

LATE EOCENE OSTRACODA FROM THE JAISALMER BASIN, RAJASTHAN

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ABSTRACT

Late Eocene Ostracoda have been recorded for the first time from the Sadewala and Kharatar wells of the Jaisalmer Basin, Rajasthan. The important ostracodes recorded from the *Pellatispira*-bearing glauconitic clays include: *Alocopocythere transversa* morphotype E, Siddiqui 1971, *Stigmatocythere lumaria* Siddiqui, 1971, *Acanthocythereis decoris* Siddiqui, 1971, *Echinocythereis (Scelidocythereis) multibullata* Siddiqui, 1971 and *Patagonocythere? nidulus* Siddiqui, 1971. It is comparable with the Late Eocene Ostracoda assemblage from the Upper Chocolate Clays (upper part) and *Pellatispira* beds of the Rakhi Nala and Zao River sections of Pakistan by Siddiqui (1971).

INTRODUCTION

The Jaisalmer Basin is located on the north western slope of the Indian Platform, and forms the central part of the Rajasthan Shelf. The Early and Middle Eocene ostracodes of the Rajasthan Shelf have been known from the work of Singh *et al.* (1968) and Khosla (1972). In the Palaeogene sequence of Sadewala and Kharatar wells (Fig. 1) drilled by ONGC, a 15-40 m thick Late Eocene sequence has been established on *Pellatispira* sp. and *Nummulites fabianii*.

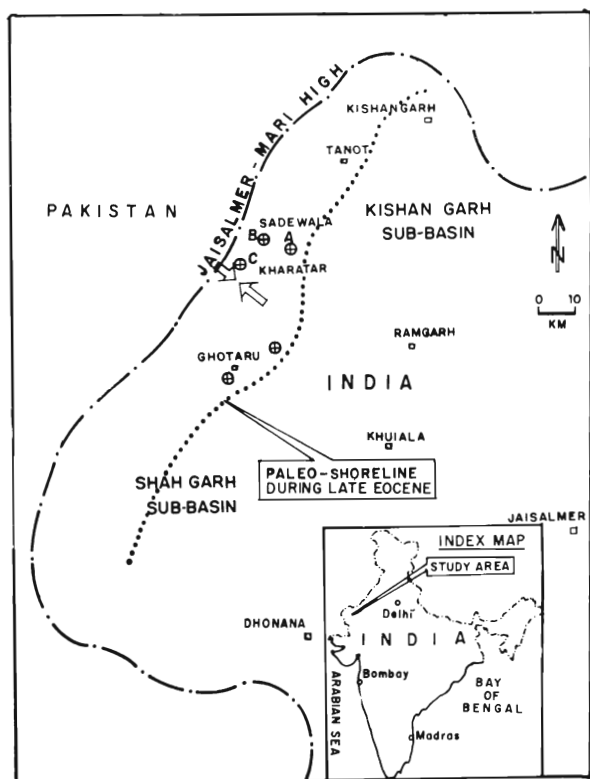


Fig. 1. Map showing location of wells and a probable paleo-shore during Late Eocene.

The characteristic ostracodes recorded from the upper part of the Bandah Formation (glauconitic clays) include: *Acanthocythereis decoris* Siddiqui, *Alocopocythere transversa* morphotype E Siddiqui, *Bairdoppilata* Sp., *Cytherella* sp., *Cytherelloidea* sp., *Echinocythereis (Scelidocythereis) multibullata* Siddiqui, *Echinocythereis (Scelidocythereis) sahnii* (Tewari and Tandon), *Patagonocythere? nidulus* Siddiqui, *Hornibrookella subquadra* Siddiqui, *Krithe indica*, *Paijenborchella (Eopaijenborchella) sp.*, *Propontocypris* sp., *Stigmatocythere lumaria* Siddiqui and *Uroleberis* cf. *U. armenica* Neale and Singh. Most of these ostracodes have been described by Siddiqui (1971) from the Late Eocene sequence of the Rakhi Nala and Zao River sections of the Sulaiman Range, Pakistan. The main aim of the present paper is to describe and illustrate the Late Eocene Ostracode of the Rajasthan Basin, which has been hitherto considered as a hiatus. The distribution of important Late Eocene ostracodes has been shown in table 1.

The specimens illustrated in this paper are deposited in the collection of the Regional Geology Laboratory, Oil and Natural Gas Commission, Baroda and reference to them is designated by BOS catalogue numbers in text and in the plate explanation.

STRATIGRAPHY

The generalised Palaeogene stratigraphy of subsurface sequence of the Jaisalmer Basin has been worked out by Singh (1984) and is summarised in table 2. The Late Eocene microfauna have been recovered from the top of the Bandah Formation, represented by glauconitic clays and calcareous sands.

AGE

The presence of the characteristic ostracodes, i.e.

Table 2 Distribution of Late Eocene Ostracoda in the Subsurface Sequence of Jaisalmer Basin, Rajasthan

Ostracodes	Well# A	Well# B	Well# C
<i>Cytherella</i> Sp.	X	X	X
<i>Cytherelloidea</i> Sp.		X	
<i>Bairdoppilata</i> Sp.	X	X	
<i>Paijenborchella</i> (<i>Eopaijenborchella</i>) Sp.	X	X	X
<i>Krithe indica</i>	X	X	X
<i>Alocopocythere transversa</i> E Siddiqui	X	X	X
<i>Patagonacythere</i> ? <i>nidulus</i> Siddiqui	X	X	X
<i>Echinocythereis</i> (<i>Scelidocythereis</i>) <i>multibullata</i> Siddiqui	X	X	X
<i>Echinocythereis</i> (<i>Scelidocythereis</i>) <i>sahnii</i> (Tewari and Tandon)	X	X	
<i>Hornibrookella subquadra</i> Siddiqui	X	X	X
<i>Stigmatocythere lumaria</i> Siddiqui		X	X
<i>Acanthocythereis decoris</i> Siddiqui	X	X	X
<i>Uroleberis</i> C. F. U. <i>armeniaca</i> Neal And Singh	X	X	X
<i>Propontocypris</i> Sp.	X	X	

Alocopocythere transversa morphotype E, *Echinocythereis* (*Scelidocythereis*) *multibullata*, *Stigmatocythere lumaria* and *Acanthocythereis decoris* and foraminifera, i.e., *Nummulites fabianii*, *N. chavannesi*, *N. pengaronesis*, *Pellatispira* sp., *Baclogypsinoidea* sp., *Discocyclusina dispansa* and *Proporocyclusina* sp. (Sharma & Bhandari, 1986) suggests Late Eocene age.

PALAEOECOLOGY

The ostracode and foraminiferal assemblages in general suggest a warm, shallow inner shelf environment of deposition. The Tethys Sea transgressed across the northwestern part of the Rajasthan Basin via Pakistan during the Late Eocene. On the basis of microfaunal evidence a probable Late Eocene paleo-shoreline has been drawn (Fig.1). The Late Eocene section is preserved only in the basinal area and seems to be absent towards the east of the shoreline drawn

Table 1. Paleogene Stratigraphy of the Sub-surface Sequence of Jaisalmer Basin, Rajasthan (after Singh, 1984)

Age	Formation	Generalised Lithology
Post Eocene	Shumar	Desert Sands & Sand Dunes, Arenaceous Limestone Sandstone and Variegated Clays
Unconformity		
Late Eocene	Bandah	Glauconitic Clays
Middle Eocene		White to Cream Foraminiferal Limestone
Paraconformity		
Early Eocene	Khuijala	Grey-Green Shales With Foraminiferal Limestone Interbedded with Marls
Paraconformity		
Late Palaeocene	Sanu	Glauconitic Limestone And Calcareous Silty Clays With Sands Medium to Coarse Grained Argillaceous Sand Stone
Unconformity		
Cretaceous	Parh	

in figure 1.

SYSTEMATIC DESCRIPTION

Family Cytherellidae SARS, 1866
Genus *Cytherelloidea* ALEXANDER, 1929

Cytherelloidea Sp.
(Plate I—1)

Material : Four carapaces from Sadewala well-B.

Description : Carapace subrectangular in lateral outline, with greatest height anteriorly; right valve overlaps left valve all along margins; dorsal margin nearly straight, ventral sinuate; anterior margin rounded, posterior less so; valve surface with a thick marginal ridge forming single band along periphery, intercostal area smooth.

Dimensions : A Carapace (BOS No. 100), length 0.54mm, height 0.30mm and width 0.15mm.

Remarks : *Cytherelloidea* sp. resembles *Cytherelloidea mitra* described by Sohn (1970) from the Upper Chocolate Clays (Late Eocene) of Pakistan; its lateral outline, however, differs in length/height and length/width ratios. Moreover, *C. mitra* has scattered spinelets, which are absent in the present species.

Family Bairdidae SARS, 1888
Genus *Bairdoppilata* CORYELL, SAMPLE AND JENNINGS, 1935

Bairdoppilata sp.
(Plate I—2)

Material : Eight carapaces from Sadewala well-A and six from well-B.

Description : Carapace subdeltoid in lateral outline, with greatest height anterior to middle; overlap pronounced along dorsal and mid ventral margins; dorsal margin arched, anterodorsal slope gentle, posterodorsal slope intense; ventral margin convex in left valve and concave in right valve; anterior end high, above mid-height, anterior margin broadly rounded downwardly; posterior margin narrowly rounded, posterodorsal margin concave below mid height; in dorsal view carapace biconvex with maximum width near middle, valve surface smooth.

Dimensions : A carapace (BOS No. 102), length 1.16mm, height 0.80mm and width 0.60mm.

Remarks : The present species closely resembles *Bairdoppilata poddari* Lubimova and Mohan, 1960 described from Middle Eocene beds of Kutch. How-

ever, it has a different lateral outline from *B. poddari*.

Genus *Paijenborchella* KINGMA, 1948
Subgenus *Eopaijenborchella* KEIJ, 1966

Paijenborchella (*Eopaijenborchella*) sp.
(Plate I—3)

Material : 2 carapaces from Sadewala well-A and one each from Sadewala well-B and Kharatar well-C.

Description : Carapace subovate in lateral outline, with greatest height at anterior cardinal angle; dorsal margin straight, inclined posteriorly; ventral margin straight; anterior margin obliquely rounded; posterior margin with long caudal process subventrally; in dorsal view carapace biconvex, ends compressed; valve surface marked with deep vertical sulcus, traversed by small median ridge and a prominent ventral ridge concave upwards. Surface of the valve distinctly reticulate.

Dimensions : A carapace (BOS No. 103), length 0.60mm, height 0.33mm and width 0.30mm.

Remarks : The present species resembles *Paijenborchella tewarii* described by Guha, 1971 from the Upper Eocene, Cambay, Western India in general appearance and ornamentation. *P. tewarii* has caudal process at mid height and has indistinct reticulation. These two species also differ in length/height and length/width ratios.

Family Trachyleberididae SYLVESTER-BRADLEY, 1948

Genus *Patagonacythere* HARTMANN, 1962

Patagonacythere ? *nidulus* SIDDIQUI
(Plate I—4)

Patagonacythere ? *nidulus* Siddiqui, 1971, pp 54-56, pl.28, figs 5-12; pl 29, figs. 1-4.

Diagnosis : Carapace subrectangular in lateral outline, with greatest height at anterior cardinal angle. Valve surface strongly reticulate with three longitudinal ridges and a rim along anterior, ventral and posterior margins; dorsal ridge thinly developed, convex upwards; ventral ridge strongly developed, slopes obliquely, upward towards posterior; median ridge short convex upwards; subcentral tubercle prominent, composed of reticulate complex.

Dimensions : A carapace (BOS No. 103), length 0.75mm, height 0.45mm and width 0.45mm.

Remarks : Except for having median ridge short and convex upwards, the present specimens are

similar to *Patagonacythere? nidulus* Siddiqui (1971), described from the Upper Chocolate Clays (Upper part) from the Zao River and Rakhi Nala sections Pakistan.

Genus Alocopocythere SIDDIQUI, 1971

Alocopocythere transversa morphotype E, SIDDIQUI
(Plate I—Figs. 5-7)

Alocopocythere transversa morphotype E, Siddiqui, 1971, pp. 19-22, pl.7, figs. 5-8 and pl.8, figs 1,3 and 5.

Diagnosis : Carapace subrectangular in lateral outline with three posterior transverse concentric ridges; a short ridge in anteroventral area runs obliquely from anterior towards venter; surface reticulate with superimposed papillae or surface papillose.

Dimensions : A carapace (BOS No.104), length 1.00mm, height 0.56mm and width 0.60mm; a carapace (BOS No. 105), length 0.90mm, height 0.50mm, width 0.50mm; a carapace (BOS No. 106), length 0.90mm, height 0.56mm and width 0.55mm.

Remarks : The present specimens are similar to *Alocopocythere transversa* E, described by Siddiqui (1971), from the Upper Chocolate Clays (Upper part) and *Pellatispira* beds of the Rakhi Nala and Zao river sections of Pakistan.

In the present, material the forms of *A. transversa* morphotype E with superimposed reticles with papillae are frequent. In the Kharatar well, at the base of the Glauconitic clays, the forms of *A. transversa* morphotype E are frequent.

Genus Echinocythereis PURI, 1954

Echinocythereis (Scelidocythereis) multibullata SIDDIQUI,
(Plate I—8)

Echinocythereis (Scelidocythereis) multibullata Siddiqui, 1971, pp. 34-35, pl.16, figs. 3-9 and pl.17, figs. 1,2,8.

Diagnosis : Carapace subrectangular in lateral outline, with greatest height anteriorly. Surface ornamented with tubercles, subcentral tubercle prominent and composed of 3-4 nodes; a prominent ventral ridge.

Dimensions : A carapace (BOS No. 107), length 0.90mm, height 0.52mm and width 0.40mm.

Remarks : The present specimens recorded are similar to *Echinocythereis (Scelidocythereis) multibullata* Siddiqui (1971), from the Upper Chocolate Clays (Upper part) of the Zao River section, Pakistan.

Echinocythereis (Scelidocythereis) sahnii
(TEWARI AND TANDON)
(Plate I—9)

Hemicythere sahnii Tewari and Tandon, 1960, pl.4 pp. 157, text fig. 4, fig. 19-d

Echinocythereis (Scelidocythereis) rasilis Siddiqui, 1971 pp. 36-37, pl. 17, figs. 1-3, 5-7.

Diagnosis : Carapace subreniform in lateral outline with greatest height at anterior cardinal angle, dorsal margin arched with a concavity behind the anterior cardinal angle, ventral margin concave in middle; anterior and posterior margins denticulate. Surface sparsely tuberculate with two ventral ridges.

Dimensions : A carapace (BOS No. 108), length 0.75mm, height 0.45mm and width 0.38mm.

Remarks : The present specimens are identical to *Echinocythereis (Scelidocythereis) sahnii* (Tewari and Tandon) described from the Middle Eocene beds of Kutch.

Genus Quadracythere HORNIBROOK, 1952

Subgenus Hornibrookella MOOS, 1965

Hornibrookella subquadra SIDDIQUI
(Plate I—10)

Quadracythere (Hornibrookella) subquadra Siddiqui, 1971 pp. 68-69, pl. 34, figs. 6-11

Diagnosis : Carapace subquadrate in lateral outline, with a short caudal process; subcentral tubercle prominent, eye tubercle distinct. Surface coarsely and deeply reticulate, distinct ventral ridge and a short curved horn-like ridge at posterodorsal corner.

Dimensions: A carapace (BOS No. 109), length 0.56mm, height 0.32mm and width 0.30mm.

Remarks : The present specimens are similar to *Hornibrookella subquadra* described by Siddiqui, 1971 from Upper Chocolate Clays (Upper part), Zao River section, Pakistan. The specimens recorded from the Jaisalmer Basin are slightly smaller in size.

Genus Stigmatocythere SIDDIQUI, 1971

Stigmatocythere lumaria morphotype A SIDDIQUI
(Plate I—11-12)

Stigmatocythere lumaria morphotype A, Siddiqui, 1971, pp 75-77 pl. 38, figs. 1-10, pl. 39, figs. 10-8, 11.

Diagnosis : Carapace subrectangular in lateral outline, dorsal margin straight, ventral margin slightly concave anteroventrally; anterior margin broadly rounded with numerous small denticles, posterior ex-

tremity more or less rounded. Eye tubercle distinct, subcentral tubercle bilobate, two ridges springing from eye tubercle, one to form high marginal rim, the other curving sharply round to join subcentral tubercle. Surface ornamentation consists of a combination of reticulation and tubercles, with three tubercles in mid-dorsal region.

Dimensions : A carapace (BOS No. 110), length 0.70mm, height 0.35mm, width 0.35mm; A complete carapace (BOS No. 111), length 0.64mm, height 0.38mm, width 0.30mm.

Remarks : In the present material the specimens recorded are similar to *Stigmatocythere lumaria* morphotype A recorded by Siddiqui, 1971, from Upper Chocolate Clays (Upper part) from the Rakhi Nala and Zao River sections of Pakistan.

Genus *Acanthocythereis* HOWE, 1963

Acanthocythereis decoris SIDDIQUI
(Plate I—13)

Trachyleberis (Acanthocythereis) decoris Siddiqui, 1971 pp. 60-61, pl.40, figs. 12-13, pl. 41, figs. 1,3,4

Diagnosis : Sexual dimorphism pronounced, carapace elongate, subrectangular with dorsal and ventral margins almost straight and subparallel; anterior margin broad and evenly rounded; posterior margin subtriangular, ornamented by double row of short spines. Surface reticulate with superimposed pustules. Eye tubercle distinct, subcentral tubercle indistinct.

Dimensions : A carapace (BOS No. 112), length 0.55mm, height 0.30mm and width 0.25mm.

Remarks : The present specimens recorded from the subsurface sequence of the Jaisalmer Basin are identical to *Trachyleberis (Acanthocythereis) decoris* described by Siddiqui (1971) from the Upper Chocolate Clays (Upper part) of the Rakhi Nala section of Pakistan.

Family *Xestoleberidae* SARS, 1928

Genus *Uroleberis* TRIEBEL, 1958

Uroleberis cf. *U. armeniaca* NEALE AND SINGH
(Plate I-14)

cf. *Uroleberis armeniaca* Neale and Singh, 1985 p. 381, pl.46, figs. 7-9

Material : Four complete carapaces from

Sadewala well-A, two complete carapaces from Sadewala well-B.

Description : Carapace subovate in lateral outline and biconvex in dorsal view; anterior margin narrowly rounded, posterior margin broadly rounded with short caudal process near mid-height, dorsal margin strongly arched, ventral margin convex. Valve surface densely pitted, pits arranged in concentric pattern.

Dimensions : A carapace (BOS No. 113), length 0.40mm, height 0.25mm and width 0.30mm.

Remarks : Except for the strongly convex ventral margin and concentric arrangement of pits, the present specimens from the Jaisalmer Basin are similar to *Uroleberis armeniaca* described by Neale and Singh (1985) from the Middle Eocene of Assam.

Family *Pontocypridae* MULLER, 1894

Genus *Propontocypris* SYLVESTER-BRADLEY, 1947

Propontocypris sp.
(Plate I—11-15)

Material : Five carapaces from Sadewala well-A and three carapaces from Sadewala well-B.

Description : Carapace subtriangular in lateral outline, with greatest height anterior to middle, right valve larger than left valve, overlapping distinctly along dorsal margin, dorsal margin angulate, ventral margin nearly straight; anterior margin narrowly rounded, posteroventral angulate; in dorsal view carapace lanceolate with maximum width anterior to middle.

Dimensions : A carapace (BOS No. 114), length 0.65mm, height 0.40mm and width 0.35mm.

Remarks : The present species closely resembles *P. eocaenica* Neale and Singh (1985) described from the Middle Eocene of Assam. However, *P. eocaenica* is smaller in size with a distinct overlap along ventral margin.

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EXPLANATION OF PLATE

PLATE 1

- 1 *Cytherelloidea* sp.
A carapace (BOS No. 100), left valve lateral view, X 94
- 2 *Bairdoppilata* sp.
A carapace (BOS No. 101), right valve lateral view, X 44.
- 3 *Paijenborchella* (*Eopaijenborchella*) sp.
A carapace (BOS No. 102), right valve lateral view, X 85.
- 4 *Patagonacythere ? nidulus* Siddiqui
A carapace (BOS No. 103), right valve lateral view, X 64.
- 5 *Alocopocythere transversa* morphotype A Siddiqui
A male carapace (BOS No. 104), lateral view, X 52.
- 6-7 *Alocopocythere transversa* morphotype E Siddiqui
6 A carapace (BOS No. 105), right valve lateral view, X 56.
7 A carapace (BOS No. 106), right valve lateral view, X 56.
- 8 *Echinocythereis* (*Scelidocythereis*) *multibullata* Siddiqui
A female carapace (BOS No. 107), lateral view, X 57.
- 9 *Echinocythereis* (*Scelidocythereis*) *sahnii* (Tewari and Tandon)
A carapace (BOS No. 108), left valve lateral view, X 68.
- 10 *Hornibrookella subquadra* Siddiqui
A carapace (BOS No. 109), left valve lateral view, X 91.
- 11-12 *Stigmatacythere lumaria* Siddiqui
11 A carapace (BOS No. 110), right valve lateral view, X 71.
12 A carapace (BOS No. 111), dorsal view, X 81.
- 13 *Acanthocythereis decoris* Siddiqui
A carapace (BOS No. 112), right valve lateral view, X 93.
- 14 *Uroleberis* cf. *U. armeniaca* Neale and Singh
A carapace (BOS No. 113), right valve lateral view, X 127.
- 15 *Propontocypris* sp.
A carapace (BOS No. 114), left valve lateral view, X 80.

