

## Middle Jurassic record of the limnic ostracode genus *Rosacythere* (Limnocytheridae, Timiriaseviinae): implications on the origin and evolution of the *Kovalevskiella* group

J.-P. COLIN<sup>1</sup> & P. CARBONEL<sup>2</sup>

<sup>1</sup>Esso Rep, 213 Cours Victor Hugo, 33323 Bègles Cedex, France.

<sup>2</sup>Département de Géologie et Océanographie, Université de Bordeaux, Avenue des Facultés, 33405 Talence Cedex, France.

**ABSTRACT** - Two species of the limnic ostracode genus *Rosacythere* Colin (Limnocytheridae, Timiriaseviinae) have been identified in the uppermost Bajocian (Middle Jurassic) of the southern part of the Paris Basin, France. This record is the earliest for this genus and for the '*Kovalevskiella* group' of Colin & Danielopol (1978; 1980). This study also confirms that most of the Timiriaseviinae morphological groups really started to diversify during the Middle Jurassic. *J. Micropalaeontol.* 15(2): 187–191, October 1996.

### INTRODUCTION

The limnic ostracod genus *Rosacythere*, defined by Colin (*in* Colin & Danielopol, 1980), belongs to the family Limnocytheridae, subfamily Timiriaseviinae. It is one of the genera forming the '*Kovalevskiella* group' defined by Colin & Danielopol (1978, 1980).

According to the authors, the main diagnostic characters of this lineage are: small-sized carapace, about 0.5 mm (or less); ornamentation in 'rosettes' or micropustulose, 'raspberry-type' (Colin, 1991); inverse hingement with positive elements on the left valve; right valve < left valve; no, or one to two vertical sulci; marked sexual dimorphism, females having a developed brood pouch.

The 'raspberry-type' of ornamentation is in fact derived from the 'rosettes'-type by the development of a small hemispherical pustule at the intersection of the alveolae muri. These types of ornamentation which are always present in the genus *Kovalevskiella* are sometimes absent in some species of *Rosacythere* (*Theriosynoecum?* sp. 4 and *Theriosynoecum?* sp. 2 Andreu, 1978 from the uppermost Albian–Cenomanian of northern Spain) and *Frambocythere* (*Frambocythere* cf. *tumiensis ferreri* Colin *in* Babinot, 1980 from the Maastrichtian of SE France) which are totally smooth.

Until recently, the earliest known representatives of this lineage which comprises the genera *Rosacythere* Colin, 1980, *Frambocythere* Colin, 1980, *Kovalevskiella* Klein, 1963, and probably *Abrotocythere* Zhao, 1987, were not older than Early Cretaceous as indicated by the presence of '*Timiriasevia*' *cardiiformis* Rosenfeld & Raab, 1984 in the 'Neocomian' of Israel. Zhao (1987) considered the genus *Abrotocythere* as a 'Tertiary derivative' of *Rosacythere*, which differs from other genera of the *Kovalevskiella* lineage by its normal hinge with positive elements on the right valve (left valve > right valve) and its less regular type of ornamentation.

The genus *Rosacythere* was considered to be restricted to the Late Aptian to Cenomanian interval (Fig. 1) of southern Europe, being known especially from SW France, Spain, Portugal and Hungary (Colin, 1974; Colin & Danielopol, 1980; Andreu, 1978, 1983; Cabral, 1995; Zalanyi, 1959) (Fig. 2). The genus *Frambocythere*, originally thought to be

restricted to the Late Maastrichtian to Early Eocene interval from southern Europe (southern Belgium, France and Spain), India and China, has recently been identified in the Albian of Zaire (Colin, 1993). The oldest known species of *Kovalevskiella* dates from the Oligocene of Germany (Carbonnel & Ritzkowski, 1969), and in the present day this genus is confined to the hypogean and interstitial realms in south-central Europe (Colin & Danielopol, 1980; Carbonel *et al.*, 1986). The genus *Abrotocythere* has until now been only found in the Miocene (or possibly Oligocene) of SW China (Zhao, 1987).

Although non-marine sediments were widespread during the Late Jurassic and the Early Cretaceous ('Purbecko-Wealden' facies) in many parts of the world, no representative of this group, other than the 'Neocomian' Israeli record of '*Timiriasevia*' *cardiiformis* (Rosenfeld & Raab, 1984), has been reported from this period, whereas other Timiriaseviinae such as *Timiriasevia* and *Theriosynoecum* (= *Bisulcocypris* Pinto & Sanguinetti, 1958 and *Dryelba* Sohn, 1982, auct.) were common.

### THE GENUS *ROSACYTHERE* IN THE MIDDLE JURASSIC

Although it is currently accepted that the first Timiriaseviinae probably appeared during the Triassic (Colin & Danielopol, 1980), they really started to develop and to diversify only during the Middle Jurassic and especially during the Bathonian as indicated by the presence of numerous species of the genera *Timiriasevia* Mandelstam, 1947, and *Theriosynoecum* Branson, 1936 (Whatley, 1990; Colin, *in* press). Until now, representatives of the *Kovalevskiella* Group were not known from this period, although few species showed strong affinities with it.

In the Late Bathonian of SW France, Rohr (1976) described a small species (L = 0.45–0.53 mm) of Timiriaseviinae, '*Bisulcocypris*' *pusilla* (also reported and illustrated as *Theriosynoecum* sp. by Malz *et al.* (1985) in the Early Bathonian of Sardinia and as *Metacypris* sp. 2 by Mette (1995) in the Callovian of southern Tunisia) showing strong morphological affinities with the *Kovalevskiella* Group, but from which it differs mainly by its weak reticulate ornamentation.

AGE	<i>Rosacythere</i> sp. 2 (Oertli)	<i>Rosacythere</i> sp. 3 (Oertli)	<i>Rosacythere</i> n.sp. Cabral & Colin	<i>Rosacythere</i> baconica (Zalanyi)	<i>Rosacythere</i> faiadensis Andreu	<i>Rosacythere</i> sp. 1 (Andreu)	<i>Rosacythere</i> sp. 2 (Andreu)	<i>Rosacythere</i> sp. 3 (Andreu)	<i>Rosacythere</i> sp. 4 (Andreu)	<i>Rosacythere</i> grekoffi (Colin)
Cenomanian										
Albian										
Aptian										
Barremian										
Hauterivian										
Valanginian										
Berriasian										
Portlandian										
Kimmeridgian										
Oxfordian										
Callovian										
Bathonian										
Bajocian										

Fig. 1. Stratigraphical distribution of *Rosacythere* species.

'*Bisulcocypris*' *calcar* Grékoff, 1963, from the Bathonian of the Majunga Basin in Madagascar has a morphology and a micro-pustulose ornamentation very close to the

*Kovalevskiella* Group and, because of the presence of two sulci, especially to the genus *Frambocythere*. It differs essentially by its large size ( $L = 0.70-0.94$  mm) which make it probably related to the *Theriosynoecum* Group.

A re-examination of uppermost Bajocian material (Mourier, unpublished) from the southern part of the Paris Basin (Vienne valley, about 35 km SE of Poitiers), previously studied and illustrated by Oertli (*in* Bernard *et al.*, 1957 and Oertli, 1963), and Dépêche (1984) allowed us to attribute to the genus *Rosacythere* two forms originally tentatively assigned to the genus *Gomphocythere* Sars, 1924. Pinto & Sanguinetti (1962) recognized that these two species belonged to a new indeterminate genus and Dépêche (1984) attributed one of this species to the genus *Kovalevskiella* and the other to the genus *Rosacythere*. The two species encountered possess all the diagnostic features of the genus *Rosacythere*: size, ornamentation, inverse hingement, sexual dimorphism. In the type-locality (La Tour-au-Cognum, near the town of Civaux, Vienne valley ; IGN map 1/25000 Chauvigny 8 ) they have been found in a thin shaly interval rich in organic matter, 2 m below a limestone level having yielded the uppermost Bajocian ammonite *Parkinsonia* aff. *subtilis* Arkell. In the studied horizon *Rosacythere* species are associated with *Cypridea?* *postelongata* Oertli, *Timiriasevia* sp. (= *Gomphocythere* nov. sp. 1 Oertli), *Erpetocypris?* sp. and charophyte gyrogonites.

#### COMMENTS ON THE ORIGIN AND EVOLUTION OF THE KOVALESKIELLA GROUP

This study shows that the oldest known representatives of the *Kovalevskiella* lineage already possessed most of the diagnostic characters of the group: size, ornamentation, sexual dimorphism, inverse hinge.

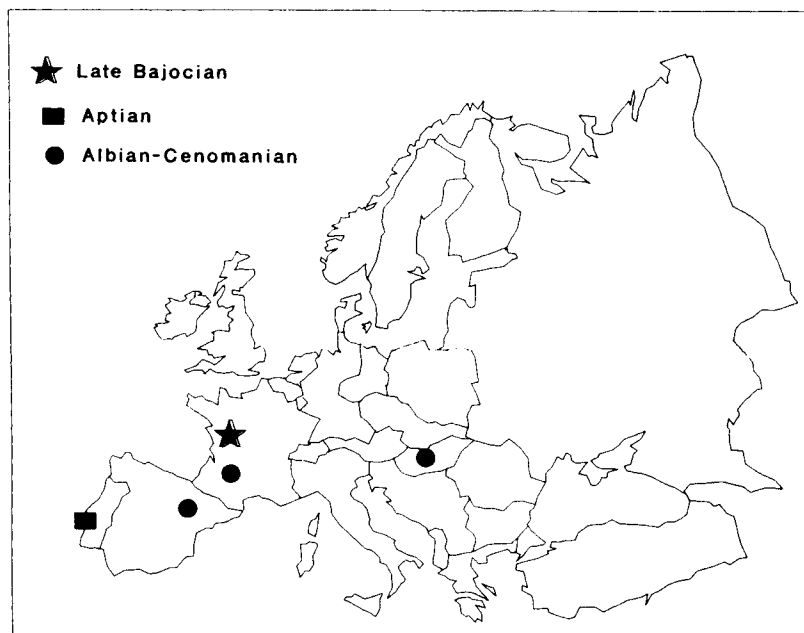


Fig. 2. Geographical distribution of *Rosacythere* species. Late Bajocian: Bernard *et al.*, (1957) and this paper; Aptian: Cabral (1995), Cabral & Colin (*in* prep.); Albian: Zalanyi (1959), Andreu (1978, 1983); Cenomanian: Colin (1974), Colin & Danielopol (1980).

A close observation shows that the *Kovalevskiella* ornamentation, i.e. 'raspberry-type', which was generally developed by the end of the Cretaceous (in the genus *Frambocythere*) and later in the Cenozoic (in the genus *Kovalevskiella*), was derived from the 'rosettes'-type by the development of a small hemispherical pustule at the intersection of the alveolae muri. It is therefore suggested that the 'rosettes'-type is a more primitive character.

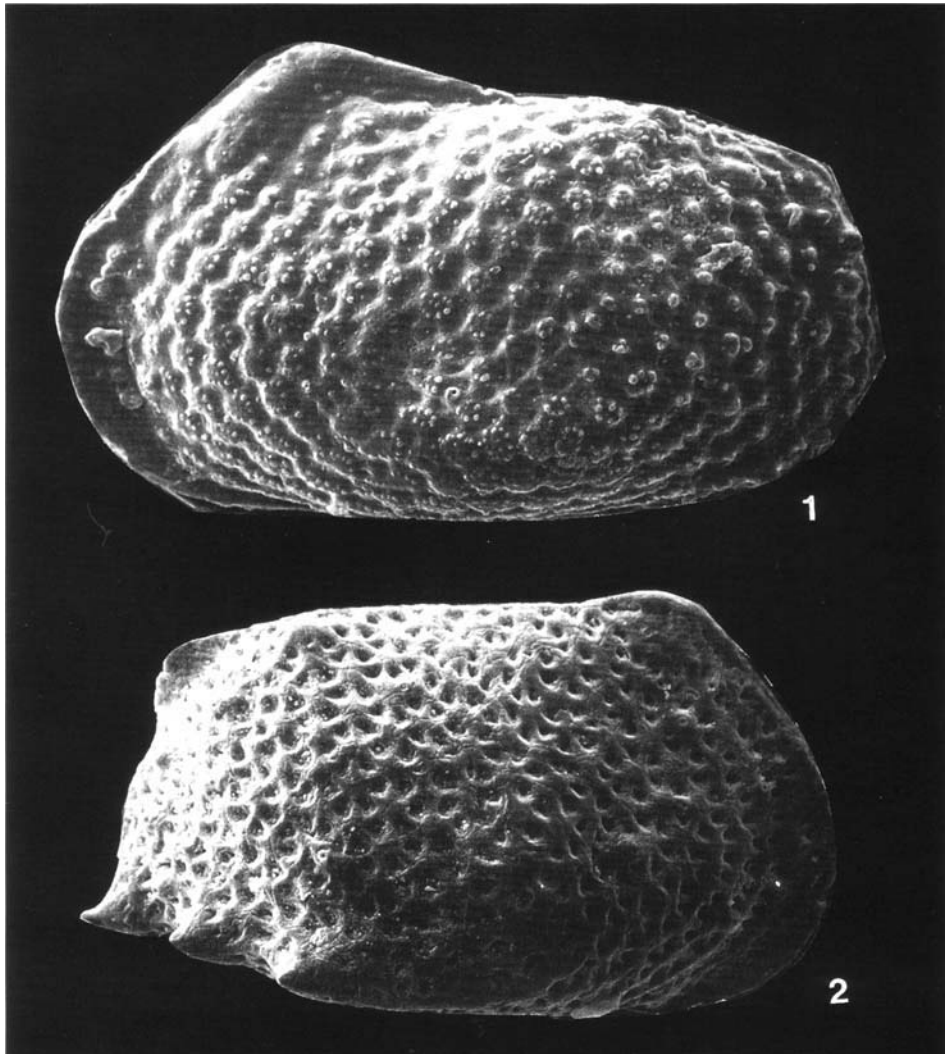
It is also suggested that the absence of sulcus is a primitive character. Bisulcate forms make their first appearance in the Albian with the genus *Frambocythere*. Monosulcate forms, appearing in the Oligocene with the genus *Kovalevskiella* would therefore be more evolved. The fact that one of the youngest known species of *Frambocythere* (*F. valeroni* Tambareau) from the Early Eocene of southern France (Tambareau *et al.*, 1991) shows a tendency toward a single sulcus would support this hypothesis.

#### TAXONOMIC NOTES

Illustrated specimens are deposited in the Collections of the University of Geneva, Geneva, Switzerland.

Due to the scarcity of the material and especially of adult specimens both species are left in open nomenclature.

Subclass **Ostracoda** Latreille, 1806  
Order **Podocopida** G.W. Müller, 1894  
Suborder **Podocopina** Sars, 1866  
Superfamily **Cytheracea** Baird, 1850  
Family **Limnocytheridae** Sars, 1925  
Subfamily **Timiriaseviinae** Mandelstam 1960 (emend. Colin & Danielopol, 1978)  
Genus ***Rosacythere*** Colin, 1980  
**Type species** (by original designation): *Theriosynoecum grekoffi* Colin, 1974.



**Fig. 3.** 1. *Rosacythere* sp. 2 (Oertli, 1957), left valve, lateral view,  $\times 200$ . 2. *Rosacythere* sp. 3 (Oertli, 1957), right valve, lateral view,  $\times 200$ . Vienne valley, level BE 195 of Bernard *et al.*, 1957. Uppermost Bajocian.

**Diagnosis** (translated from Colin & Danielopol, 1980). Timiriaseviinae with small-sized carapace (about 0.5 mm), ornamented by triangular alveolae disposed in 'rosettes'. Hinge lophodont, inverse, with terminal positive elements on the left valve. Presence of a brood pouch in females.

This diagnosis is emended to include species having a micropustulose, 'raspberry'-type of ornamentation, and the smooth species of *Rosacythere* found by Andreu (1978) in the Late Albian of northern Spain.

***Rosacythere* sp. 2** (Oertli, 1957)

(Fig. 3, 1)

1957 *Gomphocythere* ? nov. sp. 2 Oertli; Bernard *et al.*: 764, pl. 23, figs 1–4.

1962 *Genus incertus* n.sp. 2 (Oertli); Pinto & Sanguinetti: 23, 31.

1963 *Gomphocythere* ? Oertli, pl. 27–2.

1984 *Kovalevskiella* 'nov. sp. 2' (Oertli); Dépêche: 210, pl. 5, fig. 3.

1985 *Kovalevskiella* sp. Dépêche, tabl. 6: 122.

**Remarks.** This species differs from all other described species of *Rosacythere* by its 'raspberry'-type of ornamentation similar to the genera *Kovalevskiella* and *Frambocythere*. Such an ornamentation in the genus *Rosacythere* has been observed in a new species from the Late Aptian of Portugal (Cabral, 1995 and Cabral & Colin in prep.). On adult specimens, pustules are often papillate. Juvenile specimens show a spine at the postero-dorsal and postero-ventral angles (Oertli in Bernard *et al.*, 1957, pl. 13, fig. 2). The right valve is the largest (inverse). Hinge with positive elements on the left valve. Narrow anterior marginal zone (1/12 on the length) with about 10 simple pore canals (*vide* Oertli in Bernard *et al.*, 1957).

**Dimensions.** L = 0.300–0.550 mm. H = 0.190–0.305 mm.

***Rosacythere* sp. 3** (Oertli, 1957)

(Fig. 3, 2)

1957 *Gomphocythere* ? nov. sp. 3 Oertli; Bernard *et al.*: 764, pl. 23, figs 5–14.

1962 *Genus incertus* n.sp. 3 (Oertli); Pinto & Sanguinetti: 23, 31

1963 *Gomphocythere* ? Oertli, pl. 27–2.

1984 *Rosacythere* 'nov. sp. 3' (Oertli); Dépêche: 210–211, pl. 5, fig. 4.

1985 *Rosacythere* sp. Dépêche, tabl. 6: 122.

**Remarks.** This species possess the characteristic 'rosette' ornamentation of *Rosacythere*, and differs from other known species of this genus essentially by the presence of three well developed conical spines on the posterior half of the ventral margin. It possesses a conical spine on the dorsal margin anterior to the posterodorsal angle. That is characteristic of the type-species *Rosacythere grekoffi* (Colin, 1974) from the Cenomanian of Dordogne (SW France). The juvenile specimen illustrated by Dépêche (pl. 5, fig. 4) shows another conical spine located in the middle part of the valves. The right valve is the largest (inverse). Hinge with positive elements on the left valve (Oertli in Bernard *et al.*, 1957, pl. 23, fig. 13)

**Dimensions.** L = 0.350–0.580 mm. H = 0.180–0.275 mm.

## CONCLUSIONS

The identification of two species of the limnic ostracod genus *Rosacythere* (Limnocytheridae, Timiriaseviinae) in the uppermost Bajocian of France is the earliest record of representatives of the '*Kovalevskiella* group' of Colin & Danielopol (1980) which will have two periods of maximum development during the Late Maastrichtian–Early Eocene with the genus *Frambocythere* and Oligocene–Recent with the genus *Kovalevskiella*.

This discovery also confirms that most of the Timiriaseviinae morphological groups (*Timiriasevia*–*Metacypris*, *Theriosynoecum*, *Kovalevskiella*) which appeared during the Triassic, really started their diversification during the Middle Jurassic.

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