

## APRICARDIA MANUELAE N. SP. IN THE LOWER TURONIAN OF NORTHEASTERN MATESE (SOUTH APENNINES), ITALY

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### ABSTRACT

A new species (*Apricardia manuelae*) is described from the carbonate neritic facies of the lower Turonian in the northeastern Matese Massif, located at the southern part of the Apennines of Italy. The new species was discovered in a coquina on a hill among Colle Morotti, Fonte Malanotte and Aria del'Orso, together with the remains of pernid bivalves, rare specimens of *Nerinea schiosensis* and rare *Sauvagesia* sp. The new taxon is also found in La Gallinola Mountain, with remains of *Distefanella bassani* Parona and *Sauvagesia* sp.

Key words: Rudistae, Requieridae, lower Turonian, Southern Apennines, northeastern Matese, Italy.

### RESUMEN

Se describe una especie nueva (*Apricardia manuelae*) proveniente de la facies carbonatada nerítica del Turoniano inferior, situada al noreste del Macizo Matese, en la parte sur de los Apeninos italianos. La nueva especie se encontró en una coquina en una colina situada entre Colle Morotti, Fonte Malanotte y Aria del'Orso junto con los restos de bivalvos pérnidos; raros ejemplares de *Nerinea schiosensis* y de *Sauvagesia* sp. El nuevo taxon también se encuentra en la Montaña La Gallinola, asociada a restos de *Distefanella bassani* Parona y *Sauvagesia* sp.

Palabras clave: Rudista, Requieridae, Turoniano inferior, Apeninos del Sur, Matese nororiental, Italia.

### INTRODUCTION

The rudists from the Upper Cretaceous of the Carbonate Platform facies of the northeastern Matese Massif are characterized by a great diversity of taxa distributed in communities usually very variable according to different environmental conditions (Accordi *et al.*, 1990). *Apricardia manuelae* n. sp. was discovered in rich fossiliferous deposits in a hill located between Colle Morotti, Fonte Malanotte and Aria del'Orso, near San Polo Matese, at an altitude of 970 m a.s.l. The new species was found also in La Gallinola Mountain on the Grotta del Fumo, at the altitude of 1,870 m a.s.l. (Figure 1). The first locality, named here as "Hill 970", consists of a limestone sequence about 40 m thick, whose layers dip 40 to 50° to the NE. The two dominant lithofacies are the following:

(1) Pelecypod-gastropod floatstones in several heights, with packstone-wackestone matrix containing miliolids and other forams, algae and ostracods. (2) Frequently graded bioclastic-intraclastic rudstones-grainstones, with pelecypods, gastropods, rare corals remains, intercalated with pelecypod-gastropod floatstones.

The new taxon is present in a lenticular layer 30 m long, 40 cm thick of pelecypod-gastropod floatstone. The thanatocenosis association is represented by well preserved whole shells and test fragments of *Apricardia manuelae* n. sp., *Nerinea schiosensis* and *Lithyoperna* sp.

The limestone sequence of "Hill 970" contains *Vaccinites petrocoriensis* Douvillé, *Distefanella bassani* Parona, *Sauvagesia sharpei* Bayle, *Cuneolina pavonia parva* Henson,

*Dicyclina schlumbergerii* Munier-Chalmas, *Nummoloculina heimi* Bonet and *Thaumatoporella parvovesiculifera* Raineri.

The second locality, named here as "La Gallinola 1870", on Grotta del Fumo, is a limestone sequence 25 m thick. The layers dip 20-25° ENE. The lithofacies is similar to that of the "Hill 970". In fact, it consists of pelecypod-gastropod floatstones intercalated with bioclastic-intraclastic-rudstones, grainstones and packstones. *Apricardia manuelae* n. sp. is found in a limestone bed, together with *Distefanella bassani* Parona, rare *Sauvagesia* sp. and rare *Nerinea* sp.

The limestone sequence of "La Gallinola 1870" presents the following significant forms, in addition to the above: *Vaccinites petrocoriensis* Douvillé, *Cuneolina pavonia parva* Henson and *Thaumatoporella parvovesiculifera* Raineri. According to this stratigraphical analysis, the age of *Apricardia manuelae* n. sp. can be considered as early Turonian.

### SYSTEMATIC PALEONTOLOGY

The repository of the specimens described is the Museum of Paleontology of the Dipartimento di Scienze della Terra, Università La Sapienza, Rome, Italy.

Order Rudistae Lamarck, 1812

Suborder Dextrodonta Pchelintsev, 1959; Mainelli, 1992

Family Requieridae Douvillé, 1914

Genus *Apricardia* Guéranger, 1853

**Type species**—*A. carinata* Guéranger, 1853, p. 36.

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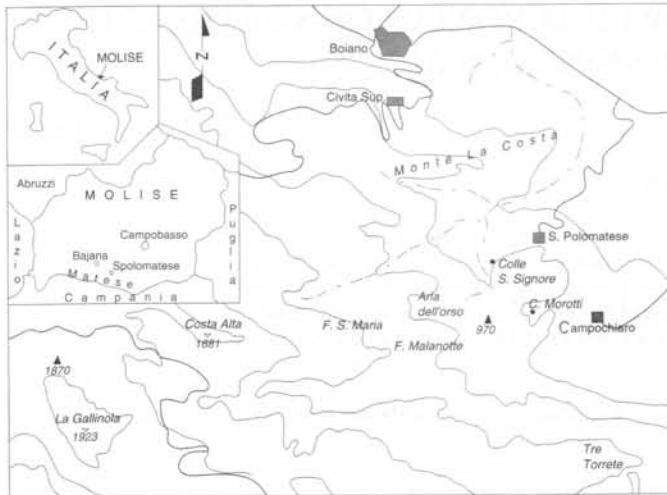


Figure 1. Northeastern Matese: altitude 970 (Hill 970) Colle Morotti, Fonte Malanotte and Aria dell'Orso; altitude 1870 of La Gallinola (La Gallinola 1870) on Grotta del Fumo (Servizio Geologico d'Italia, without year).

*Apricardia manuelae* n. sp.  
(Figure 2, a-c; Plate 1, figures 1-13)

**Diagnosis**—Inequilateral shell, slightly inequivalve, highly inflated, free valve umboned. Valves strongly carinated with

subhorizontal commissural plane, ornamented with transversal growth lines. Attached and free valves coiled, about one and a half whorls, posteriorly very convex and anteriorly concave; very strong hinge-myophore apparatus, vertically developed. Attached valve lying in the first coil, and the rest of the coil upright.

**Description**—In both valves the shell wall is formed by two layers: the outer one is brown, with transversal growth lines; the inner layer, carrying the internal structures, is thick, waxen, glazed, with the outer surface marked with striae corresponding to the growth lines of the exterior layer.

The shell is slightly inequivalve, with the free valve usually bigger than the attached one. Remarkably inequilateral, with two geometrical spirals well developed, with highly inflated posterior regions. Commissural plane subhorizontal.

*Attached valve (left valve) (AV = LV)*. The left valve is formed by a dextrorse spiral of about one and a half detached coils; the first one is flat, lying on the substratum, the second coil is upright, highly developed.

The posterior region (pr) of the valve is very convex; the anterior region (ar) presents the first coil concave and the

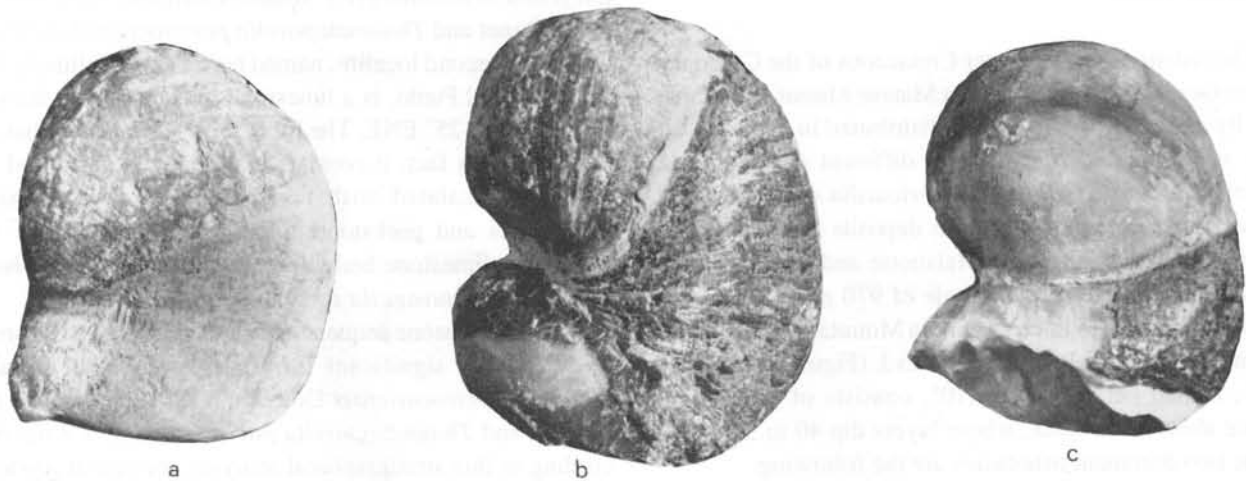
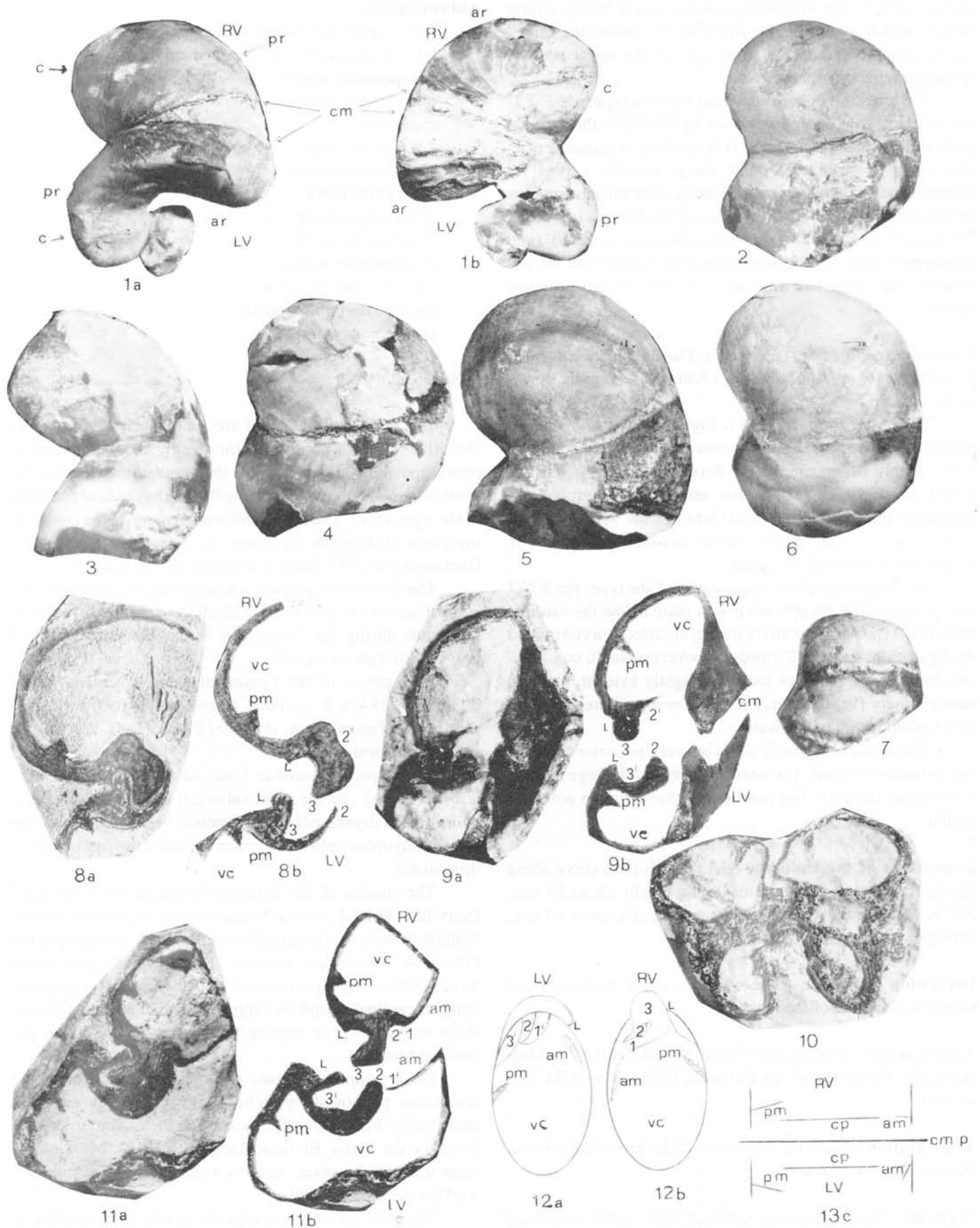


Figure 2. Distinction: *a*, *Apricardia carentonensis* d'Orbigny (1847); *b*, *Apricardia carinata* Guéranger (1853); *c*, *Apricardia manuelae* n. sp., in the features relevant to the general shape of the shell, synthetically described in Table 1. The comparison is made because the species are present in the Cenomanian-Turonian of carbonate neritic facies in northeastern Matese.

Plate 1. *Apricardia manuelae* n. sp. Figure 1, a, b—Holotype in two views (x 1); *a*, *pr* convex and lacking of siphonal bands; *ar* LV concave with first whorl of the spiral; *b*, *ar* RV slightly concave, umboned; *ar* LV concave in first whorl, convex in second whorl of the spiral. *a*, *b*, show shell slightly inequivalve and very inequilateral; valves with conjugated and very involute spirals; *cm* subhorizontal; *c* highly strong; growth striae. Figures 2-7—Paratypes (phenotypes) with posterior view (x 1). Show shell slightly inequivalve and very inequilateral; *cm* subhorizontal; *pr* convex in valves. Figure 8, a, b—Unusual oblique section across two valves (8, a) and relative description of some features (8, b) x 1. The view shows the divaricated valves with hinges and sockets 3-2' / 3' 2; myophores *pm* RV/*pm* LV; *vc*, ventral carine; ligamental groove behind 3. Figure 9, a, b—Oblique section across the valves (9, a) and description of some features (9, b) x 1. The view shows the closed valves; large *vc*; partly *cm*; teeth and myophores RV-*pm* 3 2' / LV - 3' 2 *pm*. Figure 10—Unusual longitudinal section across the valves, x 1. Two portions of the shell broken and divaricated in the transport or in the deposition. The section shows the closed valves with the tooth 3 and the socket 3'; the shell inequivalve (RV>LV); *pm* plate in *vc*. Figure 11, a, b—Oblique section across the valves (11, a) and description of features (11, b), x 1. Particularly the view shows the closed valves; very large *vc*; teeth, and myophore apparatus with shape and arrangement as described in the text, of type RV *pm* 3 2' 1 *am* / LV *pm* 3' 2 1. Figure 12, a, b—Diagrams of the teeth and myophores in LV and RV. Figure 13—Diagram of myophores in position with respect to the cardinal platform (*cp*). The specimens of figures 1-4, 8, 9, and 11 come from "Hill 916"; the specimens of figures 5-7, and 10 come from "La Gallinola 1870".



second convex; the ventral region (vr) has a highly strong careen, which identifies the curve of the spiral; the dorsal region (dr) presents the winding axis of the spiral and the apparatus hinge-myophore.

The hinge-myophore apparatus is of the type: pm 3' 2 1' am; pm (posterior myophore) is on a plate below the cardinal platform; 3' (posterior socket) is deep, long arcuated; 2 (median tooth) is strong, elevated, sharp, dorsally curved; 1' (anterior socket) small and conspicuous, near am; am (anterior myophore) is extended, narrow, at cardinal platform (cp) level. The ligamental groove (L) is between posterior socket (3') and commissure (cm). The ventral cavity (vc) is large and has not tabulae. The valve has not siphonal bands in the posterior region.

*Free valve (right valve) (FV = RV).* The free valve is formed by a sinistrose spiral of one and a half whorls rapidly developed.

The posterior region (pr) is highly convex, the anterior region (ar) umboned, slightly concave; the ventral region (vr) with a highly strong careen (cl); dorsal region (dr) comprises a very short winding spiral axis and the hinge-myophores apparatus; the commissure (cm) identifies the valve opening, which was very wide because of the considerable increase in height and in width of the spiral.

The hinge-myophore apparatus is of the type: pm 3 2' 1 am; pm (posterior myophore) is in a plate below the cardinal platform; 3 (posterior tooth) is strong, arcuated, curved toward the ligamental groove; 2' (median socket) is small, conspicuous, behind 3; 1 (anterior tooth) is slightly evident, between ventral cavity (vc) and am; am (anterior myophore) is small, on a ventral cavity of the wall.

The ligamental groove (L) is between posterior tooth (3) and commissure (cm). The ventral cavity (vc) is large and has not tabulae; the valve has not siphonal bands in the posterior region.

**Dimensions of the Holotype**—LV: developing curve along the ventral careen, 110 mm; maximum height, about 19 mm. RV: developing curve along the ventral careen, about 80 mm, maximum height, about 20 mm.

**Derivation of name**—The specific name derives from Manuela, daughter of the author.

**Type locality**—Northeastern Matese Massif, "Hill 970" (Map. IGM 162, 110 NO) and "La Gallinola 1870" (Map IGM 161, 11 EN).

**Type stratum**—Rudistid limestones of the lower Turonian in the open platform facies.

**Material**—Forty specimens, of which 19 are entire and 21 are fragments of right and left valves.

#### Abbreviations:

RV = right valve (= FV, free valve)  
 LV = left valve (= AV, attached valve)  
 pr = posterior region  
 ar = anterior region  
 c = carine  
 1 = anterior tooth  
 1' = anterior socket  
 2 = median tooth  
 2' = median socket  
 3 = posterior tooth  
 3' = posterior socket  
 am = anterior myophore  
 pm = posterior myophore  
 cm = commissural plane.

#### DISCUSSION

The taxonomic study of the new species is based on Douvillé (1887), who defined thoroughly the cardinal-myophoral apparatus, particularly the shape and arrangement of the posterior myophore plate, passing below the cardinal platform in the right valve. The shape and arrangement of the posterior myophore distinguish the genus *Apricardia*, established by Guéranger in 1853, from *A. carinata* as type species.

The decision to propose a new species resulted from the comparison of the specimens with all the described species of the genus during the Cretaceous of the Mediterranean and peri-Mediterranean regions.

The species of the Cenomanian are *A. carentonensis* d'Orbigny (1847), *A. carinata* Guéranger (1853) (also present in the Turonian), *A. douvillei* Péron (1889-93), and *A. laevigata* d'Orbigny (1847).

These species resemble *Toucasia* in the shape, with the left valve lying and the right valve flat on the anterior myophore with a depressed umbo. Cardinal apparatus, except the anterior myophore plate, is similar to that of the right valve of *Apricardia*.

The species of the Turonian-Senonian are *A. archiaci* Douvillé (1887), *A. pironai* Boehm (1885), *A. pironai cristata* Futterer (1892), *A. pironai difformis* Pirona, *A. pironai gracilis* Pirona, *A. tenuistriata* Futterer (1896), and *A. pachiniana* Sirna (1983). These species show left valve partly lying, partly upright; cardinal myophoral apparatus rather strong with posterior myophore plate passing the ventral cavity, farther the cardinal platform.

For a natural systematic of suprafamily categories, the taxonomy proposed by Pchelintsev (1959) is adopted, emended by Mainelli (1992), accepting the Suborder Dextrodonta in the Order Rudistae Lamarck (1812). Most of the nomenclature, however, derives from Dechaseaux and co-workers (*in* Moore, 1969).

The new species is compared (Table 1), according to several features, with the species mentioned above from the

Table 1. Differences among the species that are compared.

Species Age Features	<i>A. carentonensis</i> Cenomanian	<i>A. carinata</i> Cenom.-Turon.	<i>A. manuelae</i> Turonian	<i>A. pironai</i> Turonian	<i>A. tenuistriata</i> Turonian	<i>A. archiaci</i> Santonian	<i>A. pachiniana</i> Maastrichtian
Shell	Highly inequivalve Slightly inflated Lying	Inequivalve Inflated Slightly upright	Slightly inequivalve Highly inflated Upright	Inequivalve Slightly inflated Slightly upright	Inequivalve Slightly inflated Slightly upright	Highly inequivalve Slightly inflated Slightly upright	Highly inequivalve Inflated Slightly upright
LV spiralled	2 whorls about	2 whorls about	Very involute 1.5 whorls about	2 whorls about	2 whorls about	2 whorls about	2 whorls about
• pr	Convex	Convex	Very convex	Convex	Convex	Convex	Convex
• ar	Flat	Concave 1° whorl Convex 2° whorl	Concave 1° whorl Convex 2° whorl	Concave 1° whorl Convex 2° whorl	Concave 1° whorl Convex 2° whorl	Concave 1° whorl Convex 2° whorl	Concave 1° whorl Convex 2° whorl
• c	Highly strong	Highly strong	Highly strong	Highly strong	Highly strong	Highly strong	Highly strong
RV spiralled	2 whorls about	1.5 whorls about	1.5 whorls about	1.5 whorls about	1.5 whorls about	Very involute 2 whorls	1.5 whorls about
• pr	Convex	Convex	Highly convex	Slightly convex	Slightly convex	Convex	Convex
• ar	Flat	Flat, umboned	Slightly concave, umboned	Concave	Concave	Concave	Umboned
• c	Highly strong	Highly strong	Highly strong	Highly strong	Highly strong	Highly strong	Highly strong
1	Small, short*	Small, conical	Slightly evident	Highly evident	Small, slightly evident	Small, slightly evident	Small, short
1'	Small*	Small, deep	Small, evident	Evident	Evident	Small, evident	
2	Strong	Strong, short	Strong, high, sharp	Strong	Strong	Slightly short and sharp	Big, triangular
2'	In deep before 3	In deep before 3	Small, well evident	in deep	in deep	narrow, evident	
3	Small, evident*	Strong, short, carinated	Strong, arcuated, curved	Slightly strong, arcuated	Slightly strong, arcuated	Slightly strong, carinated	Strong, triangular
3'	Slightly deep	Deep	Deep, long, arcuated	Slightly deep, narrow	Slightly deep, narrow	Slightly deep, narrow	
am LV	extended, narrow	extended, narrow*	extended, narrow at cp level	extended, narrow	extended, narrow	extended, narrow	
am RV	extended, narrow, near cm	extended, narrow, near cm	small, on ventral cavity wall	narrow, near cm	narrow, near cm	narrow, near cm	
pm LV	On plate below cp	On plate below cp	On plate very below cp	On plate very below cp	On plate very below cp	On plate below cp	On plate near umbo-cavity
pm RV	On plate below cp	On plate below cp	On plate very below cp	On plate very below cp	On plate very below cp	On plate below cp	On plate near umbo-cavity
cm	Oblique	Oblique	Subhorizontal	Oblique	Oblique	Oblique	Oblique

Turonian-Senonian of the paleogeographic European and African provinces of the peri-Mediterranean region, and also with the species of the Cenomanian of Matese. The comparison is made directly with specimens from the type localities and also with those appearing in literature. The features of *A. carentonensis* d'Orbigny and *A. carinata* Guéranger are inferred from specimens found in the upper Cenomanian of La Costa Mountain, northeast of the Matese Massif.

With this comparison, it is shown that *Apricardia manuelae* has the following essential characteristics: shell slightly inequivalve, being RV greater than LV, with upright development; valves highly inflated; vertical development of hinges, subhorizontal commissure.

The phenotypic variability of the general form is evident in several specimens that are shown in Plate 1. Moreover, this variability is also remarkable in other features, as inequality of valves, convexity, vertical development of valves and commissural plane.

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