fig. C is stated to be a reproduction of '*Cleodora caudata*' of Rang (1829, pl. 19, fig. 1), but this reference is erroneous. The drawing was first published by Péron & Lesueur (1810, pl. 2, fig. 14, as '*Cléodore pyramidale*') and redrawn by Calandrelli.

This taxon is easily recognised as a junior synonym of *Clio pyramidata* Linné, 1767 forma *lanceolata* (Lesueur, 1813), which, as now known, ranges from the Late Miocene to Recent (Tiberi, 1878, p. 72; Janssen, 1995).

HISTORY

The first author after Calandrelli to refer to the present taxon was Michelotti (1847, p. 147), who recorded specimens from 'colline de Turin et des environs de Rome' under the name of *Cleodora Riccioli*. However, Bellardi (1873, p. 31) re-identified Michelotti's north Italian specimens (from the Colli Torinesi; thus of Miocene age) as *Balantium pedemontanum* (Mayer), now *Clio pedemontana* (Mayer, 1868). Indeed, to my knowledge specimens assignable to *C. riccioli* have never been collected from the Miocene of the Turin Hills.

In his catalogue of fossils from the Monte Mario, Conti (1864, p. 26) listed *Cleodora Riccioli*, and in the same paper (pp. 26, 48) introduced a new species, *Balantium Uncinatum*. This latter taxon, which was not illustrated, was based on two specimens with a shell height of 3 mm and a width of 1¾ mm. These specimens demonstrate a lengthwise curvature and a transverse ornament ('linee ondulate di accrescimento salienti nel centro verso la base a modo di curva') and might represent juvenile *C. riccioli*. From the same locality, Conti

(1866, pp. 5, 6) described *Cleodora striata*, comparing this species to '*Cleodora Riccioli*', noting it to be '*doppiamente striata e più piccola*' (doubly striated and smaller). On the basis of this description, *C. striata* cannot be separated from *C. riccioli*. Incidentally, the name *C. striata* preoccupies '*Cleodora pyramidata*, Linneo sp., var. B. *striata*' of Seguenza (1876, p. 39).

Seguenza (1876, p. 41) also referred to *Cleodora Riccioli*, but apparently did not see any specimens, since he mentioned only 'Monte Mario e Monte Vaticano' as localities, obviously based on the literature.

The next author to discuss the present species is Ponzi (1876, p. 945), who referred to it as *Balantium Riccioli*, and apparently possessed new material, since he was the first to illustrate the dorsal shell part, including long apertural spines.

As has recently been pointed out by Janssen (1995), Ponzi erroneously stated that the same species had previously been described by Bellardi as '*Cl. Sinuosa*'. Bellardi's (1873, pl. 3, fig. 11) illustration of that species, however, does not at all resemble *C. riccioli*. Ponzi obviously intended to make reference to Bellardi's figure (pl. 3, fig. 12) of *Balantium braidense*, a drawing placed alongside that of *Balantium sinuosum*, and indeed closely resembling *C. riccioli* (see below).

Ponzi's error was not spotted by Tiberi (1878, 1880), who thus incorrectly included Bellardi's locality data for *B. sinuosum* in his descriptions of *B. Riccioli*. Tiberi also

considered *Balantium pulcherrimum* Mayer, 1868 to probably represent a variety of *B. Ricciolii*, but there is no similarity whatsoever between these two taxa. I assume that what he meant to say was that *B. pulcherrimum* could be synonymous with *B. sinuosum*, a view which becomes understandable when comparing Bellardi's illustrations of these taxa. Of *B. sinuosum*, no syntypal material survives, which makes this form difficult to interpret (but see Robba, 1977, p. 603).

Tiberi (1878, 1880) also discussed *Balantium braidense* Bellardi, and he even went so far as to suggest that that species could be synonymous with *Cleodora pyramidata*!

Audenino (1897, p. 107) compared his new species *Clio triplicata* to *C. ricciolii*, fortunately referring to Ponzi's paper. Sacco (1904, p. 14), probably influenced by Tiberi's papers, omitted the species described as *Balantium sinuosum* by Bellardi (1873), but maintained both *B. braidense* and *B. pulcherrimum*, limiting himself to copying Tiberi's views in his 'Osservazioni'.

Bellini (1905, p. 39) worsened the successive errors of Ponzi and Tiberi, by not only including Bellardi's original description of *Balantium sinuosum* in *B. Ricciolii*, but several subsequent records as well, e.g. Verri & de Angelis d'Ossat (1899, p. 549; specimens identified as *Clio sinuosa* Bell. sp. by Pantanelli; 1900, p. 271) from Umbria, and Bortolotti (1898, p. 56, as *B. sinuosum*) from the Bologna area. Bellini assigned a Helvetian and Langhian age to the records of *Clio sinuosa* and surprisingly interpreted Ponzi's Monte Vaticano specimens to be of Tortonian age, thus assuming *Clio ricciolii* to be restricted to the Miocene, from which the species had never been collected! Finally, Bellini's description of *B. Ricciolii* is a direct translation in French of Bellardi's (1873) Italian description of *B. sinuosum*, and his illustration (fig. 38) most probably represents a failed attempt to redraw Bellardi's figure of *B. sinuosum*.

Robba (1977), unaware of Ponzi's error, provided an exhaustive discussion of the morphological differences between *Balantium sinuosum* and *B. ricciolii*, rightly assuming them to represent different taxa, and concluding that '... la definitiva soluzione del problema presuppone una migliore conoscenza della fantomatica specie di Calandrelli.' (... the final solution of the problem presupposes a better knowledge of Calandrelli's phantom species).

It appears that of all the authors referred to above, only Calandrelli (1844), Conti (1864, 1866) and Ponzi (1876) actually had material of *C. ricciolii* at hand. The above shows how a small error may become absolute nonsense in the literature, through uncritical copying of previous authors.

I have recently (Janssen, 1995) pointed out that *C.*

ricciolii is closely related to and probably even synonymous with *Clio braidensis*. This observation was based on the similar outlines and patterns of ornament of *C. ricciolii* (as shown in Calandrelli's and Ponzi's illustrations), and *C. braidensis* (of which I studied the type material), as well as on the similar age assignments. The lack of syntypes, and of topotypical material, of *C. ricciolii* kept me from putting these species in synonymy: I noted that the transverse ornament of *C. ricciolii*, as shown in Calandrelli's and Ponzi's illustrations, appeared to be considerably finer than that of *C. braidensis*. In the abundant material of *C. braidensis* available to me from various north Italian localities, among which was new material from the type locality Monte Capriolo near Bra (Piemonte), the transverse ornament is invariably developed as in the type specimen, without any sign of transitional forms with a finer transverse ornament.

An attempt to trace the original material of *C. ricciolii* in Rome remained unsuccessful. Dr Riccardo Manni (Museo di Paleontologia, Università di Roma 'La Sapienza', Dipartimento di Scienze della Terra, Roma) at first informed me that Calandrelli's and Ponzi's material was no longer extant. Later, however, he succeeded in finding a topotypical sample (collector's name unknown), identified only as 'pteropodi', and with an old locality label stating 'Monte della Creta Vaticano'. This sample consists of a single slab of clay which preserves various pteropod species, among which are two specimens of *Clio* that perfectly match the illustrations of *C. ricciolii*, demonstrating the fine transverse ornament. I here designate one of these specimens neotype, in order to end the long-lasting confusion.

SYSTEMATIC PART

Family	Cavoliniidae
Subfamily	Clioinae
Genus	<i>Clio</i> Linné, 1767

Type species — *Clio pyramidata* Linné, 1767.

Clio ricciolii (Calandrelli, 1844) Figs 1-3

- * 1844 *Cleodora Riccioli*. Nobis, Calandrelli, p. 14, fig. A-B (lower).
- 1847 *Cleodora Ricciolii*. Calandrelli — Michelotti, p. 147 [*partim*, includes also *Clio pedemontana* (Mayer, 1868)].
- 1864 *Cleodora Riccioli* Calandrelli — Conti, p. 26.

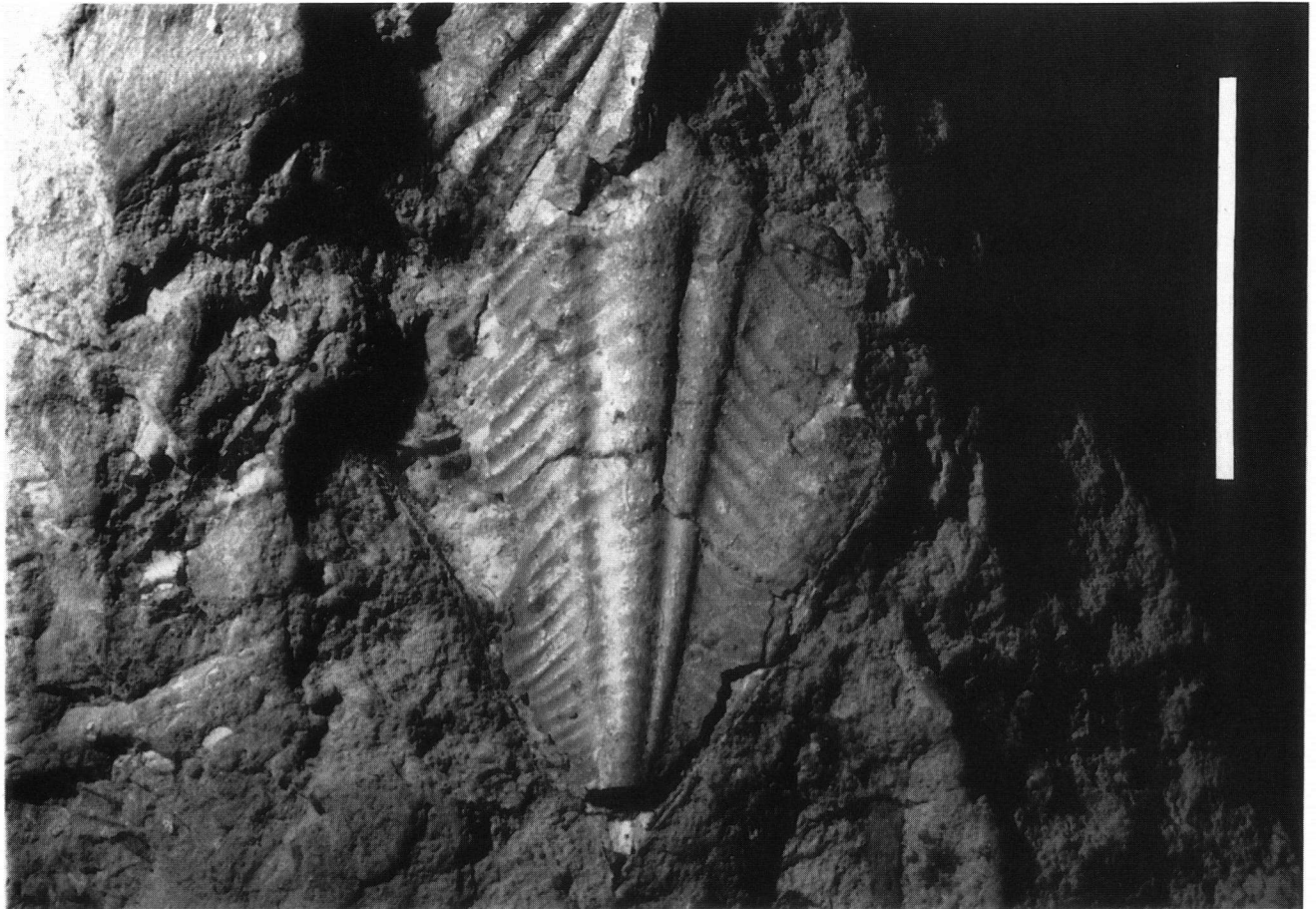


Fig. 2. *Clio ricciolii* (Calandrelli, 1844), neotype. Monte della Creta Vaticano, Rome (Italy), Pliocene. Specimen with internal mould in place, showing dorsal side. Collection of the Museo di Paleontologia, Università di Roma, registration number i 575. Scale bar equals 1 cm.

- ? 1864 *Balantium Uncinatum* sp. nu. Nobis, Conti, pp. 26, 49.
1866 *Cleodora striata*, Conti, pp. 5, 6.
1873 *Cleodora Ricciolii* Michitti — Bellardi, p. 31.
1876 *Cleodora Ricciolii*, Calandrelli — Seguenza, p. 41.
1876 *Balantium Riccioli* Calandr. — Ponzi, p. 945, pl. 3, fig. 5a, b.
1878 *Balantium Ricciolii* (*Cleodora*), Calandrelli — Tiberi, pp. 72, 73 [*partim*, includes *Clio sinuosa* (Bellardi, 1873)].
1880 *Balantium Ricciolii* (*Cleodora*), Calandrelli — Tiberi, p. 33 [*partim*, includes *Clio sinuosa* (Bellardi, 1873)].
1897 *Clio ricciolii*, Calan. sp. — Audenino, p. 107.
1904 *Balantium Ricciolii* Calandr. — Sacco, p. 14.
1905 *Balantium (Flabellulum) Ricciolii*, Calandrelli sp. — Bellini, p. 39 [*partim*, exclusively specimens from Monte Vaticano, *non* fig. 38 = ? *Clio sinuosa* (Bellardi, 1873)].
1977 *Balantium ricciolii* (Calandrelli) — Robba, p. 603.
1995 '*Cleodora Riccioli*' — Janssen, p. 64.

Neotype — Fig. 2; specimen in sample number i 575, Museo di Paleontologia, Università di Roma 'La Sapienza', Dipartimento di Scienze della Terra, Roma.

Neoparatypes — A single specimen in the same slab of clay (Fig. 3) and an additional poorly preserved specimen contained in another slab with registration number i 576. *Locus neotypicus* — Monte della Creta Vaticano, Roma (Italy).

Stratum neotypicum — Yellowish grey marl (= level *f* in the section given by Conti, 1864) (Pliocene).

Description — The neotype is preserved as an inner clay mould showing its dorsal side. It proved possible to remove the mould from the slab, thus exposing also the impression of the ventral side. The neoparatype is another impression of the ventral side.

The shell is triangular in shape with an apical angle of 67° (both specimens), the neotype being diagenetically compressed dorso-ventrally. The protoconch and early teleoconch are not preserved.

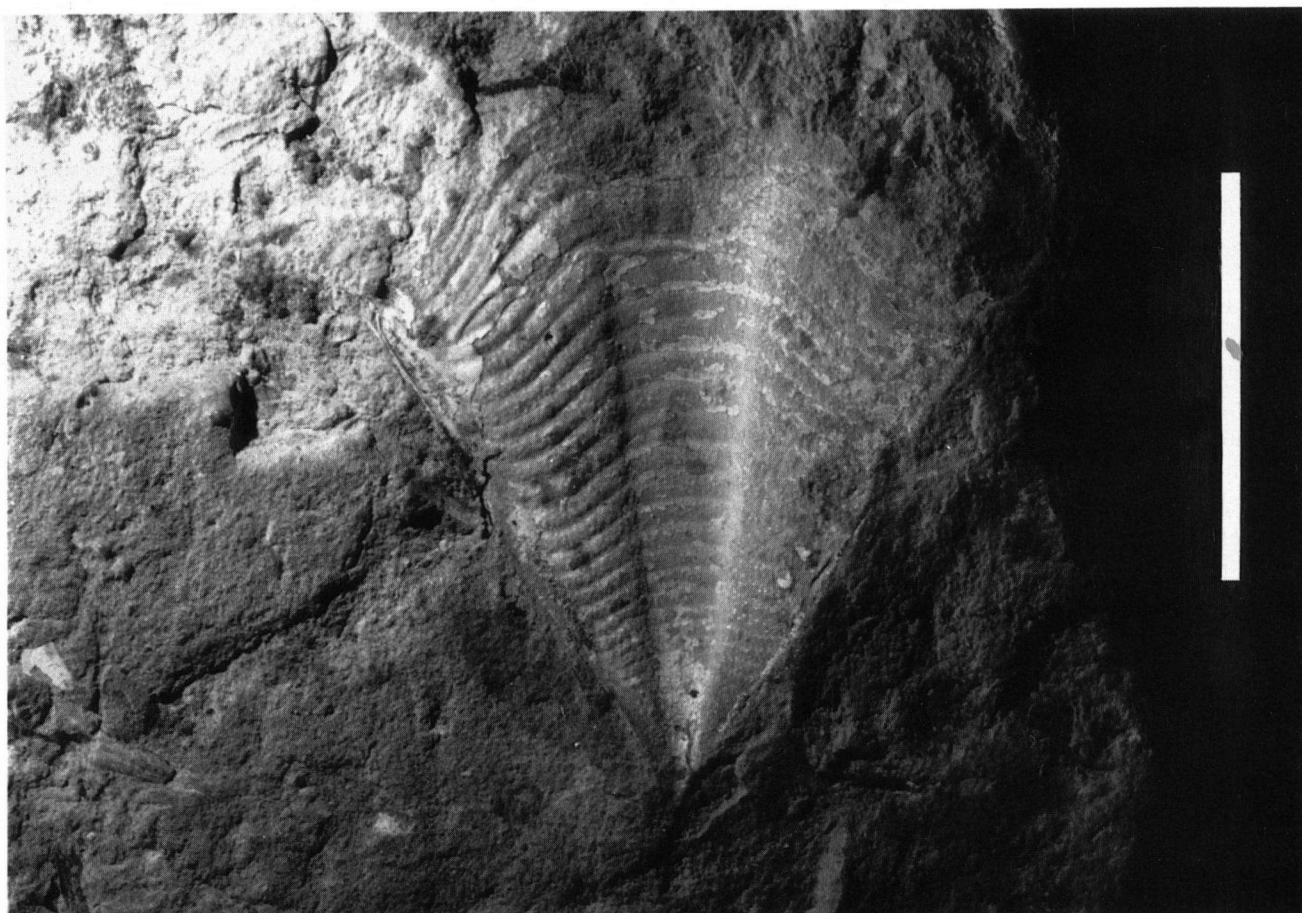


Fig. 3. *Clio ricciolii* (Calandrelli, 1844), neoparatype. Monte della Creta Vaticano, Rome (Italy), Pliocene. Specimen showing cast of ventral side. Collection of the Museo di Paleontologia, Università di Roma, registration number i 575. Scale bar equals 1 cm.

The available specimens show no sign of a dorsal curvature in the apical shell part, which is often seen in other *Clio* species.

The apertural margins are abapically rounded, the dorsal one being more strongly curved and projecting beyond the ventral margin. Lateral apertural spines as illustrated by Ponzi (1876) are indicated by the curvature of the growth lines, the basal parts of spines being preserved in the neoparatype.

The ventral side has a central, well-separated, flat elevation, which is slightly narrower than the lateral depressions. The entire ventral side is covered with a very regular ornament of transverse riblets, distinctly narrower than their interstices and, although becoming weaker, crossing the central elevation. From the lateral carina these riblets at first descend in adapical direction but soon turn upward to form a regular and wide abapical curve.

The dorsal shell part shows a set of three central ra-

dial ribs, together occupying slightly less than one third of the shell width. The middle one of these ribs is about twice as wide as the lateral ones, and separated from them by grooves that are as wide as the lateral ribs. This side of the shell has a similar transverse ornament as does the ventral side, but the riblets are somewhat more strongly curved abapically. The lateral carinae are not well preserved, but appear to be squarish in transverse section.

Discussion — The slab of clay preserving the two specimens cannot be considered to represent syntypical material. The same holds true for the third specimen. If Calandrelli had had these specimens before him, he would undoubtedly have illustrated both sides of the shell. These specimens cannot be the ones studied by Ponzi either, as he did not describe nor illustrate the ventral shell side. Moreover, the long apertural spines he illustrated are not preserved in the present specimens. This would imply that at least five specimens assignable

to this species have been found throughout the years. Conti (1864, 1866) even recorded the species as common.

Clio ricciolii is closely related to *C. braidensis*, whose transverse ornament however is considerably coarser and stronger on the lateral depressions of both dorsal and ventral sides. The transverse riblets usually do not cross the central ribs in *C. braidensis*, but when they do so (Janssen, 1995, pl. 5, fig. 5) their number on the central rib of the ventral side is higher than on the lateral depressions, approaching the number seen in *C. ricciolii*.

The fact that *Clio ricciolii* and *C. braidensis* are very similar in shape and ornament, and also are of comparable stratigraphic age, could be looked upon as evidence for interpreting these taxa as subspecies or formae. However, they have never been found to co-occur, so that formae may be excluded. In addition, with the distance between the type localities being only some 500 km within the same basin, it seems inappropriate to consider these planktonic organisms as subspecies. For that reason, I maintain *C. ricciolii* for the time being as a separate species, which probably represents a later evolutionary stage of the *C. braidensis* lineage.

There appears to be a difference in age, albeit slight, between the two species. *Clio braidensis* has been recorded from the Serravallian to the Piacenzian, thus suggesting that *C. ricciolii* could be of a Late Middle-Late Pliocene date. Euthecosomatous species co-occurring in the slab preserving the neotype comprise c. 5 specimens of *C. pyramidata* Linné, 1767 forma *lanceolata* (Lesueur, 1813) and numerous fragments of *Styliola subula* (Quoy & Gaimard, 1827). From other slabs (both from Monte Vaticano and Monte Mario), *Diacria trispinosa* (de Blainville, 1821) and *Cavolinia tridentata* (Niebuhr, 1775) are known. This association corroborates the assumed age of *C. ricciolii*, since in earlier Pliocene (Zanclean) deposits *Cavolinia grandis* (Bellardi, 1873) (= *C. rattonei* Simonelli, 1896; see Janssen, 1995), the precursor of *C. tridentata*, is found.

ACKNOWLEDGEMENTS

Dr Riccardo Manni (Museo di Paleontologia, Roma) is thanked for making the neotype and other samples available to me, for supplying indispensable literature and for translating the abstract into Italian. Mrs M. van Engelen (Nationaal Natuurhistorisch Museum, Leiden) prepared the photographs, while John W.M. Jagt (Venlo), as always, improved the English.

REFERENCES

Audenino, L., 1897. Pteropodi miocenici del Monte dei Cap-

puccini in Torino. — Boll. Soc. Malac. It., 20: 97-114, pl. 5 (this paper is also found cited as 1895 or 1899).

Bellardi, L., 1873. I molluschi dei terreni terziari del Piemonte e della Liguria, 1. Cephalopoda, Pteropoda, Heteropoda, Gastropoda (Muricidae et Tritonidae). — Mem. r. Accad. Sc. Torino, (2)27: 1-264, 15 pls. (this paper is frequently found cited with the year 1872, but on p. 264 the publication date 1873 is printed).

Bellini, R., 1905. Les ptéropodes des terrains tertiaires et quaternaires d'Italie. — Ann. Soc. r. zool. malac. Belgique, 40: 23-45.

Bortolotti, E., 1898. Contribuzione alla conoscenza dei fossili del Miocene medio nel Bolognese. — Riv. ital. Paleont., 4: 55-61.

Calandrelli, A., 1844. Scoperta di due nuove specie di conchiglie fossili fatta dal sig. Giuseppe Riccioli nell'argilla del Vaticano. Lettera diretta al chiarissimo sig. Avvocato Sarzana. — Album di Roma, (9)28: 1-14, 1 pl.

Conti, A., 1864. Il Monte Mario ed i suoi fossili subapennini. Roma (Cesaretti), 57 pp., 1 fig.

Conti, A., 1866. Scoperta di nuovi pteropodi fossili nella base marnosa del Monte Mario. — Bullettino Universale della Corrispondenza Scientifica di Roma per l'Avanzamento delle Scienze, 7(33): 1-8.

Janssen, A.W., 1995. Systematic revision of holoplanktonic Mollusca in the collections of the 'Dipartimento di Scienze della Terra' at Torino, Italy. — Monogr. Mus. reg. Sc. Nat. Torino, 17: 1-233, 3 figs, 14 pls.

Michelotti, G., 1847. Description des fossiles des terrains miocènes de l'Italie septentrionale. — Natuurk. Verhand. Holl. Maatsch. Wetensch. Haarlem, 3(2): 1-408, 17 pls.

Péron, [F.], & [C.A.] Lesueur, 1810. Histoire de la famille des mollusques ptéropodes; caractères de dix genres qui doivent la composer. — Ann. Mus. Hist. nat. Paris, 15: 57-68, pls 1, 2.

Ponzi, G., 1876. I fossili del Monte Vaticano. — Atti r. Accad. Lincei, (2)3(2): 925-959, 3 pls.

Rang, [P.C.A.L.], 1829. Description de cinq espèces de coquilles fossiles appartenant à la classe des ptéropodes. — Ann. Sc. nat., 16: 492-499, pl. 19.

Robba, E., 1977. Pteropodi serravalliani delle Langhe (Piemonte). — Riv. ital. Paleont., 83(3): 575-640, pls 17-25.

Sacco, F., 1904. I molluschi dei terreni terziari del Piemonte e della Liguria, 30. Aggiunte e correzione. Considerazioni generali. Indice generale dell'opera. Torino (Clausen), 1-203 + i-xxxvi, 31 pls.

Seguenza, G., 1875-1876. Studi paleontologici sulla fauna malacologica dei sedimenti pliocenici depositatisi a grande profondità, 1-2. — Bull. Soc. malacol. Ital., 1: 99-124 (1875); 2: 18-49 (1876).

Tiberi, N., 1878. Mollusques marins d'Italie. Céphalopodes, ptéropodes, hétéropodes vivant de la Méditerranée et fossiles du terrain tertiaire d'Italie. — Ann. Soc. malacol. Belg., 13(2): 52-84.

Tiberi, N., 1880. Cefalopodi, pteropodi, eteropodi viventi nel Mediterraneo e fossili nel terreno terziario italiano con aggiunte e correzioni. — Bull. Soc. malacol. Ital., 6: 5-49.

Verri, A., & G. de Angelis d'Ossat, 1899. Contributo allo studio del Miocene nell'Umbria. — Rend. r. Accad. Lincei, (5)8(11): 543-550, 1 fig.

Verri, A., & G. de Angelis d'Ossat, 1900. Secondo contributo allo studio del Miocene nell'Umbria. — Boll. Soc. geol. Ital., 19(1): 240-279.

Manuscript received 22 September 1995, revised version accepted 8 November 1995.