

Roveacrinids from the Northern Arabian Plate in SE Turkey

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Abstract: Crinoid remains from Cenomanian limestones in SE Anatolia have been studied. These crinoids belong to the family Roveacrinidae and are characterised by their lacking a stem and free living above the sea floor.

A new species, *Roveacrinus derdereensis* Manni, n. sp., has been erected.

Key Words: crinoids, roveacrinids, systematics, cenomanian, Turkey

Kuzey Arap Plakasından Yeni bir Roveacrinid Türü, GD Türkiye

Özet: Güneydoğu Anadolu'da yüzeyleyen Senomaniyen yaşlı kiretaşlarında Crinoid fosilleri ayrıntılı olarak incelenmiştir. İncelenen krinoidler Roveacrinidae ailesine ait deniz tabanı üzerinde serbest yaşayan ve stemleri olmayan türlerden oluşmaktadır.

Bu çalışmada *Roveacrinus derdereensis* Manni, n. sp. yeni bir tür olarak tanımlanmaktadır.

Anahtar Sözcükler: krinoidler, roveacrinids, sistematik, senomaniyen, Türkiye

Introduction

In Cenomanian limestones from wells in the northern Arabian Plate and along stratigraphical sections in the field, crinoid remains without stems have been found (Figure 1).

The skeletal organisation of these crinoid remains caused confusion with similar fragments of saccocomid crinoids.

Cros *et al.* (1991), in a good stratigraphical study, described these fossils as "crinoides pélagiques analogues aux Saccocomidae" from the Cenomanian Derdere Formation in the Sabunsuyu section near the frontier between Turkey and Syria (Figure 1). The specimens investigated here were collected along the Sabunsuyu outcrop. In addition, thin sections from boreholes in SE Turkey were considered.

Previously, Perinçek (1979a, b) assigned the Sabunsuyu section to the Cretaceous from Albian to Maastrichtian.

These Cretaceous crinoids are distributed worldwide. The list of localities in which fragments of them have been found is published by Ferré *et al.* (1997).



Figure 1. Map showing the location of the Sabunsuyu area (*). Inside the rectangle on the right is the northern portion of the Arabian Plate from which samples with roveacrinid specimens were collected.

Systematics

Classis Crinoidea Miller, 1821

Subclassis Articulata Zittel, 1879

Order Roveacrinida Sieverts-Doreck, 1952

Family Roveacrinidae Peck, 1943, emend.

Rasmussen, 1961

The crinoids of this family, stemless, have a cup characterised by a very peculiar ornamentation. The theca

is composed of five radials, generally massive, and five basals, often fused. The circle of basals is "developed into a dorsal spine supporting the radials or reduced to thin plate overgrown by radials surrounding two cavities (body and dorsal)" (Rasmussen 1978). No cirri. Arms ten, branching on second primibranch.

The family is subdivided in two subfamilies: Roveacrininae Peck, 1943 and Somphocrininae Peck, 1978. The first subfamily comprises Cretaceous crinoids, and the second Triassic crinoids.

Subfamily **Roveacrininae** Peck, 1943, emend.

Peck, 1978

Diagnosis: Crinoids with cups composed of five radial plates and five basal plates. The radials form the theca with two cavities: the body and the dorsal. The basals, small and generally fused, are located between the two cavities.

Remarks: Often in the literature roveacrinid fragments are classified erroneously as fragments of saccocomids, because in thin section roveacrinids and saccocomids are very similar.

Nine genera: *Birgelenocrinus*, Jagt, 1999; *Discocrinus* Peck, 1943; *Orthogonocrinus* Peck, 1943; *Plotocrinus* Peck, 1943; *Poecilocrinus* Peck, 1943; *Roveacrinoides* Rasmussen, 1971; *Roveacrinus* Douglas, 1908; *Stylacocrinus* Peck, 1955; *Veugelersia* Jagt, 1999.

Occurrence: Roveacrinids are worldwide crinoids, known from Early Hautherivian to the Late Maastrichtian.

Genus **Roveacrinus** Douglas, 1908

(type species: *R. alatus* Douglas, 1908)

Diagnosis: Small crinoids characterised by generally high cups with well developed vertical wings or ridges with or without secondary lateral ridges. The ventral cavity is wide. Also the brachials are characterised by well developed wings. The cups are composed of five radials and five basals. The ventral cavity is divided into two parts: one upper, the body cavity, and the other lower, the dorsal cavity.

Roveacrinus derdereensis Manni, n. sp.

Text-figure 2, Plates 1, 2

Holotype: Plate 1, figure 1

Description: Microcrinoids characterised by a cup with very prominent and narrow vertical radial wings (Figures 2 & 3). This cup can be divided in two very distinct parts: an upper one and a lower one. The upper part, wide and pentagonal in outline, is characterised by a very wide and deep ventral cavity and by five very prominent vertical radial wings. The lower part, in contrast, is very narrow and oblong with vertical radial wings.

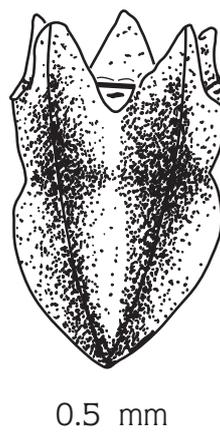


Figure 2. *Roveacrinus derdereensis* Manni, n. sp. Reconstruction of the cup.

The dorsal cavity, not very evident, is very narrow and placed along the lower part of the cup. In this cavity the basals are not seen.

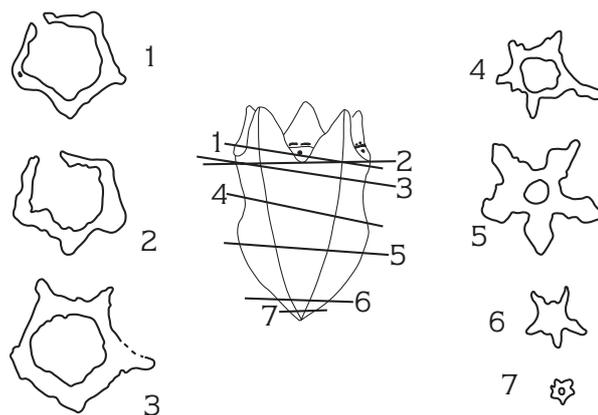


Figure 3. Orientation of sections illustrated in Plate 2. The traced drawings are oriented on the reconstructed *Roveacrinus derdereensis* cup.

The radial wings, subpentagonal in outline in the upper part, are very prominent. At half height, after a narrow neck, the wings become larger.

At the lower part of the cup, the wings rapidly narrow, becoming less prominent.

The brachials are characterised by evident lateral wings.

Remarks: The description is not complete because from thin section it is not possible to determine with certainty the shape of the following parts: theca, interradial projections, dorsal cavity, external ornamentation and radial facets.

Since the morphological features are very typical and differ from those of any known species, a new species is erected. Vertical radial wings, subpentagonal outline and enlargement at half-height are the particular morphological features.

This new species is very similar to *Roveacrinus alatus* Douglas, 1908 and *R. geinitzi* Schneider, 1989, but lacks the globular dorsal cavity. It is also similar to *R. occultus* Schneider, 1987 and *R. raueni* Schneider, 1987. In fact, both are characterised by cups with prominent vertical radial wings; but our roveacrinid differs from *R. occultus* in the longer and much narrower lower part of the cup and from *R. raueni* overall, because it lacks the globular dorsal cavity, and in the general shape of the radial vertical wings.

Moreover, *R. communis* Douglas, 1908 is very similar in terms of the shape of the cup, but differs from the new species as it lacks radial vertical wings. It differs also from *R. bairstowi* Peck, 1955 in having radial vertical wings more developed dorsally and the longer and narrower cup. Lastly the species differs from *Veugelersia diana* Jagt, 1999 overall in the longer radial wings and in the body cavity outline apparently non-stellate.

It is not possible to describe sufficiently the characteristics of the brachials, because they are not clearly observed in thin section.

Depository: The material is stored at the Museo di Paleontologia, Università di Roma "La Sapienza". Holotype: thin section NS 137/1, the specimen labelled 1. Paratypes: all specimens of the sections NS 137/ 1-10.

Material: All specimens of the species are analysed in thin sections of limestones.

Derivatio nominis: From Derdere, the name of the Cenomanian Derdere Formation widespread in Eastern Taurus, Turkey.

Type locality: Sabunsuyu gorge, along the eastern side of the river, in the Gaziantep district, about 30 km from the Syrian frontier.

Type level: Cenomanian.

Palaeoenvironment: *Roveacrinus derdereensis* is abundant in shallow water carbonates, with medium-high energy as normal in the ramp environment. In the roveacrinid assemblage it is possible to find radiolarian levels, benthonic and planktonic foraminifers, bivalve and brachiopod shells of mid ramp with shifting towards inner and outer ramp environments, as deduced from facies analysis and in agreement with Cros *et al.* (1991).

Conclusions

In the literature, remains of roveacrinids in thin section are poorly known. Granier *et al.* (1995) quoted and illustrated (fig. 3, 4) a single fragment of roveacrinid from a thin section. Ferré & Granier (2000) erected the new species of roveacrinid (*Roveacrinus berthouli* Ferré & Granier 1997) from the same fragment.

Ferré *et al.* (1997) quoted roveacrinid microfacies from New Zealand, Turkey, Syria, SW and SE France, Tunisia, Morocco, Spain, NE Brazil, Guatemala and Mexico. All these roveacrinid microfacies are latest Cenomanian in age. Lastly, Ferré and Granier (2000) described some Albian species of roveacrinids in thin section from Angola.

Moreover, this new species is very important because for the first time a new roveacrinid is described from Turkish sediments of the ramp environment and for the usefulness in Cretaceous stratigraphy.

From a palaeoecological point of view, it is possible to draw some conclusions from these crinoids. In fact the roveacrinids are generally considered pelagic crinoids, overall because they are stemless. Milsom (1989),

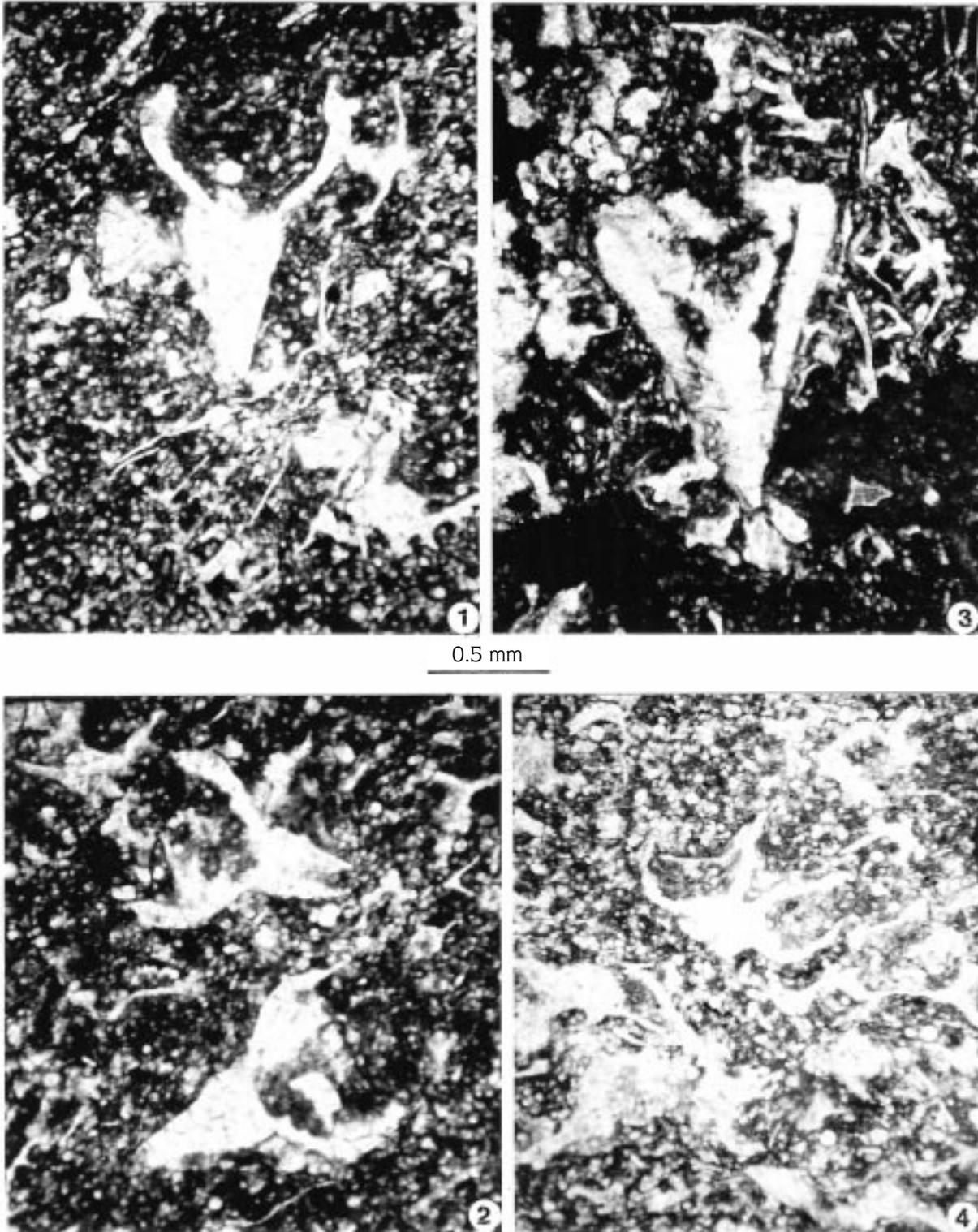


PLATE 1: Figs 1-4. *Roveacrinus derdereensis* Manni, n. sp. (1-3) vertical cortical sections of cups, (4) transversal section of brachial. (1) Holotype (NS 137/1.1). Paratypes (2, 3,) (NS 137/2. 1-2), (4), (NS 137/6.2).

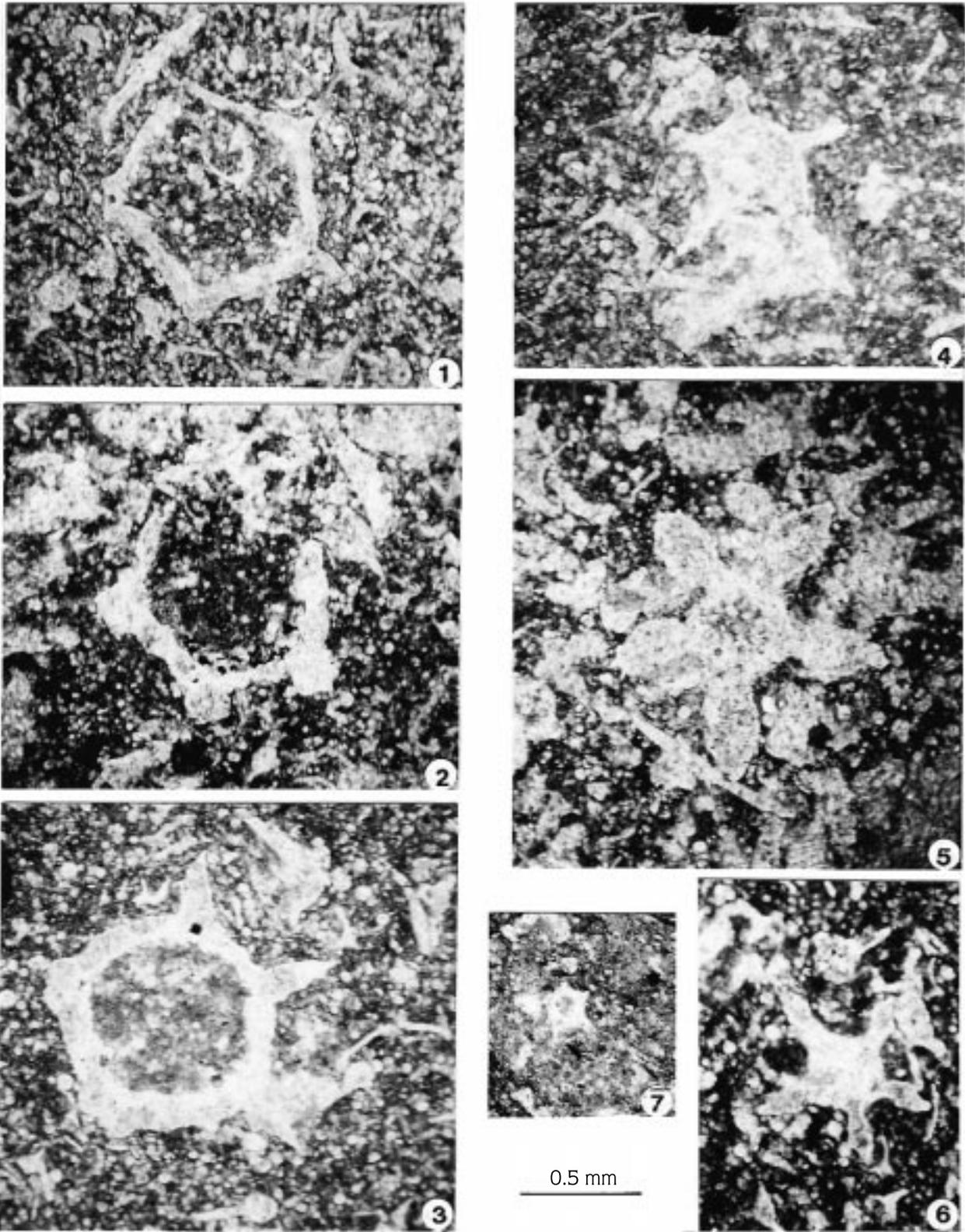


PLATE 2: Figs 1-7. *Roveacrinus derdereensis* Manni, n. sp., transversal section of cups. (1) NS 137/7.1, (2) NS 137/8.1, (3) NS 137/6.1, (4) NS 137/7.2, (5) NS 137/8.2, (6) NS 137/2.3, (7) NS 137/9.1.

analysing the functional morphology, hypothesised two different life-styles: benthonic with the ability to swim, and nektonic.

“The benthonic roveacrinids are characterised by the presence of flanges and spines on the calix and proximal brachials, and limited arm mobility. Nektonic roveacrinids have an enlarged dorsal cavity, extreme arm mobility, are virtually devoid of ornamentation and show evidence for skeletal lightening” (Milsom 1999).

Therefore, some roveacrinids can live upon the sea floor, simply anchoring the lower part of the cup into the bottom sediment and, if necessary, swim away.

From Milsom’s point of view, this new species is probably a benthonic crinoid, having wide flanges (i.e.

wings) on the cup and brachials. However, this roveacrinid microfacies is characterised by fragments of cups and brachials. Probably a storm destroyed a roveacrinid prairie or it is also possible to hypothesise, considering that the cups of these crinoids are very abundant and not too broken, that they lived truly upon the bottom and that they were transported a short distance after their death.

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