

Mitt. Geol.-Paläont. Inst. Univ. Hamburg	Heft 77	Seite 603–635	Hamburg, Mai 1996
---	---------	---------------	-------------------

## Constructional morphology of some Upper Cretaceous rudists of the Ajlun (Jordan)

KLAUS BANDEL & HAKAM MUSTAFA\*)

### Abstract

The rudists evolved their characteristics during Aptian/Albian time. Their basic morphological patterns appeared rapidly. By Cenomanian and Turonian time typical species lived in the shallow sea at what is the Ajlun today. Up to the end of the Cretaceous rudists dominated the shallow marine environment in tropical settings. Here the requienids like *Apricardia* continued to live in the tradition of their megalodontid ancestors attaching themselves to the substrate by the left valve. The vase-like rudists of the radiolitids and hippuritids, in contrast, cemented their right conical valve to the substrate. Two discussed species of radiolitids with massive walls of cellular construction in mixed structural composition had interior rooms in their valves that remained open to almost the base. They grew singly or formed colonies in which individuals are attached to each other in several levels of growth. Their opercular valve had a flexible and translucent margin and opened to a narrow gape. The hippuritids, in contrast, adopted the strategy of rapid growth with the small soft body moving upward in a solidly calcified shell closed by a series of septa at its base. Individuals attached to each other forming reef-like thickets. Mantle tissue was extended into the surface layer of the opercular valve that had a free margin. This valve was pushed up in total when the animal was active. The caprinid represented in the Ajlun fauna grew singly with irregularly horn-shaped valves of equal dimensions interlinked to each other by massive hinge-teeth. Valves opened only to a narrow gape. Tissue extended into the walls of the valves in numerous pores and canals. A constructional morphological analysis based on the rudists from Jordan and enriched with data from rudists of other occurrences is presented. According to it, symbiotic algae lived in the mantle tissue of the bivalves. This tissue was placed into the porous inner walls and below the transparent outer walls in the caprinids, into the canals and pores of the upper valve in active hippuritids and held below the transparent margin of the opercular valves and on the surface of the thick shell margin of the conical valves in radiolitids.

### Introduction:

Between the castle of Rabad and the village of Istafena north of the town Ajlun in northern Jordan deposits of an extensive rudist bank are exposed accompanied by lagoonal limestones above. While the rudist bank was deposited during Cenomanian time, the sediments of the lagoon were formed during Turonian time. Some of the gastropods living in both environments were described by MUSTAFA & BANDEL (1992), while a regular sea urchin from the Rudist bank had been published by BANDEL & GEYS (1984).

\*) Addresses of authors: K. BANDEL, Universität Hamburg, Geologisch-Paläontologisches Institut, Bundesstr. 55, D-20146 Hamburg, Germany. H. MUSTAFA, Yarmouk University, Dept. of Earth and Environmental Sciences, Irbid, Jordan.

Species belonging to the Radiolitidae and Caprinidae represent the main frame producing elements of the rudist bank (Rabad-rudist member of MUSTAFA & BANDEL, 1992).

While species of the first represent coral-like elevators that grew singly or attached to each other in thickets, the caprinid species consist of recumbent individuals that are never attached to each other or to the substrate. Among acteonellid shell debris in the shallow lagoon lived a requienid species that retained the ancient constructional morphology of earlier ancestors of the rudists. Within the same environment hippuritids formed thickets attached to beachrock formed at lagoonal shores and to cemented shoal debris.

An attempt to reconstruct the soft-part anatomy of the rudists from the Aj-lun area is made since they provide an opportunity to analyse individuals preserved as fossils in an unusual way. Here growth geometry as well as growth ecology and shell-soft part relation can be analysed and reconstructed. Members of four rudists families, the Requiiniidae, Caprinidae, Radiolitidae and Hippuritidae are present with 5 species preserved quite well. Among these only the individuals of the genus *Apricardia* are small with shell size below 2,5 cm while the others are large growing to 20 cm and more. According to SKELTON (1991) representatives of the rudists can be grouped into the elevators in which the entire growth margin of the attached valve was deployed in upward growth, like *Sauvagesia* and *Hippurites*, clingers where parts of the growth margin of the attached valve overgrew the substrate, like *Apricardia*, and recumbents that were unattached with valve margins lying flush against the substratum, like *Caprinula*.

## 1. A traditional rudist of the megalodont type.

Family Requiiniidae DOUVILLÉ, 1919 (? 1914)

In lagoonal limestones about 15 m above the Rabad-rudist bank a species of the Requiiniidae is found together with a slender rudist and a thick walled *Durania* type rudist, both of which are not described here. The requienid represents a spirogyrally coiled encruster with characters defined by DECHASEAUX & COOGAN (1969, p. N 779).

Genus *Apricardia* GUÉRANGER 1853

The genotype is *Apricardia carinata* GUÉRANGER, 1853 figured by DOUVILLÉ (1886 Pl.28, Fig. 3.) that looks very similar to the Jordanian specimen.

Species *Apricardia* sp.

Only two specimen were found among shell debris forming a bank in the lagoonal limestone in the small quarry on the hill ridge Zuan between castle Rabad and Istafena. *Hippurites requieni* that is well known from many Turonian limestones around the Mediterranean Sea dates these lagoonal limestones.

The coiled valves of *Apricardia* differ from each other in size and shape. The attached left valve is the larger one (maximum diameter about 3 cm) and forms a coil of about half a whorl. The right, free valve forms less than half a whorl and is flatter than the left valve (2 cm maximum diameter). The hinge resembles that of *Diceras*. A single tooth along with a tooth-like thickening behind the posterior socket is present in the left valve and the right valve has two teeth. The hinge plate is massive and projects from the valve margin. The insertion of the posterior muscle lies on a plate that passes below the cardinal platform.