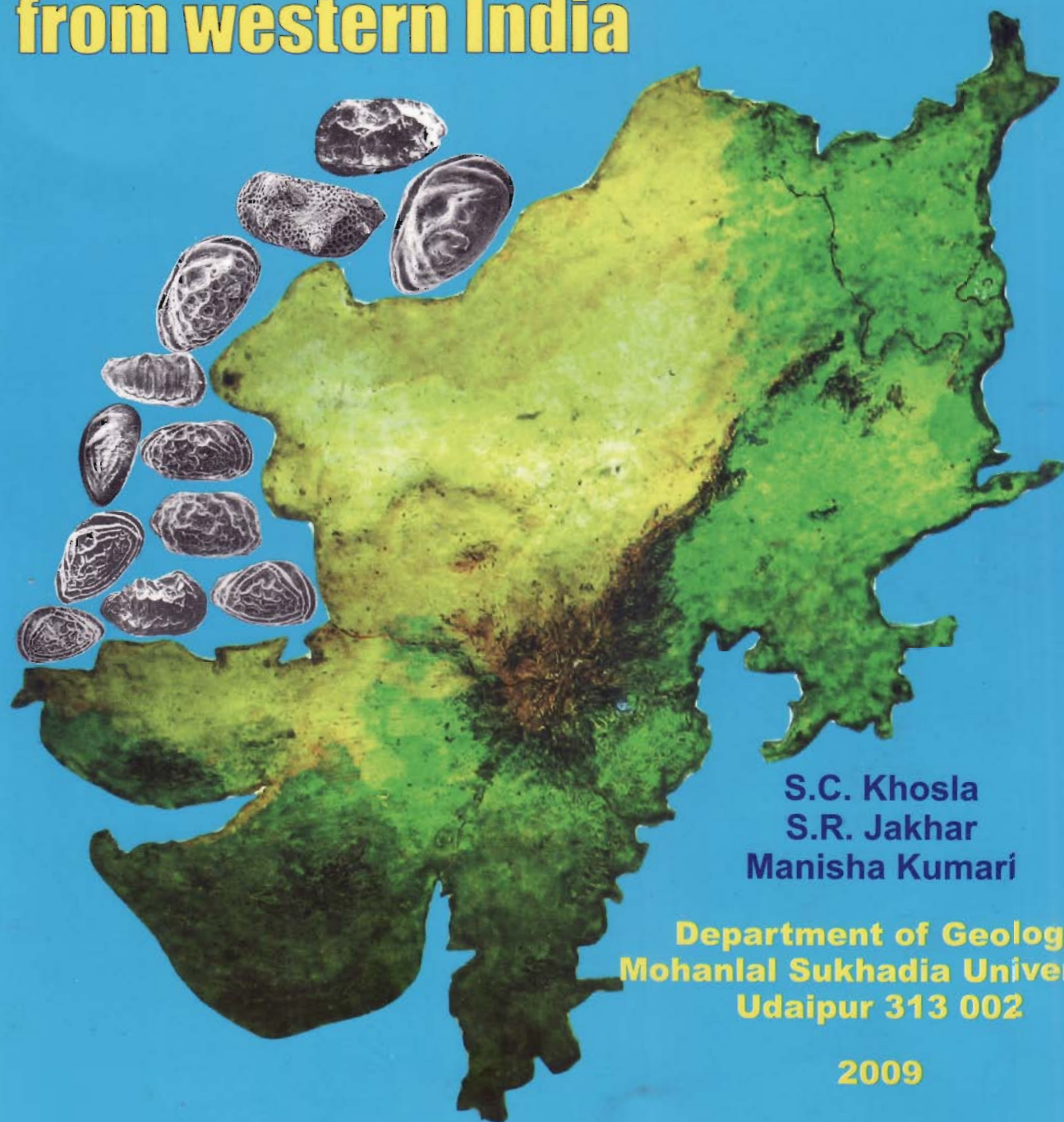


Atlas of the Middle Jurassic Ostracods from western India



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Udaipur 313 002

2009



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Lucknow**

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THE PALAEOLOGICAL SOCIETY OF INDIA
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Price : Inland : Rs. 5000.00
Foreign : US\$ 100.00

CONTENTS

Acknowledgements	i
Introduction	1
Previous Work	3
Classification of the Mesozoic	6
Kachchh	6
Jaisalmer	8
Stratigraphy	8
Biostratigraphical Zonation	16
Systematics	21
Taxonomic comments on the Genus <i>Fastigatocythere</i> Wienholz, 1967	21
<i>Acrocythere oculata</i> Mette and Geiger	32
<i>Anchistrocheles</i> sp. A	32
<i>Anchistrocheles</i> sp. B	34
<i>Bairdoppilata badiensis</i> (Khosla, Jakhar and Mohammed)	34
<i>Bairdoppilata jhuraensis</i> (Khosla, Jakhar and Mohammed)	36
<i>Bairdoppilata</i> sp. A	36
<i>Bairdoppilata</i> sp. B	38
<i>Bairdoppilata</i> ? sp. C	38
<i>Bairdoppilata</i> sp. D	40
<i>Bairdoppilata</i> sp. E	40
<i>Bairdoppilata</i> sp. F	42
<i>Bairdoppilata</i> sp. G	42
<i>Bhatiana indica</i> Mannikeri	44
<i>Bythocypris rajasthanensis</i> Khosla and Jakhar	44
<i>Citrella belaensis</i> Khosla, Manisha Kumari and Darwin Felix	46
<i>Cytherella disjuncta</i> Lyubimova and Mohan	46
<i>Cytherella jaisalmerensis</i> Khosla and Jakhar	48
<i>Cytherella kalajarensis</i> Khosla and Jakhar	48
<i>Cytherella masuguluensis</i> Bate	50
<i>Cytherella obscura</i> Lyubimova and Mohan	50
<i>Cytherella</i> sp.	52
<i>Cytherelloidea badiensis</i> Khosla, Jakhar and Mohammed	52
<i>Cytherelloidea bhujensis</i> Khosla, Jakhar and Mohammed	54
<i>Cytherelloidea dhrangensis</i> Khosla and Jakhar	54
<i>Cytherelloidea difficila</i> Lyubimova and Mohan	56
<i>Cytherelloidea ipis</i> Grekoff	56
<i>Cytherelloidea kuldharensis</i> Khosla and Jakhar	58
<i>Cytherelloidea langijarensis</i> Khosla, Jakhar and Mohammed	58
<i>Cytherelloidea paradifficila</i> Khosla, Jakhar and Mohammed	60
<i>Cytherelloidea</i> sp. A	60
<i>Cytherelloidea</i> sp. B	62
<i>Cytherelloidea</i> sp. C	62
<i>Cytheropteron agrawali</i> (Khosla, Jakhar and Mohammed)	64

<i>Cytheropteron devai</i> (Khosla, Jakhar and Mohammed)	64
<i>Cytheropteron kutchensis</i> Neale and Singh	66
<i>Cytheropteron lellapadiensis</i> Khosla and Jakhar	66
<i>Cytheropteron micropunctata</i> Khosla, Darwin Felix and Manisha Kumari	68
<i>Cytheropteron pandeyi</i> (Khosla, Jakhar and Mohammed)	68
<i>Cytheropteron rajasthanensis</i> Khosla and Jakhar	70
<i>Cytheropteron sajjaniae</i> (Khosla, Jakhar and Mohammed)	70
<i>Cytheropteron</i> sp. A	72
<i>Cytheropteron</i> sp. B	72
<i>Cytheropteron</i> sp. C	74
<i>Darwinula</i> sp.	74
<i>Eocytheridea?</i> sp.	76
<i>Eucytherura</i> sp. A	76
<i>Eucytherura</i> sp. B	78
<i>Fabanella</i> sp.	78
<i>Fastigatocythere</i> (<i>Fastigatocythere</i>) <i>jaisalmerensis</i> Khosla and Jakhar	80
<i>Fastigatocythere</i> (<i>Fastigatocythere</i>) <i>retusa</i> (Grekoff)	80
<i>Fastigatocythere</i> (<i>Amicytheridea</i>) <i>flebilis</i> Khosla and Darwin Felix	82
<i>Fastigatocythere</i> (<i>Amicytheridea</i>) <i>globosa</i> Mette and Geiger	82
<i>Fastigatocythere</i> (<i>Amicytheridea</i>) <i>indica</i> Khosla and Manisha Kumari	84
<i>Fastigatocythere</i> (<i>Amicytheridea</i>) <i>kachchhensis</i> Khosla and Darwin Felix	84
<i>Fastigatocythere</i> (<i>Amicytheridea</i> ?) <i>pachchhamensis</i> Khosla and Darwin Felix	86
<i>Fastigatocythere</i> (<i>Amicytheridea</i>) <i>triangulata</i> (Bate)	86
<i>Fastigatocythere</i> (<i>Batella</i>) <i>befotakaensis</i> (Grekoff)	88
<i>Fastigatocythere</i> (<i>Batella</i>) <i>belaensis</i> Khosla and Manisha Kumari	88
<i>Fastigatocythere</i> (<i>Batella</i>) <i>clavata</i> (Khosla, Jakhar and Mohammed)	90
<i>Fastigatocythere</i> (<i>Batella</i>) <i>depressa</i> (Khosla, Jakhar and Mohammed)	90
<i>Fastigatocythere</i> (<i>Batella</i>) <i>falcula</i> (Grekoff) s.s.	92
<i>Fastigatocythere</i> (<i>Batella</i>) <i>falcula</i> (Grekoff), Morphotype A	92
<i>Fastigatocythere</i> (<i>Batella</i>) <i>falcula</i> (Grekoff), Morphotype B	94
<i>Fastigatocythere</i> (<i>Batella</i>) <i>falcula</i> (Grekoff), Morphotype C	94
<i>Fastigatocythere</i> (<i>Batella</i>) sp. A	94
<i>Fastigatocythere</i> (<i>Batella</i>) sp. B	96
<i>Fastigatocythere</i> (<i>Habocythere</i>) <i>bicrucata</i> (Grekoff)	96
<i>Fastigatocythere</i> (<i>Habocythere</i>) <i>diluta</i> (Khosla and Jakhar)	98
<i>Fastigatocythere</i> (<i>Habocythere</i>) <i>dorsoangulata</i> (Grekoff)	98
<i>Fastigatocythere</i> (<i>Habocythere</i>) <i>elongata</i> Khosla and Manisha Kumari	100
<i>Fastigatocythere</i> (<i>Habocythere</i>) <i>jakhari</i> Khosla, Darwin Felix and Manisha Kumari	100
<i>Fastigatocythere</i> (<i>Habocythere</i>) <i>juglandica malgachica</i> (Grekoff)	102
<i>Fastigatocythere</i> (<i>Habocythere</i>) <i>mouwanaensis</i> Khosla and Manisha Kumari	102
<i>Fastigatocythere</i> (<i>Habocythere</i>) <i>ventrisulcata</i> (Khosla, Jakhar and Mohammed)	104
<i>Fastigatocythere</i> (<i>Habocythere</i>) sp.	104
<i>Galliaecytheridea grekoffi</i> Khosla and Jakhar	106
<i>Galliaecytheridea gujaratensis</i> Khosla and Darwin Felix	106
<i>Galliaecytheridea lodraniensis</i> Khosla and Manisha Kumari	108
<i>Galliaecytheridea remota</i> Grekoff	108
<i>Galliaecytheridea satyendrai</i> (Khosla, Jakhar and Mohammed)	110
<i>Glabellacythere hussaini</i> Khosla, Darwin Felix and Manisha Kumari	110
<i>Glabellacythere mathuri</i> (Khosla, Jakhar and Mohammed)	112
<i>Glabellacythere</i> sp.	112
<i>Lophocythere mannikerii</i> Khosla and Jakhar	114

<i>Lophocythere vertipolycostata</i> Khosla and Manisha Kumari	114
<i>Majungaella perforata</i> Grekoff	116
<i>Majungaella perforata kachchhensis</i> Khosla, Jakhar and Mohammed	116
<i>Majungaella rasilis</i> Khosla, Jakhar and Mohammed	118
<i>Mandawacythere curvicosta</i> Neale and Singh	118
<i>Mandawacythere kachchhensis</i> Khosla, Manisha Kumari and Darwin Felix	120
<i>Mandawacythere multicostata</i> Khosla and Manisha Kumari	120
<i>Mandelstamia banniensis</i> (Neale and Singh)	122
<i>Mandelstamia biswasi</i> Khosla, Manisha Kumari and Darwin Felix	122
<i>Mandelstamia kachchhensis</i> Khosla, Darwin Felix and Manisha Kumari	124
<i>Micropneumatocythere masurdiensis</i> Khosla and Jakhar	124
<i>Micropneumatocythere rasilis</i> Khosla and Jakhar	126
<i>Monoceratina fortensis</i> Khosla and Jakhar	126
<i>Monoceratina mouwanaensis</i> Khosla and Manisha Kumari	128
<i>Monoceratina parascrobiculata</i> Khosla and Jakhar	128
<i>Monoceratina rannensis</i> Khosla and Manisha Kumari	130
<i>Morkhovenicythereis rectangularis</i> Khosla, Manisha Kumari and Darwin Felix	130
<i>Neurocythere denticulata</i> (Kulshreshtha, Singh and Tewari)	132
<i>Neurocythere kachchhensis</i> Khosla and Manisha Kumari	132
<i>Neurocythere kuldharensis</i> Khosla and Jakhar	134
<i>Neurocythere whatleyi</i> (Khosla and Jakhar)	134
<i>Oligocythereis minuta</i> Kulshreshtha, Singh and Tewari	136
<i>Paracypris contermia</i> Lyubimova and Mohan	136
<i>Paracypris kachchhensis</i> Khosla and Darwin Felix	138
<i>Paracypris mohani</i> Khosla, Darwin Felix and Manisha Kumari	138
<i>Paracypris salmiformis</i> Neale and Singh	140
<i>Paranotacythere</i> sp.	140
<i>Procytheridea ihopyensis</i> Grekoff	142
<i>Procytheridea kachchhensis</i> Khosla, Jakhar and Mohammed	142
<i>Progonocythere haboensis</i> Khosla and Jakhar	144
<i>Progonocythere jaisalmerensis</i> Khosla, Jakhar, Nagori and Darwin Felix	144
<i>Progonocythere laeviscula</i> Lyubimova and Mohan	146
<i>Progonocythere sadharaensis</i> Khosla and Jakhar	146
<i>Progonocythere tharensis</i> Khosla and Jakhar	148
<i>Progonocythere tenuisulcata</i> (Mette and Geiger)	148
<i>Protobuntonia</i> sp.	150
<i>Pseudoperissocytheridea concentrica</i> Khosla, Manisha Kumari and Darwin Felix	150
<i>Schuleridea (Eoschuleridea) soodani</i> Khosla, Jakhar and Mohammed	152
<i>Theriosynoecum</i> sp.	152
<i>Timiriasevia khadirensis</i> Khosla and Darwin Felix	154
<i>Trichordis amraparensis</i> Khosla and Darwin Felix	154
<i>Trichordis devexa</i> (Grekoff)	156
<i>Trichordis grumosa</i> (Lyubimova and Mohan)	156
<i>Trichordis gujaratensis</i> Khosla, Jakhar and Mohammed	158
<i>Trichordis hadibhadangensis</i> Khosla, Darwin Felix and Manisha Kumari	158
<i>Trichordis jaisalmerensis</i> (Kulshreshtha, Singh and Tewari)	160
<i>Trichordis parvicarinata</i> Khosla and Jakhar	160
<i>Trichordis praetexta</i> Grekoff	162
Genus A	162
References	164

ACKNOWLEDGEMENTS

The present atlas is based on the extensive works carried out on the Middle Jurassic ostracods of Kachchh District, Gujarat and Jaisalmer District, Rajasthan during the last one and a half decades in the Department of Geology, Mohanlal Sukhadia University, Udaipur by the first author (Dr. S. C. Khosla) and his Ph.D. research scholars namely Dr. S. R. Jakhar, Dr. Maki H. Mohammed, Dr. Manisha Kumari, Dr. A. Darwin Felix and Mr. Sanjay Dubey. The first author is solely responsible for the write up of the atlas. Dr. S. R. Jakhar, Assistant Professor and Dr. Manisha Kumari, Fast Track Fellow, D.S.T., both of the Department of Geology, Mohanlal Sukhadia University immensely helped him in taking S.E.M. photographs of the ostracod species, preparing plates and other illustrations accompanying the atlas.

Besides the research scholars, Dr. M. L. Nagori, Associate Professor, Department of Geology, Mohanlal Sukhadia University was co-investigator with the authors in study of ostracod fauna from the Middle Jurassic of Northern Island Belt, Rann of Kachchh for which sincere appreciation is due to him. The authors are highly thankful to the Head of Department of Geology, Mohanlal Sukhadia University for kindly extending library and laboratory facilities, including SEM.

The first author is also greatly thankful to the Vice Chancellor, Mohanlal Sukhadia University for his permission to carry out research work in the department after author's superannuation from active university service; to DST for award of Project No. ESS/23/033/98 during 1999-2003 when bulk of the work included in the atlas was carried out; and to the All India Council for Technical Education (A Statutory Body of the Government of India, New Delhi) for award of Emeritus Fellowship vide its letter No. 1-51/FD/EF (05)/2002-2003/I dated 30.05.2002 which enabled him to undertake the preparation of this atlas.

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INTRODUCTION

The ostracods are widely recognized amongst the best microfossils for palaeo-environmental interpretations. They are equally valuable as stratigraphical tool for age dating, correlation and palaeogeography. Ostracods have several advantages over other groups of microfossils, e.g. i, they cover the entire Phanerozoic time scale; ii, they are metazoans and possess better understood speciation modalities; and iii, they are present in nearly all aquatic environments, from terrestrial (soil, epiphytal plants), freshwater to abyssal depths in the oceans, thus they can be used effectively in zoning almost all types of facies, including brackish or lacustrine deposits which are not usually frequented by other groups of fossils. By virtue of these characteristics ostracods find extensive applications in petroleum exploration to answer various geological problems.

In so far as study of ostracods from India is concerned fairly good works have been done on the Mesozoic and Tertiary formations during the past 4 to 5 decades. These are scattered in large number of publications and often they are not readily accessible to individual workers. It has been observed that in many papers, especially those published prior to 1980, the figures of ostracods are camera lucida sketches or optical photomicrographs of poor quality rendering their recognition difficult. The diagnoses too in certain cases are inadequate or not precise. To overcome these lacunae it is desirable to have atlas and/or index of the known ostracod species of the country with SEM photographs of high quality. The "Atlas of Paleogene ostracods of Rajasthan Basin" brought out by Bhandari (1996) was the first attempt in this regard. This was followed by "Atlas of Early and Middle Miocene ostracods from West Coast of India" by Bhandari, Khosla and Nagori (2001). The

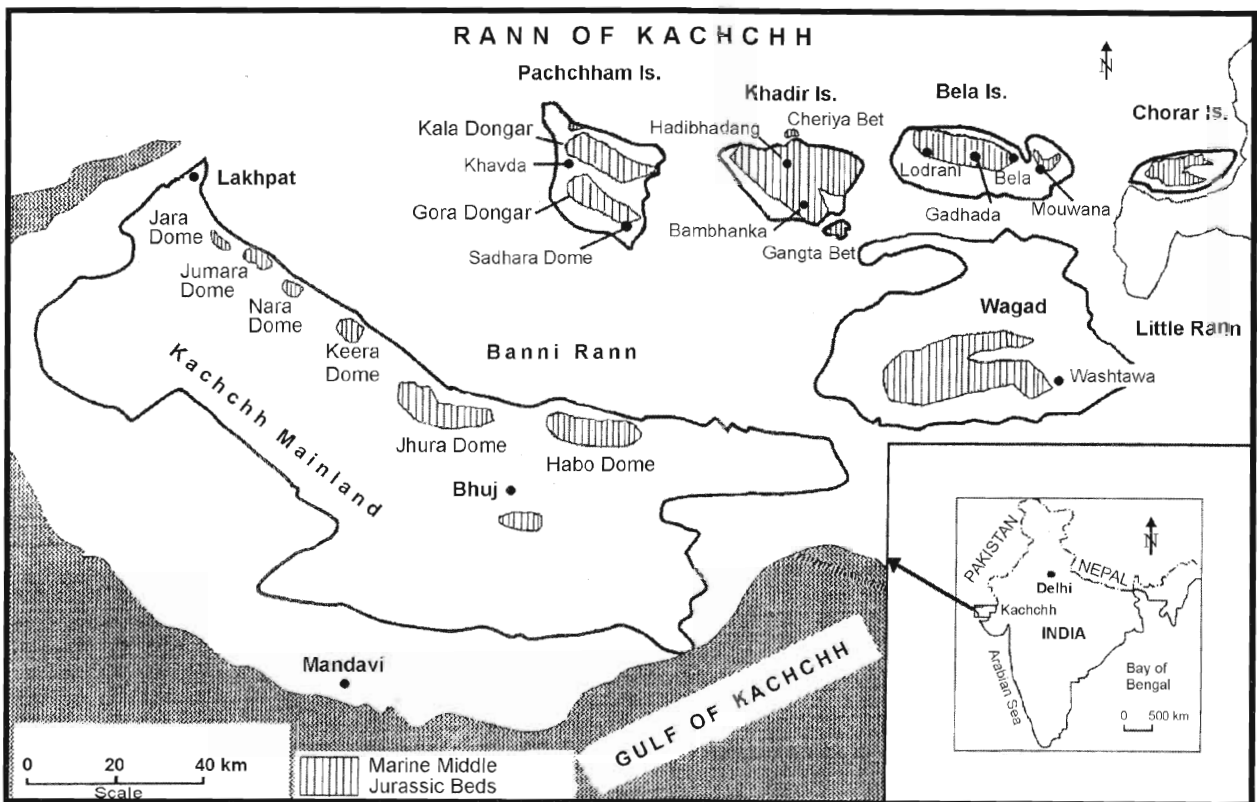


Fig. 1. Sketch map of the Kachchh and adjoining regions.

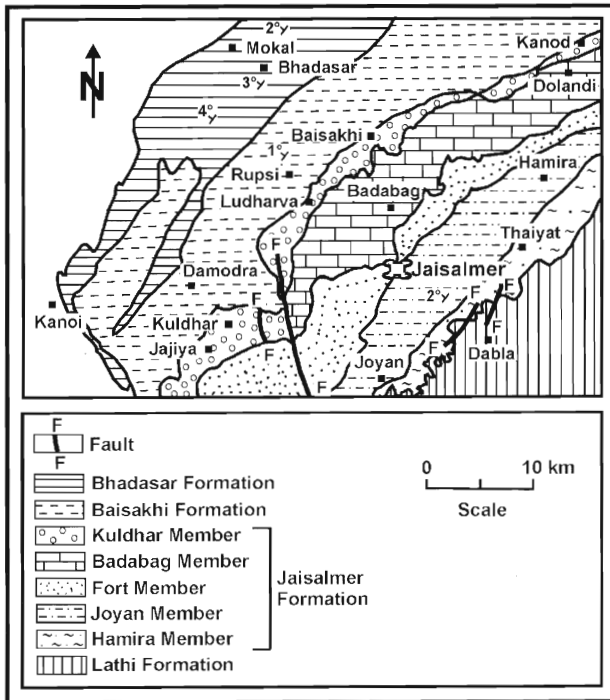


Fig. 2. Geological map of the Jaisalmer Formation, Jaisalmer, Rajasthan (after Dave and Chatterjee, 1996).

present “Atlas of the Middle Jurassic ostracods from western India” is third in the series.

The Middle Jurassic beds in western India are extensively developed in Kachchh District of Gujarat State and Jaisalmer District in Rajasthan State. These beds represent marine facies and are rich in both macro and microfaunas. In Kachchh District the beds crop out in three east-west trending anticlinal hill ranges and an isolated mass near Wagad. The three hill ranges are broken up by transverse undulations into number of domes, the erosion of which has exposed successive beds in a concentric series of small scarps, which afford an ideal opportunity to the fossil collector. In Jaisalmer District the beds are exposed in a stretch extending between Thaiyat Village in the east and Ludharva Village in west of Jaisalmer Town. A total of 130 Middle Jurassic ostracod species from Habo, Jhura and Jumara domes, Mainland Kachchh; Pachchham, Khadir and Bela islands (part of the Northern Island Belt), Rann of

Kachchh; and Jaisalmer District are included in the atlas (Figs. 1-2). By and large the type materials of species described by Khosla and Jakhar (1993), Khosla *et al.* (1997, 2003a, 2003c, 2005, 2006) and some topo type materials of other species have been illustrated in the atlas. Brief diagnoses of all ostracod species, supported by SEM photographs, are given in alphabetical order.

On the basis of distribution of ostracods three range zones, in ascending order: *Progonocythere laeviscula* Range Zone (late Bathonian-early Callovian), *Majungaella perforata kachchhensis* Partial Range Zone (mid-late Callovian) and *Majungaella perforata kachchhensis* - *Galliaecytheridea remota* Concurrent Range Zone (mid-late Callovian) are recognized in the Middle Jurassic of Mainland Kachchh; five range zones: *Trichordis hadibhadangensis* Range Zone (Bajocian-Bathonian), *Cytheropteron micropunctata* Range Zone (Bathonian), *Progonocythere laeviscula* Range Zone (late Bathonian-early Callovian), *Fastigatocythere (Habocythere) mouwanaensis* Range Zone (Callovian) and *Majungaella perforata kachchhensis* - *Galliaecytheridea remota* Concurrent Range Zone (mid-late Callovian) in the Northern Island Belt, Rann of Kachchh; and four range zones: *Trichordis hadibhadangensis* Range Zone (Bajocian-Bathonian), *Majungaella perforata kachchhensis* - *Fastigatocythere (Batella) falcula* Concurrent Range Zone (late Bathonian-early Callovian), *Majungaella perforata kachchhensis* - *Galliaecytheridea remota* Concurrent Range Zone (mid-late Callovian) and *Majungaella perforata kachchhensis* - *Galliaecytheridea remota* Interval Zone (mid-late Callovian) in Jaisalmer District. The common zones in three regions compare well with each other and are extremely useful in correlation. They have been standardized with foraminiferal and ammonite zones wherever possible.

PREVIOUS WORK

Kachchh

The ostracods from the Jurassic of Kachchh did not receive any attention from micropalaeontologists until 1960 when Lyubimova and Mohan (in Lyubimova *et al.*) described, among others, eight species (all new) from Khavda and Lodai localities. These are: *Cytherella disjuncta*, *C. obscura*, *Cytherelloidea difficila*, *Paracypris contermia*, *Progonocythere grumosa*, *P. implicata*, *P. laeviscula* and *P. prolata*.

Subsequently, Guha (1977) recorded 18 species, including one new, from the late Jurassic and early Cretaceous subsurface succession of well No. 2, Banni, Rann of Kachchh. The check list of these ostracods is as follows: *Cytherella index* Oertli, *Cytherella* sp. cf. *C. 962* Grekoff, *Cytheropteron corrosum* Grekoff, *Fastigatocythere accessa* (Grekoff), *Fastigatocythere* sp., *Majungaella brentonensis* Dingle, *M. nematis* Grekoff, *M. perforata* Grekoff, *Mantelliana* sp., *Paracypris contermia* Lyubimova and Mohan, *Paracypris* sp., *Pirileberis prognata* Grekoff, *Pontocyprilla* sp., *Progonocythere befotakaensis* Grekoff, *P. kutchensis* Guha, *P. laeviscula* Lyubimova and Mohan, *Trichordis* sp. cf. *T. praetexta crispa* Grekoff and Ostracoda gen. indet. Though all the species were illustrated, no description was given of the new taxon - *P. kutchensis*.

Neale and Singh (1986) re-examined the ostracod fauna of the previously mentioned well No. 2, Banni, Rann of Kachchh and reported the presence of a much richer fauna comprising 34 species. These included following 19 new species: *Cytherella guhai*, *C. indica*, *C. rannensis*, *Cytheropteron banniensis*, *C. guhai*, *C. kutchensis*, *Galliaecytheridea wahii*, *Hutsonia asiatica*, *Majungaella biswasi*, *Mandawacythere? curvicosta*, *Metacytheropteron posteroacuminata*, *M. ventrocostata*, *Nophreacythere orientalis*, *Paracypris salmi-*

formis, *Polycope kutchensis*, *P. rotunda*, *P. unituberculata*, *Progonocythere banniensis* and *Pseudoperissocytheridea indica*. Other recorded species are: *Afrocytheridea? sp.*, *Bairdia* sp., *Cytherella* aff. *C. guhai* Neale and Singh, *Fastigatocythere? sp.*, *Galliaecytheridea? sp. juv.*, *Metacytheropteron* sp., *Pontocypris* sp., *Rhadinocythere? sp.*, *Trichordis* sp. cf. *T. triangula* Bate, *Trichordis* sp. juv.?, Genus A, Genus B, *Incertae Sedis* sp. 1, *Incertae Sedis* sp. 2 and *Incertae Sedis* sp. 3.

Khosla *et al.* (1992) observed that Bate (1975) incorrectly designated *Procytheridea ihopyensis* Grekoff (1963) as the type species of the genus *Amicytheridea*. Therefore, they approached the International Commission on Zoological Nomenclature to use its plenary powers to set aside all designations of type species made prior to the ruling requested for the genus *Amicytheridea* Bate, 1975 and having done so to designate *A. triangulata* Bate, 1975 as the type species of that genus. The Commission passed the resolution in favour of these authors.

Khosla and Jakhar (1993) described two species of *Amicytheridea* - *Amicytheridea triangulata* Bate, 1975 and *Amicytheridea* sp. - from the Jurassic of the Habo Dome, Mainland Kachchh. In addition, they established a new subgenus *Paratrichordis* to accommodate four species including one new, *Trichordis triangulata* Bate, 1975 (type species), *T. (Paratrichordis) devexa*, *T. (P.) grumosa* and *T. (P.) parvicarinata* n. sp. The occurrences of the last three species have been reported from the Jurassic of Kachchh.

Khosla *et al.* (1997) described 49 ostracod species from the Jurassic of the Habo Dome, in which two genera - *Batella* and *Habocythere* - 20 species and one subspecies are new. The new taxa are: *Batella clavata*, *B. depressa*, *Cytherella kalajarensis*, *Cytherelloidea bhujensis*, *C. dhrangensis*, *C. langijarensis*, *C. paradifficila*, *Cytheropterina devai*, *C. pandeyi*, *C. sajjaniae*, *Habocythere*

diluta, *H. ventrisulcata*, *Majungaella perforata kachchhensis*, *M. rasilis*, *Mandelstamia depecheae*, *Mesocytheridea? mathuri*, *Nophrecythere whatleyi*, *Procytheridea kachchhensis*, *Progonocythere haboensis*, *Schuleridea (Eoschuleridea) soodani* and *Trichordis (Trichordis) gujaratensis*. Other recorded species are: *Acrocythere? sp.*, *Amicytheridea triangulata* Bate, *Amicytheridea sp.*, *Batella befotakaensis* (Grekoff), *B. falcula* (Grekoff), *Cytherella disjuncta* Lyubimova and Mohan, *C. masuguluensis* Bate, *C. obscura* Lyubimova and Mohan, *Cytherella sp.*, *Cytherelloidea sp. cf. C. atlantolevantiana* Rosenfeld and Honigstein, *C. ipis* Grekoff, *Cytherelloidea sp.*, *Habocythere bicrucata* (Grekoff), *H. malgachica* (Grekoff), *Habocythere sp.*, *Majungaella perforata* Grekoff, *Mandelstamia sp.*, *Nophrecythere denticulata* (Kulshreshtha *et al.*), *N. jaisalmerensis* (Kulshreshtha *et al.*), *Paracypris contermia* Lyubimova and Mohan, *Pirileberis remota* (Grekoff), *Procytheridea ihopyensis* Grekoff, *Progonocythere laeviscula* Lyubimova and Mohan, *Progonocythere sp.*, *Trichordis (Paratrachordis) devexa* (Grekoff), *T. (P.) grumosa* (Lyubimova and Mohan), *T. (P.) parvicarinata* Khosla and Jakhar and *T. (Trichordis) praetexta* Grekoff. Khosla and Jakhar (1997) further gave the stratigraphic distribution of the above stated species in the Chari Formation of Habo Dome.

Khosla and Jakhar (1999) recorded 28 species from the Jurassic of the Jumara Dome. Of these, 25 species have been assigned to taxa already described from the Chari Formation of the Habo Dome by Khosla *et al.* (1997), while three species have been left in open nomenclature. These are: *Anchistrocheles sp.*, *Bairdia sp. A* and *Bairdia sp. B*.

Khosla *et al.* (2003a) recorded for the first time occurrence of a rich assemblage comprising 54 ostracod species from the type section of Khadir Formation, Khadir Island, Rann of Kachchh. Of these 30 species are assigned to the previously known taxa. Twenty-

three species are left in open nomenclature and one species *Lophocythere vertipolycostata* is described as new.

Khosla *et al.* (2003b) recorded 57 species from the Khadir Formation of Bela Island, Rann of Kachchh, of which 31 species are assigned to the previously known taxa from Kachchh and Jaisalmer, while 26 are left in open nomenclature.

Khosla *et al.* (2003c) described three species of the genus *Progonocythere* - *P. laeviscula* Lyubimova and Mohan, *P. sadharaensis* n. sp. and *P. jaisalmerensis* n. sp. - from the Jurassic of Kachchh and Jaisalmer districts of western India.

Khosla *et al.* (2004) reported 49 species from the Jurassic of the Jhura Dome, of which the following six have been described as new: *Bairdia badiensis*, *B. jhuraensis*, *Cytherelloidea badiensis*, *Cytheroptera agrawali*, *Mandawacythere chariensis* and *Pirileberis satyendrai*. Seven species have been left in open nomenclature. They are: *Bairdia sp. A*, *Bairdia sp. B*, *Bairdia? sp. C*, *Batella? sp.*, *Habocythere sp. A*, *Habocythere sp. B* and *Mandelstamia sp.* Thirty-six species have been assigned to the previously described species from the Chari Formation of the Habo Dome by Khosla *et al.* (1997).

Khosla *et al.* (2005) described and/or recorded 74 species from the Middle Jurassic of the Northern Island Belt, including Bela, Khadir and Pachchham islands, Rann of Kachchh. Twenty-seven species - *Citrella belaensis*, *Cytheropteron micropunctata*, *Fastigatocythere belaensis*, *F. elongata*, *F. flebilis*, *F. indica*, *F. jakhari*, *F. kachchhensis*, *F. mouwanaensis*, *F.? pachchhamensis*, *Galliaecytheridea gujaratensis*, *G. lodraniensis*, *Glabellacythere hussaini*, *Mandawacythere kachchhensis*, *M. multicostrata*, *Mandelstamia biswasi*, *M. kachchhensis*, *Monoceratina mouwanaensis*, *M. rannensis*, *Morkhovenicythereis rectangularis*, *Neurocythere? kachchhensis*, *Paracypris*

kachchhensis, *P. mohani*, *Pseudoperisocytheridea concentrica*, *Timiriasevia khadirensis*, *Trichordis amraparensis* and *T. hadibhadangensis* - are new. Seven species - *Bairdoppilata* sp. E, *Bairdoppilata* sp. F, *Cytherelloidea* sp., *Darwinula* sp., *Eucytherura* sp., *Glabellacythere* sp. and *Paranotacythere* sp. - are left in open nomenclature. Forty species are assigned to already known taxa from Kachchh, Jaisalmer and elsewhere.

Jaisalmer

The ostracods from the Jurassic of Jaisalmer were first described by Lyubimova *et al.* (1960) who recorded following six species from the upper part of the Jaisalmer Formation: *Cytherella* aff. *obscura* (generic name wrongly given as *Progonocythere*), *Progonocythere* sp. juv., *Progonocythere implicata*, *P. prolata*, *Progonocythere* sp. juv. indet. and *Bythocythere* sp. juv.

Thereafter, Singh and Jai Krishna (1969) in a short note on the Mesozoic of Jaisalmer District listed six species from the Jaisalmer Formation. They are: *Cytherella* sp., *Cytherelloidea* sp., *Hutsonia* sp., *Neocythere* sp., *Schuleridea* sp. and *Venia* sp. Singh and Kulshreshtha (1973) described a new genus - *Pokornya*, with *P. kuldharensis* as the type species from the Kuldhar Member of Jaisalmer Formation.

Bhatia and Mannikeri (1977) recorded following fresh and brackish water ostracods in association with charophytes from the Fort Member of the Jaisalmer Formation: *Darwinula leguminella*, *Bisulcocypris* n. sp., *Amicytheridea* n. sp., *Citrella* n. sp., *Fastigatocythere* n. sp., *Lophocythere* (*Lophocythere*) n. sp., *Mandelstamia* n. sp., *Micropneumatocythere* n. sp., *Paracypris* n. sp., *Paralophocythere* n. sp., *Pichotia* n. sp. and *Pontocyprella* n. sp.

Kulshreshtha *et al.* (1985) recorded 34 species from the Kuldhar Member, Jaisalmer

Formation. Of these the following 12 species are new: *Aphelocythere kuldharensis*, *Cytheropteron marusthalum*, *C. parvexa*, *Hutsonia simplex*, *Lophocythere denticulata*, *L. jaisalmerensis*, *Macrodentina gowdi*, *Neocythere rajasthanensis*, *Oligocythereis minuta*, *Orthonotacythere joshii*, *Pokornya sahnii* and *P. sureshi*. Other recorded species are: *Bairdia hilda* Jones, *B. jurassica* Jones, *Bairdia* sp. A, *Bairdia* sp. B, *Cytherella disjuncta* Lyubimova and Mohan, *C. obscura* Lyubimova and Mohan, *Cytherelloidea jugosa* (Jones), *Cytherelloidea* cf. *obliquecostata* van den Bold, *Fuhrbergiella* cf. *arens* Bate, *Glabellacythere reticulata* Whatley, *Krausella* sp., *Lophocythere acutiplicata* (Jones and Sherborn), *L. cruciata oxfordiana* Lutze, *Majungaella mundula* (Grekoff), *Monoceratina scrobiculata* Triebel and Bartenstein, *Paracypris contermia* Lyubimova and Mohan, *Pokornya kuldharensis* Singh and Kulshreshtha, *Procytherura tenuicostata* Whatley, *Progonocythere implicata* Lyubimova and Mohan, *P. laeviscula* Lyubimova and Mohan, *Venia* sp. and *Uroleberis* sp.

Mannikeri (1996) described two new genera *Jainiana* including two species, the genotype *J. retusa* (Grekoff) and *J. grekoffi* n. gen. and n. sp.; and *Bhatiana* including three species, the genotype *B. indica* n. gen. and n. sp., and two indeterminate species *Bhatiana* sp. A and *Bhatiana* sp. B, from the Joyan, Fort and Badabag members of Jaisalmer Formation.

Very recently, Khosla *et al.* (2006) described and/or recorded 72 species from the Fort and the Kuldhar members of Jaisalmer Formation, Jaisalmer. Thirteen species - *Bythocypris rajasthanensis*, *Cytherella jaisalmerensis*, *Cytherelloidea kuldharensis*, *Cytheropteron lellapadiensis*, *C. rajasthanensis*, *Galliaecytheridea grekoffi*, *Lophocythere mannikerii*, *Micropneumatocythere masurdiensis*, *M. rasilis*, *Monoceratina fortensis*, *M. parascrobiculata*, *Neurocythere kuldharensis* and *Progonocythere tharensis* are new. Fourteen species - *Acrocythere?* sp., *Anchistro-*

cheles sp. B, *Bairdoppilata* sp. E, *Bairdoppilata* sp. G, *Cytheropteron* sp. A, *Cytheropteron* sp. B, *Cytheropteron* sp. C, *Eocytheridea?* sp., *Eucytherura* sp. B, Genus A, *Fabanella* sp., *Fastigatocythere* sp. D, *Protobuntonia* sp. and *Theriosynoecum* sp. - are left in open nomenclature. Forty-five species are assigned to already known forms from Kachchh, Jaisalmer and elsewhere.

Important contributions to our understanding of Jurassic Ostracoda from other countries bordering the Indian Ocean, with which Kachchh and Jaisalmer ostracods have affinities, are by Grekoff (1963), Bischoff (1964), Dingle (in Dingle and Klinger, 1972), Bate (1975, 1976, 1977), Basha (1980), Dépêche (in Dépêche *et al.*, 1987), Rosenfeld *et al.* (1987, 1988), Rafara (1990) and Rosenfeld and Honigstein (1991).

CLASSIFICATION OF THE MESOZOIC

Kachchh

Wynne (1872) gave the first comprehensive account of the Geology of the Kachchh region. He divided the Jurassic (the Cretaceous at that time not being recognized and included in the Jurassic) into lower marine and upper non-marine units which he designated as the Lower Jurassic Group and the Upper Jurassic Group respectively. These divisions were based on physical differences, therefore, represented the lithostratigraphic units. Subsequently Stoliczka classified the entire Mesozoic succession into the following four groups, in ascending order, 'Putchum' (=Patcham), 'Charee' (=Chari), Katrol and 'Oomia' (=Umia) which were formalized by Waagen (1873, Introductory part). These were also lithostratigraphic units established on physical contrast as well as palaeontological considerations. Though no type sections were suggested, their names were apparently derived after localities or landmarks of those names. Ever since then, this classification has been widely utilized, of

course with certain modifications and/or refinements and still it is the most favoured one.



Rajnath (1932) designated the aforesaid divisions as series instead of groups and thus changed their status from lithostratigraphic to chronostratigraphic units. He also introduced a new division Bhuj 'Series'/'Stage' for the upper Oomia Group of Stoliczka including the *Zamia* beds. Agrawal (1955), realizing that the beds of the Chari 'Series' and its topmost horizon, the Dhosa Oolite do not crop out at or in nearby localities after which they were designated, renamed these units as the Habo Series and the Mehba Oolite.

Many later workers, including Pascoe (1959), Poddar (1959, 1964), Mitra and Ghosh (1964), Krishnan (1968) and Maithani (1968), following Rajnath also assigned chronostratigraphic status to Stoliczka's four-fold divisions and considered them series, while other workers namely Mitra *et al.* (1979), Jai Krishna *et al.* (1983), Mandwal and Singh (1989), Bhalla and Talib (1991) and Khosla *et al.* (1997a, 2004) reverted back to the earlier lithostratigraphic status and designated these divisions as formations. Stoliczka's four-fold classification as modified by Jai Krishna *et al.* (1983) is given here in Table 1.

TABLE 1 : Classification of the Mesozoic of Kachchh
(After Jaikrishna *et al.*, 1983).

Lithostratigraphic Units	Age
Umia Formation	Upper Tithonian - Albian
Katrol Formation	Kimmeridgian? - Lower to Middle Tithonian
Chari Formation	Upper Bathonian - Upper Oxfordian
Patcham Formation	Bajocian - Bathonian

TABLE 2 : Classification of the Mesozoic of Kachchh, Biswas (1971).

Time Unit	Mainland	Pachham Island	Eastern Kutch
Paleocene to Upper Cretaceous	Deccan Trap Formation		
	— Disconformity —		
Albian to ?Santonian			
Aptian	Ukra Member 		
	Bhuj Formation		
Neocomian to Tithonian	— Disconformity —		(Top not exposed)
			Wagad Sandstone
Portlandian to Kimmeridgian	Jhuran Formation		
Argovian			Kanthkot Sandstone Member
Oxfordian	Local disconformity (Dhosa Oolite Member)		
		(Top not exposed)	Washitawa Formation (Occurs in Central Waged only)
Callovian	Jumara Formation		
		Goradongar Formation	
	Jhurio Formation		Khadir Formation
Bathonian	— Base not exposed —	Kaladongar Formation	
			— ? — ? — ? —
		— Base not exposed —	Precambrian ? Erinpura Granite and Aravalli rocks exposed in Meruda Hill and Nagar Parkar

Biswas (1971, 1980) proposed new lithostratigraphic classifications separately for the Mesozoic of Mainland Kachchh, Pachchham Island and Eastern Kachchh (Wagad, Khadir and Bela islands and Chorad Hill) and these are given in Table 2. According to him, Stoliczka's divisions lack a precise definition of the units with respect to designated type sections, mappability, regional applicability, ambiguous status in the modern concept of stratigraphy and improper use of stratigraphic terminology.

More recently, Fürsich *et al.* (2001) proposed another lithostratigraphic framework for the Jurassic of Kachchh, which is given in Table 3. It includes stratigraphic units partly those of Stoliczka (in Waagen, 1873) and Biswas (1980) and partly new, yet to be formally described.

In the present work the author has followed Stoliczka's four-fold classification in so far as Mainland Kachchh is concerned because it is well established, enriched in literature and has priority over all other classifications. For Khadir and Bela islands, which are separated from the Mainland by alluvium covered Rann of Kachchh and physical continuity of outcrops can't be established, the author has followed Biswas (1980). The Middle Jurassic here is represented by Khadir Formation and it is divisible in ascending order in following members: (i) Cheriya Bet Conglomerate Member, (ii) Hadibhadang Shale Member, (iii) Hadibhadang Sandstone Member, (iv) Gadhada Sandstone Member and (v) Bambhanka/Gangta Member. In Sadhara Dome of Pachchham Island, Fürsich *et al.* (1994) have produced a detailed stratigraphy and their classification has been followed. They classified the Middle Jurassic exposed in this dome into three formations viz, in ascending order, (i) Khavda Formation, (ii) Patcham Formation and (iii) Chari Formation. The Khavda Formation was further subdivided into six members: (i) Sadhara Coral Limestone

Member, (ii) Eomiodon Red Sandstone Member, (iii) Lower Yellow Flagstone Member, (iv) Middle Sandstone Member, (v) Goradongar Yellow Flagstone Member and (vi) Gadaputa Sandstone Member.

Jaisalmer

Das Gupta (1975) has given a detailed account of the Mesozoic of the Jaisalmer Basin and according to him it is divisible, in ascending order, into following six formations: Lathi Formation, Jaisalmer Formation, Baisakhi Formation, Bhadasar Formation, Parihar Formation and Habur Formation. Of these the last two formations are Cretaceous in age, while the rest are of Jurassic age. Among the Jurassic, Jaisalmer Formation is faunally very important and hence included in our study. Das Gupta (1975) further subdivided the Jaisalmer Formation into five members. These are, in ascending order: Hamira Member, Joyan Member, Fort Member, Badabag Member and Kuldhhar Member. To these Kachhara and Jodhawat (1982) on the basis of ammonite fauna added a new member, namely Jajiya Member taken out from the Kuldhhar Member.

Dave and Chatterjee (1966) proposed integrated foraminiferal and ammonitic biostratigraphy of the Jurassic sediments in the Jaisalmer Basin and recognized seven benthic foraminiferal zones. Of these four zones are in the Jaisalmer Formation and three in the overlying Baisakhi and Bhadasar formations. Besides the authors also recorded number of ammonite fossils from different horizons. The subdivisions of the Jaisalmer Formation, foraminiferal zones recognized in these and ammonite fauna are summarized in Table 4.

STRATIGRAPHY

A brief stratigraphical account of the Middle Jurassic of localities included in the present study is given in the sequel.

TABLE 3 : Lithostratigraphic framework of Middle and early Late Jurassic rocks of the Kachchh Basin, Fürsich *et al.* (2001).

	Kachchh Mainland	Pachchham Island		Eastern Kachchh				
		Gora Dongar	Kala Dongar	Khadir, Bela and Chorar	Wagad			
Kimmeridgian								
Oxfordian	Dhosa Oolite Member	(eroded)		Cadhada Formation*	Wagad Sandstone			
Calloviaian	Dhosa Sandstone Member*				Cadhada Formation*	Bambhanka/Gangta Member	Washitawa Formation	
	Gypsiferous Shale Member*					Cadhada Formation*		Gadhada Sandstone Member
	Ridge Sandstone Member							
	Keera Golden Oolite Member*							
Shelly Shale Member*	Shelly Shale Member*							
Bathonian	Patcham Formation	Sponge Limestone Member*	Raimalro Limestone Member	Patcham Formation	Raimalro Limestone Member			
Bajocian	Jhurio Formation	Purple Sst./ Echinoderm Packstone	Gadaputa Sandstone Member	Goradongar Formation	Hadibhadang Sandstone Member			
		JCL Member*	Goradongar Yellow Flagstone Member					
		GYF Member						
		JGO Member*	Kaladongar Formation	Kaladongar Formation	Kaladongar Formation	Khadir Formation		
		CL/BLGO Member					Middle Sandstone Member	LPR Member
		Badi White Limestone Member*					Lower Yellow Flagstone Member	Babia Cliff Member
Eomiodon Red Sandstone Member	Kaladongar Sandstone Member							
Sadhara Coral Limestone Member								
Dingy Hill Member								

JCL: Jumara Coral Limestone; GYF: Goradongar Yellow Flagstone; JGO: Jhura Golden Oolite; CL/BLGO: Canyon Limestone/Badi Lower Golden Oolite; LPR: Leptosphinctes Pebbly Rudstone. Terms marked by asterisk are new and await formal description (Fürsich *et al.*, in prep.).

Table 4. Jaisalmer Formation and integrated Foraminiferal and Ostracod Biostratigraphy.

Formation	Members	Dave and Chatterjee, 1996		Khosla <i>et al.</i> 2006	
		Foraminiferal Zones	Characteristic Ammonites	Ostracod Zones	Age
J A I S A L M E R	Jaiya				
	Kuldhar	4. <i>Epistomina mosquensis</i> Range Zone	<i>Subgrosuvaria aberrans</i>	<i>Majungaella perforata kachchhensis</i> - <i>Galliaecytheridea remota</i> Interval Zone	mid - late Callovian
		3. <i>Tewaria kutchensis</i> Partial Range Zone	<i>Macrocephalites chariensis</i> , <i>Subkosmatia ramosa</i> , <i>S. opis</i> , & <i>Reineckia reissi</i>	<i>Majungaella perforata kachchhensis</i> - <i>Galliaecytheridea remota</i> Concurrent Range Zone	
		2. <i>Lenticulina discipiens</i> Range Zone	<i>Sivajiceras congener</i>	<i>Majungaella perforata kachchhensis</i> - <i>Fastigatocythere</i> (B) <i>falcula</i> Concurrent Range Zone	early Callovian
	Badabag				
	Fort	1. <i>Tewaria</i> sp. - <i>Dorthia poddari</i> Assemblage Zone		<i>Trichordis hadibhadangensis</i> Range Zone	Bajocian - Bathonian
	Joyan				
Hamira					

Mainland Kachchh

Habo Dome : It lies in the eastern part of east-west trending anticlinal hill range along the northern margin of the Mainland Kachchh. The beds in this dome show *quaquaversal* dips, steeper on the north but gentle on the south, east and west. The older beds lie towards the centre, while they are surrounded on all sides by younger ones. The stratigraphy of Habo Dome has been discussed in detail by Kanjilal (1978) and the succession established by him was adopted by Khosla *et al.* (1997) for their study of ostracod fauna. The latter authors preferred the term Chari Formation over the Habo Formation for Jurassic of the Habo Dome in view of its long usage and familiarity with most of the workers. Kanjilal gave number 1 to the youngest bed of the formation and assigned higher numbers to the succeeding older beds. This was done in view of the easily recognizable nature of the Dhosa Oolite (=Lodai Member), which served as a marker horizon not only in Habo Dome but throughout Mainland Kachchh, and also to maintain uniformity with other workers (Rajnath, 1932; Spath, 1933; Agrawal, 1957; Maithani, 1968) all of whom adopted the same procedure. Khosla *et al.* (1997) also followed the same practice in so far

as numbering of the beds is concerned but the samples are numbered in conventional manner from older to younger horizon. They sampled five stratigraphical sections of the Chari Formation from different localities. The locations of these sections are given below and also in Fig. 3.

Section I, exposed along banks of the Kala Jar (stream) near Dhrang Village (23° 23' 30" N: 69° 50' 30" E).

Section II, exposed along banks of the Langi Jar, 2 km east of Dhrang Village.

Section III, exposed along banks of a stream near Habai Village (23° 21' 10" N: 69° 51' 19" E) and partly along a tributary of Kala Jar north of the crest of Habo Dome.

Section IV, exposed along banks of a stream near Kotai Village (23° 23' 24" N: 69° 47' 12" E).

Section V, exposed along banks of a stream 1 km east of Fulae Village (23° 23' 29" N: 69° 48' 43" E).

Section I is more or less complete and

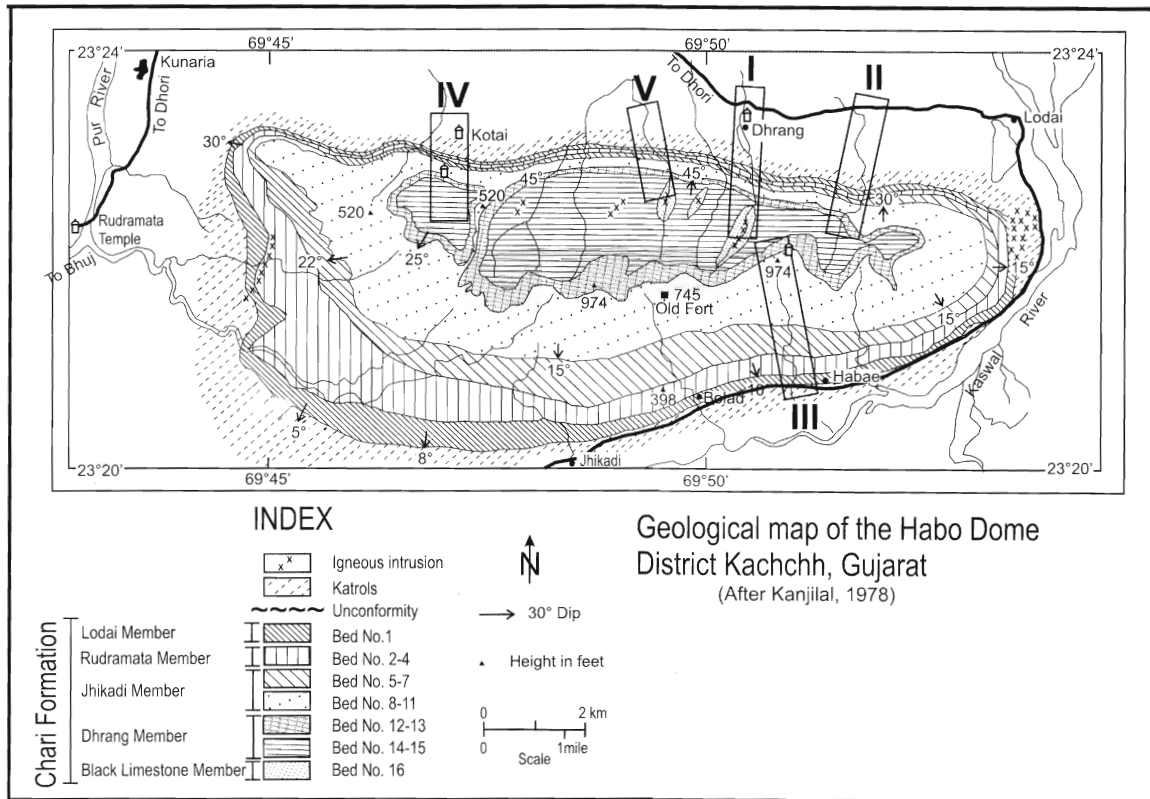


Fig. 3. Index map of the Habo Dome showing location of the sections studied.

best developed one where all the 16 beds of the Chari Formation (=Habo Formation) established by Kanjilal (1978) are encountered. The succession as worked out by Khosla *et al.* (1997) in this section is incorporated in Fig. 12 and the distribution of ostracods in the Habo Dome in Table 5.

Jhura Dome : This Dome is situated adjoining Habo Dome on its west along the northern margin of the Mainland Kachchh. Like Habo Dome the beds in Jhura Dome also show *quaquaversal* dips, steeper on the north but gentle on the south, east and west. The older beds lie towards the centre, while they are surrounded on all sides by younger ones. Many workers have dealt with the stratigraphy of the Jhura Dome. Except for Biswas (1980) and Mandwal and Singh (1989), all other workers grouped the entire sequence of the dome in single stratigraphical unit, i.e. the Chari (= Habo) Series/Formation. As against this, Biswas (1980) classified the sequence into two units, the lower Jhurio Formation and the upper Jumara

Formation which he correlated with Patcham and Chari formations respectively of Stoliczka's classification. Mandwal and Singh (1989) also classified the sequence into two units but designated them in ascending order, Patcham and Chari formations. Khosla *et al.* (2004) assigned the sequence to the Chari Formation and did not recognize the Patcham Formation. For stratigraphical distribution of ostracod fauna they accepted the succession established by Agrawal (1957), who recognized 18 lithostratigraphical units in the Chari Formation (=Habo Series). The samples from which the ostracod fauna is recorded come from two stratigraphical sections. The locations of these sections are given below and in Fig. 4.

Section I, exposed along the eastern flank of Jhura Dome, southwest of Jhura Dome (23° 26' 8" N: 69° 37' E).

Section II, exposed along a north-south trending stream near Kamaguna Village (23° 22' 23" N: 69° 33' 37" E), Jhura Dome.

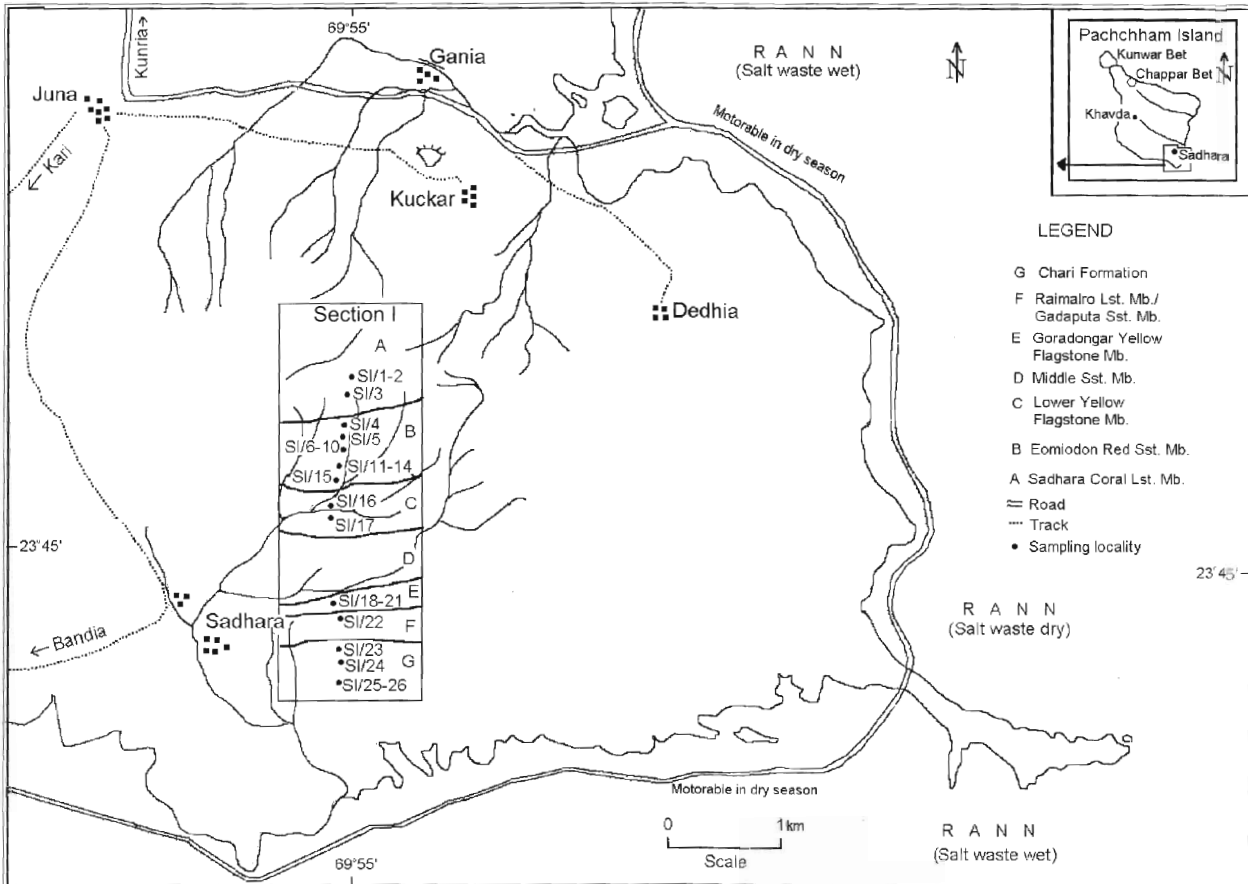


Fig. 5. Index map of southeastern most part of the Pachchham Island showing location of the section studied.

the Khadir Formation of Biswas (1971, 1980, 1993), who as stated earlier subdivided the formation into five members. Khosla *et al.* (2005) sampled three sections for the study of ostracods. The locations of these sections are given below and also in Fig. 6.

Section II, N-S cross-country section passing through Gadhada Village (23°52'06"N: 70°20'15"E) from the Cheriya Bet (23°56'15"N: 70°20'15"E) in the north to the Kakindia Bet (23°46'02"N: 70°23'35"E) close to the southernmost tip of Khadir Island.

Section III, extending N-S from the Rann of Kachchh to near Amrapar Village (23° 54' 32" N: 70° 27' 02" E).

Section IV, exposed in a dome around the Ravechimata Temple and an old Fort (23°45'15"N: 70°30'06"E) in Gangta Bet,

southeast of the Khadir Island.

Bela Island : The Middle Jurassic in Bela Island belongs to Khadir Formation. Khosla *et al.* (2005) sampled five sections for the study of ostracods. The locations of these sections are given below and also in Fig. 7.

Section V, exposed along Lodrani-Kuda track, north of Lodrani Village (23° 54' 29" N: 70° 37' 25" E).

Section VI, exposed at about 1 km NW of Gadhada Ruins (23° 54' 17" N: 70° 41' 30" E).

Section VII, exposed along a stream about 1 km northwest of Bela Village (23° 52' 35" N: 70° 48' 13" E).

Section VIII, exposed along a north-south trending stream, northern escarpment of

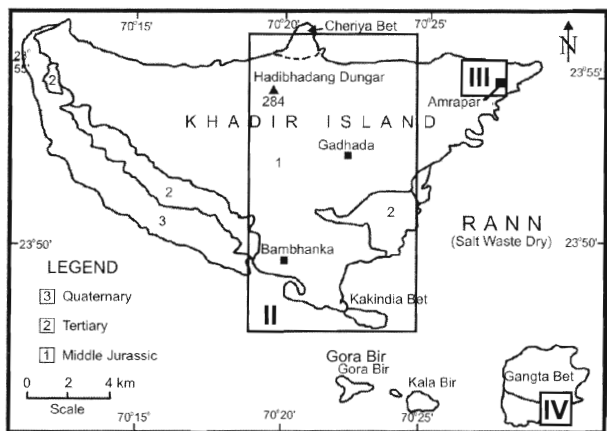


Fig. 6. Index map of the Khadir Island showing location of the sections studied.

Bela Range, near Bela Village.

Section IX, exposed along northern and southern escarpments of Mouwana Hill, (23° 49' 50" N; 70° 52' 03" E).

The composite stratigraphical sections for Khadir and Bela islands are given earlier by Biswas (1993), while the stratigraphical section of Sadhara Dome by Fürsich *et al.* (1994). These are incorporated herein in modified form in Fig. 12. For further information, reference may be made to these works. The distribution of the Ostracoda in Sadhara Dome and Khadir and Bela islands are given in Table 6.

Jaisalmer

In Jaisalmer abundant ostracods were found only in the Fort and the Kuldhar members of Jaisalmer Formation. Lithologically the former is composed of hard, compact, yellow fossiliferous sandy limestone with bands of marl and clay in the upper part and thick sandstone in the lower part, while the latter comprises yellow compact fossiliferous limestone and shale/clay with several golden and brown oolitic horizons and rich ammonites. Locations of different sections studied from the Fort and Kuldhar members are given below and also in Figs. 8-9.

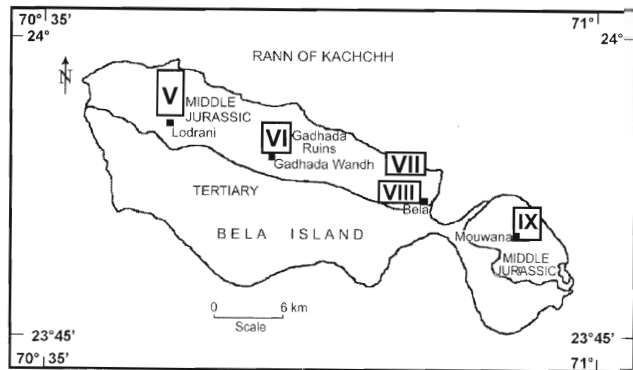


Fig. 7. Index map of the Bela Island showing location of the sections studied.

Fort Member:

Section FA: Escarpment of the fort hill about 1/2 km northwest of Jaisalmer Railway Station.

Section FB: Escarpment of the fort hill about 1/4 km west of Section FA.

Section FC: Escarpment of the fort hill about 100 m further west of Section FB.

Section FD: Escarpment near Kishanghat north of Jaisalmer Fort.

Section FE: Near lime kiln at the junction of Amarsagar-Sam roads.

Section FF: Near chattaries of Vyas Family 1/2 km SSW of Dedan Sar.

Section FG: Opposite to Indira Stadium/ Town Hall about 3 km west of Jaisalmer Fort.

Section FM: Escarpment of the fort hill about 1 km NNW of Jaisalmer Railway Station.

Kuldhar Member:

Section KA: Western bank of Masurdi Nadi (stream) east of Khethari Talab, Kuldhar

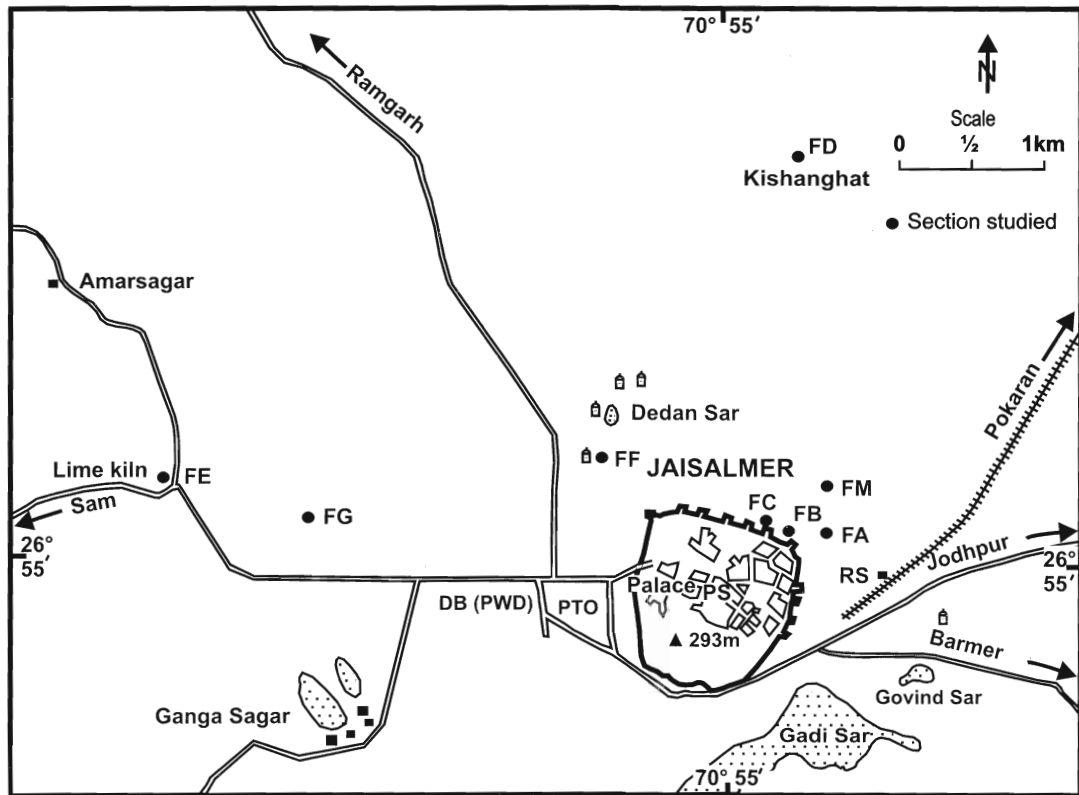


Fig. 8. Index map of Jaisalmer showing locations of the sections studied in the Fort Member.

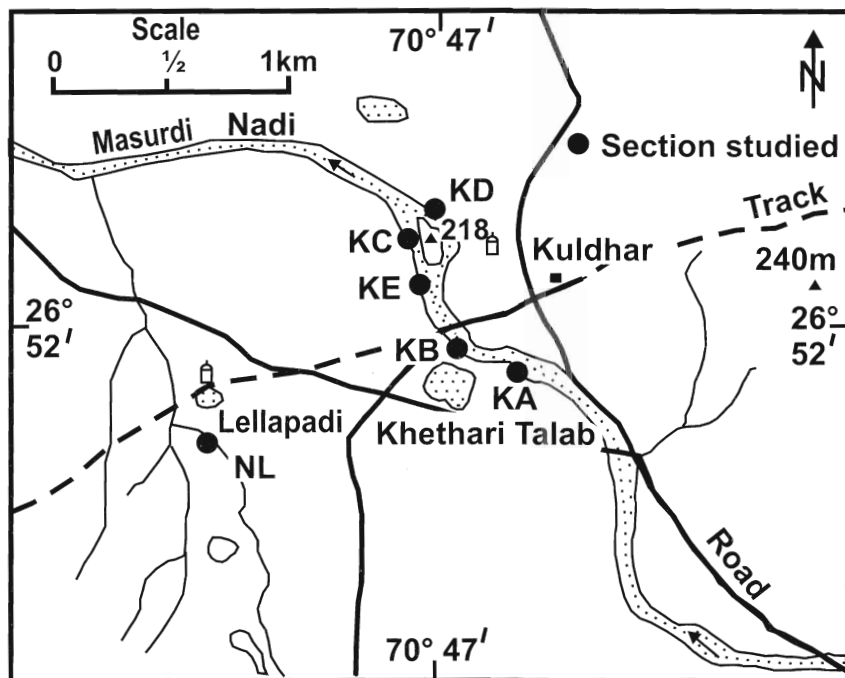


Fig. 9. Index map showing locations of the sections studied in the Kuldhar Member.

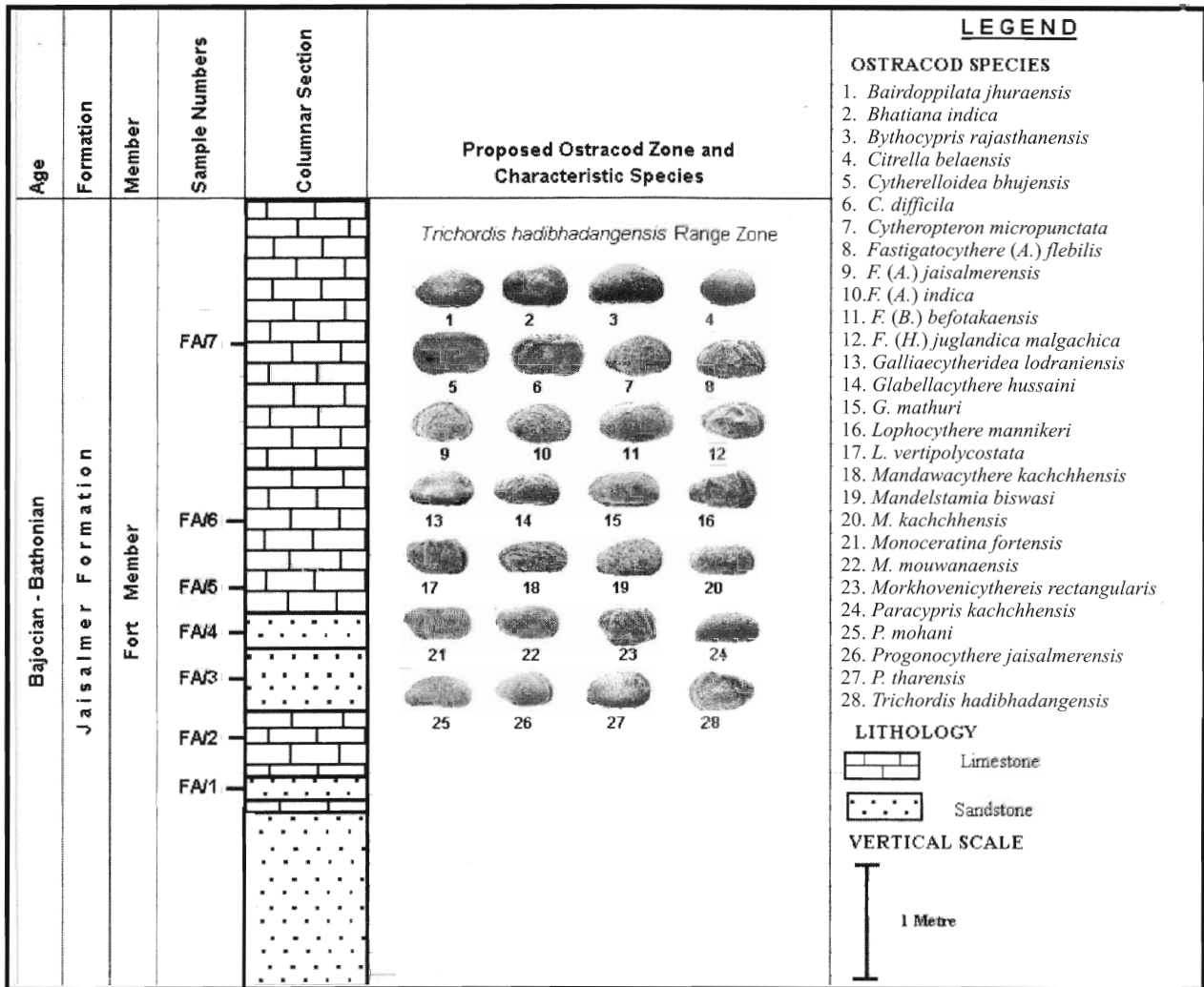


Fig. 10. Stratigraphical succession of FA Section, Escarpment of the fort hill about ½ km northwest of Jaisalmer Railway Station.

Village.

Section KB: Western bank of Masurdi Nadi, north of Khethari Talab.

Section KC: Western bank of Masurdi Nadi about 1 km NNW of Section KB.

Section KD: Eastern bank of Masurdi Nadi about 1/2 km NNW of Kuldhar Village.

Section KE: Western bank of Masurdi Nadi, in between Sections KB and KC.

Section NL: Western bank of a tributary near Lellapadi, 2 km west of Kuldhar Village.

The stratigraphical successions in the representative sections, viz. Sections FA and KD

of the Fort and Kuldhar members respectively are given in Figs. 10-11 and distribution of ostracods in these members in Table 7.

BIOSTRATIGRAPHICAL ZONATION

Kachchh

Based on the distribution of the Ostracoda, the Middle Jurassic of Kachchh are grouped into six zones. These are described, in ascending order, as follows:

Trichordis hadibhadangensis Range Zone

Authors: Khosla, Manisha Kumari and

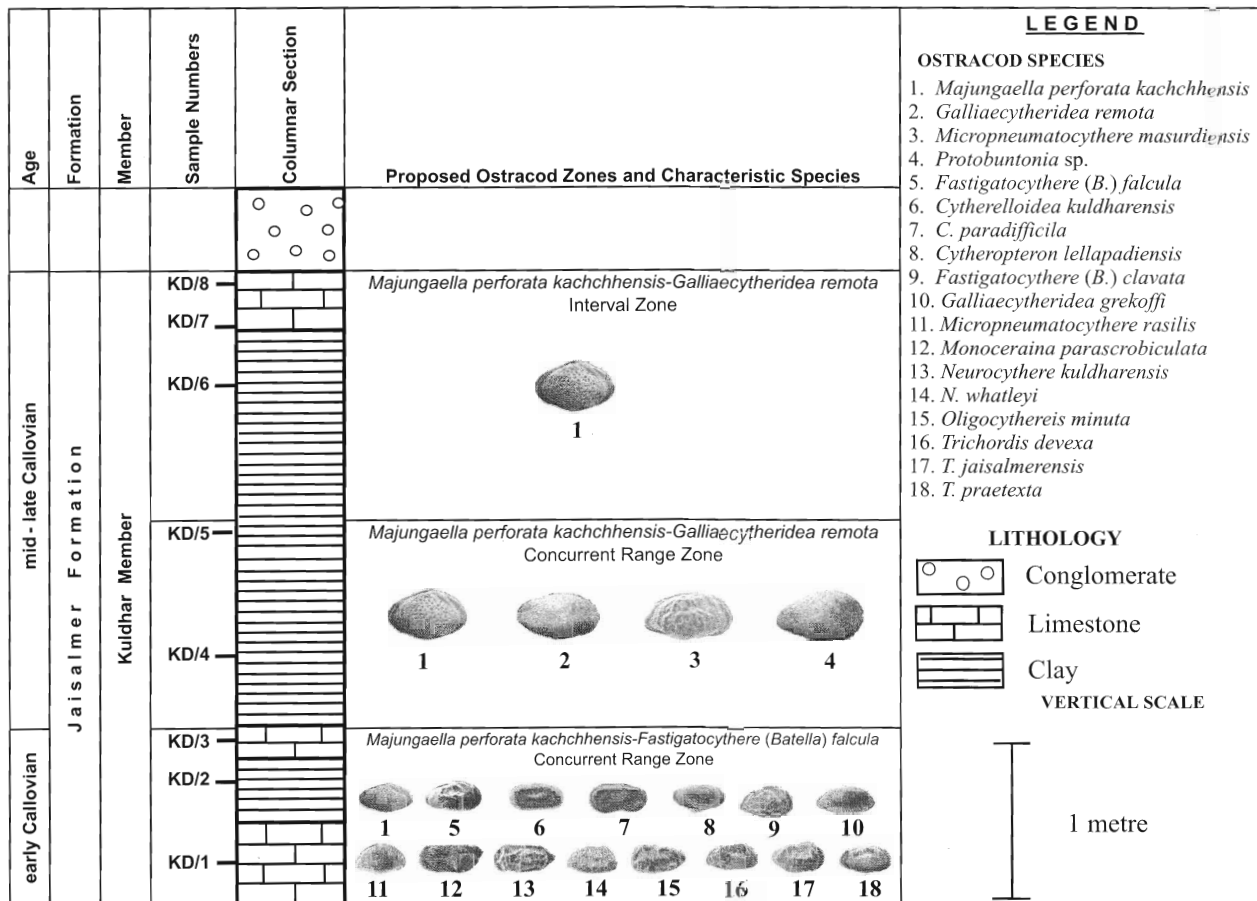


Fig. 11. Stratigraphical succession of KD Section, Eastern bank of Masurdi Nadi about ½ km NNW of Kuldhar Village.

Darwin Felix, 2005.

This is the lowermost zone recorded from the Sadhara Dome and the Khadir and Bela islands, Northern Island Belt, Rann of Kachchh. Of the three regions, the zone is more diversified in the Sadhara Dome. Earlier it was designated as *Trichordis hadibhadangensis* Assemblage Zone but herein it is renamed as *Trichordis hadibhadangensis* Range Zone.

This zone is characterized by the restricted occurrence of nominative species because of which it is named as such. The zone covers Sadhara Coral Limestone to Lower Yellow Flagstone members of the Khavda Formation in Sadhara Dome, while lower part of Hadibhadang Shale Member of the Khadir Formation in Khadir and Bela islands. In Sadhara

Dome, *T. hadibhadangensis* Zone is further divisible, into two subzones. They are in ascending order:

Trichordis hadibhadangensis - *Progonocythere sadharaensis* Concurrent Range Subzone

Type Section: Sadhara Coral Limestone and *Eomiodon* Red Sandstone members, Khavda Formation, in the core of the Sadhara Dome, north of Sadhara Village, Pachchham Island, Rann of Kachchh.

The subzone is characterized by the concurrent occurrence of *Trichordis hadibhadangensis* Khosla *et al.* and *Progonocythere sadharaensis* Khosla *et al.* Other restricted ostracods are: *Fastigatocythere (Amicytheridea?) pachchhamensis* Khosla and Darwin Felix and

Galliaecytheridea gujaratensis Khosla and Darwin Felix. The predominant associated long ranging ostracods are: *Citrella belaensis* Khosla *et al.*, *Fastigatocythere (Habocythere) dorsoangulata* (Grekoff), *F. (Amicytheridea) flebilis* Khosla and Darwin Felix, *Lophocythere vertipolycostata* Khosla and Manisha Kumari, *Mandelstamia biswasi* Khosla *et al.*, *Paracypris kachchhensis* Khosla and Darwin Felix and *P. mohani* Khosla *et al.*

Trichordis hadibhadangensis -
Progonocythere sadharaensis Interval Subzone

Type Section: Lower Yellow Flagstone Member, Khavda Formation, Sadhara Dome.

This subzone covers an interval between the Last Appearance Datum (LAD) of *Progonocythere sadharaensis* Khosla *et al.* and the LAD of *Trichordis hadibhadangensis* Khosla *et al.* The dominant associated long ranging ostracods are: *Fastigatocythere (Habocythere) dorsoangulata* (Grekoff), *F. (H.) juglandica malgachica* (Grekoff), *Paracypris kachchhensis* Khosla and Darwin Felix, *P. mohani* Khosla *et al.* and *Progonocythere jaisalmerensis* Khosla *et al.*

***Cytheropteron micropunctata* Range Zone**

Authors: Khosla, Manisha Kumari and Darwin Felix, 2005.

Type Section: Upper part of the Hadibhadang Shale Member, Khadir Formation, near Amrapar Village, Khadir Island, Rann of Kachchh.

Other occurrence: Hadibhadang Shale Member in the Bela Island covering the highly fossiliferous, reddish-brown shale (lower *Corbula lyrata* band).

Earlier, the zone was described as *Cytheropteron micropunctata* Assemblage Zone but herein it is renamed as *Cytheropteron micropunctata* Range Zone. It is characterized by the restricted occurrence of the nominative species. It is not traceable in the Sadhara Dome and seems to have been pinched out in the west.

Other ostracods restricted to this zone are: *Fastigatocythere (Amicytheridea) kachchhensis* Khosla and Darwin Felix, *F. (Fastigatocythere) retusa* (Grekoff), *Mandelstamia kachchhensis* Khosla *et al.*, *Paranotocythere* sp. and *Trichordis amraparensis* Khosla and Darwin Felix. Associated long ranging species are: *Citrella belaensis* Khosla *et al.*, *Fastigatocythere (Habocythere) bicrucata* (Grekoff), *Lophocythere vertipolycostata* Khosla and Manisha Kumari, *Mandelstamia biswasi* Khosla *et al.*, *Paracypris mohani* Khosla *et al.* and *Trichordis jaisalmerensis* (Kulshreshtha *et al.*).

***Progonocythere laeviscula* Range Zone**

Authors: Khosla, Jakhar and Mohammed (1997).

Type Section: Beds 16-12, Black Limestone and Dhrang members of Kanjilal (1978), Chari Formation, Habo Dome, Mainland Kachchh.

Other occurrences: Basal beds 17-13 of Agrawal (1957), Chari Formation, Jhura Dome; Coral, Macrocephalus and Rehmani beds of Spath, Patcham and Chari formations, Jumara Dome; Goradongar Yellow Flagstone, Gadaputa Sandstone, Raimalro Limestone members and Lower Macrocephalus Beds of Fürsich *et al.* (1994), Khavada, Patcham and Chari formations of Sadhara Dome, Pachchham Island; Hadibhadang Sandstone Member of Biswas (1980), Khadir Formation of Khadir and Bela islands.

Khosla *et al.* (1997) originally described this zone as Zone I - *Progonocythere laeviscula* Zone from the Jurassic of the Habo Dome, Mainland Kachchh and later on Khosla *et al.* (2005) renamed it as *Progonocythere laeviscula* Assemblage Zone. However, herein we designate it as *Progonocythere laeviscula* Range Zone.

In the Habo Dome the zone includes five basal beds comprising a black limestone with

thin bands of grey shales (Bed 16) at the base, successively overlain by greyish-yellow limestone with bands of shales (Bed 15), yellow gypsiferous shale (Bed 14), alternate sequence of greyish-yellow limestones and gypsiferous shales (Bed 13) and greyish-yellow gypsiferous shale (Bed 12). *Progonocythere laeviscula* Lyubimova and Mohan is the dominant species restricted to this zone which is named as such. Other predominant ostracods confined to the zone are: *Cytherelloidea badiensis* Khosla *et al.*, *C. dhrangensis* Khosla and Jakhar, *C. ipis* Grekoff, *C. paradifficila* Khosla *et al.*, *Cytheropteron devai* (Khosla *et al.*), *Fastigatocythere (Batella) befotakaensis* (Grekoff), *F. (B.) clavata* (Khosla *et al.*), *F. (B.) depressa* (Khosla *et al.*), *F. (Habocythere) juglandica malgachica* (Grekoff), *Neurocythere denticulata* (Kulshreshtha *et al.*), *Procytheridea kachchhensis* Khosla *et al.*, *P. ihopyensis* Grekoff, *Trichordis devexa* (Grekoff), *T. grumosa* Lyubimova and Mohan, *T. gujaratensis* Khosla *et al.* and *T. praetexta* Grekoff.

***Majungaella perforata kachchhensis* Partial Range Zone**

Authors: Khosla, Jakhar and Mohammed (1997).

Type Section: Beds 11-5, Jhikadi Member of Kanjilal (1978), Chari Formation, Habo Dome, Mainland Kachchh.

Other occurrences: Beds 12-5 of Agrawal (1957), Chari Formation, Jhura Dome; Anceps Beds of Spath, 1933, Chari Formation, Jumara Dome; and middle and upper part of Gadhada Sandstone Member of Biswas (1980), Khadir Formation, Khadir Island.

It includes 7 beds, no. 11-5. The lower four beds comprising in ascending order, reddish brown conglomeratic sandstone (Bed 11), highly ferruginous, hard sandstone (Bed 10), black coral limestone (Bed 9), reddish brown friable sandstone (Bed 8) are devoid of ostracods. The succeeding two beds consisting of reddish-brown hard sandstone with thin bands of shales (Bed 7) and yellowish-brown

gypsiferous shale (Bed 6) have yielded a few ostracods namely, *Cytherella disjuncta* Lyubimova and Mohan, *C. obscura* Lyubimova and Mohan, *Fastigatocythere (Habocythere) diluta* (Khosla *et al.*) and *Majungaella perforata kachchhensis* Khosla *et al.* The top bed composed of highly ferruginous, hard sandstone (Bed 5), although abounding in megafossils, is devoid of ostracods.

***Fastigatocythere (Habocythere) mouwanaensis* Range Zone**

Authors: Khosla, Manisha Kumari and Darwin Felix, 2005.

Type Section: Succession of the Gadhada Sandstone Member overlying the *P. laeviscula* Range Zone, exposed north of Mouwana Village, Bela Island.

It covers that part of the Gadhada Sandstone Member comprising buff, medium to coarse-grained sandstones containing *Pholadomya* at certain horizons and grey, gypsiferous shale. *Fastigatocythere (Habocythere) mouwanaensis* Khosla and Manisha Kumari is the dominant, restricted species of the zone. The other restricted species is *Fastigatocythere (Habocythere) elongata* Khosla and Manisha Kumari. Associated long ranging species are: *Citrella belaensis* Khosla *et al.*, *Fastigatocythere (Habocythere) bicruciatata* (Grekoff), *Lophocythere vertipolycostata* Khosla and Manisha Kumari, *Paracypris mohani* Khosla *et al.* and *Trichordis jaisalmerensis* (Kulshreshtha *et al.*).

***Majungaella perforata kachchhensis - Galliaecytheridea remota* Concurrent Range Zone**

Authors: Khosla, Jakhar and Mohammed (1997).

Type Section: Beds 4-1, Rudramata and Lodai members of Kanjilal (1978), Chari Formation, Habo Dome.

Other occurrences: Beds 4-1 of Agrawal (1957), Chari Formation, Jhura Dome; Athleta

Beds of Spath (1933), Chari Formation, Jumara Dome; Bambhanka and Gangta members of Biswas (1980), Khadir Formation, Khadir Island.

In Habo Dome, it includes the top four beds, no. 4-1. They are in ascending order, greyish-yellow gypsiferous shale (Bed 4), greyish-yellow conglomerate full of mega fossils but lacking ostracods (Bed 3), greyish-yellow gypsiferous shale (Bed 2) and an alternate sequence of greyish-brown limestones and shales, the uppermost band becoming oolitic (Bed 1). The zone is characterized by the concurrent occurrence of *Majungaella perforata kachchhensis* Khosla et al. and *Galliaecytheridea remota* (Grekoff). Other predominant species confined to the zone are as follow: *Cytherella kalajarensis* Khosla and Jakhar, *C. masuguluensis* Bate, *Cytherelloidea langijarensis* Khosla et al., *Fastigatocythere (Habocythere) bicrucata* (Grekoff), *F. (H.) ventrisulcata* (Khosla et al.), *Majungaella rasilis* Khosla et al. and *Schuleridea (Eoschuleridea) soodani* Khosla et al. Associated long ranging species are: *Cytherella disjuncta* Lyubimova and Mohan, *C. obscura* Lyubimova and Mohan, *Fastigatocythere (Amicytheridea) triangulata* (Bate) and *Majungaella perforata kachchhensis* Khosla et al.

Jaisalmer

In this district one zone is recognized for the beds of Fort Member and three for the beds of Kuldhar Member. These are described in the sequel:

***Trichordis hadibhadangensis* Range Zone**

The zone covers the Fort Member of Jaisalmer Formation forming escarpments of the Jaisalmer Fort. It is characterized by restricted occurrence of *Trichordis hadibhadangensis* Khosla et al. Other prominent restricted ostracods are: *Bairdoppilata jhuraensis* (Khosla et al.), *Bhatiana indica* Mannikeri, *Bythocypris rajasthanensis* Khosla and Jakhar, *Citrella*

belensis Khosla et al., *Cytherelloidea bhujensis* Khosla et al., *C. difficila* Lyubimova and Mohan, *Cytheropteron micropunctata* Khosla et al., *Fastigatocythere (Batella) befotakaensis* (Grekoff), *F. (Amicytheridea) flebilis* Khosla and Darwin Felix, *F. (A.) indica* Khosla and Manisha Kumari, *F. (A.) jaisalmerensis* Khosla and Jakhar, *F. (Habocythere) juglandica malgachica* (Grekoff), *Galliaecytheridea lodraniensis* Khosla and Manisha Kumari, *Glabellacythere hussaini* Khosla et al., *G. mathuri* (Khosla et al.), *Lophocythere mannikerii* Khosla and Jakhar, *L. vertipolycostata* Khosla and Manisha Kumari, *Mandawacythere kachchhensis* Khosla et al., *Mandelstamia biswasi* Khosla et al., *M. kachchhensis* Khosla et al., *Monoceratina fortensis* Khosla and Jakhar, *M. mouwanaensis* Khosla and Manisha Kumari, *Morkhovenicythereis rectangularis* Khosla et al., *Paracypris kachchhensis* Khosla and Darwin Felix, *P. mohani* Khosla et al., *Progonocythere jaisalmerensis* Khosla et al. and *P. tharensis* Khosla and Jakhar. Besides ostracods, the zone is also rich in bivalves, brachiopods, echinoids and foraminifers. In so far as ammonites are concerned they have not been recorded from the Fort Member.

***Majungaella perforata kachchhensis* - *Fastigatocythere (Batella) falcu* Concurrent Range Zone**

The zone covers basal limestone and marl of the Kuldhar Member. It is characterized by the concurrent occurrence of *Majungaella perforata kachchhensis* Khosla et al. and *Fastigatocythere (Batella) falcu* (Grekoff). Other prominent restricted ostracod species are: *Cytherelloidea kuldharensis* Khosla and Jakhar, *C. paradifficila* Khosla et al., *Cytheropteron lellapadiensis* Khosla and Jakhar, *Fastigatocythere (Batella) clavata* (Khosla et al.), *Galliaecytheridea grekoffi* Khosla and Jakhar, *Micropneumatocythere rasilis* Khosla and Jakhar, *Monoceratina parascrobiculata* Khosla and Jakhar, *Neurocythere kuldharensis* Khosla and Jakhar, *N. whatleyi* (Khosla and Jakhar), *Oligocythereis minuta* Kulshreshtha et al.,

***Majungaella perforata kachchhensis* -
Galliaecytheridea remota Concurrent Range
Zone**

The zone covers middle shale/clay beds of Kuldhar Member. It is characterized by the concurrent occurrence of *Majungaella perforata kachchhensis* Khosla *et al.* and *Galliaecytheridea remota* Grekoff. Other restricted ostracod species are: *Micropneumatocythere masurdiensis* Khosla and Jakhar and *Protobuntonia* sp.

***Majungaella perforata kachchhensis* - *Galliaecytheridea remota* Interval Zone**

The zone covers top shale/clay beds of Kuldhar Member and represents the interval between the Last Appearance Datum (LAD) of *Galliaecytheridea remota* Grekoff and LAD of *Majungaella perforata kachchhensis* Khosla *et al.*

Correlation of ostracod zones of Mainland Kachchh, Northern Island Belt, Rann of Kachchh and Jaisalmer District is given in Table 8.

SYSTEMATICS

The species included in the present atlas have been arranged in alphabetical order and synonymies, locality and horizon, diagnostic characters, dimensions and distribution are given in each case. The illustrated specimens are in the collection of the Micropaleontological Laboratory of the Department of Geology, Mohanlal Sukhadia University, Udaipur, Rajasthan and they are designated by SUGDMF No. The abbreviations used in dimensions and explanations of plates are as follows:

- Cms Central muscle scars
- DV Dorsal view
- VV Ventral view
- H Height
- Int.V Internal view

- L Length
- Lat.V Lateral view
- LV Left valve
- LVV Left valve view
- mm Milimetre
- Mpc Marginal pore canals
- RV Right valve
- RVV Right valve view
- W Width

**Taxonomic comments on the Genus
Fastigatocythere Wienholz, 1967**

Wienholz (1967) established the genus *Fastigatocythere* from the Bathonian and Callovian beds of north-west Germany on the basis of species with inverted chevron-type ornament, pronounced post-ocular sulcus, entomodont hinge, with anteromedian element in left valve composed of 3-5 teeth and 7-8 anterior marginal pore canals and described *Fastigatocythere rugosa* as its type species. In addition to the type species he also included the following middle Jurassic species - *Progonocythere juglandica juglandica* (Jones) from Europe, *Progonocythere accessa*, *P. bicrucata*, *P. befotakaensis*, *Progonocythere juglandica malgachica* and *Progonocythere* 2393 described by Grekoff (1963) from Madagascar, and *Lophocythere interrupta*, *L. interrupta directa*, *L. interrupta interrupta* described by Triebel (1951) from Germany.

Whatley and Ballent (1996) amended the diagnosis of *Fastigatocythere* to accommodate the species of *Amicytheridea* Bate, 1975, *Glyptogatocythere* Basha, 1980 and *Zerqacythere* Basha, 1980. These genera too are characterized by inverted chevron rib type ornamentation, marked eye tubercle and post-ocular sulcus. The hinge in *Glyptogatocythere* is entomodont, while in *Amicytheridea* and *Zerqacythere* lobodont. According to Whatley and Ballent (1996) the lobodont hinge can be seen to be also entomodont. In fact, the difference between

the two hinge types is only a matter of degree; in the lobodont hinge, the denticles on the anteromedian element of the left valve are more distally expanded than in an entomodont hinge. They would not regard this as a generic character.

The emended diagnosis of *Fastigatocythere* Wienholz, 1967 as given by Whatley and Ballent (1996) are: Progonocytherinae with subtriangular to subrectangular lateral outline; ornamented by ribs in inverted chevron which overreach dorsal margin and may be broken up centrally into coarse reticulation creating prominent tubercles. Ventrally punctate or with ribs parallel to ventral margin. Eye tubercle and marked post-ocular sulcus. Left valve larger than right. Anterior marginal pore canals normally seven to nine, but range up to 14. Avestibulate. Frontal scar anterodorsal in position, usually circular.

Whatley and Ballent (2004) further proposed that *Dhrumaella* Dépêche (in Dépêche *et al.*, 1987) created from the Jurassic of Saudi Arabia with *Acanthocythere spiniscutulata* Sylvester-Bradley, 1956 as type species is probably *Fastigatocythere*.

During the course of review of work of Khosla *et al.* (2005) on the Middle Jurassic Ostracoda from the Northern Island Belt, Rann of Kachchh, Gujarat, India, Prof. R. C. Whatley (personal communication) intimated the first author (SCK) that the genera *Batella* Khosla, Jakhar and Mohammed, 1997, *Habocythere* Khosla, Jakhar and Mohammed, 1997 and *Jainiana* Mannikeri, 1996 described from the Jurassic of western India too are junior synonyms of *Fastigatocythere*.

More recently, Prof. A. R. Lord who reviewed the present Atlas of the Middle Jurassic Ostracods from western India has drawn authors's attention to the important works of Mette (2004), Mette and Geiger (2004a-c) on the Jurassic Ostracoda of Madagascar. Mette and Geiger (2004c) because of the difference in hinge

structure and number of marginal pore canals classified the genera *Amicytheridea*, *Glyptogatocythere* and *Zerqacythere* as well as *Fastigatocythere* (*sensu* Wienholz, 1967) as subgenera of *Fastigatocythere* (*sensu* Whatley and Ballent, 1996). According to Mette and Geiger (2004c) the genus *Habocythere* Khosla, Jakhar and Mohammed, 1997 which also has inverted chevron-type rib pattern, 2 transverse anterodorsal sulci, a lobodont hinge and 7-10 anterior marginal pore canals should be assigned as subgenus of *Fastigatocythere*. Further *Batella* Khosla, Jakhar and Mohammed, 1997 which was suggested to differ from other genera of the Progonocytherinae in the lobodont hinge and occurrence of 17-21 anterior marginal pore canals is classified as a subgenus of *Fastigatocythere* because of the ornamentation by subtriangular ribs, the occurrence of a distinct anterodorsal sulcus and the lobodont hinge. Mette and Geiger (2004c) further amended diagnosis of *Fastigatocythere* (*sensu* Whatley and Ballent, 1996) to include *Batella* species with up to 21 marginal pore canals.

Following Whatley and Ballent (1996), Khosla *et al.* (2005 and 2006), besides others, transferred the species described under the genera *Amicytheridea*, *Batella* and *Habocythere* by Khosla and Jakhar (1993) and Khosla *et al.* (1997) from the Habo Dome, Kachchh to *Fastigatocythere*. However, now following Mette and Geiger (2004c) in this atlas these genera are regarded as subgenera of *Fastigatocythere* on the basis of distinct differences in details of ornamentation, hinge structure and number of marginal pore canals.

The hinge in *Amicytheridea* is lobodont (*sensu stricto*), while in *Batella* and *Habocythere* it is entomodont (*sensu lato*) and not lobodont as described earlier by Khosla *et al.* (1997). In the latter two genera the anteromedian element in left valve consists of, by and large, two distinct or prominent teeth instead of usual 3-5 teeth and in right

valve with two distinct or prominent loculi.

The genus *Jainiana* Mannikeri with typical entomodont hinge and 7 anterior marginal pore canals is regarded as junior synonym of *Fastigatocythere* (Whatley, personal communication). The genus *Dhrumaella* Basha with lobodont hinge (*sensu stricto*) and 6-8 anterior marginal pore canals is regarded as synonym of *Amicytheridea* Bate.

In this atlas, the authors have included as many as 24 species of *Fastigatocythere* recorded or described from the Middle Jurassic of India. These have been grouped into four subgenera as follows:

Subgenus *Fastigatocythere* s.s.:

Fastigatocythere (*Fastigatocythere*)
jaisalmerensis Khosla and Jakhar
Fastigatocythere (*Fastigatocythere*) *retusa*
Grekoff

Subgenus *Amicytheridea*:

Fastigatocythere (*Amicytheridea*) *flebilis*
Khosla and Darwin Felix
Fastigatocythere (*Amicytheridea*) *globosa* Mette
and Geiger
Fastigatocythere (*Amicytheridea*) *indica* Khosla
and Manisha Kumari
Fastigatocythere (*Amicytheridea*) *kachchhensis*
Khosla and Darwin Felix
Fastigatocythere (*Amicytheridea*?)
pachchhamensis Khosla and Darwin Felix
Fastigatocythere (*Amicytheridea*) *triangulata*

(Bate)

Subgenus *Batella*:

Fastigatocythere (*Batella*) *befotakaensis*
(Grekoff)
Fastigatocythere (*Batella*) *belensis* Khosla
and Manisha Kumari
Fastigatocythere (*Batella*) *clavata* (Khosla,
Jakhar and Mohammed)
Fastigatocythere (*Batella*) *depressa* (Khosla,
Jakhar and Mohammed)
Fastigatocythere (*Batella*) *falcula* (Grekoff)
s.s.
Fastigatocythere (*Batella*) sp. A
Fastigatocythere (*Batella*) sp. B

Subgenus *Habocythere*:

Fastigatocythere (*Habocythere*) *bicrucata*
(Grekoff)
Fastigatocythere (*Habocythere*) *diluta*
(Khosla and Jakhar)
Fastigatocythere (*Habocythere*)
dorsoangulata (Grekoff)
Fastigatocythere (*Habocythere*) *elongata*
Khosla and Manisha Kumari
Fastigatocythere (*Habocythere*) *jakhari*
Khosla, Darwin Felix and Manisha Kumari
Fastigatocythere (*Habocythere*) *juglandica*
malgachica (Grekoff)
Fastigatocythere (*Habocythere*)
mouwanaensis Khosla and Manisha Kumari
Fastigatocythere (*Habocythere*) *ventrisulcata*
(Khosla, Jakhar and Mohammed)
Fastigatocythere (*Habocythere*) sp.

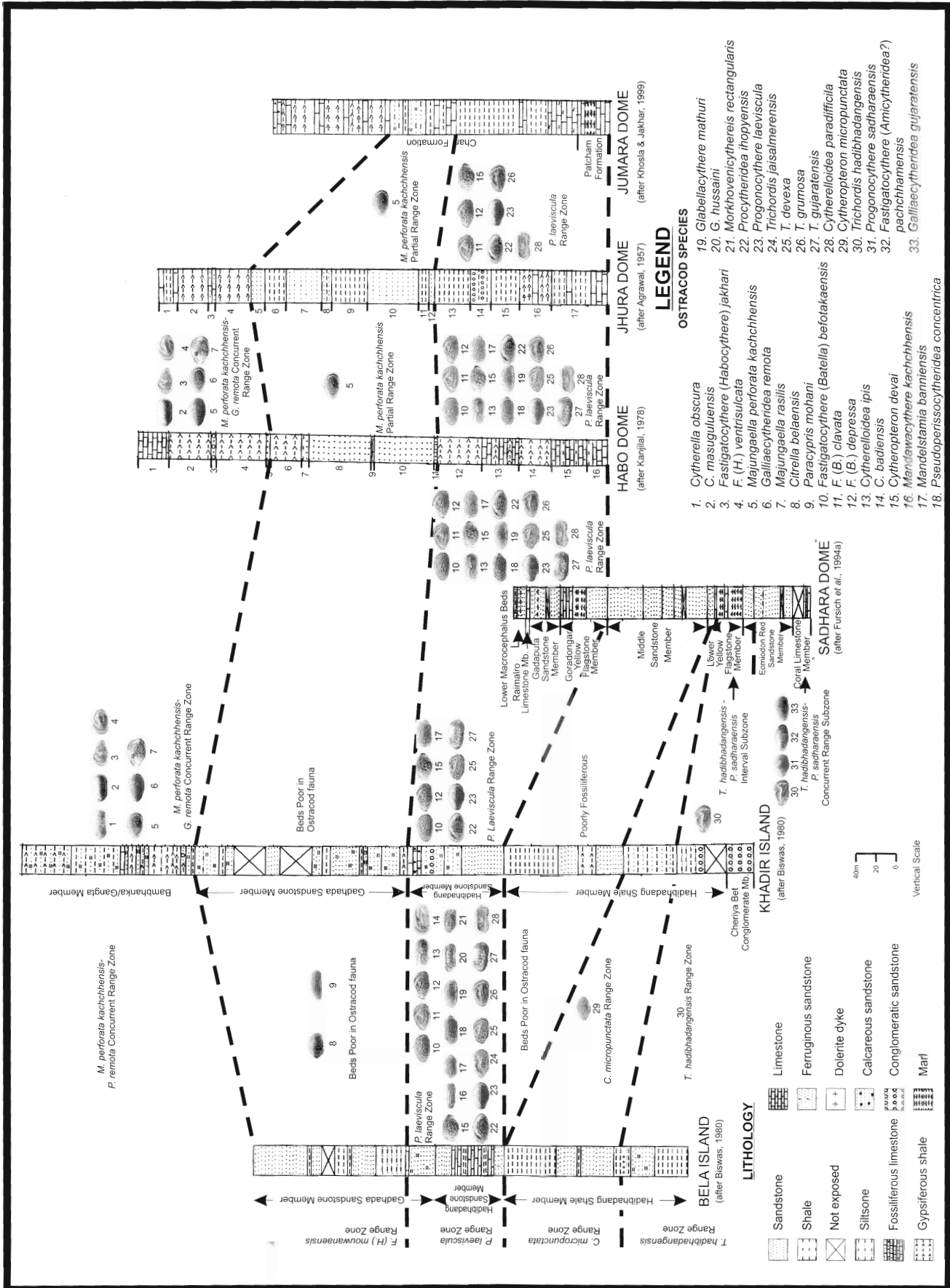


Fig. 12. Ostracod Biostratigraphical correlation of different Middle Jurassic sections exposed in the Island Belt and Mainland Kachhh, Gujarat (lithologies modified after their respective author/s)

Table 5 : Distribution of Ostracod fauna in the Middle Jurassic of Mainland Kachhh.

Name of Species	HABO DOME				JHURA DOME			JUMARA DOME		
	<i>P. laeviscula</i> Range Zone	<i>M. perforata kachchhensis</i> Partial Range Zone	<i>M. perforata kachchhensis-G. remota</i> Concurrent Range Zone	Katrol Formation	<i>P. laeviscula</i> Range Zone	<i>M. perforata kachchhensis</i> Partial Range Zone	<i>M. perforata kachchhensis-G. remota</i> Concurrent Range Zone	<i>P. laeviscula</i> Range Zone	<i>M. perforata kachchhensis</i> Partial Range Zone	<i>M. perforata kachchhensis-G. remota</i> Concurrent Range Zone
<i>Acrocythere oculata</i> Mette and Geiger	+									
<i>Anchistrocheles</i> sp. A								+		
<i>Bairdoppilata badiensis</i> (Khosla, Jakhar and Mohammed)					+			+		
<i>B. jhuraensis</i> (Khosla, Jakhar and Mohammed)					+					
<i>Bairdoppilata</i> sp. A					+					
<i>Bairdoppilata</i> sp. B								+		
<i>Bairdoppilata?</i> sp. C					+					
<i>Bairdoppilata</i> sp. D					+					
<i>Cytherella disjuncta</i> Lyubimova and Mohan	+	+	+		+	+				
<i>C. kalajarensis</i> Khosla and Jakhar			+						+	
<i>C. masuguluensis</i> Bate			+				+			
<i>C. obscura</i> Lyubimova and Mohan	+	+	+		+	+	+	+	+	
<i>Cytherella</i> sp.	+							+		
<i>Cytherelloidea badiensis</i> Khosla, Jakhar and Mohammed	+				+					
<i>C. bhujensis</i> Khosla, Jakhar and Mohammed	+		+				+			
<i>C. dhrangensis</i> Khosla, Jakhar and Mohammed	+				+					
<i>C. ipis</i> Grekoff	+				+					
<i>C. langijarensis</i> Khosla, Jakhar and Mohammed	+		+				+			
<i>C. paradifficila</i> Khosla, Jakhar and Mohammed	+				+			+		
<i>Cytherelloidea</i> sp. A	+									
<i>Cytheropteron agrawali</i> (Khosla, Jakhar and Mohammed)							+			
<i>C. devai</i> (Khosla, Jakhar and Mohammed)	+				+			+		
<i>C. pandeyi</i> (Khosla, Jakhar and Mohammed)	+				+			+		
<i>C. sajjaniae</i> (Khosla, Jakhar and Mohammed)	+		+				+			
<i>Fastigatocythere (Amicytheridea) globosa</i> Mette and Geiger	+									
<i>F. (A.) triangulata</i> (Bate)	+		+		+		+	+		

<i>Fastigatocythere (Batella) befotakaensis</i> (Grekoff)	+				+			+	+
<i>F. (B.) clavata</i> (Khosla, Jakhar and Mohammed)	+				+			+	
<i>F. (B.) depressa</i> (Khosla, Jakhar and Mohammed)	+				+	+		+	
<i>F. (B.) falcula</i> (Grekoff)	+				+			+	+
<i>Fastigatocythere (Batella) sp. A</i>					+				
<i>Fastigatocythere (Habocythere) bicrucata</i> (Grekoff)				+					
<i>F. (H.) diluta</i> (Khosla and Jakhar)	+	+		+					
<i>F. (H.) jakhari</i> Khosla, Darwin Felix and Manisha Kumari				+			+		
<i>F. (H.) juglandica malgachica</i> (Grekoff)	+				+				
<i>F. (H.) ventrisulcata</i> (Khosla, Jakhar and Mohammed)				+			+		
<i>Fastigatocythere (Habocythere) sp.</i>							+		
<i>Galliaecytheridea remota</i> Grekoff				+			+		+
<i>G. satyendrai</i> (Khosla, Jakhar and Mohammed)							+		
<i>Glabellacythere mathuri</i> (Khosla, Jakhar and Mohammed)	+				+				
<i>Majungaella perforata</i> Grekoff					+				
<i>M. perforata kachchhensis</i> Khosla, Jakhar and Mohammed	+	+		+		+	+	+	+
<i>M. rasilis</i> Khosla, Jakhar and Mohammed				+			+		
<i>Mandawacythere curvicosta</i> Neale and Singh							+		
<i>Mandelstamia banniensis</i> (Neale and Singh)	+				+			+	+
<i>Neurocythere denticulata</i> (Kulshreshtha, Singh and Tewari)	+				+	+		+	+
<i>N. whatleyi</i> (Khosla and Jakhar)	+						+		+
<i>Paracypris contermia</i> Lyubimova and Mohan	+			+	+			+	+
<i>Procytheridea ihopyensis</i> Grekoff	+				+			+	
<i>P. kachchhensis</i> Khosla, Jakhar and Mohammed	+				+				
<i>Progonocythere haboensis</i> Khosla and Jakhar	+								
<i>P. laeviscula</i> Lyubimova and Mohan	+				+			+	
<i>P. tenuisulcata</i> (Mette and Geiger)				+					
<i>Pseudoperissocytheridea concentrica</i> Khosla , Manisha Kumari and Darwin Felix	+				+				
<i>Schuleridea (Eoschuleridea) soodani</i> Khosla, Jakhar and Mohammed				+			+		
<i>Trichordis devexa</i> (Grekoff)	+				+			+	+
<i>T. grumosa</i> (Lyubimova and Mohan)	+				+			+	
<i>T. gujaratensis</i> Khosla, Jakhar and Mohammed	+				+				+
<i>T. jaisalmerensis</i> (Kulshreshtha, Singh and Tewari)	+				+	+	+	+	+
<i>T. parvicarinata</i> Khosla, Jakhar and Mohammed	+								
<i>T. praetexta</i> Grekoff	+				+			+	+

Table 6 : Distribution of Ostracod fauna in the Middle Jurassic of Northern Island Belt, Kachhh.

Name of Species	SADHARA DOME		KHADIR ISLAND				BELA ISLAND				
	<i>T. hadibhad-angensis</i> Range Zone		<i>P. laeviscula</i> Range Zone	<i>T. hadibhadangensis</i> Range Zone	<i>C. micropunctata</i> Range Zone	<i>P. laeviscula</i> Range Zone	<i>M. perforata kachchensis-G. remota</i> Concurrent Range Zone	<i>T. hadibhadangensis</i> Range Zone	<i>C. micropunctata</i> Range Zone	<i>P. laeviscula</i> Range Zone	<i>F. mouwanaensis</i> Range Zone
	<i>T. hadibhadangensis-P. sadharaensis</i> Concurrent Range Subzone	<i>T. hadibhadangensis-P. sadharaensis</i> Interval Subzone									
<i>Bairdoppilata badiensis</i> (Khosla, Jakhar and Mohammed)											
<i>B. jhuraensis</i> (Khosla, Jakhar and Mohammed)											
<i>Bairdoppilata</i> sp. E											
<i>Bairdoppilata</i> sp. F											
<i>Citrella belaensis</i> Khosla, Manisha Kumari and Darwin Felix	+		+	+				+	+	+	+
<i>Cytherella disjuncta</i> Lyubimova and Mohan			+		+				+	+	
<i>C. masuguluensis</i> Bate										+	
<i>C. obscura</i> Lyubimova and Mohan			+		+					+	
<i>Cytherelloidea badiensis</i> Khosla, Jakhar and Mohammed					+					+	
<i>C. dhrangensis</i> Khosla and Jakhar					+					+	
<i>C. ipis</i> Grekoff					+					+	
<i>C. paradifficila</i> Khosla, Jakhar and Mohammed					+					+	
<i>Cytherelloidea</i> sp.					+					+	
<i>Cytheropteron devai</i> (Khosla, Jakhar and Mohammed)			+		+					+	
<i>C. kutchensis</i> Neale and Singh										+	
<i>C. micropunctata</i> Khosla, Darwin Felix and Manisha Kumari					+				+		
<i>C. pandeyi</i> (Khosla, Jakhar and Mohammed)										+	
<i>Darwinula</i> sp.								+		+	
<i>Eucytherura</i> sp.										+	
<i>Fastigatocythere (Fastigatocythere) retusa</i> (Grekoff)								+		+	
<i>Fastigatocythere (Amicytheridea) flebilis</i> Khosla and Darwin Felix	+			+						+	
<i>F. (A.) indica</i> Khosla and Manisha Kumari										+	
<i>F. (A.) kachchensis</i> Khosla, Darwin Felix and Manisha Kumari					+						
<i>F.(A. ?) pachchhamensis</i> Khosla and Darwin Felix			+								
<i>F. (A.) triangulata</i> (Bate)	+					+				+	
<i>Fastigatocythere (Batella) befotakaensis</i> (Grekoff)						+				+	
<i>F. (B.) belaensis</i> Khosla and Manisha Kumari										+	
<i>F. (B.) clavata</i> (Khosla, Jakhar and Mohammed)						+				+	
<i>F. (B.) depressa</i> (Khosla, Jakhar and Mohammed)			+			+				+	
<i>Fastigatocythere (Habocythere) bicrucata</i> (Grekoff)					+			+	+	+	+

<i>F. (H.) dorsoangulata</i> (Grekoff)	+	+		+				+	+	+			
<i>F. (H.) elongata</i> Khosla and Manisha Kumari													+
<i>F. (H.) jakhari</i> Khosla, Darwin Felix and Manisha Kumari								+					+
<i>F. (H.) juglandica malgachica</i> (Grekoff)	+	+	+			+							+
<i>F. (H.) mouwanaensis</i> Khosla and Manisha Kumari								+					+
<i>F. (H.) ventrisulcata</i> (Khosla, Jakhar and Mohammed)								+					
<i>Galliaecytheridea gujaratensis</i> Khosla and Darwin Felix	+	+											
<i>G. lodraniensis</i> Khosla and Manisha Kumari													+
<i>G. remota</i> Grekoff								+					
<i>G. satyendrai</i> (Khosla, Jakhar and Mohammed)								+					
<i>Glabellacythere hussaini</i> Khosla, Darwin Felix and Manishà Kumari								+					+
<i>G. mathuri</i> (Khosla, Jakhar and Mohammed)								+					+
<i>Glabellacythere</i> sp.								+					+
<i>Lophocythere vertipolycostata</i> Khosla and Manisha Kumari	+	+		+	+					+	+		+
<i>Majungaella perforata kachchhensis</i> Khosla, Jakhar and Mohammed										+			
<i>M. rasilis</i> Khosla, Jakhar and Mohammed										+			
<i>Mandawacythere kachchhensis</i> Khosla, Manisha Kumari and Darwin Felix										+			+
<i>M. multicostata</i> Khosla and Manisha Kumari													+
<i>Mandelstamia banniensis</i> (Neale and Singh)				+		+							+
<i>M. biswasi</i> Khosla, Manisha Kumari and Darwin Felix	+					+				+	+		
<i>M. kachchhensis</i> Khosla, Darwin Felix and Manisha Kumari						+					+		
<i>Monoceratina mouwanaensis</i> Khosla and Manisha Kumari													+
<i>M. rannensis</i> Khosla and Manisha Kumari													+
<i>Morkhovenicythereis rectangularis</i> Khosla, Manisha Kumari and Darwin Felix								+					+
<i>Neurocythere? kachchhensis</i> Khosla and Manisha Kumari													+
<i>N. whatleyi</i> (Khosla and Jakhar)													+
<i>Paracypris contermia</i> Lyubimova and Mohan				+		+		+					+
<i>P. kachchhensis</i> Khosla and Darwin Felix.	+	+											
<i>P. mohani</i> Khosla, Darwin Felix and Manisha Kumari	+	+				+	+		+	+			+
<i>P. salmiformis</i> Neale and Singh													+
<i>Paranotacythere</i> sp.								+					+
<i>Procytheridea ihopyensis</i> Grekoff				+		+							+
<i>Progonocythere jaisalmerensis</i> Khosla, Jakhar, Nagori and Darwin Felix				+									
<i>P. laeviscula</i> Lyubimova and Mohan				+		+							+
<i>P. sadharaensis</i> Khosla, Jakhar, Nagori and Darwin Felix	+												+
<i>Pseudoperissocytheridea concentrica</i> Khosla, Manisha Kumari and Darwin Felix								+					+
<i>Timiriasevia khadirensis</i> Khosla and Darwin Felix						+							
<i>Trichordis amraparensis</i> Khosla and Darwin Felix								+					
<i>T. devexa</i> (Grekoff)				+		+							+
<i>T. grumosa</i> (Lyubimova and Mohan)						+							+
<i>T. gujaratensis</i> Khosla, Jakhar and Mohammed				+		+							+
<i>T. hadibhadangensis</i> Khosla, Darwin Felix and Manisha Kumari	+	+		+					+				
<i>T. jaisalmerensis</i> (Kulshreshtha, Singh and Tewari)				+	+	+	+	+	+	+	+	+	+

Table 7 : Distribution of Ostracod fauna in the Fort and Kuldhar members, Jaisalmer Formation.

Name of Species	FORT MEMBER	KULDHAR MEMBER		
	<i>T. hadibhadangensis</i> Range Zone	<i>M. perforata kachchhensis-F. (B.) jalcula</i> Concurrent Range Zone	<i>M. perforata kachchhensis-G. remota</i> Concurrent Range Zone	<i>M. perforata kachchhensis-G. remota</i> Interval Zone
<i>Acrocythere oculata</i> Mette and Geiger	+			
<i>Anchistrocheles</i> sp. B	+			
<i>Bairdoppilata badiensis</i> (Khosla, Jakhar and Mohammed)	+	+		
<i>B. jhuraensis</i> (Khosla, Jakhar and Mohammed)	+			
<i>Bairdoppilata</i> sp. E	+	+		
<i>Bairdoppilata</i> sp. G	+			
<i>Bhatiana indica</i> Mannikeri	+			
<i>Bythocypris rajasthanensis</i> Khosla and Jakhar	+			
<i>Citrella belaensis</i> Khosla, Manisha Kumari and Darwin Felix	+			
<i>Cytherella disjuncta</i> Lyubimova and Mohan	+	+		
<i>C. jaisalmerensis</i> Khosla and Jakhar	+	+		
<i>C. kalajarensis</i> Khosla and Jakhar	+	+		
<i>C. obscura</i> Lyubimova and Mohan	+	+		
<i>Cytherelloidea badiensis</i> Khosla, Jakhar and Mohammed	+	+		
<i>C. bhujensis</i> Khosla, Jakhar and Mohammed	+			
<i>C. difficila</i> Lyubimova and Mohan	+			
<i>C. ipis</i> Grekoff	+	+		
<i>C. kuldharensis</i> Khosla and Jakhar		+		
<i>C. paradifficila</i> Khosla, Jakhar and Mohammed		+		
<i>Cytherelloidea</i> sp. C	+			
<i>Cytheropteron lellapadiensis</i> Khosla and Jakhar		+		
<i>C. micropunctata</i> Khosla, Darwin Felix and Manisha Kumari	+			
<i>C. rajasthanensis</i> Khosla and Jakhar		+	+	
<i>Cytheropteron</i> sp. A	+			
<i>Cytheropteron</i> sp. B				+
<i>Cytheropteron</i> sp. C				+
<i>Eocytheridea?</i> sp.	+			
<i>Eucytherura</i> sp. B	+			
<i>Fabanella</i> sp.		+		
<i>Fastigatocythere (Fastigatocythere) jaisalmerensis</i> Khosla and Jakhar	+			
<i>Fastigatocythere (Amicytheridea) flebilis</i> Khosla and Darwin Felix	+			
<i>F. (A.) indica</i> Khosla and Manisha Kumari.	+			
<i>Fastigatocythere (Batella) befotakaensis</i> (Grekoff)	+			

<i>F. (B.) clavata</i> (Khosla, Jakhar and Mohammed)			+		
<i>F. (B.) depressa</i> (Khosla, Jakhar and Mohammed)	+		+		
<i>F. (B.) falcula</i> (Grekoff)			+		
<i>Fastigatocythere (Batella) sp. B</i>			+		
<i>Fastigatocythere (Habocythere) juglandica malgachica</i> (Grekoff)	+				
<i>Galliaecytheridea grekoffi</i> Khosla and Jakhar			+		+
<i>G. lodraniensis</i> Khosla and Manisha Kumari	+				
<i>G. remota</i> Grekoff				+	
Genus A	+				
<i>Glabellacythere hussaini</i> Khosla, Darwin Felix and Manisha Kumari	+				
<i>G. mathuri</i> (Khosla, Jakhar and Mohammed)	+				
<i>Lophocythere mannikerii</i> Khosla and Jakhar	+				
<i>L. vertipolycostata</i> Khosla and Manisha Kumari	+				
<i>Majungaella perforata kachchhensis</i> Khosla, Jakhar and Mohammed			+	+	+
<i>Mandawacythere kachchhensis</i> Khosla, Manisha Kumari and Darwin Felix	+				
<i>Mandelstamia banniensis</i> (Neale and Singh)	+		+		+
<i>M. biswasi</i> Khosla, Manisha Kumari and Darwin Felix	+				
<i>M. kachchhensis</i> Khosla, Darwin Felix and Manisha Kumari	+				
<i>Micropneumatocythere masurdiensis</i> Khosla and Jakhar				+	
<i>M. rasilis</i> Khosla and Jakhar			+		
<i>Monoceratina fortensis</i> Khosla and Jakhar	+				
<i>M. mouwanaensis</i> Khosla and Manisha Kumari	+				
<i>M. parascrobiculata</i> Khosla and Jakhar			+		
<i>Morkhovenicythereis rectangularis</i> Khosla, Manisha Kumari and Darwin Felix	+				
<i>Neurocythere denticulata</i> (Kulshreshtha, Singh and Tewari)	+		+		
<i>N. kuldharensis</i> Khosla and Jakhar			+		
<i>N. whatleyi</i> (Khosla and Jakhar)			+		
<i>Oligocythereis minuta</i> Kulshreshtha, Singh and Tewari			+		
<i>Paracypris contermia</i> Lyubimova and Mohan			+	+	
<i>P. kachchhensis</i> Khosla and Darwin Felix	+				
<i>P. mohani</i> Khosla, Darwin Felix and Manisha Kumari	+				
<i>Progonocythere jaisalmerensis</i> Khosla, Jakhar, Nagori and Darwin Felix	+				
<i>P. tharensis</i> Khosla and Jakhar	+				
<i>Protobuntonia sp.</i>				+	
<i>Theriosynoecum sp.</i>	+				
<i>Trichordis devexa</i> (Grekoff)			+		
<i>T. gujaratensis</i> Khosla, Jakhar and Mohammed	+		+		
<i>T. hadibhadangensis</i> Khosla, Darwin Felix and Manisha Kumari	+				
<i>T. jaisalmerensis</i> (Kulshreshtha, Singh and Tewari)			+		
<i>T. praetexta</i> Grekoff			+		

Table 8 : Correlation of Ostracod Biostratigraphical Zonation of Middle Jurassic of the Mainland and Northern Island Belt of Kachchh and Jaisalmer districts.

Age	Kachchh District		Jaisalmer District
	Mainland	Northern Island Belt	
middle-late Callovian			<i>Majungaella perforata</i> <i>kachchhensis</i> - <i>Galliaecytheridea remota</i> Interval Zone
	<i>Majungaella perforata</i> <i>kachchhensis</i> - <i>Galliaecytheridea remota</i> Concurrent Range Zone	<i>Majungaella perforata</i> <i>kachchhensis</i> - <i>Galliaecytheridea</i> <i>remota</i> Concurrent Range Zone	<i>Majungaella perforata</i> <i>kachchhensis</i> - <i>Galliaecytheridea remota</i> Concurrent Range Zone
	<i>Majungaella perforata</i> . <i>kachchhensis</i> Partial Range Zone		
Callovian		<i>Fastigatocythere</i> (<i>Habocythere</i>) <i>mouwanaensis</i> Range Zone	
late Bathonian- early Callovian	<i>Progonocythere</i> <i>laeviscula</i> Range Zone	<i>Progonocythere</i> <i>laeviscula</i> Range Zone	<i>Majungaella perforata</i> <i>kachchhensis</i> - <i>Fastigatocythere (Batella)</i> <i>falcula</i> Concurrent Range Zone
Bathonian		<i>Cytheropteron</i> <i>micropunctata</i> Range Zone	
Bajocian- Bathonian		<i>Trichordis</i> <i>hadibhadangensis</i> Range Zone	<i>Trichordis hadibhadangensis</i> Range Zone

***Acrocythere oculata* Mette and Geiger**

Plate 1, figures 1-2

Acrocythere? sp. Khosla *et al.*, 1997, p. 32, pl. 7, fig. 6. - Khosla *et al.*, 2006, pp. 16-17, pl. 2, fig. 12.

Acrocythere oculata Mette and Geiger, 2004b, pp. 64-68, pl. 6, figs. 9-10; pl. 7, figs 1-4.

Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Yellow gypsiferous shale (Sample No. D14/13), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace elongate-subquadrate in lateral outline; greatest height at anterior cardinal angle. Eye tubercle distinct and translucent. Valve surface ornamented by four longitudinal ribs, dorsal, median, ventrolateral and ventral, median rib zigzag, two short transverse ribs in dorsomedian and ventromedian regions; and indistinct reticulation and papillae over rest of the area. Mpc 7-8 anteriorly and probably 3 or 4 posteriorly. Hinge antimerodont.

Dimensions (mm): LV (SUGDMF No. 543), L. 0.46, H. 0.28.

Distribution: *P. laeviscula* Range Zone, Habo Dome, Kachchh; *T. hadibhadangensis* Range Zone, Jaisalmer; and early Callovian of Morondava Basin, Madagascar.

Figures 1-2. LV, 1, Lat.V, x 167; 2, DV, x 170.

***Anchistrocheles* sp. A**

Plate 2, figures 1-2

Anchistrocheles sp. Khosla and Jakhar, 1999, p. 45, pl. 3, fig. 8.

Locality and horizon: Core of the Jumara Dome, Kachchh. Limestone bed (Sample No. J/1) at the base of Patcham Formation (Bathonian).

Diagnostic characters: Carapace subreniform in lateral outline, with greatest height at middle; anterior and posteroventral marginal regions compressed and fringed with spines. Left valve slightly larger than right valve overlapping along dorsal and mid-ventral margins. Dorsal margin arched; ventral concave; anterior bluntly rounded; posterior steeply sloping down for upper 2/3rd of height, lower 1/3rd somewhat rounded. Valve surface almost smooth.

Remarks: The species was earlier recorded as *Anchistrocheles* sp., but herein it is redesignated as *Anchistrocheles* sp. A.

Dimensions (mm): Carapace (SUGDMF No. 1011), L. 0.54, H. 0.30, W. 0.18.

Distribution: *P. laeviscula* Range Zone, Jumara Dome, Kachchh.

Figures 1-2. Carapace; 1, RVV, x 137; 2, DV, x 148.

PLATE 1

Acrocythere oculata Mette and Geiger

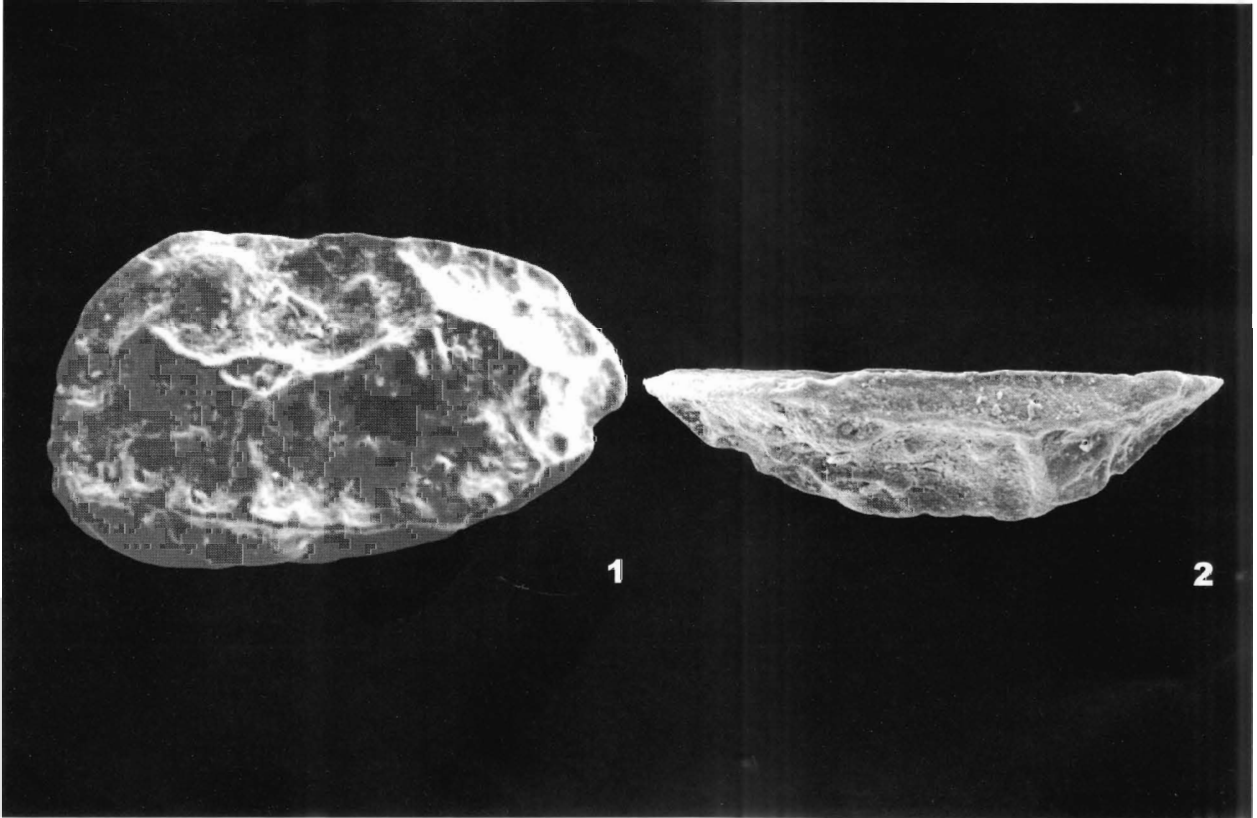


PLATE 2

Anchistrocheles sp. A



***Anchistrocheles* sp. B**

Plate 3, figures 1-2

Anchistrocheles sp. B Khosla *et al.*, 2006, p. 13, pl. 1, figs. 7-8.

Locality and horizon: Escarpment of the fort hill, about 3/4th km WNW of Jaisalmer Railway Station. Clay bed (Sample No. FB/2), Fort Member (Bajocian-Bathonian), Jaisalmer Formation.

Diagnostic characters: Carapace subreniform in lateral outline, with greatest height posterior to middle; anterior and posteroventral marginal regions compressed. Left valve slightly larger than right valve. Dorsal margin weakly arched; ventral distinctly concave at anterior 1/3rd of length; anterior bluntly rounded; posterior steeply sloping down for upper 2/3rd of height, lower 1/3rd rounded. Valve surface marked by a shallow, median, vertical sulcus, rest of the area smooth.

Dimensions (mm): Carapace (SUGDMF No. 902), L. 0.80, H. 0.45, W. 0.29. Carapace (SUGDMF No. 903), L. 0.70, H. 0.37, W. 0.27.

Distribution: *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-2. 1, carapace, RVV, x 94; 2, carapace, DV, x 109.

***Bairdoppilata badiensis* (Khosla, Jakhar and Mohammed)**

Plate 4, figures 1-2

Bairdia badiensis Khosla, Jakhar and Mohammed, 2004, pp. 23-24, pl. 1, figs. 2-3.

Bairdoppilata badiensis (Khosla *et al.*) - Khosla *et al.*, 2005, p. 32, pl. 1, fig. 1. - Khosla *et al.*, 2006, p. 12, pl. 1, fig. 1.

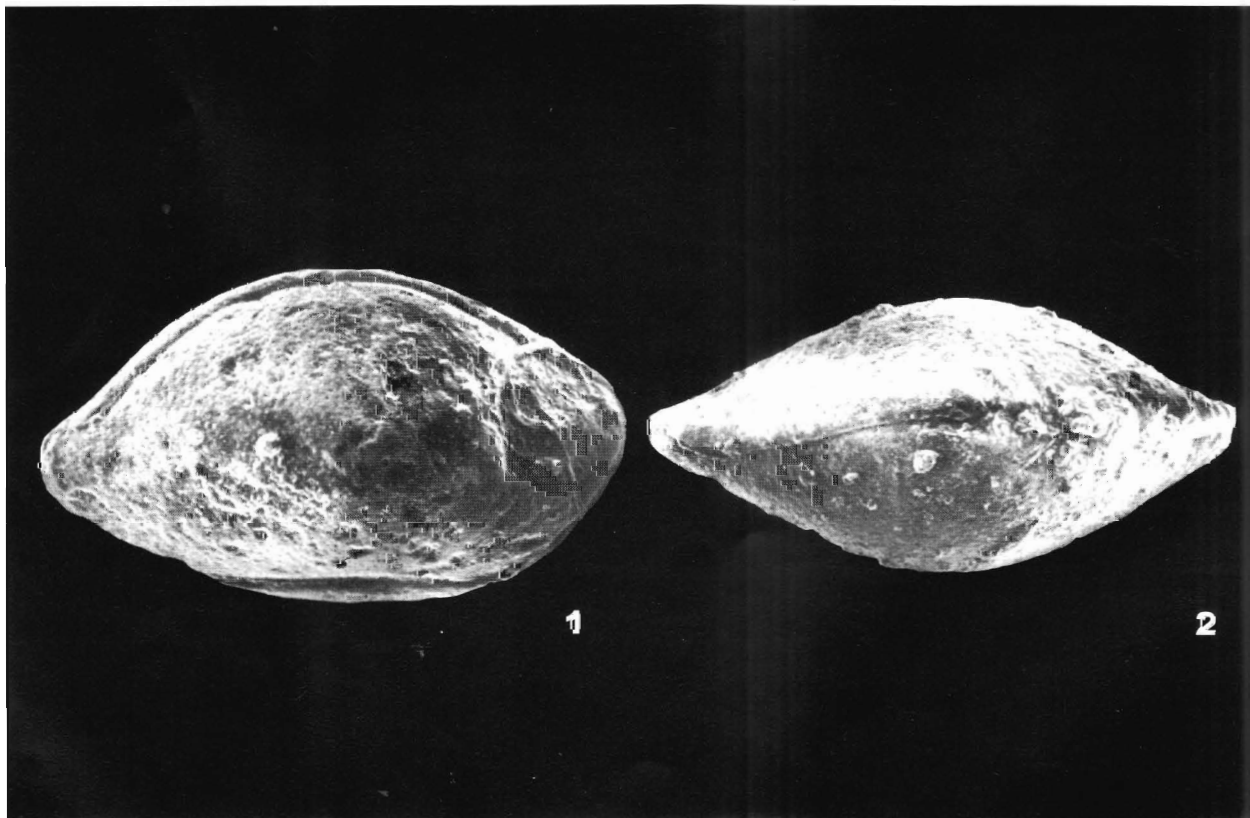
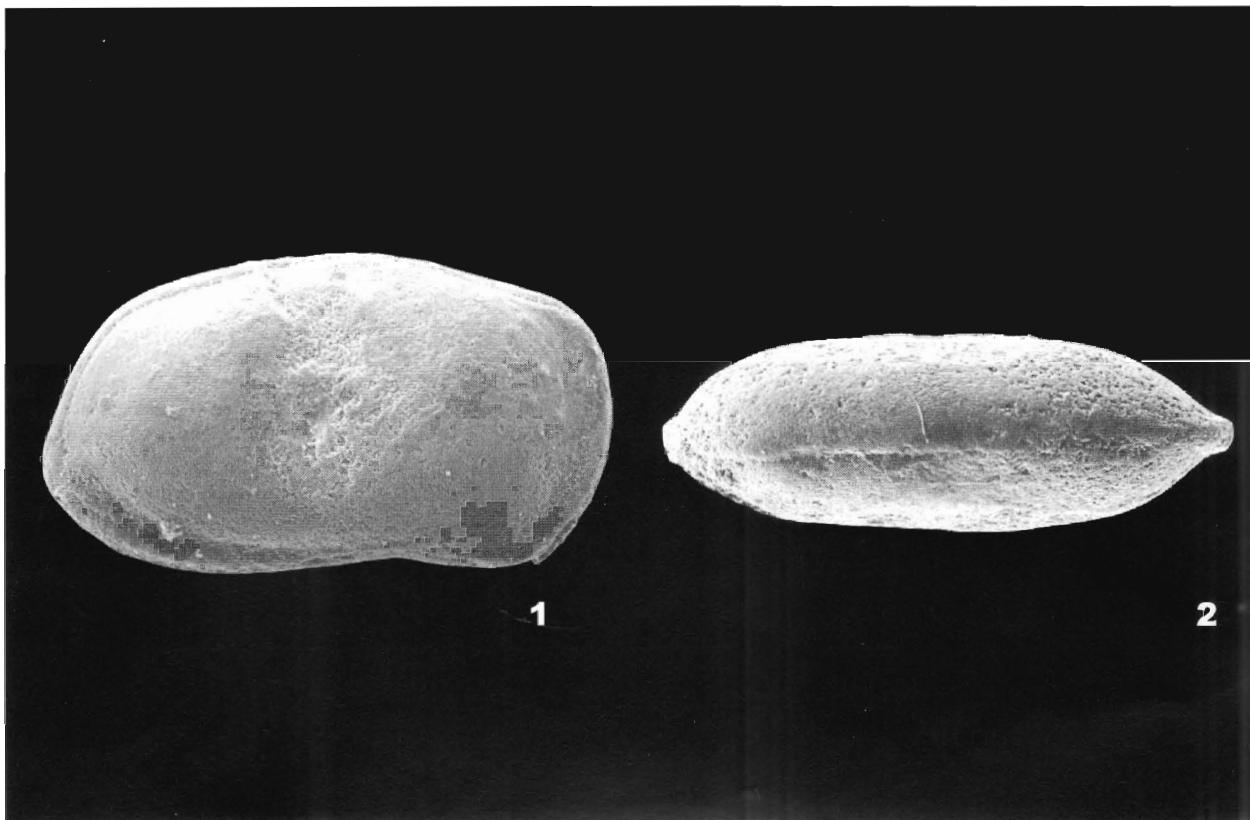
Locality and horizon: Southwest of Jhura Village, Jhura Dome, Kachchh. Light yellow shales, with bands of Golden Oolite (Sample No. J17/2), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subdeltoid in lateral outline and biconvex in the dorsal; greatest height and width near middle. Left valve larger than right valve, overlapping it distinctly along dorsal and mid-ventral margins. Dorsal margin symmetrically arched, ventral margin convex; anterior margin rounded downwardly; anterodorsal angle above mid-height; posterior margin narrowly rounded; posterodorsal angle near mid-height.

Dimensions (mm): Holotype (SUGDMF No. 716), carapace, L. 0.86, H. 0.50, W. 0.43. Paratype (SUGDMF No. 717), carapace, L. 0.88, H. 0.50, W. 0.44.

Distribution: *P. laeviscula* Range Zone, Jhura Dome, Jumara Dome and Bela Island, Kachchh; *T. hadibhadangensis* Range Zone and *M. perforata kachchhensis* - *F. (B.) falcula* Concurrent Range Zone, Jaisalmer.

Figures 1-2. 1, holotype, carapace, RVV, x 90; 2, paratype, carapace, DV, x 89.



Bairdoppilata jhuraensis (Khosla, Jakhar and Mohammed)

Plate 5, figures 1-2

Bairdia jhuraensis Khosla, Jakhar and Mohammed, 2004, p. 24, pl. 1, figs. 4-5.

Bairdoppilata jhuraensis (Khosla *et al.*). - Khosla *et al.*, 2005, p. 32, pl. 1, fig. 2. - Khosla *et al.*, 2006, p. 12, pl. 1, fig. 2.

Locality and horizon: Southwest of Jhura Village, Jhura Dome, Kachchh. Light yellow shales, with bands of Golden Oolite (Sample No. J17/2), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subdeltoid in lateral outline, with greatest height about 3/5th of length near middle. Dorsal margin strongly arched; ventral margin convex; anterior margin broadly rounded downwardly; anterodorsal angle above mid-height; posterior margin narrowly rounded; posterodorsal angle below mid-height.

Dimensions (mm): Holotype (SUGDMF No. 718), carapace, L. 0.90, H. 0.56, W. 0.46. Paratype (SUGDMF No. 719), carapace, L. 0.92, H. 0.53, W. 0.46.

Distribution: *P. laeviscula* Range Zone, Jhura Dome and Bela Island, Kachchh; *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-2. 1, holotype, carapace, RVV, x 86; 2, paratype, carapace, DV, x 84.

***Bairdoppilata* sp. A**

Plate 6, figures 1-2

Bairdia sp. A Khosla *et al.*, 2004, p. 24, pl. 1, fig. 6.

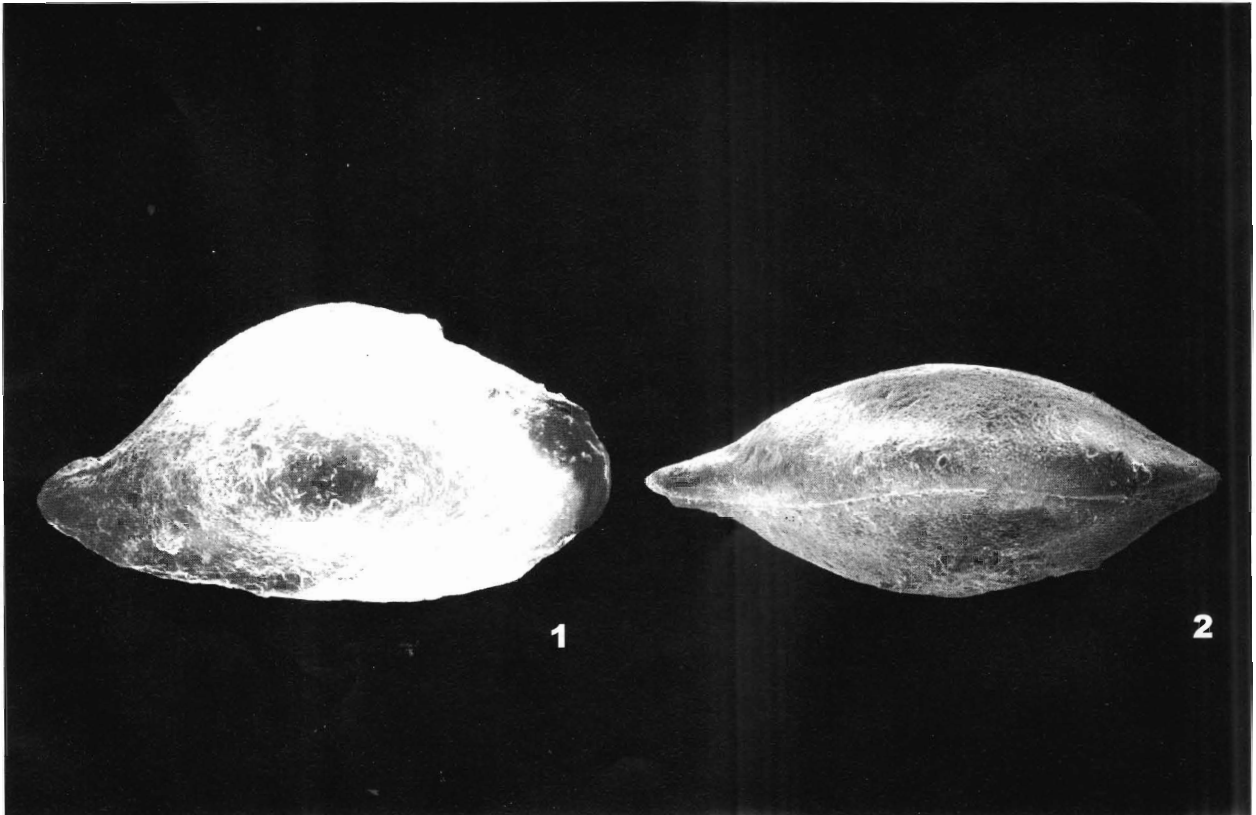
Locality and horizon: Southwest of Jhura Village, Jhura Dome, Kachchh. Light yellow shale with bands of Golden Oolite (Sample No. J17/2), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subdeltoidal in lateral outline and biconvex in the dorsal. Dorsal margin strongly arched, with a distinct concavity in posterodorsal part; anterior margin broadly rounded; anterodorsal angle above mid-height; posterior margin narrow and drawn out below mid-height. Valve surface indistinctly pitted.

Dimensions (mm): Carapace (SUGDMF No. 720), L. 0.84, H. 0.48, W. 0.37.

Distribution: *P. laeviscula* Range Zone, Jhura Dome, Kachchh.

Figures 1-2. Carapace; 1, RVV, x 91; 2, DV, x 92.



***Bairdoppilata* sp. B**

Plate 7, figures 1-2

Bairdia sp. B Khosla and Jakhar, 1999, p. 45, pl. 3, fig. 10.

Locality and horizon: Core of the Jumara Dome, Kachchh. Limestone bed (Sample No. J/1) at the base of Patcham Formation (Bathonian).

Diagnostic characters: Carapace subtrapezoidal in lateral outline and spindle shaped in the dorsal. Dorsal margin consists of three parts, median part straight and horizontal, posterodorsal distinctly concave, anterodorsal straight, sloping down forwardly; ventral margin medially concave; anterior margin broad, downwardly rounded and denticulate; anterodorsal angle above mid-height; posterior margin narrowly rounded below mid-height. Valve surface densely granulated.

Dimensions (mm): Carapace (SUGDMF No. 1012), L. 0.73, H. 0.40, W. 0.32.

Distribution: *P. laeviscula* Range Zone and *M. perforata kachchhensis* Partial Range Zone, Jumara Dome, Kachchh.

Figures 1-2. Carapace; 1, RVV, x 104; 2, DV, x 105.

***Bairdoppilata?* sp. C**

Plate 8, figures 1-2

Bairdia? sp. C Khosla *et al.*, 2004, pp. 24-26, pl. 1, fig. 8.

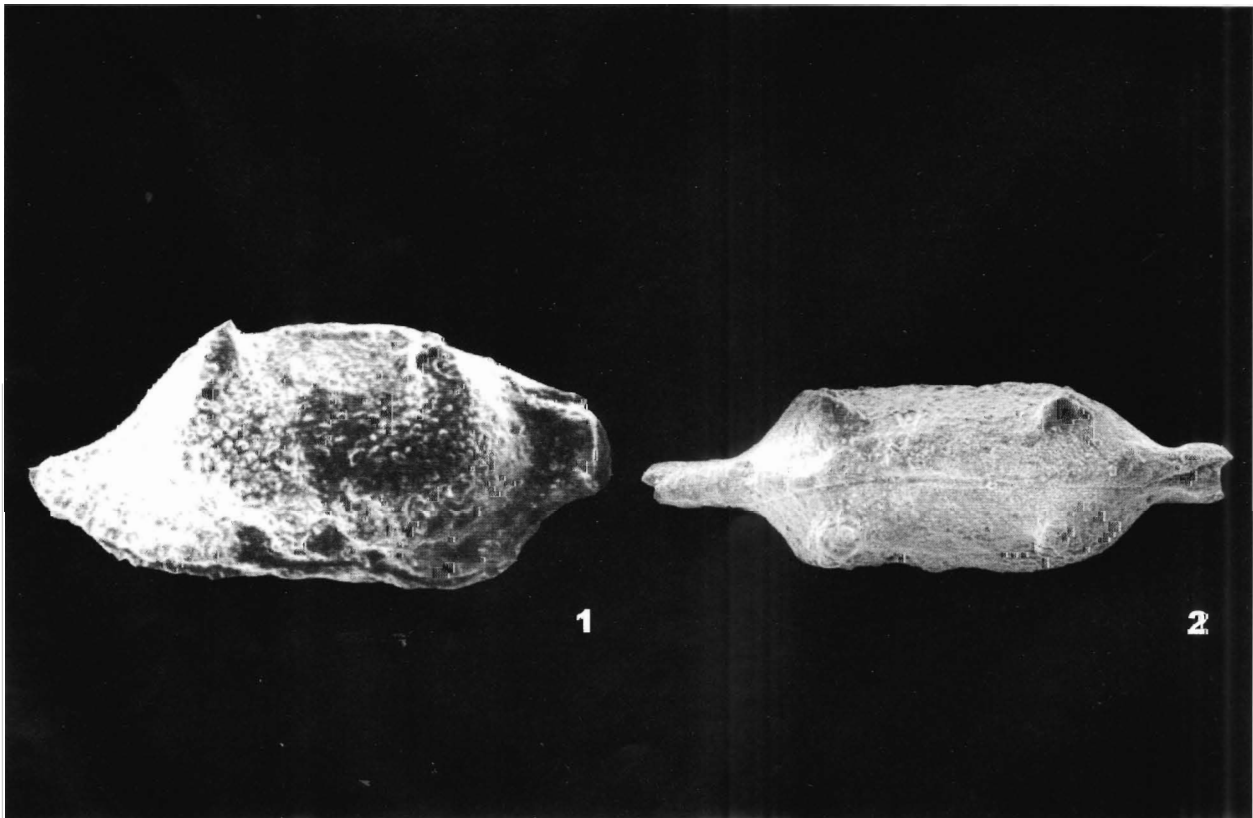
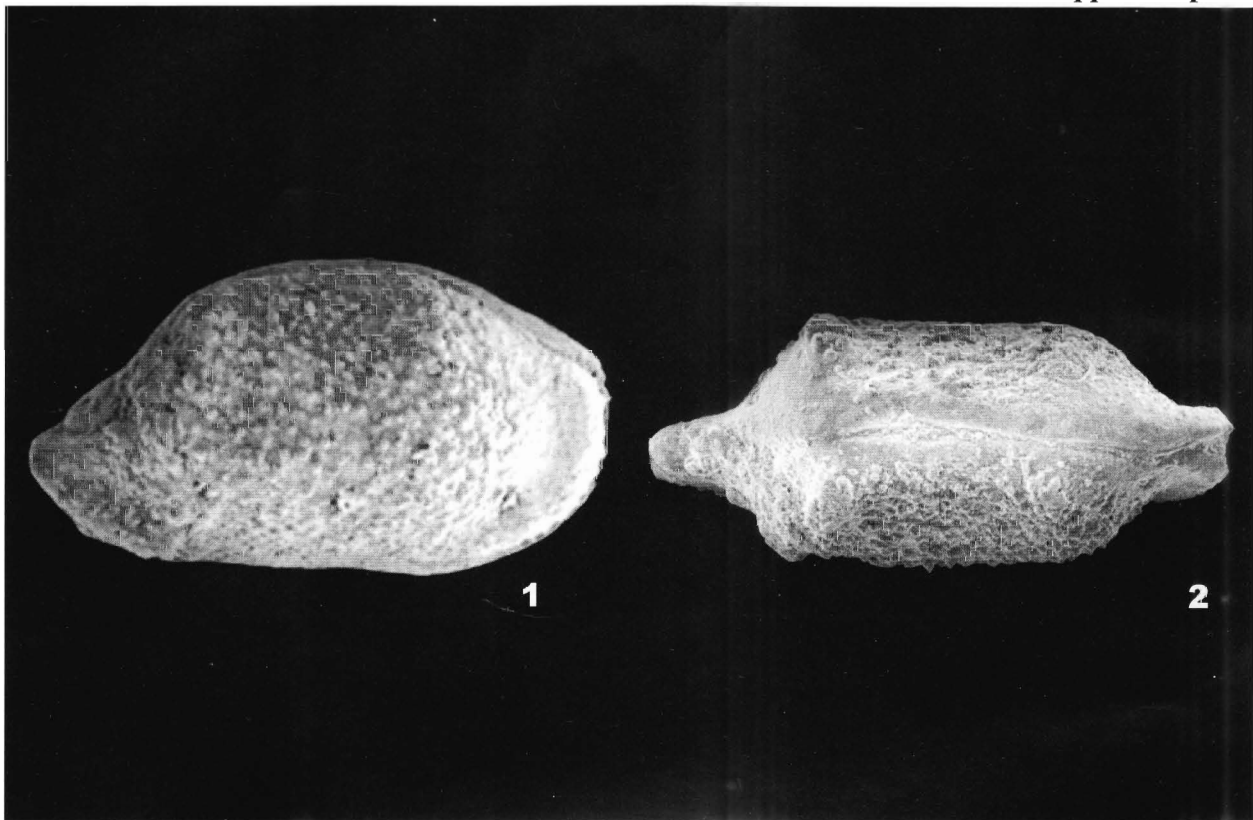
Locality and horizon: Southwest of Jhura Village, Jhura Dome, Kachchh. Light yellow shale with bands of Golden Oolite (Sample No. J17/2), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subtrapezoidal in lateral outline and spindle shaped in the dorsal. Dorsal margin consists of three parts, median part straight and horizontal, posterodorsal distinctly concave, anterodorsal straight, sloping down forwardly; anterodorsal angle above mid-height; posterior margin drawn out and narrowly rounded at mid-height. Valve surface marked by two prominent knobs near either ends of mid-dorsal margin; rest of the area finely pitted.

Dimensions (mm): Carapace (SUGDMF No. 722), L. 0.78, H. 0.36, W. 0.26.

Distribution: *P. laeviscula* Range Zone, Jhura Dome, Kachchh.

Figures 1-2. Carapace; 1, RVV, x 100; 2, DV, x 100.



***Bairdoppilata* sp. D**

Plate 9, figures 1-2

Bairdia sp. B Khosla *et al.*, 2004, p. 24, pl. 1, fig. 7.

Locality and horizon: Southwest of Jhura Village, Jhura Dome, Kachchh. Light yellow shale with bands of Golden Oolite (Sample No. J17/2), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subtrapezoidal in lateral outline. Dorsal margin consists of three parts, median part straight and horizontal, posterodorsal distinctly concave, anterodorsal straight sloping down forwardly; ventral margin concave medially; posteroventral margin turning sharply upwards; anterodorsal angle above mid-height; posterior margin drawn out and pointed near mid-height. Valve surface finely pitted.

Dimensions (mm): Carapace (SUGDMF No. 721), L. 0.74, H. 0.36, W. 0.28.

Remarks: The species was earlier designated as *Bairdia* sp. B, however, it is herein renamed as *Bairdoppilata* sp. D.

Distribution: *P. laeviscula* Range Zone, Jhura Dome, Kachchh.

Figures 1-2. Carapace; 1, RVV, x 105; 2, DV, x 107.

***Bairdoppilata* sp. E**

Plate 10, figures 1-2

Bairdoppilata sp. E Khosla *et al.*, 2005, p. 32, pl. 1, fig. 3. - Khosla *et al.*, 2006, p. 12, pl. 1, fig. 3.

Locality and horizon: 1 km northwest of Gadhada ruins, Bela Island, Kachchh. Oolitic limestone overlying the Coralline Limestone (Sample No. BVI/2), Gadhada Sandstone Member (early-mid Callovian), Khadir Formation.

Diagnostic characters: Carapace elongate-subdeltoidal in lateral outline, with greatest height about half the length near middle. Dorsal margin moderately arched; anterodorsal angle slightly above mid-height, posterodorsal angle at mid-height; ventral margin straight; anterior margin broad and downwardly rounded; posterior margin narrowly rounded in lower half.

Dimensions (mm): Carapace (SUGDMF No. 898), L. 0.72, H. 0.34, W. 0.29. Carapace (SUGDMF No. 742), L. 0.61, H. 0.30, W. 0.24.

Distribution: *F. (H.) mouwanaensis* Range Zone, Bela Island, Kachchh; *T. hadibhadangensis* Range Zone and *M. perforata kachchhensis* - *F. (B.) falcula* Concurrent Range Zone, Jaisalmer.

Figures 1-2. 1, carapace, RVV, x 106; 2, carapace, DV, x 125.



***Bairdoppilata* sp. F**

Plate 11, figures 1-2

Bairdoppilata sp. F Khosla *et al.*, 2005, pp. 32-33, pl. 1, fig. 4.

Locality and horizon: North of Lodrani Village, Bela Island, Kachchh. *Corbula lyrata* bearing reddish-brown siltstone (Sample No. BV/6), Hadibhadang Shale Member (mid-late Bathonian), Khadir Formation.

Diagnostic characters: Carapace bairdoid in lateral outline, with greatest height at middle. Dorsal margin strongly convex; ventral margin nearly straight, gently ascending posteriorly; anterior margin broad and rounded; posterior margin considerably drawn out and narrowly rounded in ventral half.

Dimensions (mm): Carapace (SUGDMF No.743), L. 0.89, H. 0.51, W. 0.45.

Distribution: *C. micropunctata* Range Zone, Bela Island, Kachchh.

Figures 1-2. Carapace; 1, RVV, x 85; 2, DV, x 85.

***Bairdoppilata* sp. G**

Plate 12, figures 1-2

Bairdoppilata sp. G Khosla *et al.*, 2006, p. 12, pl. 1, fig. 4.

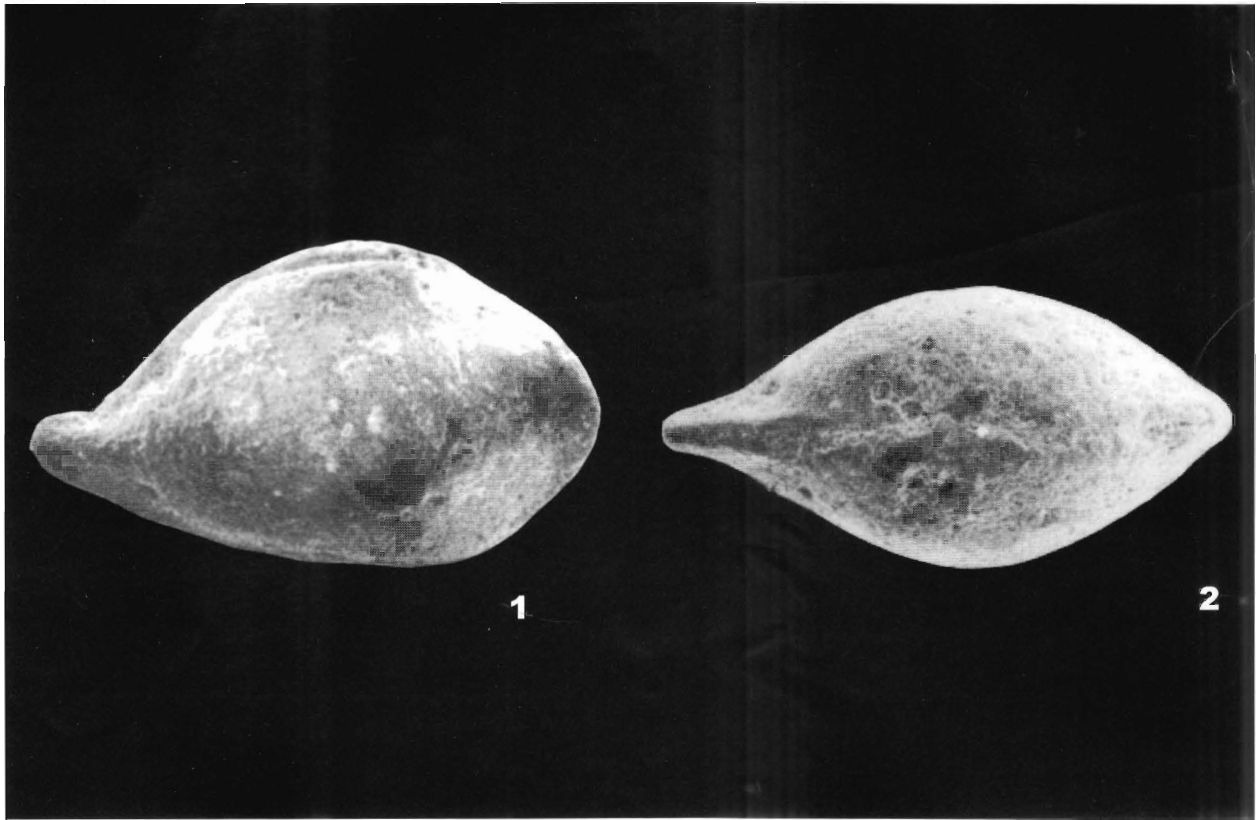
Locality and horizon: Escarpment of the fort hill, 1/2 km NW of Jaisalmer Railway Station. Yellow fossiliferous limestone (Sample No. FA/7), Fort Member (Bajocian-Bathonian), Jaisalmer Formation.

Diagnostic characters: Carapace elongate-subdeltoid in lateral outline. Left valve larger than right valve, overlapping along dorsal and ventral margins. Dorsal margin convex; ventral margin straight; anterior margin downwardly rounded; anterodorsal angle above mid-height; posterior margin drawn out and sharply angulated below mid-height.

Dimensions(mm): Carapace (SUGDMF No. 899), L. 0.86, H. 0.46, W. 0.40.

Distribution: *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-2. Carapace; 1, RVV, x 87; 2, DV, x 87.



Bhatiana indica Mannikeri

Plate 13, figures 1-2

Bhatiana indica Mannikeri, 1996, pp. 401-402, pl. 1, figs. 1 a-b; pl. 2, figs. 3a-c. - Khosla *et al.*, 2006, p. 27, pl. 5, fig. 18.

Locality and horizon: Near Chattries of Vyas family, 1/2 km SSW of Dedan Sar, Jaisalmer. Yellow fossiliferous limestone (Sample No. FF/6), Fort Member (Bajocian-Bathonian), Jaisalmer Formation.

Diagnostic characters: Carapace subrectangular in lateral outline and saggitate in the dorsal, ends compressed. Valve surface marked by prominent tubercles, including a subcentral tubercle, an eye tubercle, two node-like tubercles in posterodorsal and posteroventral regions; anterior and posterior marginal rims and reticulation over rest of the area. Mpc about 7 anteriorly and 3 posteriorly. Cms with a subvertical row of 4 adductor scars in subcentral depression. Hinge paramphidont.

Dimensions (mm): Carapace (SUGDMF No. 989), L. 0.61, H. 0.35, W. 0.32. Carapace (SUGDMF No. 1013), L. 0.56, H. 0.34, W. 0.29.

Distribution: *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-2. 1, carapace, RVV, x 123; 2, carapace, DV, x 136.

Bythocypris rajasthanensis Khosla and Jakhar

Plate 14, figures 1-2

Bythocypris rajasthanensis Khosla and Jakhar, in Khosla *et al.*, 2006, pp. 12-13, pl. 1, figs. 5-6.

Locality and horizon: Near Chattries of Vyas family, 1/2 km SSW of Dedan Sar, Jaisalmer. Yellow fossiliferous limestone (Sample No. FF/6), Fort Member (Bajocian-Bathonian), Jaisalmer Formation.

Diagnostic characters: Carapace reniform in lateral outline and biconvex in the dorsal; greatest height and width at middle. Left valve slightly larger than right valve, overlapping along anterodorsal and ventral margins. Dorsal margin symmetrically convex; ventral margin slightly concave; anterior and posterior margins rounded. Valve surface smooth.

Dimensions (mm): Holotype (SUGDMF No. 900), carapace, L. 0.67, H. 0.37, W. 0.30. Paratype (SUGDMF No. 901), carapace, L. 0.67, H. 0.37, W. 0.34.

Distribution: *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-2. 1, holotype, carapace, RVV, x 112; 2, paratype, carapace, DV, x 112.



Citrella belaensis Khosla, Manisha Kumari and Darwin Felix

Plate 15, figures 1-4

Citrella belaensis Khosla, Manisha Kumari and Darwin Felix, in Khosla *et al.*, 2005, p. 41, pl. 3, figs. 1-3. - Khosla *et al.*, 2006, p. 17, pl. 2, fig. 15.

Locality and horizon: North of Lodrani Village, Bela Island, Kachchh. *Corbula lyrata* bearing reddish-brown siltstone (Sample No. BV/7), Hadibhadang Shale Member (mid-late Bathonian), Khadir Formation.

Diagnostic characters: Carapace subovate in lateral outline and biconvex in the dorsal; greatest height and width posterior to middle. Dorsal margin convex; ventral margin concave anteriorly and convex posteriorly; anterior margin evenly rounded; posterior margin broad, drawn out in a short caudal process at mid height. Valve surface smooth. Mpc about 7-8 anteriorly and 3-4 posteriorly posteriorly. Hinge adont.

Dimensions (mm): Holotype (SUGDMF No. 771), female carapace, L. 0.41, H. 0.28, W. 0.20. Paratype I (SUGDMF No. 772), female LV, L. 0.37, H. 0.23. Paratype III, male carapace (SUGDMF No. 1014), L. 0.49, H. 0.30, W. 0.25.

Distribution: Occurs widely in Bajocian-early Callovian beds of Northern Island Belt, Kachchh; *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-4. 1-2, holotype, female carapace; 1, RVV, x 176; 2, DV, x 176; 3, paratype I, female LV, Int.V, x 195; 4, paratype III, male carapace, RVV, x 149.

Cytherella disjuncta Lyubimova and Mohan

Plate 16, figures 1-2

Cytherella disjuncta Lyubimova and Mohan, in Lyubimova *et al.*, 1960, p. 16, pl. 1, figs. 2a-c. - Kulshreshtha *et al.*, 1985, p. 125, figs. 1.7, 1.8, 1.16, 1.19, 1.20. - Khosla *et al.*, 1997, p. 8, pl. 1, fig. 1. - Khosla *et al.*, 2005, p. 61, pl. 7, fig. 9. - Khosla *et al.*, 2006, p. 27, pl. 6, fig. 2.

Cytherella index Guha, 1977, p. 85, pl. 2, figs. 9a, b (not *Cytherella index* Oertli, 1959, p. 16, pl. 1, figs. 13-26).

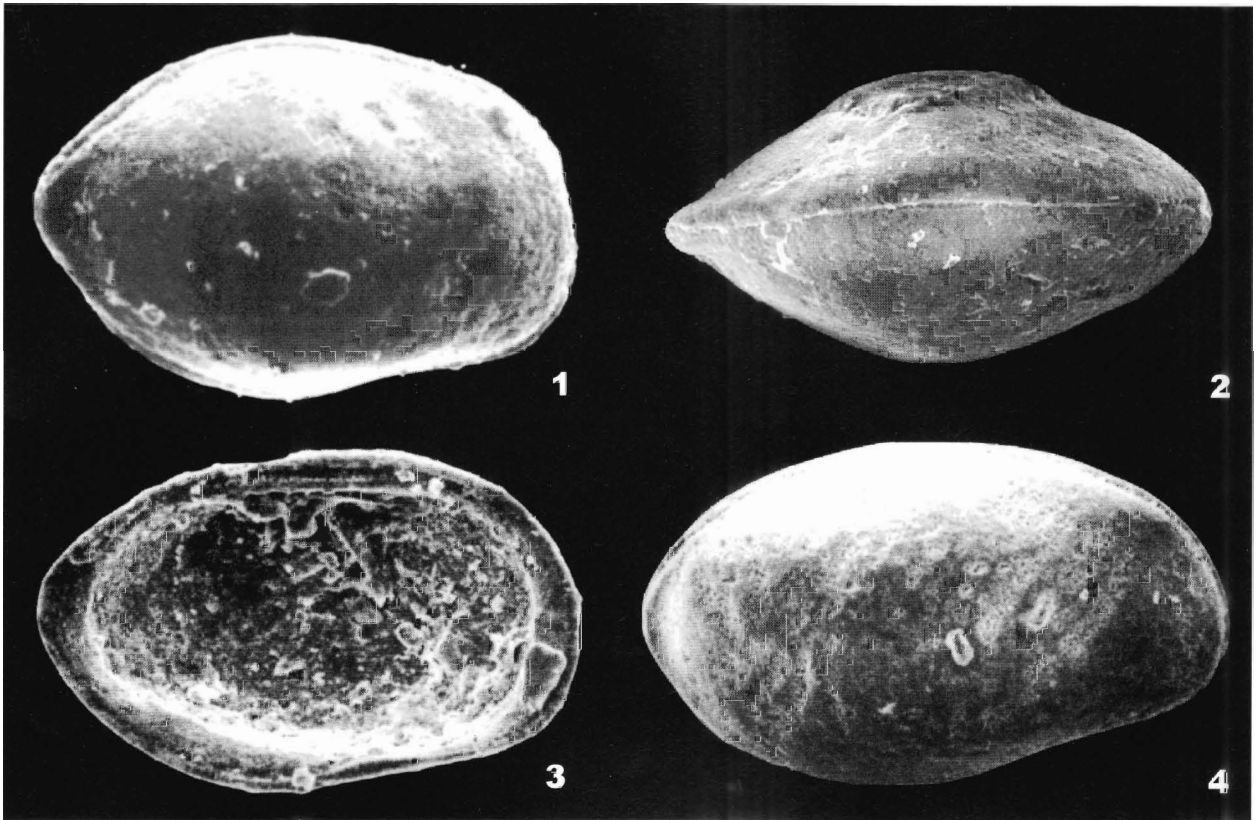
Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Greyish-yellow gypsiferous shale (Sample No. D4/35), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subovate in lateral view and inflated posteriorly and tapering anteriorly in the dorsal; greatest height about 3/5th of length posterior to middle. Right valve overlapping left valve conspicuously along dorsal, posterodorsal and ventral margins. Valve surface smooth.

Dimensions (mm): Carapace (SUGDMF No. 444), L. 0.78, H. 0.46, W. 0.34.

Distribution: Ranging throughout the middle Jurassic beds of Kachchh and Jaisalmer.

Figures 1-2. Carapace; 1, LVV, x 97; 2, DV, x 97.



Cytherella jaisalmerensis Khosla and Jakhar

Plate 17, figures 1-4

Cytherella jaisalmerensis Khosla and Jakhar, in Khosla *et al.*, 2006, pp. 27-28, pl. 6, figs. 3-6.

Locality and horizon: Western bank of Masurdi Nadi, east of Khethari Talab, Kuldhar, Jaisalmer. Shale bed (Sample No. KA/4), Kuldhar Member (early Callovian), Jaisalmer Formation.

Diagnostic characters: Carapace elongate-subrectangular in lateral outline; height equal in anterior and posterior halves. Right valve prominently overlaps left valve. In dorsal view adult carapace somewhat wedge shaped, with maximum width near posterior end, gradually narrowing towards the anterior; in molts carapace biconvex, ends pointed. Valve surface marked by a median slit-like, vertical sulcus, otherwise smooth.

Dimensions (mm): Holotype (SUGDMF No. 994), carapace, L. 0.66, H. 0.37, W. 0.29. Paratype I (SUGDMF No. 995), carapace, L. 0.64, H. 0.35, W. 0.30. Paratype II (SUGDMF No. 996), LV, L. 0.53, H. 0.29. Paratype III (SUGDMF No. 997), carapace, L. 0.54, H. 0.32, W. 0.24.

Distribution: *T. hadibhadangensis* Range Zone and *M. perforata kachchhensis* - *F. (B.) falcu* Concurrent Range Zone, Jaisalmer.

Figures 1-4. 1, holotype, carapace, LVV, x 115; 2, paratype I, carapace, DV, x 117; 3, paratype II, LV(juvenile), Lat.V, x 142; 4, paratype III, carapace(juvenile), DV, x 141.

Cytherella kalajarensis Khosla and Jakhar

Plate 18, figures 1-2

Cytherella kalajarensis Khosla and Jakhar, in Khosla *et al.*, 1997, p. 8, pl. 1, figs. 2-3. - Khosla *et al.*, 2005, p. 61, pl. 7, fig. 10. - Khosla *et al.*, 2006, p. 28, pl. 6, fig. 7.

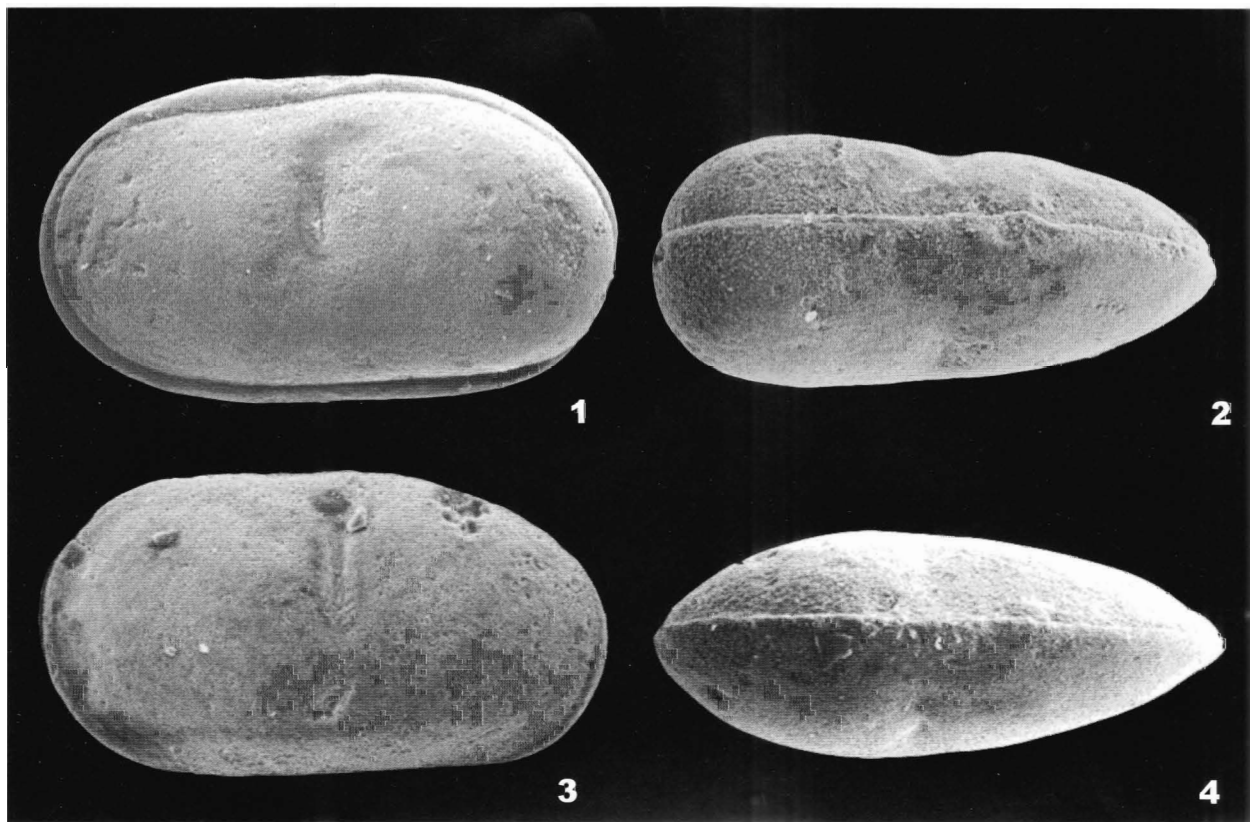
Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Greyish-yellow gypsiferous shale (Sample No. D4/36), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace elongate-subrectangular in lateral outline, with greatest height at anterior 1/4th of length. Right valve slightly overlaps left valve. In dorsal view carapace nearly biconvex with maximum width posterior to middle. Valve surface marked by a median depression, otherwise smooth.

Dimensions (mm): Holotype (SUGDMF No. 445), carapace, L. 0.61, H. 0.32, W. 0.22. Paratype (SUGDMF No. 446), carapace, L. 0.62, H. 0.32, W. 0.22.

Distribution: *M. perforata kachchhensis* Partial Range Zone, Jumara Dome and *M. perforata kachchhensis* - *G. remota* Concurrent Range Zone, Habo Dome, Kachchh; *T. hadibhadangensis* Range Zone and *M. perforata kachchhensis* - *F. (B.) falcu* Concurrent Range Zone, Jaisalmer

Figures 1-2. 1, holotype, carapace, LVV, x 123; 2, paratype, carapace, DV, x 121.



Cytherella masuguluensis Bate

Plate 19, figures 1-2

Cytherella masuguluensis Bate, 1975, p. 173, pl. 1, figs. 2, 10. - Khosla *et al.*, 1997, p. 8, pl. 1, fig. 4. - Khosla *et al.*, 2005, p. 61, pl. 7, fig. 11.

Locality and horizon: Near Kotai Village, Habo Dome, Kachchh. Greyish-yellow gypsiferous shale (Sample No. K4/21), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subrectangular in lateral outline; height almost equal in anterior and posterior halves. Right valve larger than left valve and except for the posterior part moderately overlapping all along margin. In dorsal view carapace inflated posteriorly and tapering anteriorly. Valve surface smooth.

Dimensions (mm): Carapace (SUGDMF No. 447), L. 0.68, H. 0.40, W. 0.30.

Distribution: *M. perforata kachchhensis* - *G. remota* Concurrent Range Zone, Habo and Jhura domes and Khadir Island, Kachchh.

Figures 1-2. Carapace; 1, LVV, x 112; 2, DV, x 112.

Cytherella obscura Lyubimova and Mohan

Plate 20, figures 1-2

Cytherella obscura Lyubimova and Mohan, in Lyubimova *et al.*, 1960, pp. 15-16, pl. 1, figs. 1a-b.- Kulshreshtha *et al.*, 1985, p. 125, figs. 1.14, 1.15, 1.18. - Khosla *et al.*, 1997, pp. 8-9, pl. 1, fig. 5. - Khosla *et al.*, 2005, pp. 61-62, pl. 7, fig. 12. - Khosla *et al.*, 2006, p. 28, pl. 6, fig. 8.

Cytherella rannensis Neale and Singh, 1986, p. 353, pl. 1, figs. 10-11.

Cytherella cf. obscura Lyubimova and Mohan. - Mette and Geiger, 2004b, p. 63, pl. 9, figs. 1-2.

Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Yellow gypsiferous shale (Sample No. D14/13), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace elongate-subovate in lateral outline, with greatest height near middle. Right valve slightly larger than left valve. Dorsal margin weakly angulate; ventral margin straight; anterior margin evenly rounded; posterior margin rounded in upper part and truncated in the lower. In dorsal view carapace nearly biconvex, with maximum width posteriorly. Valve surface smooth.

Dimensions (mm): Carapace (SUGDMF No. 448), L. 0.82, H. 0.46, W. 0.34.

Distribution: Occurs widely in the Middle Jurassic beds of Kachchh and Jaisalmer; Morondava Basin, Madagascar.

Figures 1-2. Carapace; 1, LVV, x 91; 2, DV, x 91.



***Cytherella* sp.**

Plate 21, figure 1

Cytherella sp. Khosla *et al.*, 1997, p. 9, pl. 1, fig. 6.

Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Yellow gypsiferous shale (Sample No. D14/13), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Valve elongate-subrectangular in lateral outline; height almost equal in anterior and posterior halves. Dorsal and ventral margins concave medially; anterior and posterior margins rounded. Valve surface ornamented by faint striations/pits.

Dimensions (mm): RV (SUGDMF No. 449), L. 0.76, H. 0.40.

Distribution: *P. laeviscula* Range Zone, Habo and Jumara domes, Kachchh.

Figure 1. RV, Lat. V, x 101.

***Cytherelloidea badiensis* Khosla, Jakhar and Mohammed**

Plate 22, figures 1-2

Cytherelloidea sp. cf. *C. atlantolevantiana* Khosla *et al.*, 1997, p. 10, pl. 1, figs. 12-13.

Cytherelloidea badiensis Khosla, Jakhar and Mohammed, 2004, p. 23, pl. 1, fig. 1. - Khosla *et al.*, 2005, p. 62, pl. 7, fig. 13. - Khosla *et al.*, 2006, p. 28, pl. 6, fig. 9.

Locality and horizon: Near Fulae Village, Habo Dome, Kachchh. Grey shale (Sample No. F.16/1), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subquadrate in lateral outline and wedge-shaped in the dorsal. Valve surface ornamented by a wide rim extending along anterior, ventral and posterior margins and four oblique subparallel ribs; second rib from above discontinuous in middle; posterior terminal ends of ribs join marginal rim, while anteriorly they remain separate.

Dimensions (mm): Carapace (SUGDMF No. 453), L. 0.62, H. 0.34, W. 0.24. Carapace (SUGDMF No. 454), L. 0.64, H. 0.36, W. 0.24.

Distribution: Occurs widely in *P. laeviscula* Range Zone of Kachchh; *T. hadibhadangensis* Range Zone and *M. perforata kachchhensis* - *F. (B.) falcula* Concurrent Range Zone, Jaisalmer.

Figures 1-2. 1, carapace, LVV, x 121; 2, carapace, DV, x 120.



Cytherelloidea bhujensis Khosla, Jakhar and Mohammed
Plate 23, figures 1-2

Cytherelloidea bhujensis Khosla, Jakhar and Mohammed, 1997, p. 9, pl. 1, figs 7-8. - Khosla *et al.*, 2006, p. 28, pl. 6, fig. 10.

Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Yellow gypsiferous shale (Sample No. D14/13), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subrectangular in lateral outline and wedge-shaped in the dorsal. Valve surface ornamented with two vertical ribs one each near anterior and posterior ends and three horizontal ribs; of the latter ribs, dorsal and ventral ribs run parallel to their respective margins and to each other, their ends merge with vertical ribs; middle horizontal rib convex downwardly, its anterior end joins with anterior vertical ridge near mid-height and posterior end with dorsal horizontal and posterior vertical ribs in posterodorsal region; rest of the area smooth.

Dimensions (mm): Holotype (SUGDMF No. 450), carapace, L. 0.62, H. 0.36, W. 0.24. Paratype (SUGDMF No. 451), carapace, L. 0.64, H. 0.36, W. 0.24.

Distribution: *P. laeviscula* Range Zone and *M. perforata kachchhensis* - *G. remota* Concurrent Range Zone, Habo and Jhura domes Kachchh; *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-2. 1, holotype, carapace, LVV, x 123; 2, paratype, carapace, DV, x 116.

Cytherelloidea dhrangensis Khosla and Jakhar
Plate 24, figures 1-2

Cytherelloidea dhrangensis Khosla and Jakhar, in Khosla *et al.*, 1997, pp. 9-10, pl. 1, figs. 9-10. - Khosla *et al.*, 2005, p. 62, pl. 7, fig. 14.

Locality and horizon: About 2 km east of Dhrang Village, Habo Dome, Kachchh. Yellow gypsiferous shale (Sample No. L14/2), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subrectangular in lateral outline and cuneiform in the dorsal. Valve surface ornamented by a peripheral rib extending from mid-dorsal region, runs parallel to anterodorsal, anterior, ventral and posterior margins, then in posterodorsal region turning down towards middle of valve where it forms a U-shaped bend, two ends of rib remain separate; rest of the area smooth.

Dimensions (mm): Holotype (SUGDMF No. 452), carapace, L. 0.80, H. 0.44, W. 0.32.

Distribution: *P. laeviscula* Range Zone, Habo and Jhura domes and Bela Island, Kachchh.

Figures 1-2. Holotype, carapace; 1, LVV, x 94; 2, DV, x 94.



Cytherelloidea difficila Lyubimova and Mohan

Plate 25, figures 1-2

Cytherelloidea difficila Lyubimova and Mohan, in Lyubimova *et al.*, 1960, p. 18, pl. 1, figs. 4a-b. - Khosla *et al.*, 2006, p. 28, pl. 6, fig. 11.

Locality and horizon: Near Chattries of Vyas family, 1/2 km SSW of Dedan Sar, Jaisalmer. Yellow fossiliferous limestone (Sample No. FF/6), Fort Member (Bajocian-Bathonian), Jaisalmer Formation.

Diagnostic characters: Carapace subrectangular in lateral outline and wedge-shaped in the dorsal. Height almost equal in anterior and posterior halves. Dorsal margin nearly straight; ventral margin straight to slightly concave medially; anterior margin evenly rounded; posterior margin truncated. Valve surface ornamented by a distinct marginal rib all along periphery; rest of the area smooth.

Dimensions (mm): Carapace (SUGDMF No. 1002), L. 0.80, H. 0.45, W. 0.35. Carapace (SUGDMF No. 1015), L. 0.78, H. 0.40, W. 0.29.

Distribution: *T. hadibhadangensis* Range Zone, Jaisalmer.

Figure 1-2. 1, carapace, LVV, x 94; 2, carapace, DV, x 96.

Cytherelloidea ipis Grekoff

Plate 26, figures 1-2

Cytherelloidea ipis Grekoff, 1963, p. 1722, pl. 1, figs. 16-17. - Khosla *et al.*, 1997, p. 10, pl. 1, fig. 11. - Khosla *et al.*, 2005, p. 62, pl. 7, fig. 15. - Khosla *et al.*, 2006, p. 28, pl. 6, fig. 12.

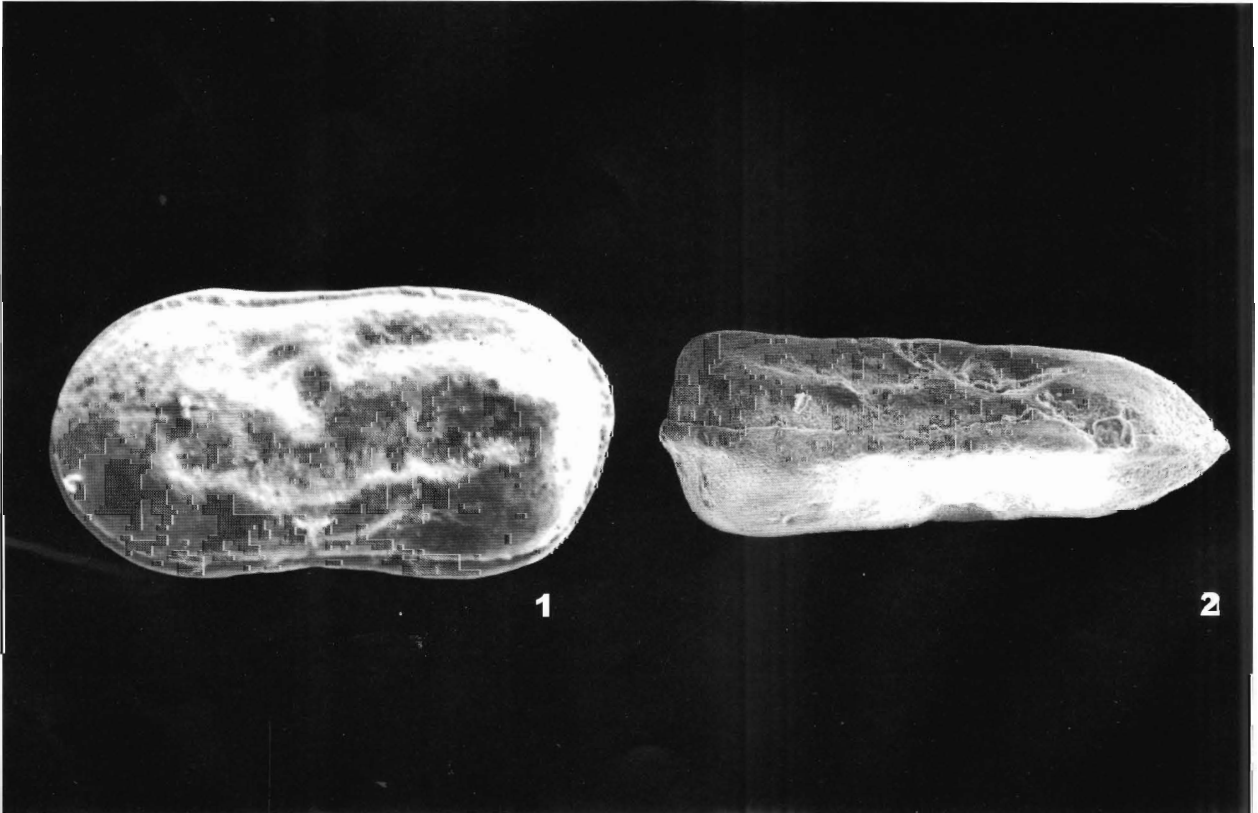
Locality and horizon: Near Fulae Village, Habo Dome, Kachchh. Grey shale (Sample No. F.16/1), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subrectangular in lateral outline. Surface ornamented by three longitudinal ribs; dorsal and ventral ribs weak and parallel to their respective margins, while median rib prominent and sinuate with a central pit above it; dorsal rib joins median rib at central pit by a short vertical rib; three longitudinal ribs join near posterior end to form a vertical rib parallel to margin.

Dimensions (mm): Carapace (SUGDMF No. 455), L. 0.70, H. 0.36, W. 0.30.

Distribution: Middle Jurassic of Majunga Basin, Madagascar; *P. laeviscula* Range Zone, Habo Dome, Jhura Dome, Khadir Island and Bela Island, Kachchh; *T. hadibhadangensis* Range Zone and *M. perforata kachchhensis* - *F. (B.) falcula* Concurrent Range Zone, Jaisalmer.

Figures 1-2. Carapace; 1, LVV, x 107; 2, DV, x 107.



Cytherelloidea kuldharensis Khosla and Jakhar
Plate 27, figures 1-2

Cytherelloidea kuldharensis Khosla and Jakhar, in Khosla *et al.*, 2006, p. 28, pl. 6, figs. 13-15.

Locality and horizon: Western bank of Masurdi Nadi, about 1 km NNW of Khethari Talab, Kuldhar, Jaisalmer. Clay bed (Sample No. KC/4), Kuldhar Member (early Callovian), Jaisalmer Formation.

Diagnostic characters: Carapace elongate-subrectangular in lateral outline and wedge-shaped in the dorsal; greatest height at anterior 1/4th of length. Right valve slightly larger than left valve. Dorsal margin weakly arched; ventral margin slightly concave medially; anterior margin evenly rounded; posterior margin less so. Valve surface ornamented by a prominent rib all along margin and a thick, median transverse rib; rest of the area smooth.

Dimensions (mm): Holotype (SUGDMF No. 1004), LV, L. 0.58, H. 0.29. Paratype I (SUGDMF No. 1005), carapace, L. 0.59, H. 0.33, W. 0.23.

Distribution: *M. perforata kachchhensis* - *F. (B.) falcula* Concurrent Range Zone, Jaisalmer.

Figures 1-2. 1, holotype, LV, Lat. V, x 131; 2, paratype, carapace, DV, x 125.

Cytherelloidea langijarensis Khosla, Jakhar and Mohammed
Plate 28, figures 1-2

Cytherelloidea langijarensis Khosla, Jakhar and Mohammed, 1997, p. 10, pl. 1, figs. 14-15.

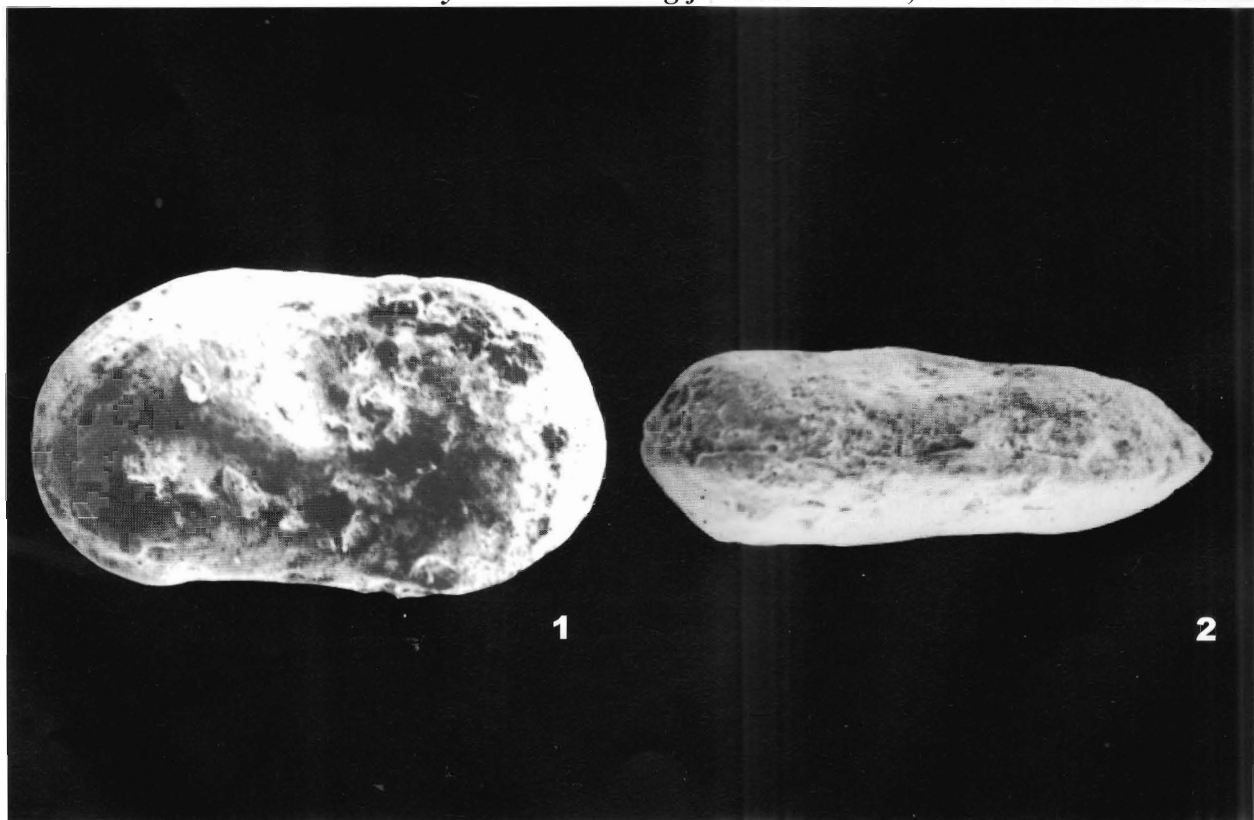
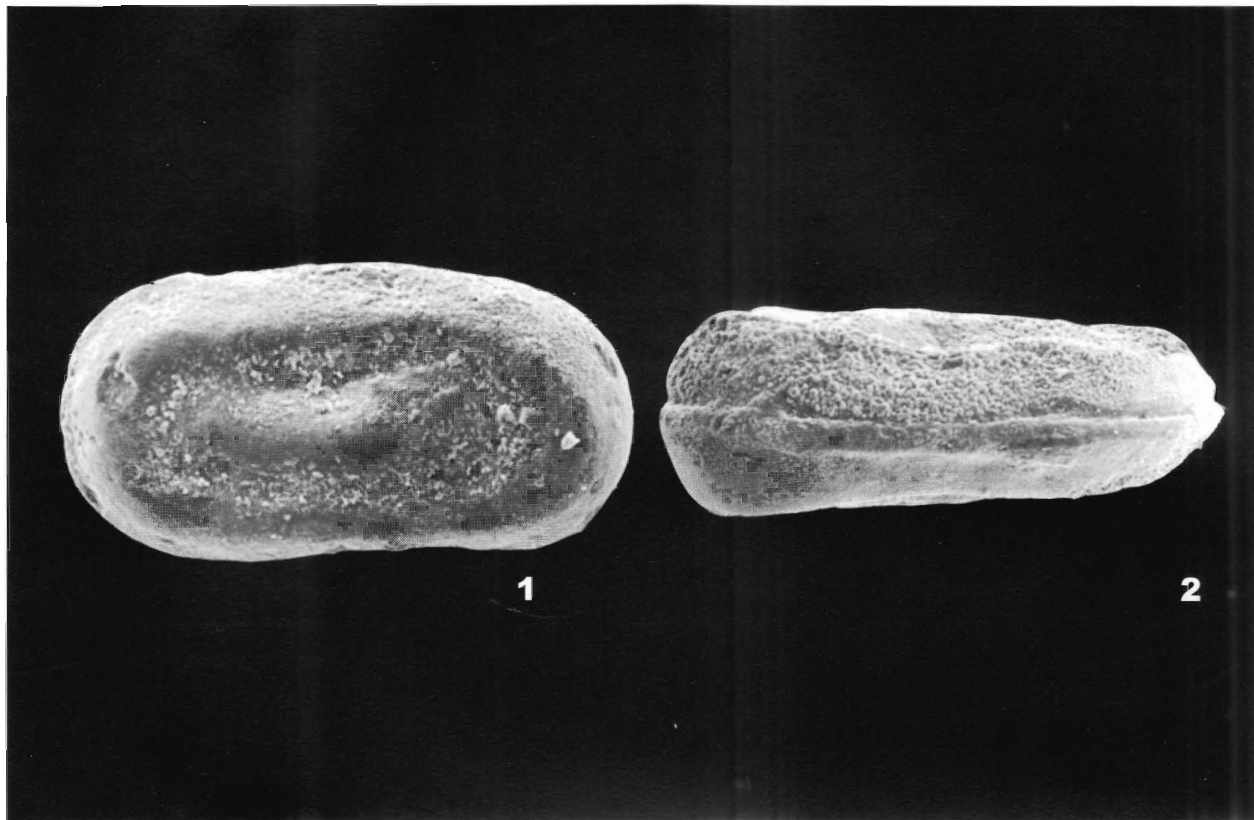
Locality and horizon: About 2 km east of Dhrang Village, Habo Dome, Kachchh. Greyish-yellow gypsiferous shale (Sample No. L2/24), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subquadrate in lateral outline and wedge-shaped in the dorsal. Anterior margin evenly rounded; posterior margin gently sloping in upper part and rounded in the lower; dorsal margin straight and slightly sloping down posteriorly; ventral margin concave medially. Valve surface ornamented by a short downwardly convex median rib, with depression both above as well as below it.

Dimensions (mm): Holotype (SUGDMF No. 456), RV, L. 0.74, H. 0.42. Paratype (SUGDMF No. 457), carapace, L. 0.70, H. 0.40, W. 0.26.

Distribution: *M. perforata kachchhensis* - *G. remota* Concurrent Range Zone, Habo and Jhura domes, Kachchh.

Figures 1-2. 1, holotype, RV, Lat. V, x 103; 2, paratype, carapace, DV, x 110.



Cytherelloidea paradifficila Khosla, Jakhar and Mohammed

Plate 29, figures 1-2

Cytherelloidea paradifficila Khosla, Jakhar and Mohammed, 1997, pp. 10-11, pl. 1, figs. 16-17. -

Khosla *et al.*, 2005, p. 62, pl. 7, fig. 16. - Khosla *et al.*, 2006, p. 28, pl. 6, fig. 16.

Cytherelloidea sp. 2 Mette and Geiger, 2004b, p. 63, pl. 9, figs. 5-6.

Locality and horizon: Near Fulae Village, Habo Dome, Kachchh. Grey shale (Sample No. F16/1), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subrectangular in lateral outline and wedge-shaped in the dorsal. Height almost equal in anterior and posterior halves. Valve surface ornamented by a distinct marginal ribs all along periphery, an indistinct downwardly convex median rib and fine reticulation over rest of the area.

Dimensions (mm): Holotype (SUGDMF No. 458), carapace, L. 0.55, H. 0.35, W. 0.22. Paratype (SUGDMF No. 459), carapace, L. 0.60, H. 0.36, W. 0.22.

Remarks: The form recorded as *Cytherelloidea* sp. 2 from the early Callovian of Morondava Basin, Madagascar by Mette and Geiger belongs to this species.

Distribution: Occurs widely in *P. laeviscula* Range Zone of Kachchh; *M. perforata kachchhensis* - *F. (B.) falcata* Concurrent Range Zone, Jaisalmer; early Callovian of Morondava Basin, Madagascar.

Figures 1-2. 1, holotype, carapace, LVV, x 136; 2, paratype, carapace, DV, x 127.

***Cytherelloidea* sp. A**

Plate 30, figures 1-2

Cytherelloidea sp. Khosla *et al.*, 1997, p. 11, pl. 1, fig. 18.

Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Greyish-yellow limestone with shale bands (Sample No. D15/7), Chari Formation (late Bathonian-Callovian).

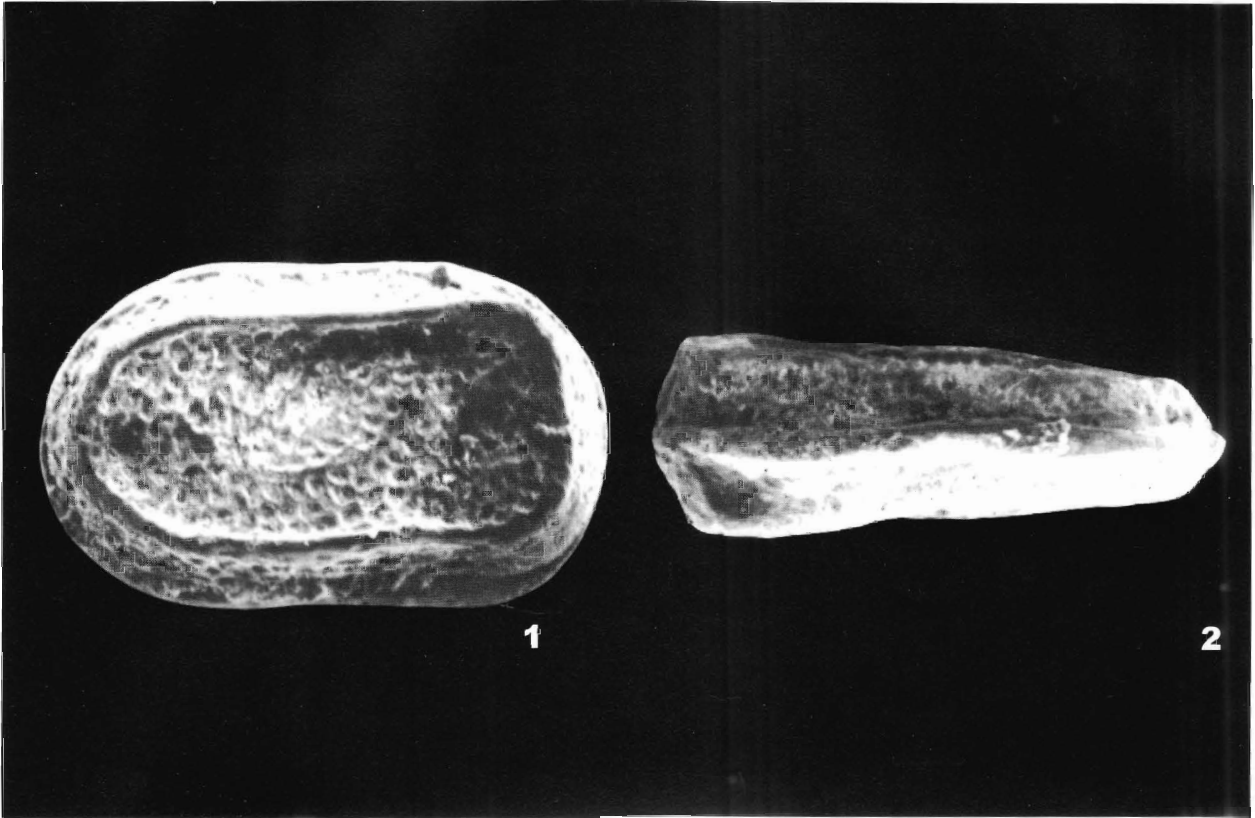
Diagnostic characters: Carapace subrectangular in lateral outline. Valve surface ornamented by two vertical and three horizontal ribs; posterior vertical rib prominent and runs near margin; anterior vertical rib less developed; of horizontal ribs, dorsal and ventral run parallel to their respective margins, their ends merge with vertical ribs; middle horizontal rib sinuous in shape and joining vertical ribs at each end near mid-height.

Remarks: The species is herein redesignated as *Cytherelloidea* sp. A.

Dimensions (mm): Carapace (SUGDMF No. 460), L. 0.76, H. 0.41, W. 0.33.

Distribution: *P. laeviscula* Range Zone, Habo Dome, Kachchh.

Figures 1-2. Carapace; 1, LVV, x 99; 2, DV, x 101.



***Cytherelloidea* sp. B**

Plate 31, figures 1-2

Cytherelloidea sp. Khosla *et al.*, 2005, p. 62, pl. 7, fig. 17.

Locality and horizon: Mouwana Hill, Bela Island, Kachchh. Calcareous sandstone (Sample No. BIX/6), Hadibhadang Sandstone Member (late Bathonian-early Callovian) Khadir Formation.

Diagnostic characters: Carapace subrhomboidal in lateral outline and biconvex in the dorsal; greatest height near middle. Valve surface ornamented by a median and a ventral longitudinal ribs, joined posteriorly; median rib downwardly convex and with a distinct depression both above as well as below it; anterior 1/3rd of valve surface smooth.

Remarks: The species is herein redesignated as *Cytherelloidea* sp. B.

Dimensions (mm): Carapace (SUGDMF No. 832), L. 0.77, H. 0.40, W. 0.33. Carapace (SUGDMF No. 1016), L. 0.80, H. 0.40, W. 0.30.

Distribution: *P. laeviscula* Range Zone, Bela Island, Kachchh.

Figures 1-2. 1, carapace, LVV, x 97; 2, carapace, DV, x 94.

***Cytherelloidea* sp. C**

Plate 32, figures 1-2

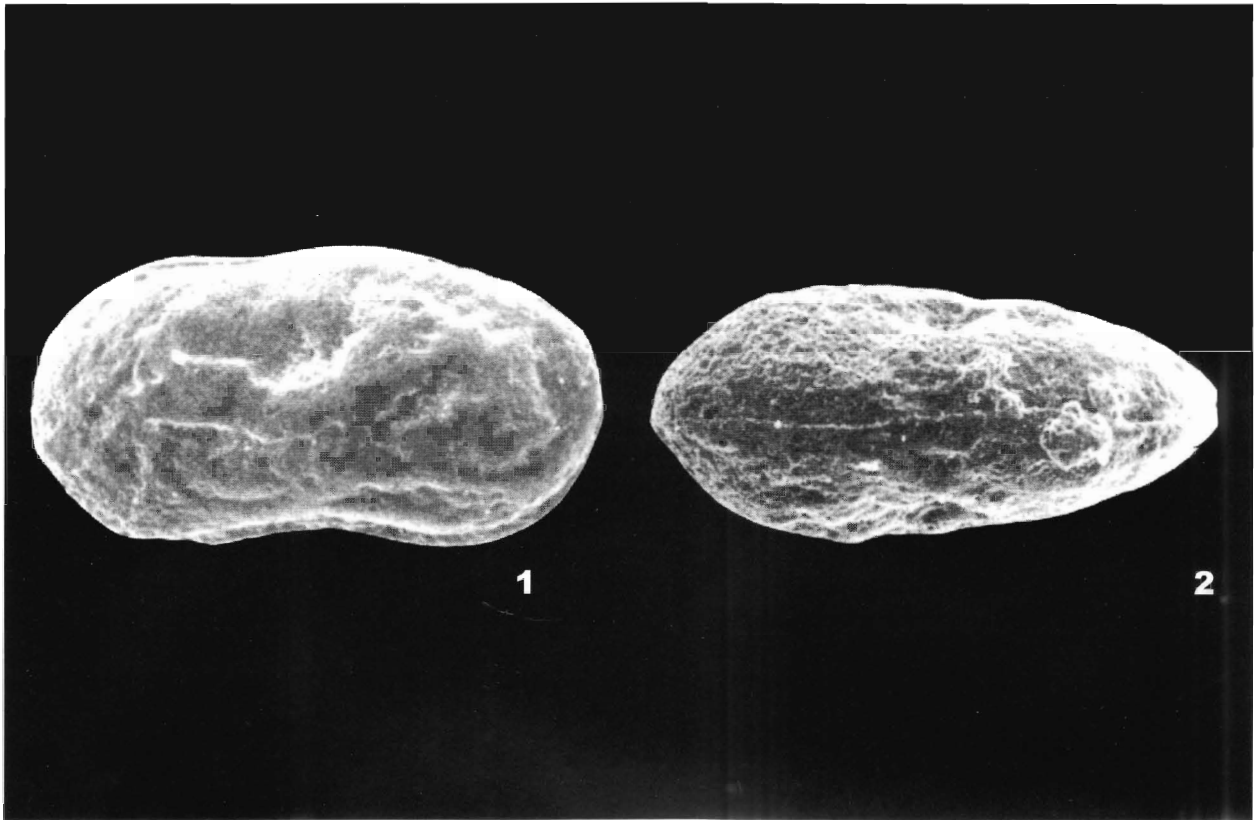
Locality and horizon: Near Chattries of Vyas family, 1/2 km SSW of Dedan Sar, Jaisalmer. Yellow fossiliferous limestone (Sample No. FF/3), Fort Member (Bajocian-Bathonian), Jaisalmer Formation.

Diagnostic characters: Carapace subrhomboidal in lateral outline. Dorsal margin sinuate, with a convexity posterior to middle; ventral distinctly concave medially; anterior evenly rounded; posterior gently sloping in upper part and rounded in the lower. Valve surface ornamented by a short, downwardly convex median rib, with a depression both above as well as below it and a ventral longitudinal rib; both ribs joined posteriorly.

Dimensions (mm): Carapace (SUGDMF No. 1017), L. 0.70, H. 0.40, W. 0.32.

Distribution: *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-2. Carapace; 1, LVV, x 107; 2, DV, x 107.



Cytheropteron agrawali (Khosla, Jakhar and Mohammed)

Plate 33, figures 1-2

Cytheropterina agrawali Khosla, Jakhar and Mohammed, 2004, p. 27, pl.1, figs. 16-18.

Locality and horizon: Near Kamaguna Village, Jhura Dome, Kachchh. Yellowish-grey gypsiferous shale (Sample No. K2/22), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subrhomboidal in lateral outline; each valve produced in a well developed ventrolateral wing. Dorsal margin gently arched; ventral obscured; anterior margin broad and obliquely rounded; posterior margin drawn out into a caudal process above mid-height. Valve surface marked by a vertical sulcus in median region; a prominent keel at outer periphery of ventrolateral wing; and 1-2 ribs on its under surface. Mpc 7-8 anteriorly and 3 posteriorly. Hinge antimerodont.

Dimensions (mm): Holotype (SUGDMF No. 730), carapace, L. 0.44, H. 0.28, W. 0.32. Paratype I, (SUGDMF No. 731), LV, L. 0.46, H. 0.30.

Distribution: *M. perforata kachchhensis* - *G. remota* Concurrent Range Zone, Jhura Dome, Kachchh.

Figures 1-2. 1, holotype, carapace, RVV, x 175; 2, paratype I, LV, Lat.V, x 163 .

Cytheropteron devai (Khosla, Jakhar and Mohammed)

Plate 34, figures 1-2

Cytheropterina devai Khosla, Jakhar and Mohammed, 1997, pp. 32-34, pl. 7, figs. 7-9.

Cytheropteron devai (Khosla *et al.*). - Khosla *et al.*, 2005, p. 41, pl. 3, fig. 4.

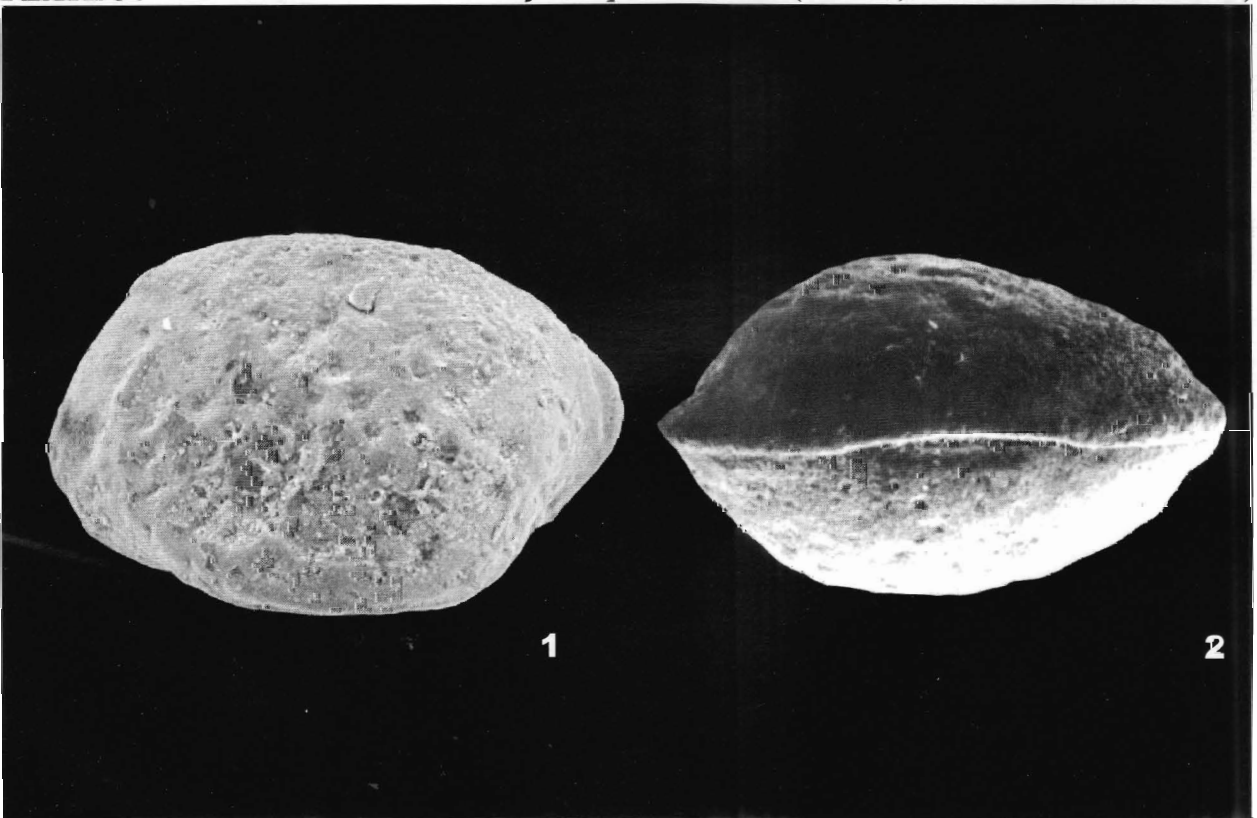
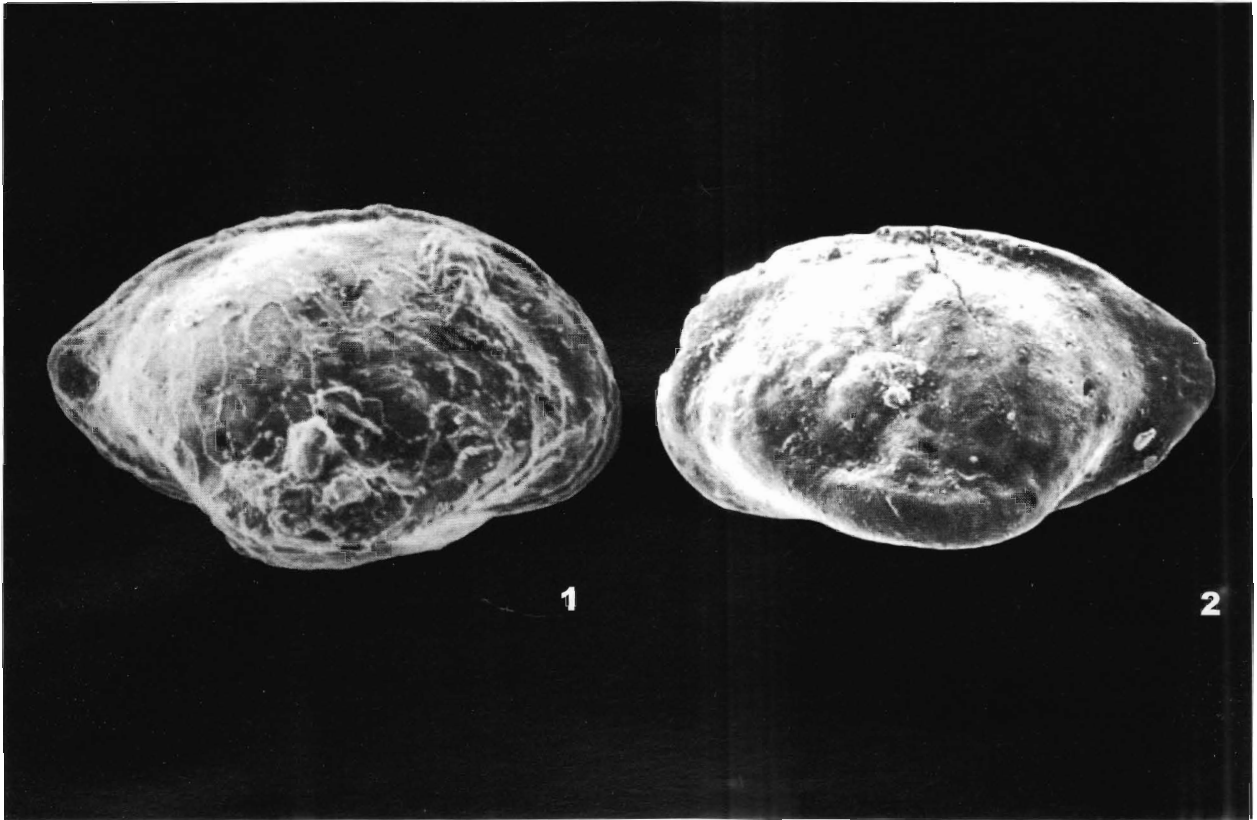
Locality and horizon: Near Fulae Village, Habo Dome, Kachchh. Grey shale (Sample No. F 16/1), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subrhomboidal in lateral outline; valves inflated ventrally and produced in a moderate wing-like expansion. Dorsal margin nearly straight and with rounded obtuse angles at ends; ventral margin obscured by lateral expansion, otherwise straight; anterior margin broad and obliquely rounded; posterior margin drawn out into a short caudal process above mid-height. Valve surface ornamented by faint pits and three horizontal ribs on under surface of ventral expansion. Mpc 7-9 anteriorly and 3-4 posteriorly. Cms consist of a vertical row of 4 adductor scars and a frontal scar. Hinge antimerodont.

Dimensions (mm): Holotype (SUGDMF No. 544), LV, L. 0.48, H. 0.34. Paratype II (SUGDMF No. 546), carapace, L. 0.52, H. 0.30, W. 0.30.

Distribution: Occurs widely in *P. laeviscula* Range Zone of Kachchh.

Figures 1-2. 1, holotype, LV, Lat.V, x 160 ; 2, paratype II, carapace, DV, x147 .



Cytheropteron kutchensis Neale and Singh

Plate 35, figures 1-2

Cytheropteron kutchensis Neale and Singh, 1986, p. 359, pl. 3, fig. 9. - Khosla *et al.*, 2005, p. 41, pl. 3, fig. 5.

Locality and horizon: About 1km NW of Bela Village, Kachchh. Raimalro limestone (Sample No. BVII/12), Hadibhadang Sandstone Member (late Bathonian-early Callovian), Khadir Formation.

Diagnostic characters: Carapace elongate-subrhomboidal in lateral outline and biconvex in the dorsal; valves inflated ventrally overhanging the margin; greatest height at posterior 1/3rd of length, and width near middle. Dorsal margin straight; anterior and posterior margins rounded. Valve surface coarsely pitted.

Dimensions (mm): Carapace (SUGDMF No. 775), L. 0.51, H. 0.28, W. 0.34.

Distribution: Bathonian-Callovian beds of Banni Well No. 2 and *P. laeviscula* Range Zone, Bela Island, Kachchh.

Figures 1-2. Carapace; 1, LVV, x151; 2, DV, x143.

Cytheropteron lellapadiensis Khosla and Jakhar

Plate 36, figures 1-2

Cytheropteron lellapadiensis Khosla and Jakhar, in Khosla *et al.*, 2006, p. 17, pl. 2, figs. 16-17.

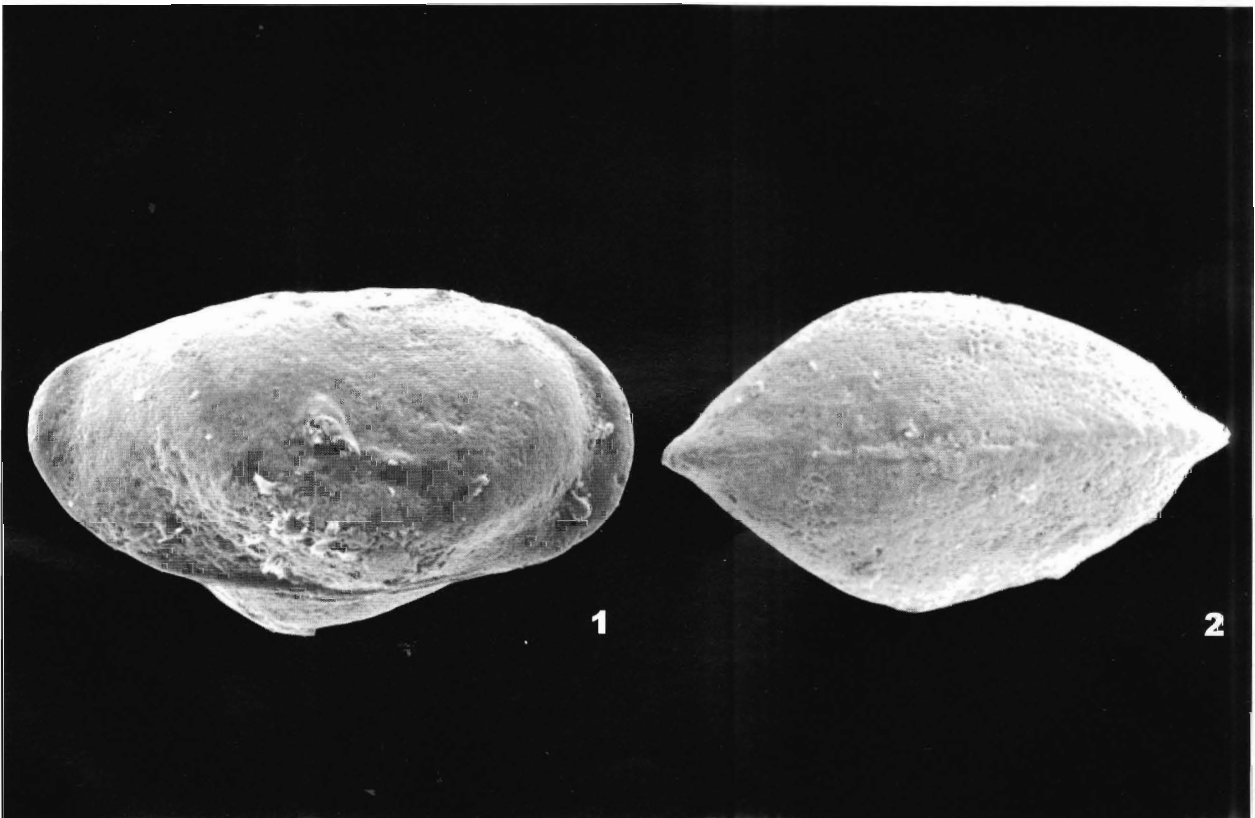
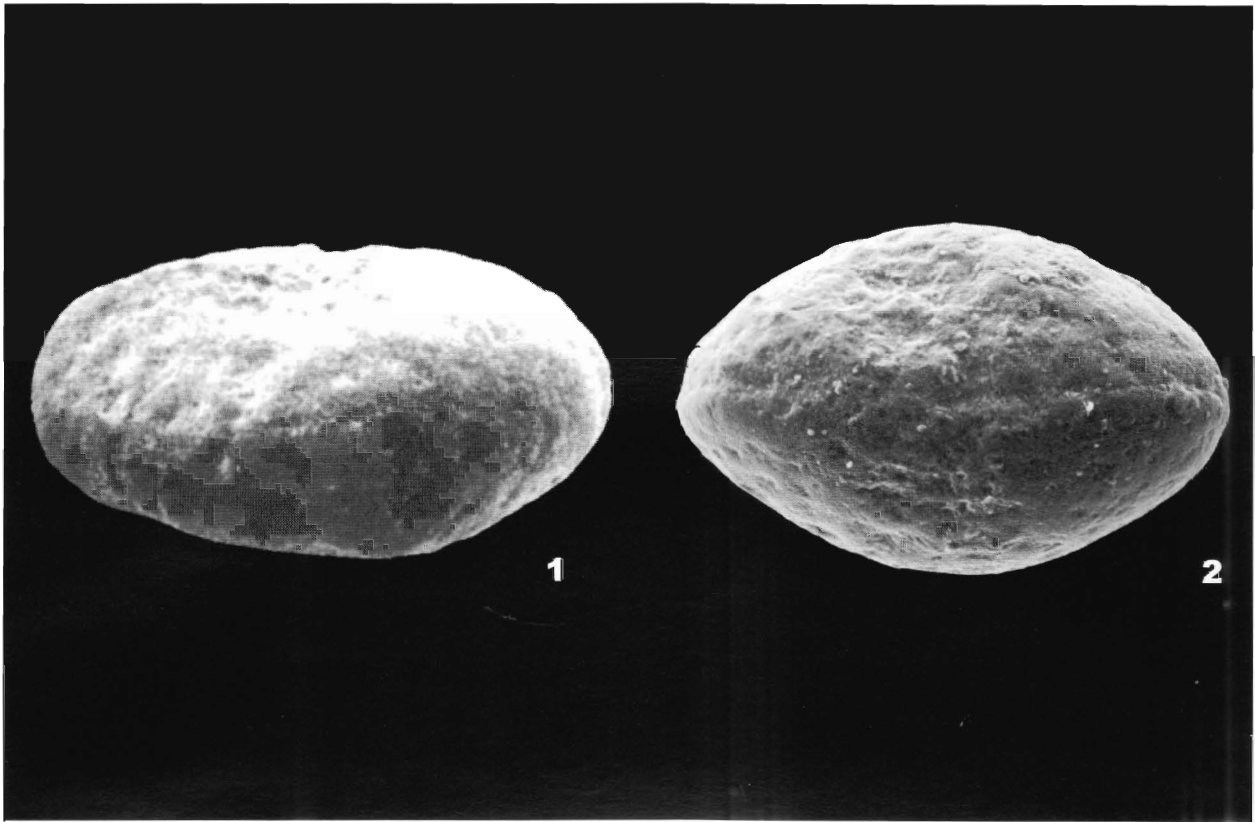
Locality and horizon: Near Lellapadi Village, Jaisalmer. Fossiliferous limestone (Sample No. NL/2), Kuldhra Member (early Callovian), Jaisalmer Formation.

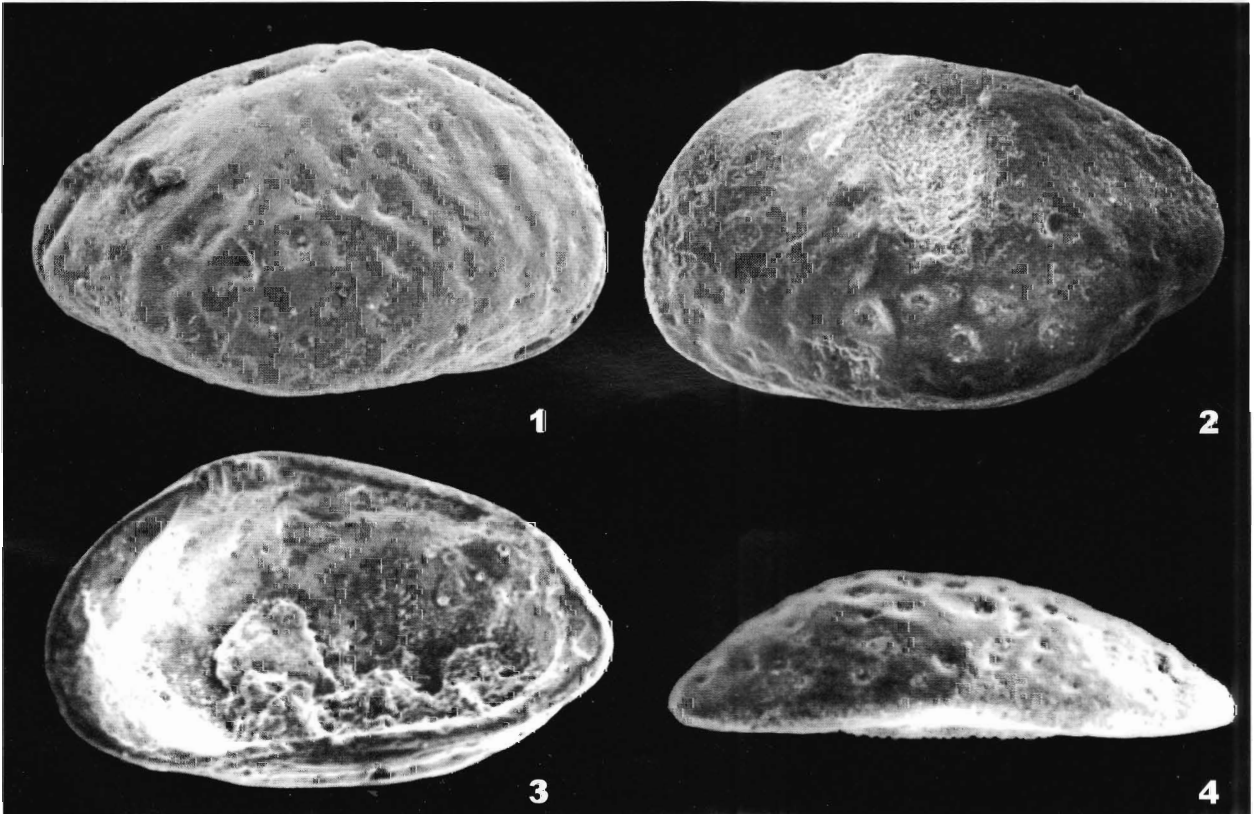
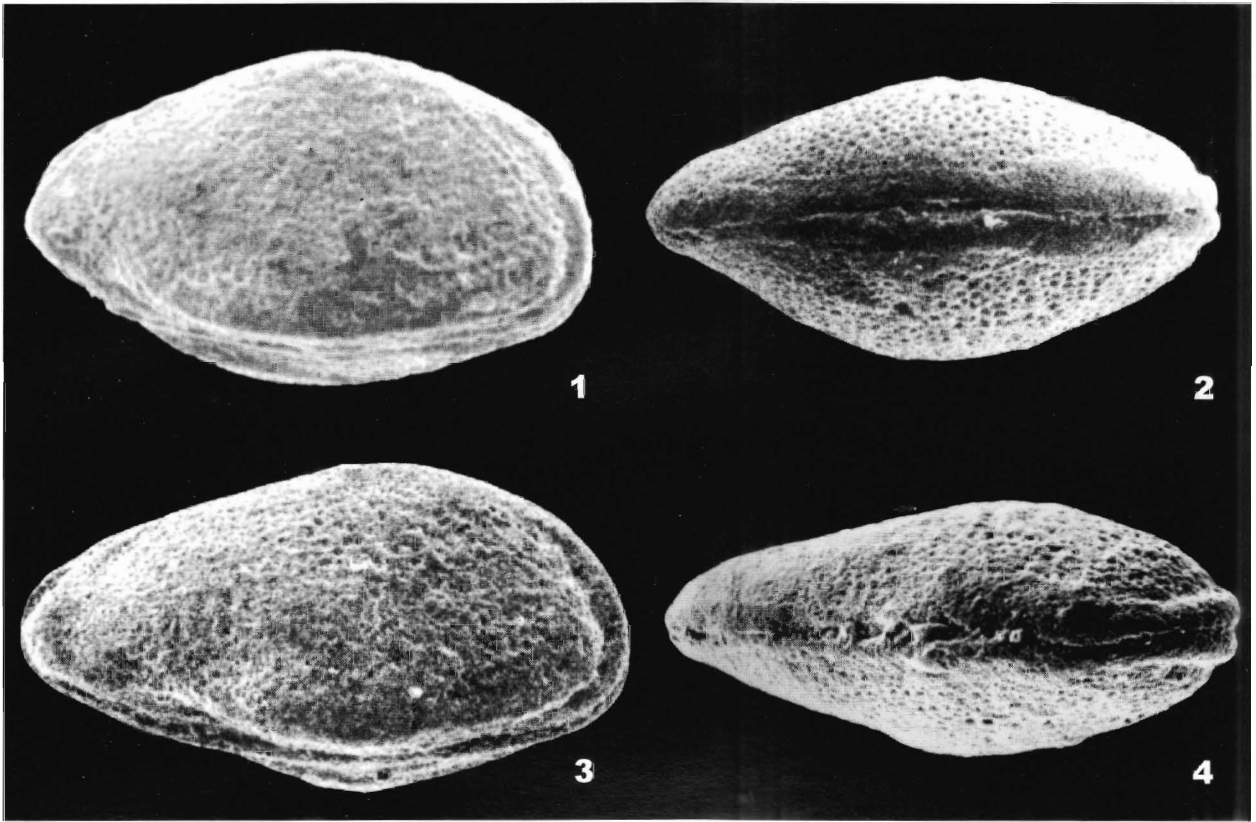
Diagnostic characters: Carapace elongate-subrhomboidal in lateral outline; valves inflated ventrally and produced in a wing-like expansion overhanging margin. Dorsal margin nearly straight, sloping downwards posteriorly; ventral margin obscured medially, otherwise straight; anterior margin broad, evenly rounded; posterior margin narrow, upturned, rounded above mid-height. In dorsal view carapace biconvex, with maximum width posterior to middle, anterior end compressed. Valve surface smooth.

Dimensions (mm): Holotype (SUGDMF No. 930), carapace, L. 0.56, H. 0.32, W. 0.34. Paratype (SUGDMF No. 931), carapace, L. 0.51, H. 0.29, W. 0.30.

Distribution: *M. perforata kachchhensis* - *F. (B.) falcula* Concurrent Range Zone, Lellapadi, Jaisalmer.

Figures 1-2. 1, holotype, carapace, RVV, x143; 2, paratype, carapace, DV, x147.





Cytheropteron rajasthanensis Khosla and Jakhar
Plate 39, figures 1-2

Cytheropteron rajasthanensis Khosla and Jakhar, in Khosla *et al.*, 2006, pp. 17-18, pl. 3, figs. 1-3.

Locality and horizon: Western bank of Masurdi Nadi, north of Khethari Talab, Kuldhar, Jaisalmer. Gypsiferous clay (Sample No. KB/1), Kuldhar Member (mid-late Callovian), Jaisalmer Formation

Diagnostic characters: Carapace elongate-subovate in lateral outline, with greatest height near middle; valves inflated ventrally and produced in a wing-like expansion. Dorsal margin convex; anterior margin narrowly rounded; posterior margin drawn out in a caudal process near mid-height. In dorsal view carapace biconvex, with maximum width, anterior to middle, both ends pointed. Valve surface sparsely pitted, arranged in more or less horizontal rows.

Dimensions (mm): Holotype (SUGDMF No. 934), carapace, L. 0.35, H. 0.20, W. 0.19. Paratype II (SUGDMF No. 936), carapace, L. 0.34, H. 0.18, W. 0.16.

Distribution: *M. perforata kachchhensis* - F. (*B.*) *falcula* and *M. perforata kachchhensis* - *G. remota* Concurrent Range Zones, Jaisalmer.

Figures 1-2. 1, holotype, carapace, RVV, x 220; 2, paratype II, carapace, DV, x 224.

Cytheropteron sajjaniae (Khosla, Jakhar and Mohammed)
Plate 40, figures 1-4

Cytheropterina sajjaniae Khosla, Jakhar and Mohammed, 1997, pp. 34-36, pl. 7, figs. 13-15.

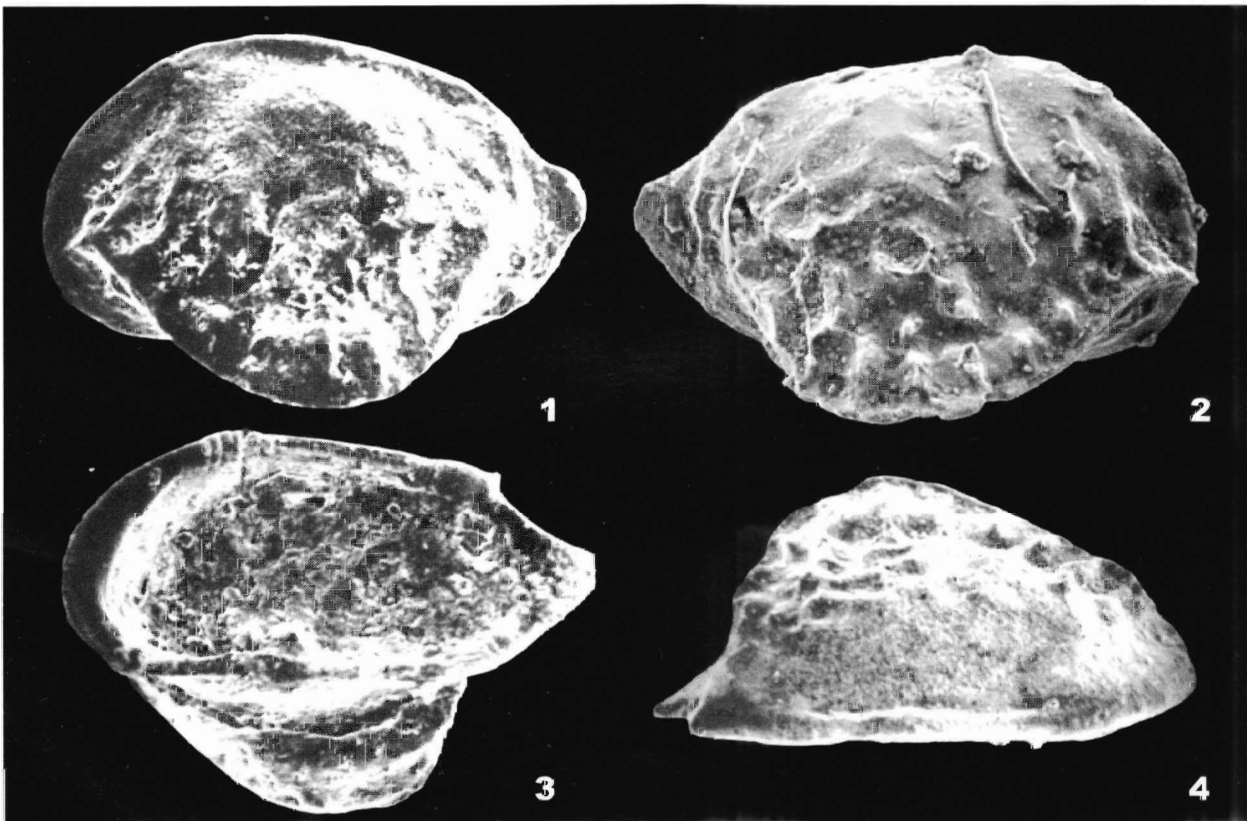
Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Greyish-yellow gypsiferous shale (Sample No. D12/21) Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Valve subovate in lateral view and with a prominent ventrolateral wing swinging backwardly. Dorsal margin arched; anterior margin broad and obliquely rounded; posterior margin drawn out into caudal process above mid-height. In dorsal view valve broadly convex. Surface ornamented by sparse reticulation, more in ventral region, and one or two ribs on under surface of ventral wing. Hinge antimerodont.

Dimensions (mm): Holotype (SUGDMF No. 550), LV, L. 0.50, H. 0.34. Paratype I (SUGDMF No. 551), RV, L. 0.46, H. 0.30. Paratype II (SUGDMF No. 552), LV, L. 0.46, H. 0.32.

Distribution: *P. laeviscula* Range Zone and *M. perforata kachchhensis* - *G. remota* Concurrent Range Zone of Habo and Jhura domes, Kachchh.

Figures 1-4. 1, holotype, LV, Lat.V, x 142; 2-3, paratype I, RV, 2, Lat.V, x 163; 3, Int.V, x 154; 4, paratype II, LV, DV, x 157.



***Cytheropteron* sp. A**

Plate 41, figures 1-2

Cytheropteron sp. A Khosla *et al.*, 2006, p. 18, pl. 3, figs. 4-5.

Locality and horizon: Escarpment of the fort hill, 1/2 km NW of Jaisalmer Railway Station. Fossiliferous sandstone (Sample No. FA/4), Fort Member (Bajocian-Bathonian), Jaisalmer Formation.

Diagnostic characters: Carapace elongate-subtriangular in lateral outline, with greatest height about half of length anterior to middle. Left valve slightly overlapping right valve along posterodorsal and ventral margins. Dorsal margin convex, sloping down backwardly; posterior cardinal angle weak; ventral margin straight; anterior margin broad, evenly rounded; posterior margin straight, sloping down in upper 2/3rd part and narrowly rounded in the lower. In dorsal view carapace biconvex, maximum width near middle, posterior end compressed. Valve minutely pitted.

Dimensions (mm): Carapace (SUGDMF No. 937), L. 0.51, H. 0.26, W. 0.19. Carapace (SUGDMF No. 938), L. 0.50, H. 0.26, W. 0.19.

Distribution: *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-2. 1, carapace, RVV, x149; 2, carapace, DV, x 154.

***Cytheropteron* sp. B**

Plate 42, figures 1-2

Cytheropteron sp. B Khosla *et al.*, 2006, p. 18, pl. 3, fig. 6.

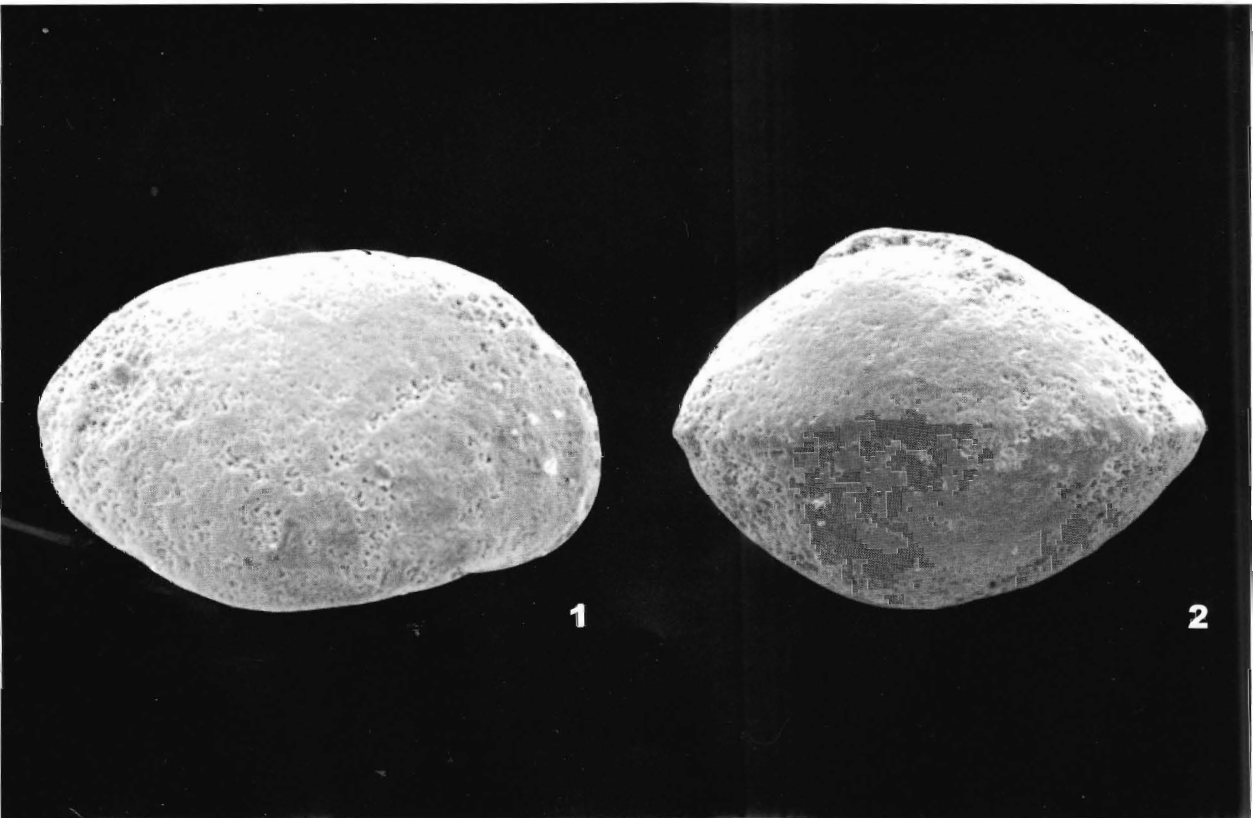
Locality and horizon: Western bank of Masurdi Nadi (stream), north of Khethari Talab, Kuldhar, Jaisalmer. Fossiliferous limestone (Sample No. KB/8), Kuldhar Member (mid-late Callovian), Jaisalmer Formation.

Diagnostic characters: Carapace subrhomboidal in lateral outline, with greatest height posterior to middle; valve inflated ventrally obscuring the margin. Dorsal margin nearly straight; anterior margin obliquely rounded; posterior drawn out in short caudal process at mid-height. Valve surface smooth.

Dimensions (mm): Carapace (SUGDMF No. 939), L. 0.48, H. 0.32, W. 0.34.

Distribution: *M. perforata kachchhensis* - *G. remota* Interval Zone, Jaisalmer.

Figures 1-2. Carapace; 1, RVV, x 154; 2, DV, x 158.



***Cytheropteron* sp. C**

Plate 43, figures 1-2

Cytheropteron sp. C Khosla *et al.*, 2006, p. 18, pl. 3, fig. 7.

Locality and horizon: Western bank of Masurdi Nadi (stream), north of Khethari Talab, Kuldhar, Jaisalmer. Fossiliferous limestone (Sample No. KB/8), Kuldhar Member (mid-late Callovian), Jaisalmer Formation.

Diagnostic characters: Carapace subrhomboidal in lateral outline, with greatest height at anterior cardinal angle. Dorsal margin slightly concave anteriorly otherwise straight and horizontal; ventral margin weakly convex, sloping posteriorly; anterior margin obliquely rounded; posterior drawn out in short caudal process at mid-height. Valve surface smooth.

Dimensions (mm): Carapace (SUGDMF No. 940), L. 0.45, H. 0.26, W. 0.26.

Distribution: *M. perforata kachchhensis* - *G. remota* Interval Zone, Jaisalmer.

Figures 1-2. Carapace; 1, RVV, x167; 2, DV, x 164.

***Darwinula* sp.**

Plate 44, figures 1-2

Darwinula sp. Khosla *et al.*, 2005, p. 35, pl. 1 fig. 11.

Locality and horizon: North of Lodrani Village, Bela Island, Kachchh. *Corbula lyrata* bearing reddish-brown siltstone (Sample No. BV/6), Hadibhadang Shale Member (mid-late Bathonian), Khadir Formation.

Diagnostic characters: Carapace elongate-subelliptical in lateral outline, with greatest height at posterior 1/3rd of length. Dorsal margin weakly arched, gently sloping anteriorly; ventral margin nearly straight; anterior margin narrowly rounded; posterior margin broadly rounded. Valve surface smooth.

Dimensions (mm): Carapace (SUGDMF No. 749), L. 0.69, H. 0.29, W. 0.24.

Distribution: *C. micropunctata* and *P. laeviscula* Range Zones, Bela Island, Kachchh.

Figures 1-2. Carapace; 1, RVV, x 104; 2, DV, x 110.



***Eocytheridea?* sp.**

Plate 45, figures 1-2

Eocytheridea? sp. Khosla *et al.*, 2006, p. 16, pl. 2, figs. 10-11.

Locality and horizon: Escarpment of the fort hill, 1/2 km NW of Jaisalmer Railway Station. Fossiliferous sandstone (Sample No. FA/4), Fort Member (Bajocian-Bathonian), Jaisalmer Formation.

Diagnostic characters: Carapace elongated-subovate in lateral outline and compressed, biconvex in the dorsal; greatest height a little over half of length anterior to middle. Overlap indistinct. Dorsal margin asymmetrically convex; ventral weakly convex; anterior broadly rounded; posterior less so. Valve surface smooth.

Dimensions (mm): Carapace (SUGDMF No. 924), L. 0.80, H. 0.34, W. 0.29. Carapace (SUGDMF No. 925), L. 0.96, H. 0.38, W. 0.30.

Distribution: *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-2. 1, carapace, RVV, x 99; 2, carapace, DV, x 80.

***Eucytherura* sp. A**

Plate 46, figures 1-2

Eucytherura sp. Khosla *et al.*, 2005, pp. 39-41, pl. 2, fig. 16.

Locality and horizon: North of Lodrani Village, Bela Island, Kachchh. Gypsiferous shale (Sample No. BV/21), Hadibhadang Sandstone Member (late Bathonian-early Callovian), Khadir Formation.

Diagnostic characters: Carapace elongate-subrectangular in lateral outline and biconvex in the dorsal; valve produced in a small wing-like extension ventrally; height almost equal in anterior and posterior halves. Valve surface nearly smooth.

Remarks: The species is herein renamed as *Eucytherura* sp. A

Dimensions (mm): Carapace (SUGDMF No. 770), L. 0.41, H. 0.19, W. 0.18.

Distribution: *P. laeviscula* Range Zone, Bela Island, Kachchh.

Figures 1-2. Carapace; 1, RVV, x 183; 2, DV, x 185.



***Eucytherura* sp. B**

Plate 47, figures 1-2

Eucytherura sp. B Khosla *et al.*, 2006, p. 17, pl. 2, figs. 13-14.

Locality and horizon: Escarpment of the fort hill, 1/2km NW of Jaisalmer Railway Station. Fossiliferous sandstone (Sample No. FA/4), Fort Member (Bajocian-Bathonian), Jaisalmer Formation.

Diagnostic characters: Carapace elongate subrectangular in lateral outline and biconvex in the dorsal; valves produced in a small wing-like extension ventrally; greatest height about half the length at anterior cardinal angle. Overlap indistinct. Dorsal margin straight, slightly sloping down posteriorly; anterior margin evenly rounded; posterior margin with an indistinct caudal process in upper half. Valve surface reticulate and with a median depression in upper half.

Dimensions (mm): Carapace (SUGDMF No. 927), L. 0.35, H. 0.16, W. 0.15. Carapace (SUGDMF No. 928), L. 0.38, H. 0.18, W. 0.14.

Distribution: *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-2. 1, carapace, RVV, x 214; 2, carapace, DV, x 197.

***Fabanella* sp.**

Plate 48, figures 1-2

Fabanella sp. Khosla *et al.*, 2006, p. 16, pl. 6, fig. 17.

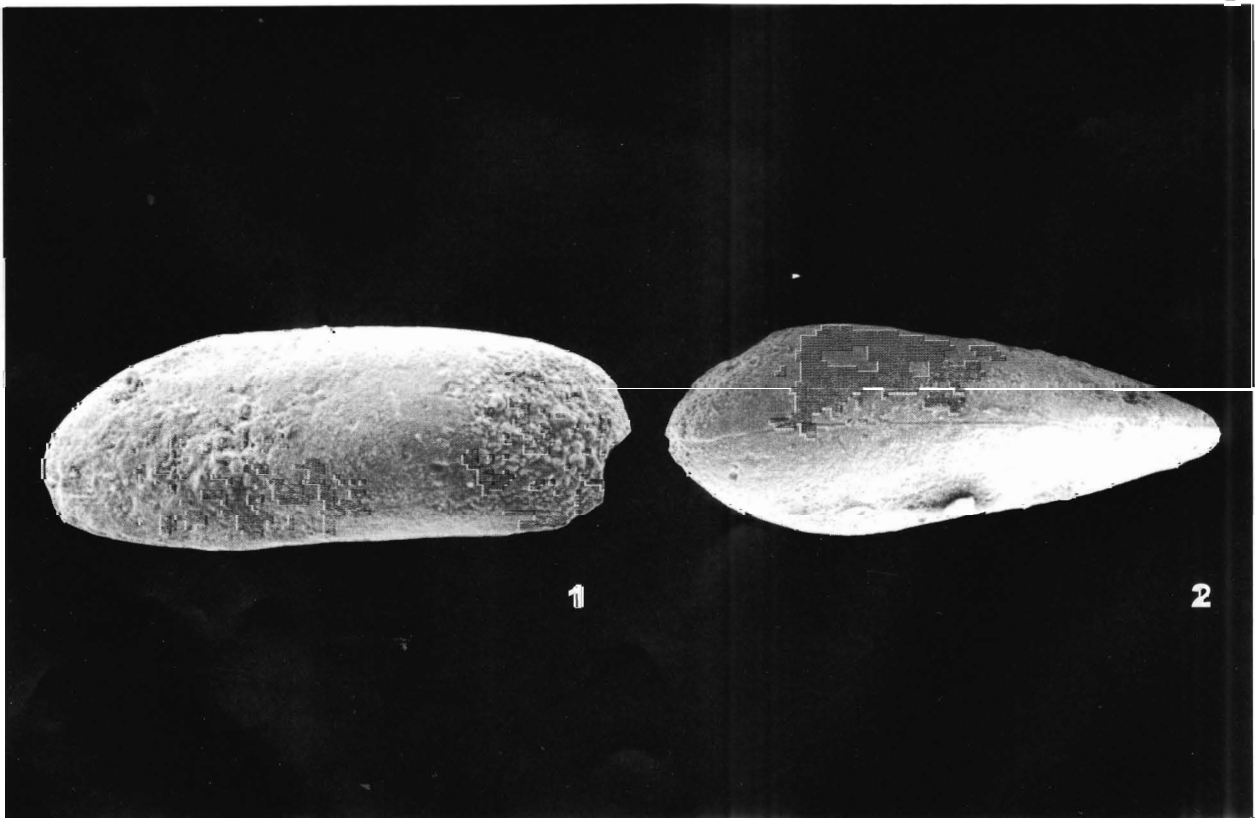
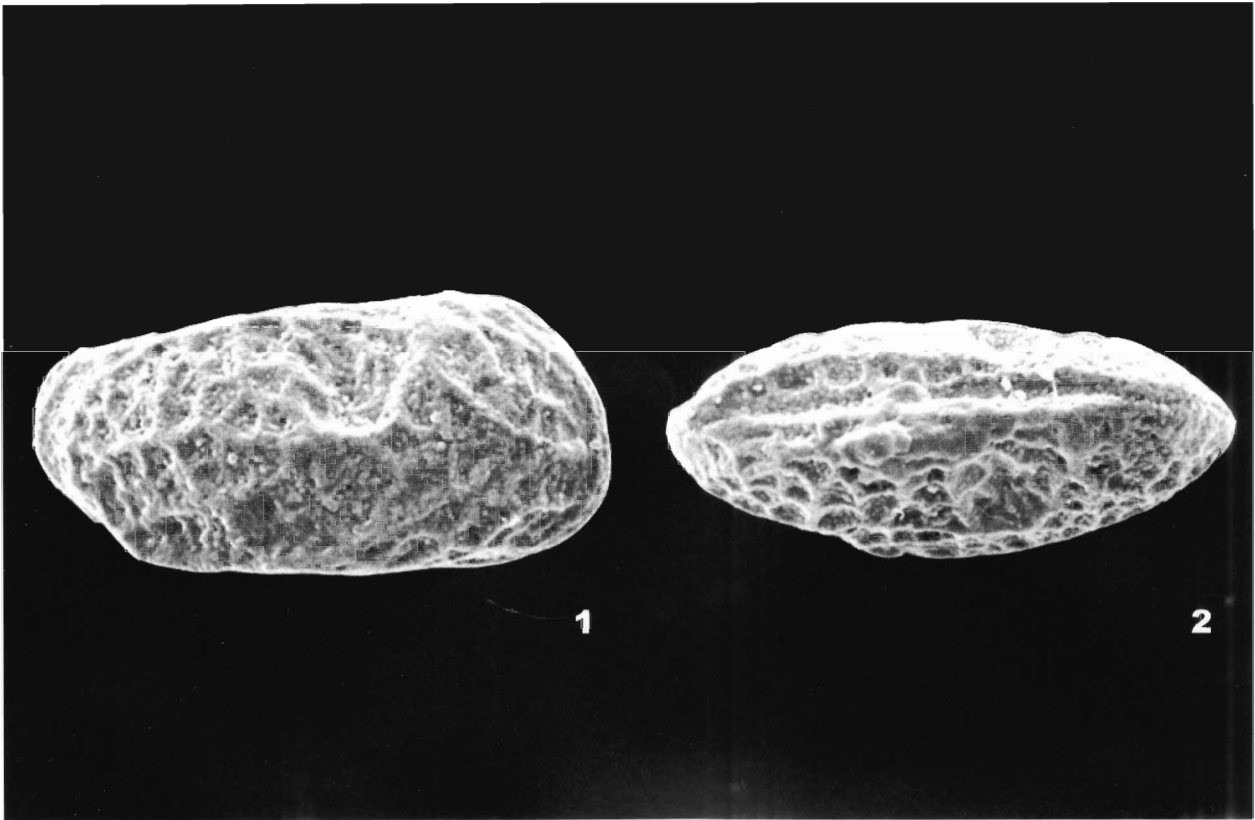
Locality and horizon: Western bank of Masurdi Nadi, east of Khethari Talab, Kuldhar, Jaisalmer. Oolitic Limestone bed (Sample No. KA/2), Kuldhar Member (early Callovian), Jaisalmer Formation.

Diagnostic characters: Carapace elongate in lateral outline and biconvex in the dorsal; greatest height about 2/5th of length posterior to middle. Overlap indistinct. Dorsal and ventral margins nearly straight; anterior margin evenly rounded; posterior margin sloping down from 1/4th of length in upper part and rounded in the lower. Valve surface smooth.

Dimensions (mm): Carapace (SUGDMF No. 1008), L. 0.53, H. 0.22, W. 0.22.

Distribution: *M. perforata kachchhensis* - *F. (B.) falcu* Concurrent Range Zone, Jaisalmer.

Figures 1-2. Carapace; 1, RVV, x147; 2, DV, x 145.



Fastigatocythere (Fastigatocythere) jaisalmerensis Khosla and Jakhar

Plate 49, figures 1-4

Jainiana grekoffi Mannikeri, 1996, pp. 398-400, pl. 1, fig. 4; pl. 2, fig. 1.

Fastigatocythere jaisalmerensis Khosla and Jakhar, new name. - Khosla *et al.*, 2006, p. 23, pl. 4, figs. 10-12.

Locality and horizon: Escarpment of the fort hill, 1/2 km NW of Jaisalmer Railway Station. Fossiliferous sandstone (Sample No. FA/4), Fort Member (Bajocian-Bathonian), Jaisalmer Formation.

Diagnostic characters: Carapace elongate-subovate in lateral outline. Dorsal margin evenly arched; ventral margin strongly convex with a slight concavity in the anterior half, and weakly plump in the posterior half; anterior margin broadly rounded; posterior margin somewhat narrowly rounded. Dorsal outline nearly symmetrically inflated, end narrowly rounded, maximum width just behind the middle. Cms a subvertical row of 4 adductor scars, frontal scar indistinct. Hinge entomodont, anteromedian element in LV with 4 teeth.

Dimensions (mm): Female carapace (SUGDMF No. 961), L. 0.48, H. 0.34, W. 0.30. Female carapace (SUGDMF No. 962), L. 0.49, H. 0.32, W. 0.30. Male carapace (SUGDMF No. 963), L. 0.54, H. 0.29, W. 0.30.

Distribution: *T. hadibhandensis* Range Zone, Jaisalmer.

Figures 1-4. 1, female carapace, RVV, x 156; 2, female carapace, DV, x 153; 3-4, male carapace, 3, RVV, x 146; 4, DV, x 141.

Fastigatocythere (Fastigatocythere) retusa (Grekoff)

Plate 50, figures 1-4

Progonocythere retusa Grekoff, 1963, p. 1737, pl. 3, figs. 81-87; pl. 8, figs. 222-223.

Jainiana retusa (Grekoff). - Mannikeri, 1996, pp. 400-401, pl. 1, figs. 5a-c; pl. 2, figs. 2a-f.

Fastigatocythere retusa (Grekoff). - Mette and Geiger, 2004b, p. 62, pl. 2, fig. 11. - Khosla *et al.*, 2005, p. 54, pl. 5, fig. 17.

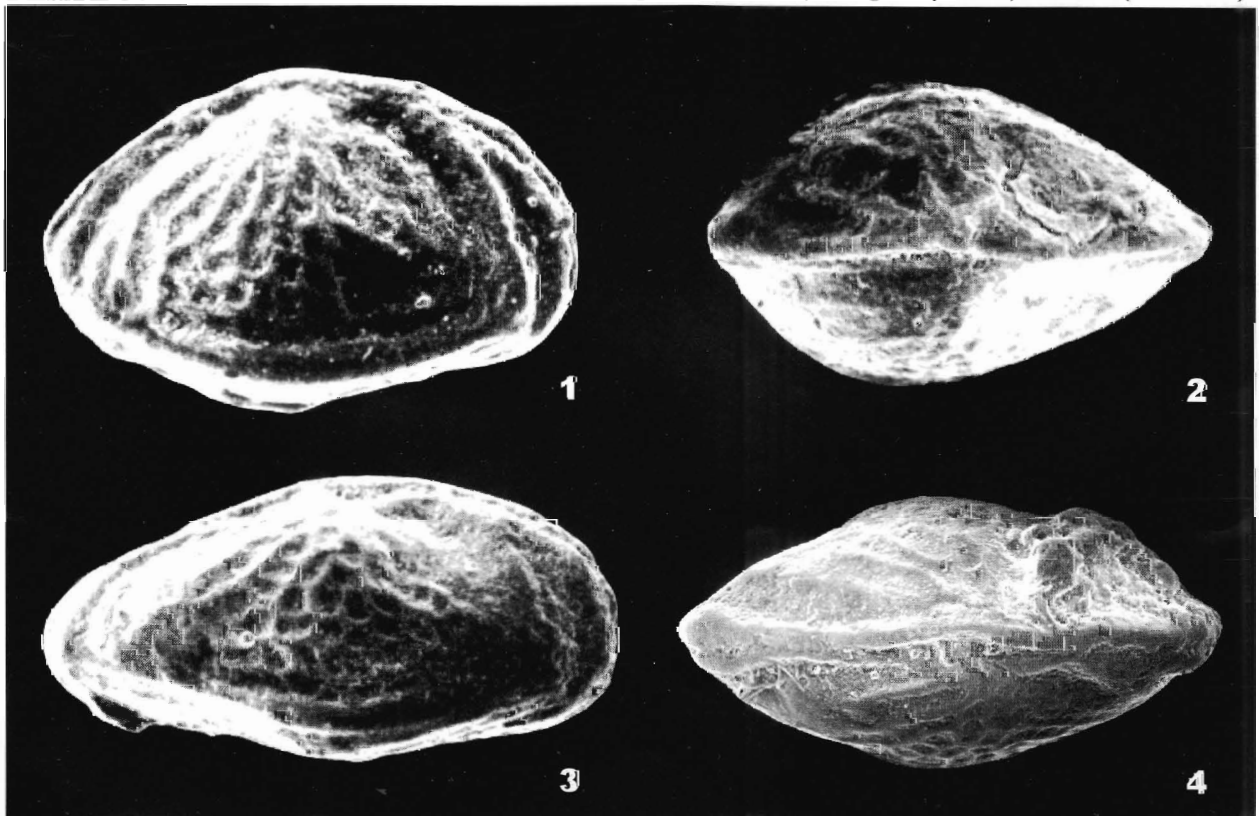
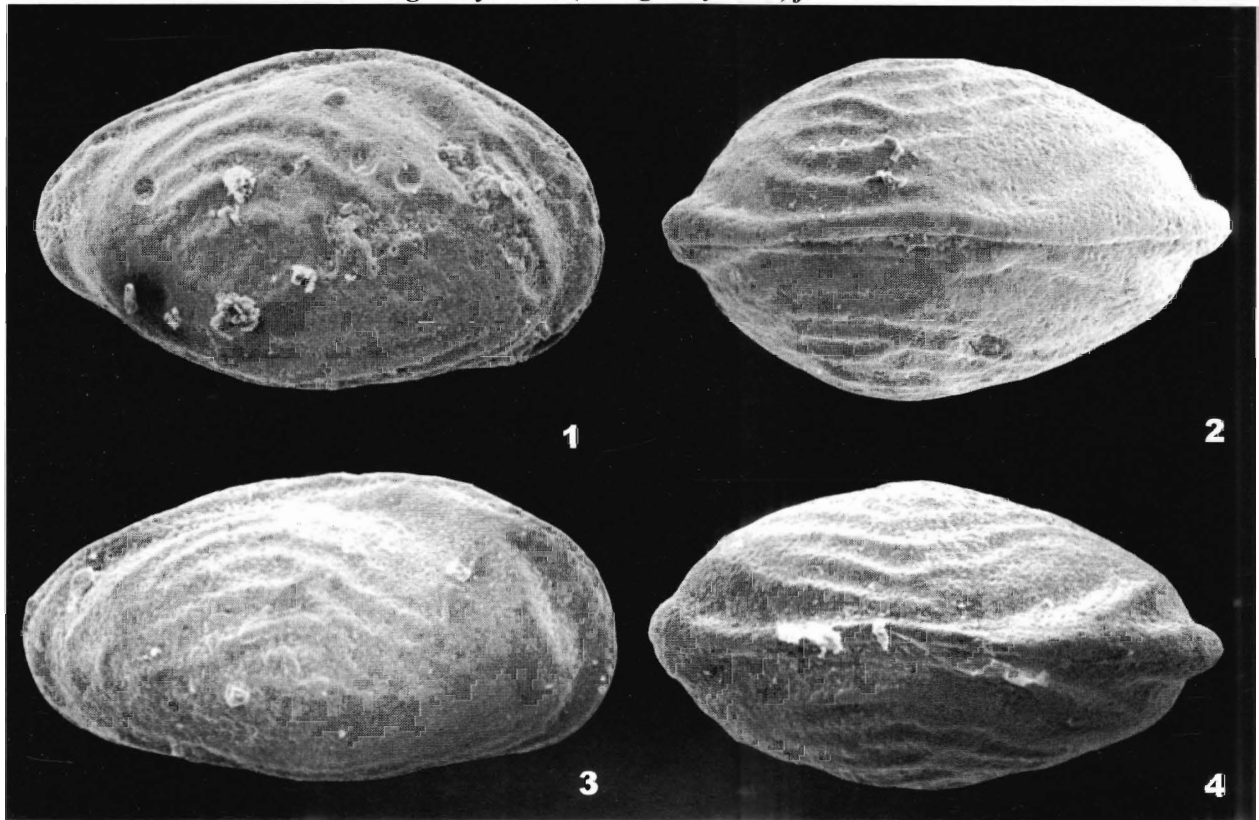
Locality and horizon: North of Lodrani Village, Bela Island, Kachchh. *Corbula lyrata* bearing reddish-brown siltstone (Sample No. BV/6), Hadibhadang Shale Member (mid-late Bathonian), Khadir Formation.

Diagnostic characters: Carapace elongate-subtriangular to subovate in lateral outline. Valve surface ornamented by 3-4 rows of reticulation arranged in triangular pattern; an oblique, shallow subocular depression in anterodorsal region; an anteromarginal furrow; and 3 ribs under ventral inflation parallel to outline. Mpc about 7 anteriorly. Cms a subvertical row of 4 closely set suboval adductor scars with a small subcircular frontal scar. Hinge entomodont, anteromedian element in LV with 3-5 large teeth.

Dimensions (mm): Female carapace (SUGDMF No. 812), L. 0.66, H. 0.40, W. 0.41. Female carapace (SUGDMF No. 1025), L. 0.61, H. 0.38, W. 0.39. Male carapace (SUGDMF No. 1026), L. 0.76, H. 0.39, W. 0.39.

Distribution: Jurassic of Majunga and Morondava basins, Madagascar and Jaisalmer; *T. hadibhadangensis* Range Zone, Bela Island, Kachchh.

Figures 1-4. 1, female carapace, RVV, x 108; 2, female carapace, DV, x 115; 3-4, male carapace; 3, RVV, x 100; 4, DV, x 101.



Fastigatocythere (Amicytheridea) flebilis Khosla and Darwin Felix

Plate 51, figures 1-4

Fastigatocythere flebilis Khosla and Darwin Felix, in Khosla *et al.*, 2005, pp. 49-50, pl. 5, figs. 1-3; fig. 6b. - Khosla *et al.*, 2006, p. 23, pl. 4, fig. 8.

Locality and horizon: Northern escarpment of Hadibhadang Hill, close to Khara Talao, Khadir Island, Kachchh. Greyish-yellow siltstone (Sample No. KII/1), Hadibhadang Shale Member (Bajocian-Bathonian), Khadir Formation.

Diagnostic characters: Carapace subovate in lateral outline. Surface ornamented by an oblique anterodorsal furrow and faint ribs arranged in triangular pattern with apices towards dorsal margin; ribs in ventral half parallel to ventral outline. Mpc 7-8 anteriorly and 3-4 posteriorly. Hinge lobodont, anteromedian element in LV distally bilobate and the furrows between the lobes not extending to its base.

Dimensions (mm): Holotype (SUGDMF No. 798), carapace, L. 0.67, H. 0.34, W. 0.43. Paratype I (SUGDMF No. 799), RV, L. 0.57, H. 0.35. Paratype II (SUGDMF No. 800), LV, L. 0.62, H. 0.38. Paratype III (SUGDMF No. 1022), carapace, L. 0.68, H. 0.41, W. 0.44.

Distribution: *T. hadibhadangensis* Range Zone, Khadir Island, Kachchh and Jaisalmer.

Figures 1-4. 1, holotype, carapace, RVV, x 106; 2, paratype I, RV, Int. V, x 123; 3, paratype II, LV, DV, x 113; 4, paratype III, carapace, DV, x 105.

Fastigatocythere (Amicytheridea) globosa Mette and Geiger

Plate 52, figures 1-2

Amicytheridea sp. Khosla and Jakhar, 1993, p. 145, figs. 4.6-8.

Fastigatocythere (Amicytheridea) globosa Mette and Geiger, 2004b, pp. 74-78, pl. 3, figs. 3-6.

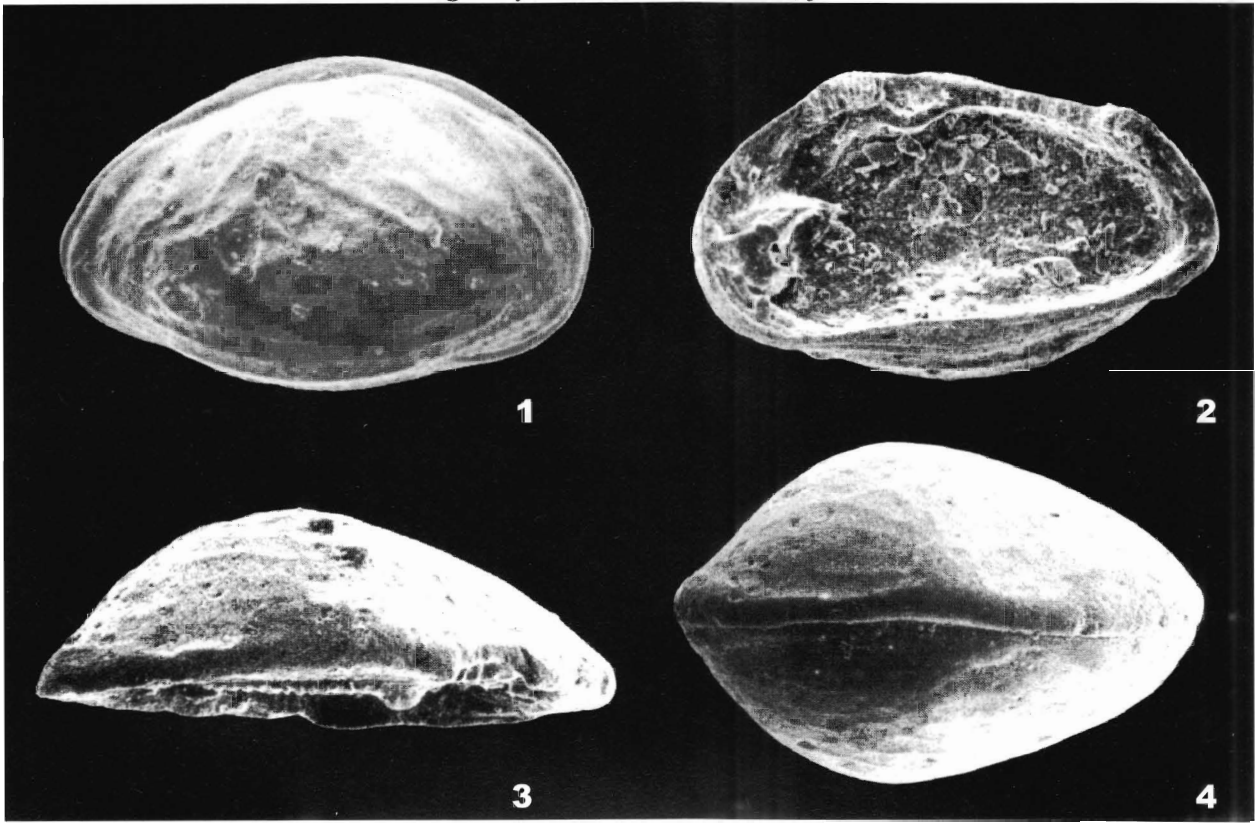
Locality and horizon: Near Fulae Village, Habo Dome, Kachchh. Greyish-yellow shale (Sample No. F.15/4), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subovate in lateral outline, with greatest height near middle. Valve surface ornamented by distinct ribs arranged in triangular pattern, with apices towards dorsal margin, and an oblique anterodorsal furrow and reticulation in between ribs; ribs in ventral half quite prominent forming four sagittate rows parallel to ventral margin. Mpc 12-14 anteriorly and 6 posteriorly. Hinge lobodont; in LV posteromedian bar denticulate, anteromedian with 3 teeth, first 2 strongly projecting beyond hinge margin in DV.

Dimensions (mm): Carapace (SUGDMF No. 468), L. 0.51, H. 0.35, W. 0.32. LV (SUGDMF No. 469), L. 0.52, H. 0.38.

Distribution: *P. laeviscula* Range Zone, Habo Dome, Kachchh, India and the early Callovian of Morondava Basin, Madagascar.

Figures 1-2. 1, carapace, RVV, x 149; 2, LV, DV, x 148.



Fastigatocythere (Amicytheridea) indica Khosla and Manisha Kumari
Plate 53, figures 1-4

Fastigatocythere indica Khosla and Manisha Kumari, in Khosla *et al.*, 2005, p. 50, pl. 5, figs. 4-6; fig. 6c. - Khosla *et al.*, 2006, p. 23, pl. 4, fig. 9.

Locality and horizon: North of Lodrani Village, Bela Island, Kachchh. Yellowish-brown siltstone with interbedded shale (Sample No. BV/22), Hadibhadang Sandstone Member (late Bathonian-early Callovian), Khadir Formation.

Diagnostic characters: Carapace elongate-subquadrate in lateral outline. Valve surface ornamented by 3-4 irregular / sinuous ribs, in upper half diverging downwards from mid-dorsal region, while in lower half nearly parallel to ventral outline forming triangular pattern. Mpc 6-8 anteriorly and 4-5 posteriorly. Hinge lobodont, anteromedian element in LV a single tooth with a slight lobation confined to its distal periphery.

Dimensions (mm): Holotype (SUGDMF No. 801), male carapace, L. 0.72, H. 0.39, W. 0.40. Paratype I (SUGDMF No. 802), female carapace, L. 0.68, H. 0.40, W. 0.42. Paratype II (SUGDMF No. 1023), female carapace, L. 0.72, H. 0.39, W. 0.43. Paratype III (SUGDMF No. 803), female LV, L. 0.67, H. 0.40.

Distribution: *P. laeviscula* Range Zone, Bela Island, Kachchh; *T. hadibhandensis* Range Zone, Jaisalmer.

Figures 1-4. 1, holotype, male carapace, RVV, x 107; 2, paratype I, female carapace, RVV, x 113; 3, paratype II, female carapace, DV, x 104; 4, paratype III, female LV, DV, x 113.

Fastigatocythere (Amicytheridea) kachchhensis Khosla and Darwin Felix
Plate 54, figures 1-4

Fastigatocythere kachchhensis Khosla and Darwin Felix, in Khosla *et al.*, 2005, pp. 51-53, pl. 5, figs. 10-11.

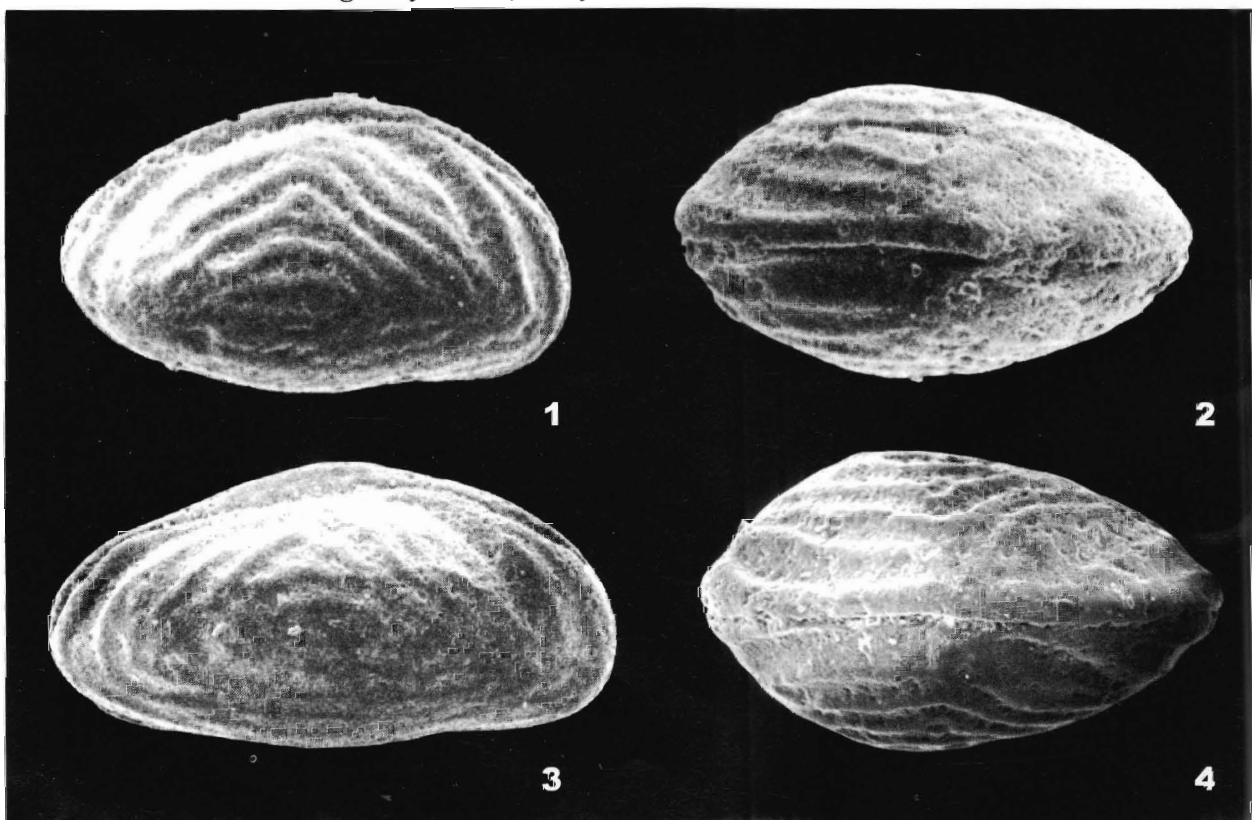
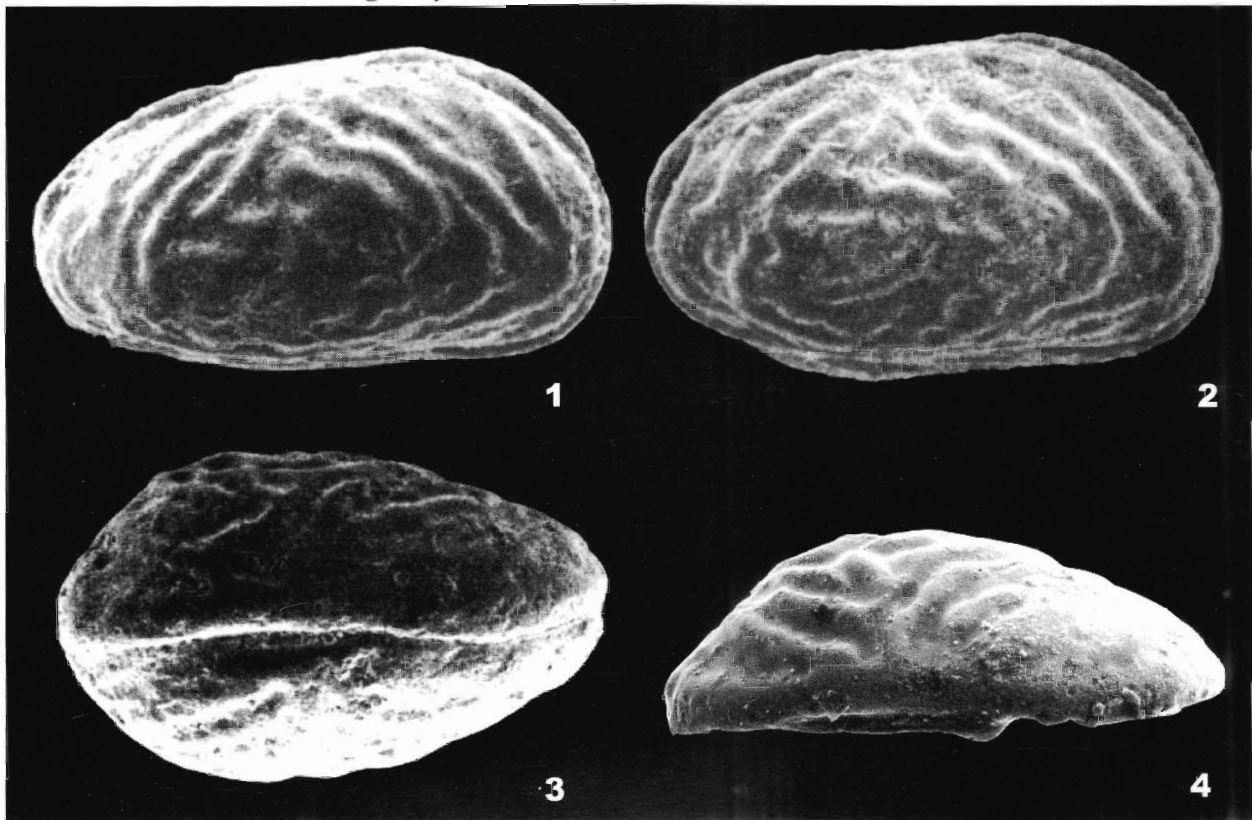
Locality and horizon: Amrapar Village, northeastern part of Khadir Island, Kachchh. Shale bed (Sample No. KIII/3), Hadibhadang Shale Member (mid-late Bathonian), Khadir Formation.

Diagnostic characters: Carapace subovate in lateral outline. Valve surface ornamented by an oblique anterodorsal furrow and distinct, thick ribs arranged in triangular pattern with apices towards dorsal margin, three inclined ribs each on anterior and posterior regions in upper half, and 4-5 ribs parallel to ventral outline in lower half; intercostal area with few reticules. Mpc 7-8 anteriorly and 3-4 posteriorly. Hinge lobodont.

Dimensions (mm): Holotype (SUGDMF No. 805), female carapace, L. 0.56, H. 0.32, W. 0.30. Paratype I (SUGDMF No. 806), female carapace, L. 0.51, H. 0.30, W. 0.33. Paratype II (SUGDMF No. 1024), male carapace, L. 0.65, H. 0.32, W. 0.33.

Distribution: *C. micropunctata* Range Zone, Khadir Island, Kachchh.

Figures 1-4. 1, holotype, female carapace, RVV, x 121; 2, paratype I, female carapace, DV, x 135; 3-4, paratype II, male carapace; 3, RVV, x 117; 4, DV, x 108.



Fastigatocythere (Amicytheridea?) pachchhamensis Khosla and Darwin Felix
Plate 55, figures 1-2

Fastigatocythere? pachchhamensis Khosla and Darwin Felix, in Khosla *et al.*, 2005, pp. 53-54, pl. 5, figs. 14-16.

Locality and horizon: Sadhara Dome, Pachchham Island, Kachchh. Coral bearing greyish-white limestone (Sample No. SI/2), Sadhara Coral Limestone Member (Bajocian-Bathonian), Khavda Formation.

Diagnostic characters: Carapace large, subovate in lateral outline and biconvex in the dorsal; greatest height at anterior 1/3rd of length. Valve surface ornamented by an oblique anterodorsal furrow and fine ribs arranged in triangular pattern with apices towards dorsal margin; intercostal area reticulated giving net-like appearance.

Dimensions (mm): Holotype (SUGDMF No. 809), carapace, L. 1.02, H. 0.56, W. 0.52. Paratype I (SUGDMF No. 810), RV, L. 1.07, H. 0.56. Paratype II (SUGDMF No. 811), carapace, L. 1.00, H. 0.56, W. 0.50.

Distribution: *T. hadibhadangensis* Range Zone, Sadhara Dome, Pachchham Island.

Figures 1-4. 1, holotype, carapace; RVV, x 75; 2, paratype I, RV, Int.V, x 68; 3-4, paratype II, carapace, 3, LVV, x 76; 4, DV, x 75.

Fastigatocythere (Amicytheridea) triangulata (Bate)
Plate 56, figures 1-2

Procytheridea? 3330 Grekoff, 1963, p. 1749, pl. 6, figs. 173-175.

Amicytheridea triangulata Bate, 1975, pp. 192-193, pl. 7, figs. 14-16, text-figs. 11a-c. - Khosla and Jakhar, 1993, pp. 143-145, figs. 4.1-5. - Dépêche *et al.*, 1987, p. 232, pl. 2, figs. 13-17.

Majungaella brentonensis Guha, 1977, p. 87, pl. 3, fig. 16a (not *Majungaella brentonensis* Dingle, 1972, p. 291, pl. 16, figs. 4a,b).

Fastigatocythere triangulata (Bate). - Whatley and Ballent, 1996, p. 933, pl. 1, figs. 18-20. - Khosla *et al.*, 2005, pl. 6, fig. 1.

Fastigatocythere (Amicytheridea) triangulata (Bate). - Mette and Geiger, 2004b, p. 62, pl. 3, fig. 8.

Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Greyish-yellow gypsiferous shale (Sample No. D4/35), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace triangular in lateral outline, prominently tapering posteriorly; greatest height near anterior cardinal angle. Valve surface marked by an oblique anterodorsal furrow and striking ornamentation comprising triangular arrangement of ribs with apices pointing upward, three inclined ribs each on anterior and posterior region in upper half, and 4-5 ribs parallel to ventral outline in lower half; intercostals area reticulate. Mpc 7-8 anteriorly and 2-3 posteriorly. Hinge lobodont, anteromedian element in LV comprising 2 bifid teeth.

Dimensions (mm): Male carapace (SUGDMF No. 468), L. 0.60, H. 0.34, W. 0.33. Female LV (SUGDMF No. 469), L. 0.52, H. 0.32.

Distribution: Jurassic of Tanzania, Madagascar, Saudi Arabia and Kachchh.

Figures 1-2. 1, male carapace, RVV, x 127; 2, female LV, DV, x 148.

PLATE 55 *Fastigatocythere (Amicytheridea ?) pachchhamensis* Khosla and Darwin Felix

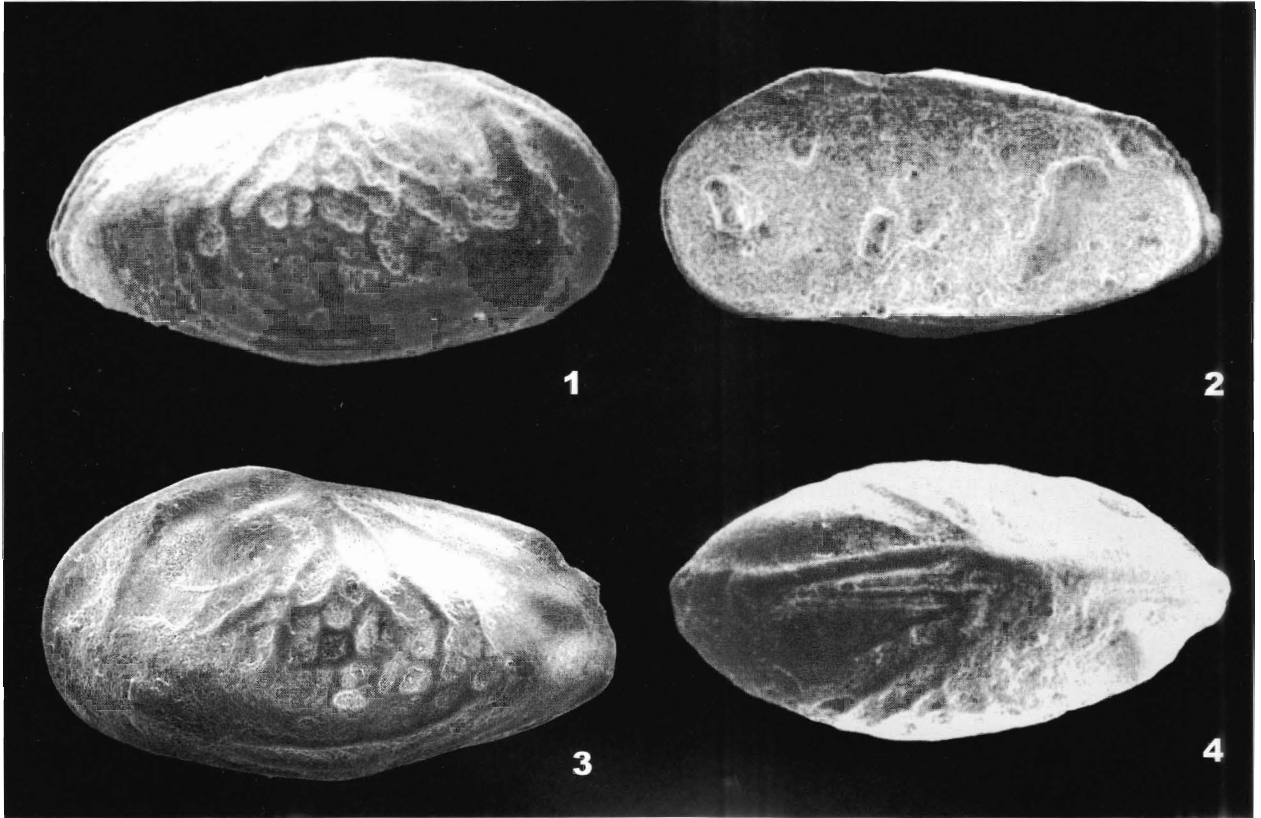


PLATE 56 *Fastigatocythere (Amicytheridea) triangulata* (Bate)



Fastigatocythere (Batella) befotakaensis (Grekoff)

Plate 57, figures 1-4

Progonocythere befotakaensis Grekoff, 1963, p. 1733, pl. 3, figs. 77-80; pl. 8, figs. 215, 217. - Guha, 1977, p. 88, pl. 2, figs. 12a, b, 13.

Fastigatocythere befotakaensis (Grekoff). - Wienholz, 1967, p. 25. - Whatley and Ballent, 1996, p. 933. - Khosla *et al.*, 2005, p. 46, pl. 4, fig. 8. - Khosla *et al.*, 2006, p. 22, pl. 3, fig. 17.

Batella befotakaensis (Grekoff). - Khosla *et al.*, 1997, pp. 12-14, pl. 2, figs. 10-13.

Fastigatocythere (Batella) befotakaensis (Grekoff). - Mette and Geiger, 2004b, p. 78, pl. 2, fig. 10; pl. 3, figs. 1-2.

Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Yellow gypsiferous shale (Sample No. D14/13), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace elongate-subpyriform in lateral outline. Valve surface ornamented by coarse reticulation arranged in rows, in upper half diverging downwards from mid-dorsal region, and in lower half parallel to ventral outline; a prominent crescent-shaped reticule or depression, with concave side towards posterior, in dorsomedian region; and an oblique anterodorsal furrow. Mpc 18-20 anteriorly. Hinge entomodont, anteromedian element in LV comprises merely 2 teeth.

Dimensions (mm): Male carapace (SUGDMF No. 470), L. 0.66, H. 0.36, W. 0.36. Female LV (SUGDMF No. 471), L. 0.60, H. 0.37. Female RV (SUGDMF No. 472), L. 0.62, H. 0.37. Female LV (SUGDMF No. 473), L. 0.62, H. 0.38.

Distribution: Middle Jurassic of Majunga and Morondava basins, Madagascar; and Kachchh and Jaisalmer, India.

Figures 1-4. 1, male carapace, RVV, x 117; 2, female LV, Lat. V, x125; 3, female RV, Int. V, x121; 4, female LV, DV, x124.

Fastigatocythere (Batella) belaensis Khosla and Manisha Kumari

Plate 58, figures 1-2

Fastigatocythere belaensis Khosla and Manisha Kumari, in Khosla *et al.*, 2005, pp. 46-47, pl. 4, figs. 9-11.

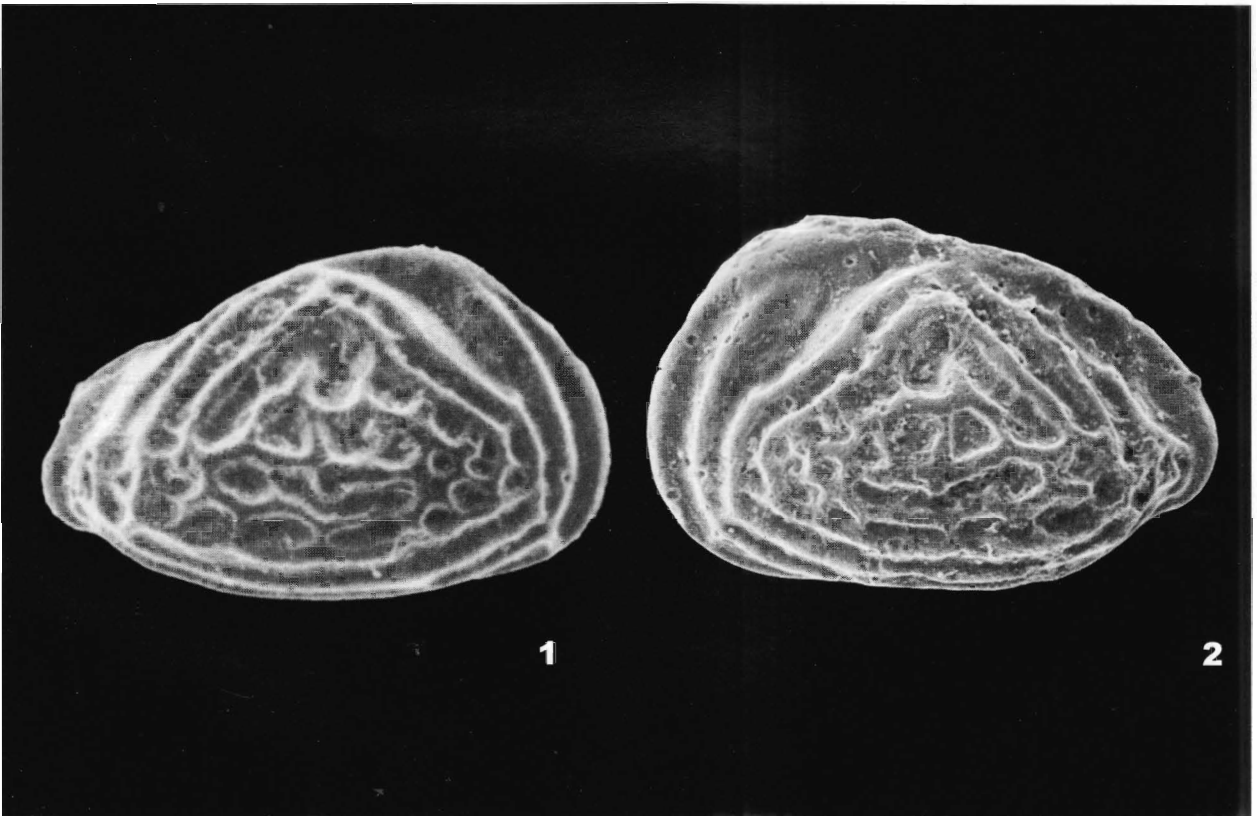
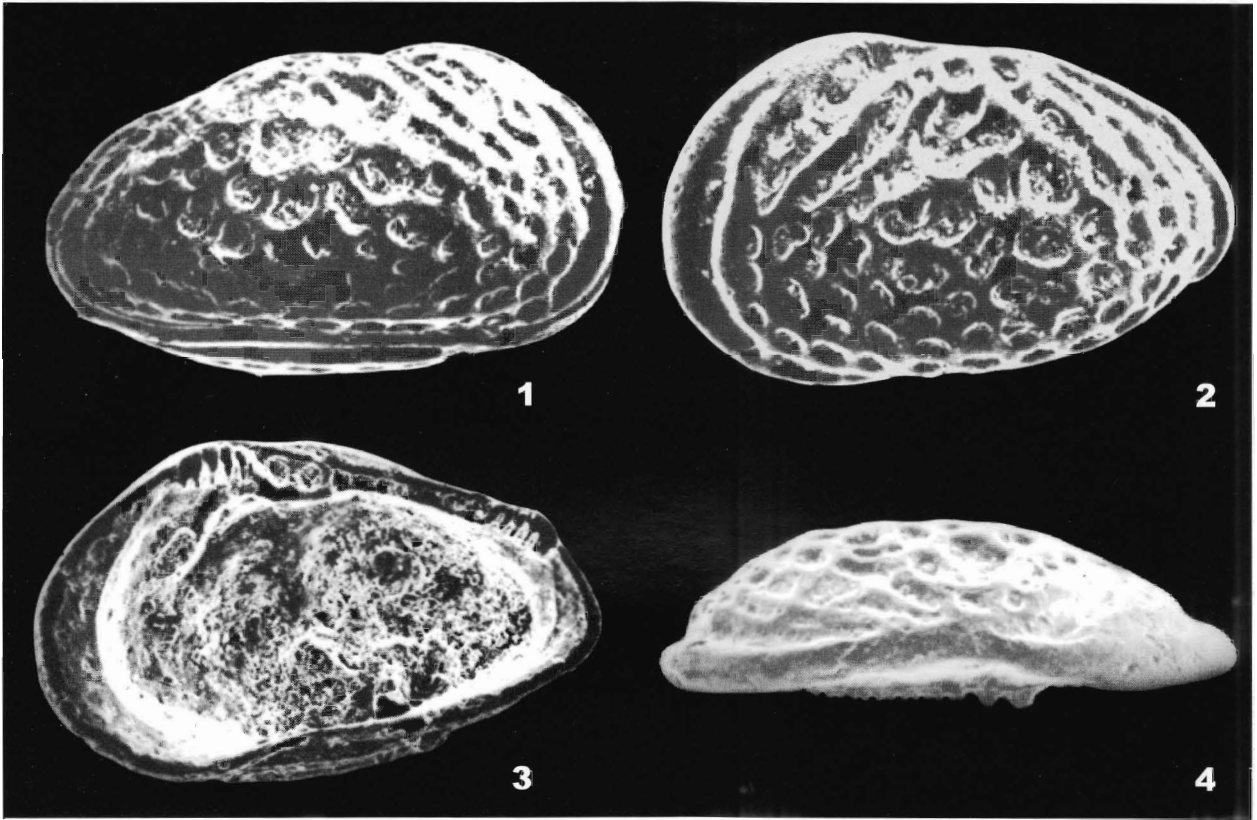
Locality and horizon: North of Lodrani Village, Bela Island, Kachchh. Yellowish-brown siltstone with interbedded shale (Sample BV/22), Hadibhadang Sandstone Member (late Bathonian-early Callovian), Khadir Formation.

Diagnostic characters: Valve subtriangular in lateral outline. Surface ornamented by a prominent hook-shaped depression in dorsomedian and posteromedian regions; an anterodorsal furrow; 2-3 distinct peripheral ribs arranged in triangular pattern, in upper half diverging downwardly from mid-dorsal region, in lower half parallel to ventral outline; and coarse reticulation between the peripheral ribs. Mpc 19 anteriorly and 5 posteriorly. Hinge entomodont.

Dimensions (mm): Holotype (SUGDMF No. 793), RV, L. 0.51, H. 0.32. Paratype III (SUGDMF No. 1018), LV, L. 0.52, H. 0.34.

Distribution: *P. laeviscula* Range Zone, Bela Island, Kachchh.

Figures 1-2. 1, holotype, RV, Lat. V, x 149; 2, paratype III, LV, Lat. V, x 146.



Fastigatocythere (Batella) clavata (Khosla, Jakhar and Mohammed)

Plate 59, figures 1-4

Batella clavata Khosla, Jakhar and Mohammed, 1997, p. 14, pl. 2, figs. 14-16; pl. 3, fig. 1.

Fastigatocythere clavata (Khosla *et al.*). - Khosla *et al.*, 2005, p. 49, pl. 4, fig. 13. - Khosla *et al.*, 2006, p. 22, pl. 3, fig. 18.

Locality and horizon: Near Fulae Village, Habo Dome, Kachchh. Grey shale (Sample No. F16/1), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subtriangular in lateral outline. Valve surface ornamented by a prominent club-shaped depression in dorsomedian and median regions; an anterodorsal furrow; ribs over rest of the area arranged in a triangular pattern, in upper half ribs diverging downwardly from mid-dorsal margin, in lower half ribs four in number and parallel to ventral outline; interarea between ribs reticulate. Mpc 19-21 anteriorly and 5-6 posteriorly. Hinge entomodont, anteromedian socket in RV with 2 loculi.

Dimensions (mm): Holotype (SUGDMF No. 474), carapace, L. 0.62, H. 0.40, W. 0.36. Paratype I (SUGDMF No. 475), LV, L. 0.60, H. 0.36. Paratype II (SUGDMF No. 476), RV, L. 0.60, H. 0.36. Paratype III (SUGDMF No. 477), carapace, L. 0.64, H. 0.40, W. 0.38.

Distribution: *P. laeviscula* Range Zone of Kachchh and *M. perforata kachchhensis* - *F. (B.) falcula* Concurrent Range Zone, Jaisalmer.

Figures 1-4. 1, holotype, carapace, RVV, x 121; 2, paratype I, LV, Lat.V, x 125; paratype II, RV, Int.V, x 125; 4, paratype III, carapace, DV, x 117.

Fastigatocythere (Batella) depressa (Khosla, Jakhar and Mohammed)

Plate 60, figures 1-4

Fastigatocythere accessa Guha, 1977, p. 88, pl. 2, fig. 10b (in part, not *Progonocythere accessa* Grekoff, 1963, p. 1734, pl. 3, figs. 63-69).

Batella depressa Khosla, Jakhar and Mohammed, 1997, pp. 14-15, pl. 3, figs. 2-6.

Fastigatocythere depressa (Khosla *et al.*). - Khosla *et al.*, 2005, p. 49, pl. 4, fig. 14. - Khosla *et al.*, 2006, p. 22, pl. 3, fig. 19.

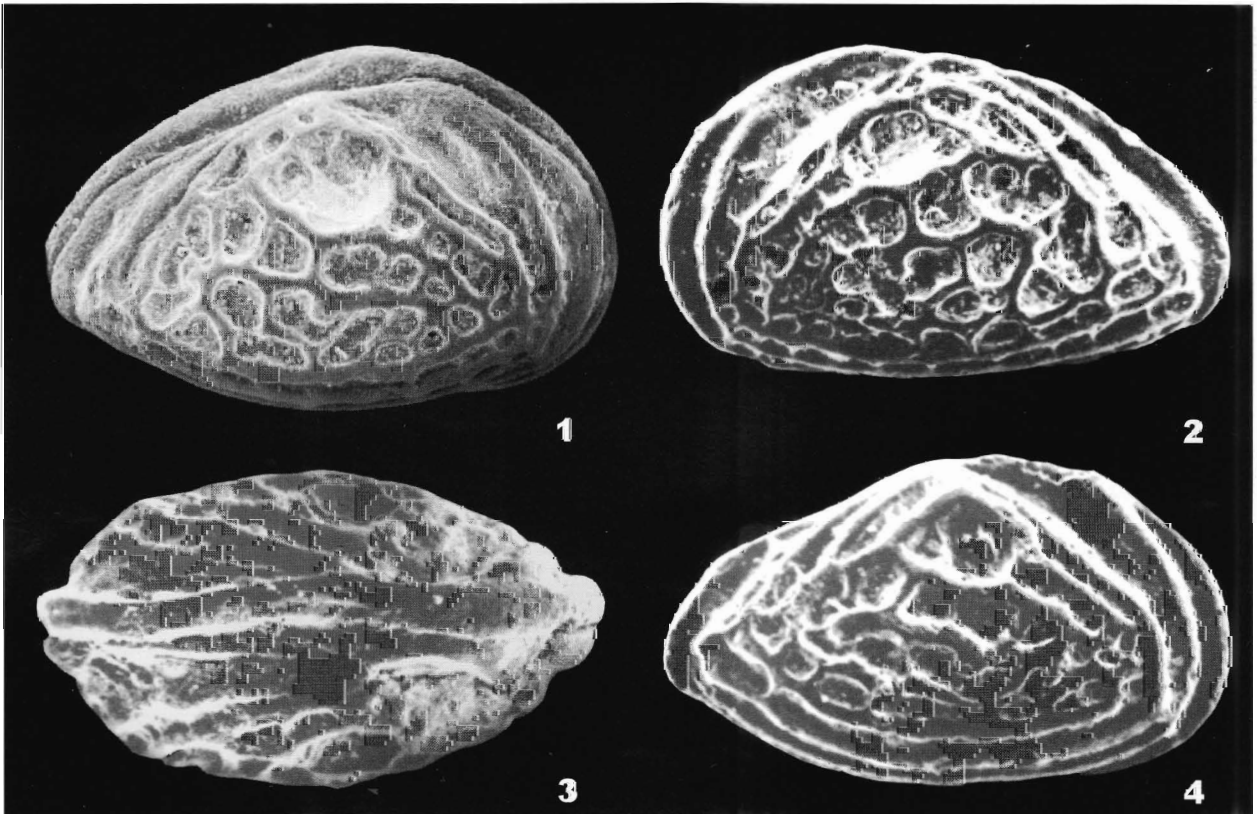
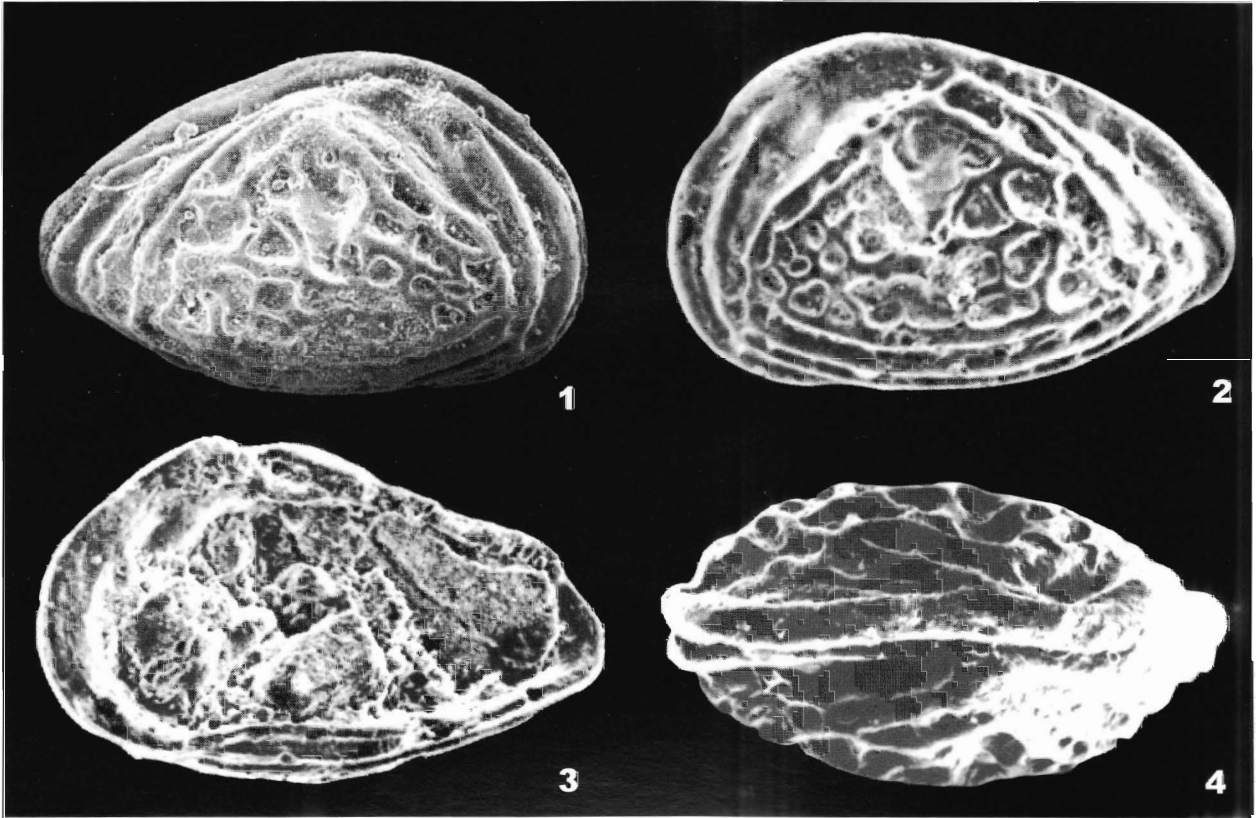
Locality and horizon: About 2 kms east of Dhrang Village, Habo Dome, Kachchh. Yellow gypsiferous shale (Sample No. L14/2), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subtriangular in lateral outline. Valve surface ornamented by a prominent subcircular depression in dorsomedian region; an anterodorsal furrow and reticulation over rest of the area; edges of reticulations meshes raised in low but distinct ribs arranged in triangular pattern. Mpc 19-21 anteriorly and 5-6 posteriorly. Hinge entomodont, anteromedian socket in RV with 2 loculi.

Dimensions (mm): Holotype (SUGDMF No. 478), carapace, L. 0.58, H. 0.38, W. 0.38. Paratype I (SUGDMF No. 479), LV, L. 0.62, H. 0.38. Paratype II (SUGDMF No. 480), carapace, L. 0.60, H. 0.40, W. 0.36. Paratype III (SUGDMF No. 481), RV, L. 0.62, H. 0.36.

Distribution: *P. laeviscula* Range Zone of Kachchh; *T. hadibhadangensis* Range Zone and *M. perforata kachchhensis* - *F. (B.) falcula* Concurrent Range Zone, Jaisalmer.

Figures 1-4. 1, holotype, carapace, RVV, x 129; 2, paratype I, LV, Lat.V, x 121; paratype II, carapace, DV, x 125; 4, paratype III, RV, Lat.V, x 121.



***Fastigatocythere (Batella) falcula* (Grekoff) s.s.**

Plate 61, figures 1-4

Progonocythere falcula Grekoff, 1963, pp. 1735-1737, pl. 4, figs. 88-91.

Fastigatocythere accessa Guha, 1977, p. 88, pl. 2, fig. 10a (in part, not *Progonocythere accessa* Grekoff, 1963, p. 1734, pl. 3, figs. 63-69).

Batella falcula (Grekoff). - Khosla *et al.*, 1997, pp. 15-16, pl. 3, figs. 7-10.

Fastigatocythere (Batella) falcula (Grekoff). - Mette and Geiger, 2004b, p. 62, pl. 2, figs. 3-8.

Fastigatocythere falcula (Grekoff) s.s. - Khosla *et al.*, 2006, p. 22, pl. 4, figs. 1-2.

Locality and horizon: Near Habai Village, Habo Dome, Kachchh. Greyish-yellow gypsiferous shale (Sample No. H12/9), Chari Formation, (late Bathonian-Callovian).

Diagnostic characters: Carapace elongate-subtriangular in lateral outline. Valve surface ornamented by a large subovate depression in dorsomedian region; an anterodorsal furrow with a marginal rib in front of it; a median transverse wavy rib; a short transverse depression posteroventral to it; and reticulations over rest of the area. Mpc 18-19 anteriorly. Hinge entomodont.

Dimensions (mm): Male carapace (SUGDMF No. 952), L. 0.66, H. 0.38, W. 0.36. Female carapace (SUGDMF No. 483), L. 0.62, H. 0.40, W. 0.36. Male LV (SUGDMF No. 484), L. 0.66, H. 0.40. Female LV (SUGDMF No. 486), L. 0.60, H. 0.36.

Distribution: *P. laeviscula* Range Zone, Habo and Jhura domes, Kachchh; *M. perforata kachchhensis* - *F. (B.) falcula* Concurrent Range Zone, Jaisalmer; early Callovian of Morondava Basin, Madagascar.

Remarks: Besides *F. (B.) falcula* s.s., three morphotypes are recognized in this species.

Figures 1-4. 1, male carapace, RVV, x123; 2, female carapace, RVV, x 123; 3, Male LV, Lat.V, x 114; 4, female LV, DV, x127.

***Fastigatocythere (Batella) falcula* (Grekoff) Morphotype A**

Plate 62, figures 1-2

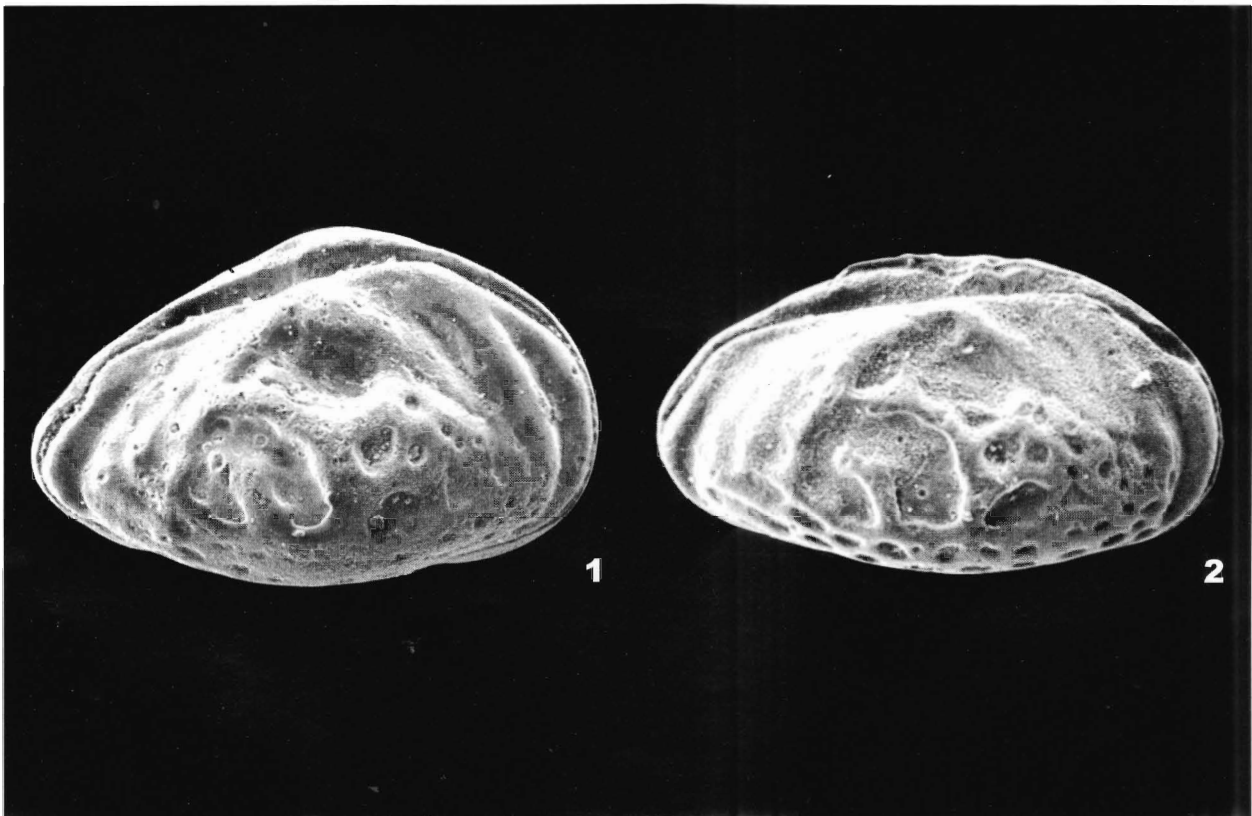
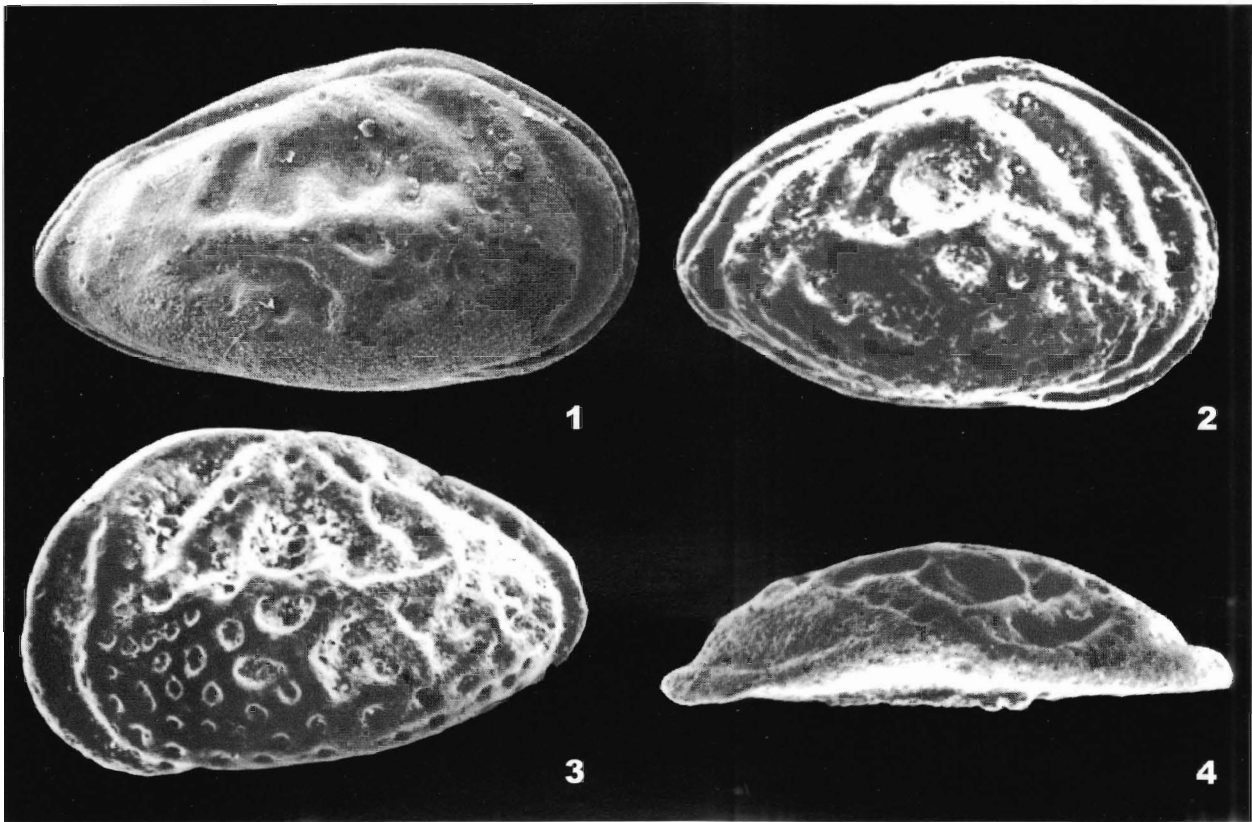
Fastigatocythere falcula (Grekoff) Morphotype A. - Khosla *et al.*, 2006, p. 22, pl. 4, figs. 3-5.

Diagnostic characters: Posteroventral depression smooth, horseshoe-shaped; rest of the area in ventral half moderately pitted.

Dimensions (mm): Female carapace (SUGDMF No. 954), L. 0.66, H. 0.42, W. 0.40. Male carapace (SUGDMF No. 955), L. 0.67, H. 0.38, W. 0.35.

Distribution: Same as *F. (B.) falcula* s.s.

Figures 1-2. 1, female carapace, RVV, x 115; 2, male carapace, RVV, x 114..



***Fastigatocythere (Batella) falcula* (Grekoff) Morphotype B**

Plate 63, figure 1

Fastigatocythere falcula (Grekoff) Morphotype B. - Khosla *et al.*, 2006, p. 22, pl. 4, fig. 6.

Diagnostic characters: Posteroventral horseshoe-shaped depression subdivided into two parts by an inclined rib; rest of the area moderately pitted.

Dimensions (mm): Male carapace (SUGDMF No. 957), L. 0.69, H. 0.39, W. 0.32.

Distribution: Same as *F. (B.) falcula s.s.*

***Fastigatocythere (Batella) falcula* (Grekoff) Morphotype C**

Plate 63, figure 2

Fastigatocythere falcula (Grekoff) Morphotype C. - Khosla *et al.*, 2006, p. 23, pl. 4, fig. 7.

Diagnostic characters: Posteroventral horseshoe-shaped depression with prominent concentric reticulation; rest of the surface also strongly reticulate.

Dimensions (mm): Male carapace (SUGDMF No. 958), L. 0.61, H. 0.37, W. 0.40.

Distribution: Same as *F. (B.) falcula s.s.*

Figures 1-2, 1, *F. (B.) falcula* morphotype B, male carapace, RVV, x 110; 2, *F. (B.) falcula* morphotype C, male carapace, RVV, x 123.

Fastigatocythere (Batella) sp. A

Plate 64, figure 1

Batella? sp. Khosla *et al.*, 2004, p. 26, pl. 1, fig. 9.

Locality and horizon: Southwest of Jhura Village, Jhura Dome, Kachchh. Yellowish-grey gypsiferous shale, (Sample No. J16/5), Chari Formation (late Bathonian-Callovian).

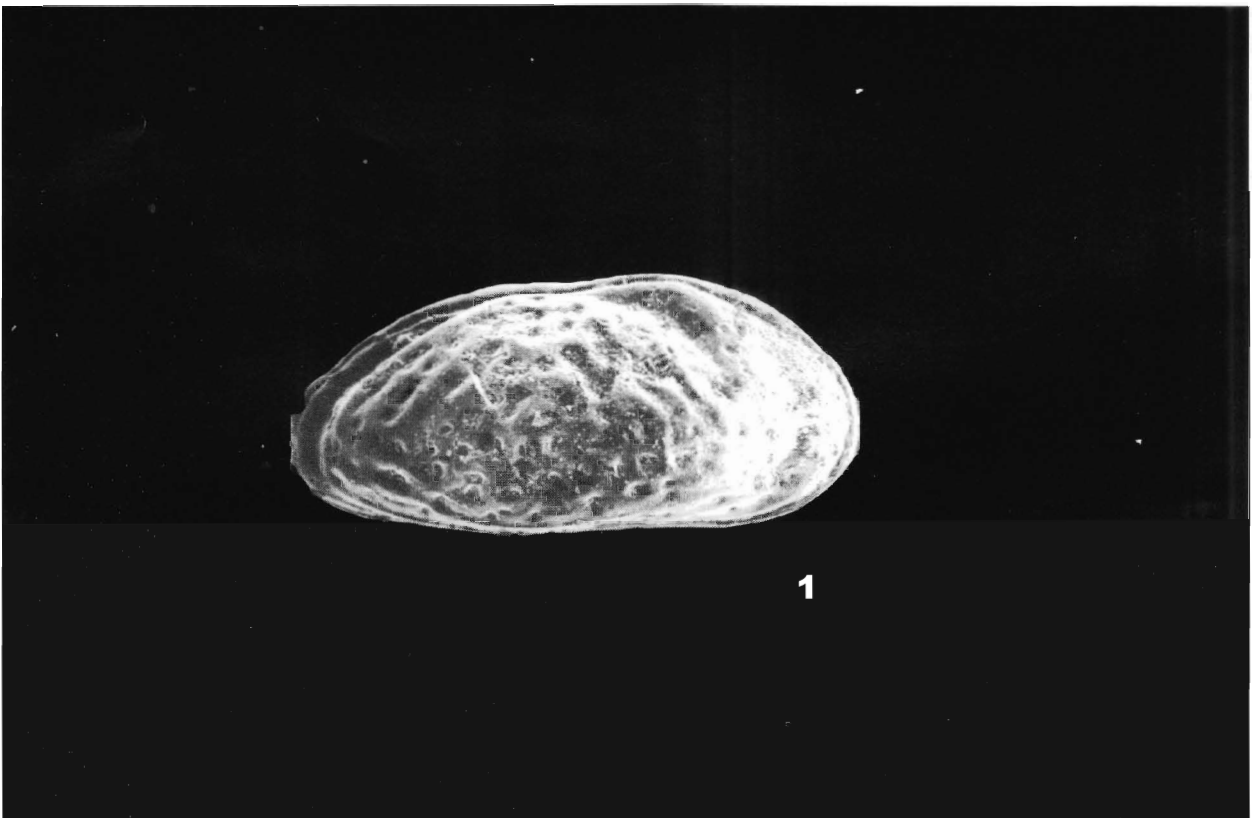
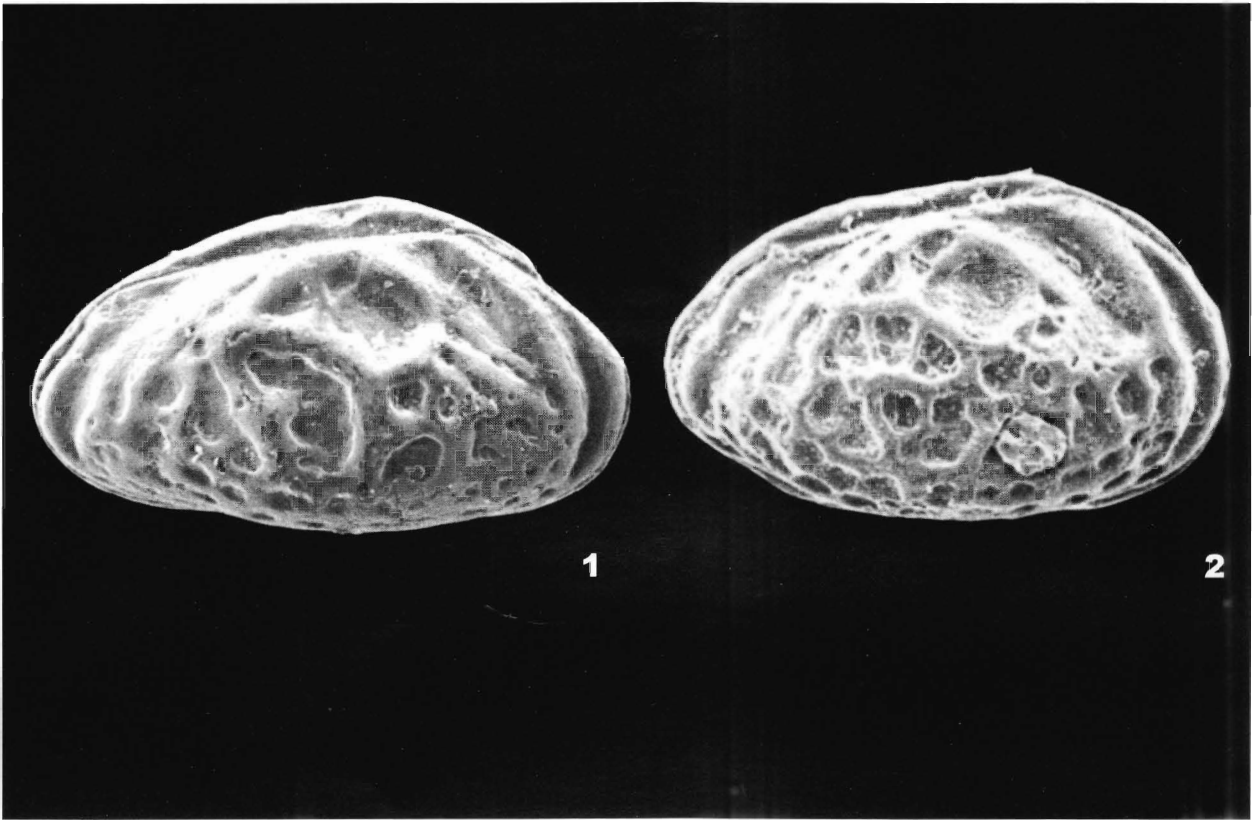
Diagnostic characters: Carapace elongate-subovate in lateral outline, with greatest height about half of length at anterior cardinal angle. Valve surface ornamented by reticulation arranged in more or less triangular pattern and an oblique anterodorsal furrow.

Remarks: The species is herein renamed as *Fastigatocythere (Batella) sp. A*.

Dimensions (mm): Carapace ((SUGDMF 723), L. 0.79, H. 0.39, W. 0.38.

Distribution: *P. laeviscula* Range Zone, Jhura Dome, Kachchh.

Figure 1. Carapace, RVV, x 96.



Fastigatocythere (Batella) sp. B

Plate 65, figure 1

Fastigatocythere sp. D Khosla *et al.*, 2006, p. 23, pl. 4, fig. 14.

Locality and horizon: Western bank of Masurdi Nadi, about 1 km NNW of Khethari Talab, Kuldhar, Jaisalmer. Clay bed (Sample No. KA/1), Kuldhar Member (early Callovian), Jaisalmer Formation.

Diagnostic characters: Carapace small, subtriangular in lateral outline. Valve surface reticulated, reticulation meshes in upper half vertically disposed, an anterodorsal furrow and a marginal rib in front of it.

Remarks: The species herein renamed as *Fastigatocythere (Batella) sp. B*.

Dimensions (mm): Carapace (SUGDMF 965), L. 0.48, H. 0.29, W. 0.23.

Distribution: *M. perforata kachchhensis* - *F. (B.) falcula* Concurrent Range Zone, Jaisalmer.

Figures 1-2. Carapace; 1, RVV, x 156; 2, DV, x 158.

***Fastigatocythere (Habocythere) bicrucata* (Grekoff)**

Plate 66, figures 1-4

Progonocythere bicrucata Grekoff 1963, pp.1733-1734, pl. 3, figs. 69-76; pl.8, figs. 218-221.

Fastigatocythere bicrucata (Grekoff). - Weinholz, 1967, p. 25. - Whatley and Ballent, 1996, p. 933. - Khosla *et al.*, 2005, p. 47, pl. 4, fig. 12.

Habocythere bicrucata (Grekoff). - Khosla *et al.*, 1997, p. 16, pl. 3, figs. 11-14.

Fastigatocythere (Habocythere) bicrucata (Grekoff). - Mette and Geiger, 2004b, p. 62, pl. 1, figs. 1-3.

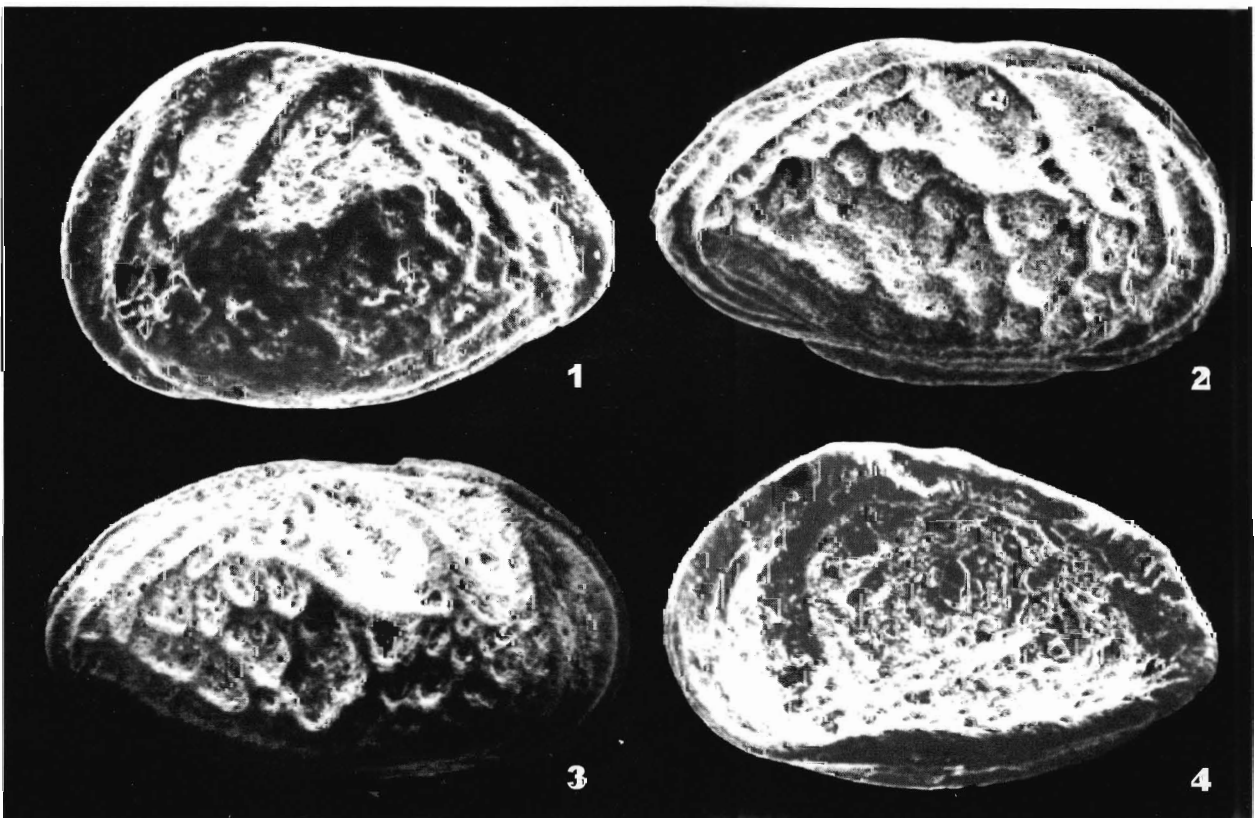
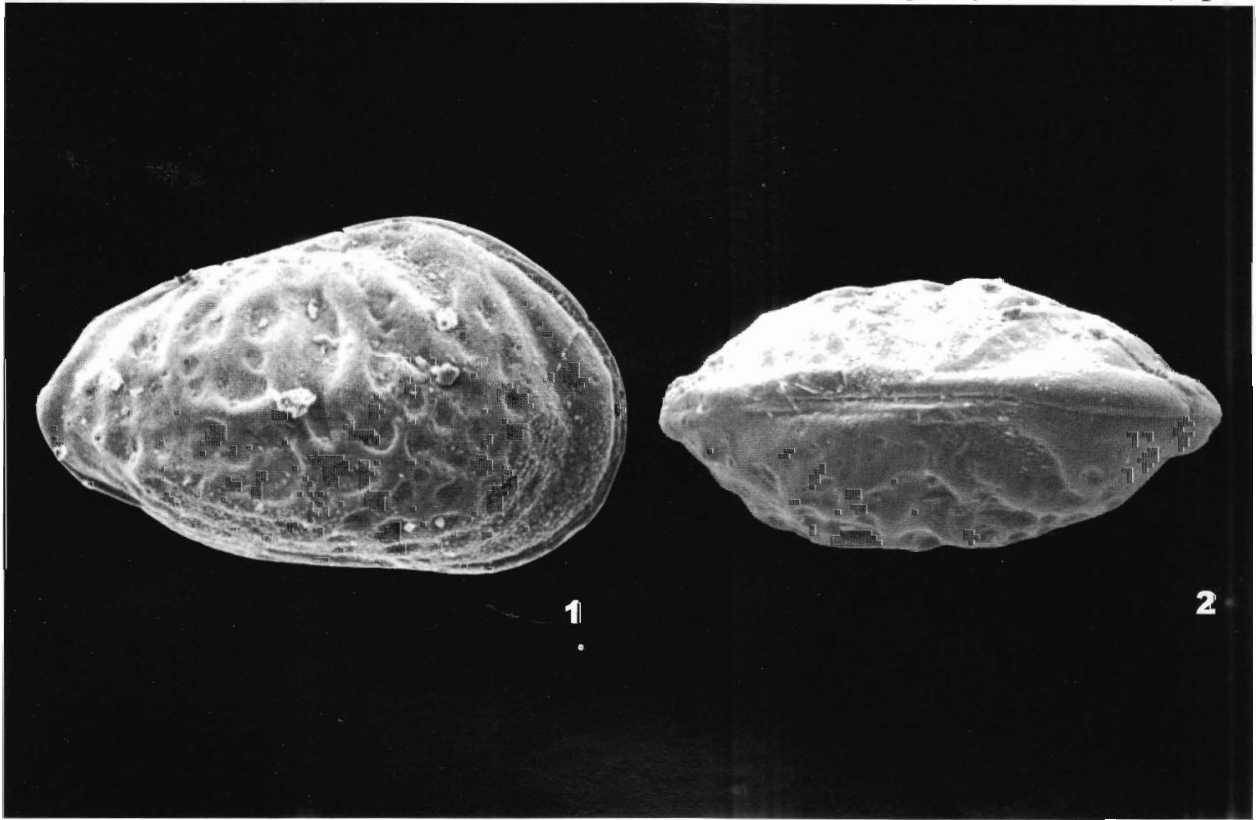
Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Greyish-yellow gypsiferous shale (Sample No. D4/36), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace elongate-subpyriform in lateral outline. Valve surface marked by two prominent vertical sulci one each in anterodorsal and dorsomedian regions; 2-3 weak V-shaped ribs in posterior half with apices backwardly directed; and reticulation over rest of the area. Mpc 8-9 anteriorly and 3-4 posteriorly. Hinge entomodont, anteromedian socket in RV with 2 loculi.

Dimensions (mm): Female LV (SUGDMF No. 487), L. 0.56, H. 0.40. Female carapace (SUGDMF No. 488), L. 0.59, H. 0.36, W. 0.34. Male carapace (SUGDMF No. 489), L. 0.72, H. 0.40, W. 0.40. Female RV (SUGDMF No. 490), L. 0.56, H. 0.34.

Distribution: Middle Jurassic of Majunga and Morondava basins, Madagascar; and Kachchh and Jaisalmer, India.

Figures 1-4. 1, female LV, Lat.V, x 132; 2, female carapace, RVV, x 131; 3, male carapace, RVV, x 108; 4, female RV, Int.V, x136.



Fastigatocythere (Habocythere) diluta (Khosla and Jakhar)

Plate 67, figures 1-2

Habocythere diluta Khosla and Jakhar, in Khosla *et al.*, 1997, pp. 16-18, pl. 3, figs. 15-16; pl. 4, fig. 1.

Locality and horizon: Near Habai Village, Habo Dome, Kachchh. Yellowish-brown gypsiferous shale (Sample No. H6/19), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace elongate-subpyriform in lateral outline. Valve surface marked by two transverse sulci in anterodorsal and dorsomedian regions; rest of the area with indistinct ribs and pits. Mpc 9-10 anteriorly and 3-4 posteriorly. Hinge poorly preserved but seems to be entomodont.

Dimensions (mm): Holotype (SUGDMF No. 491), female carapace, L. 0.51, H. 0.32, W. 0.28. Paratype II (SUGDMF No. 493), male carapace, L. 0.53, H. 0.29, W. 0.27.

Distribution: Middle Jurassic beds of Habo Dome, Kachchh.

Figures 1-2. 1, holotype, female carapace, RVV, x 145; 2, paratype II, male carapace, RVV, x 142.

Fastigatocythere (Habocythere) dorsoangulata (Grekoff)

Plate 68, figures 1-4

Procytheridea dorsoangulata Grekoff, 1963, pp. 1746-1747, pl. 5, figs. 146-151; pl. 10, fig. 238.

Fastigatocythere dorsoangulata (Grekoff). - Khosla *et al.*, 2005, p. 49, pl. 4, fig. 15.

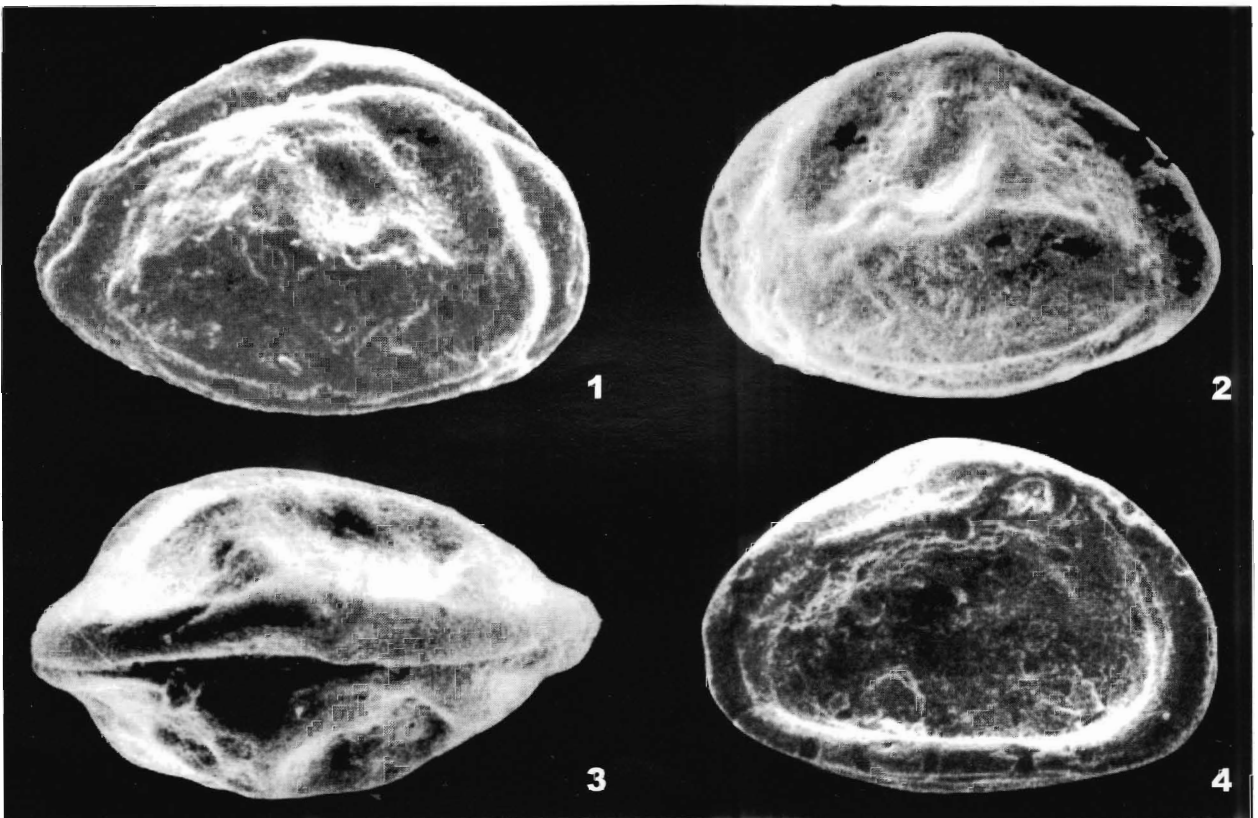
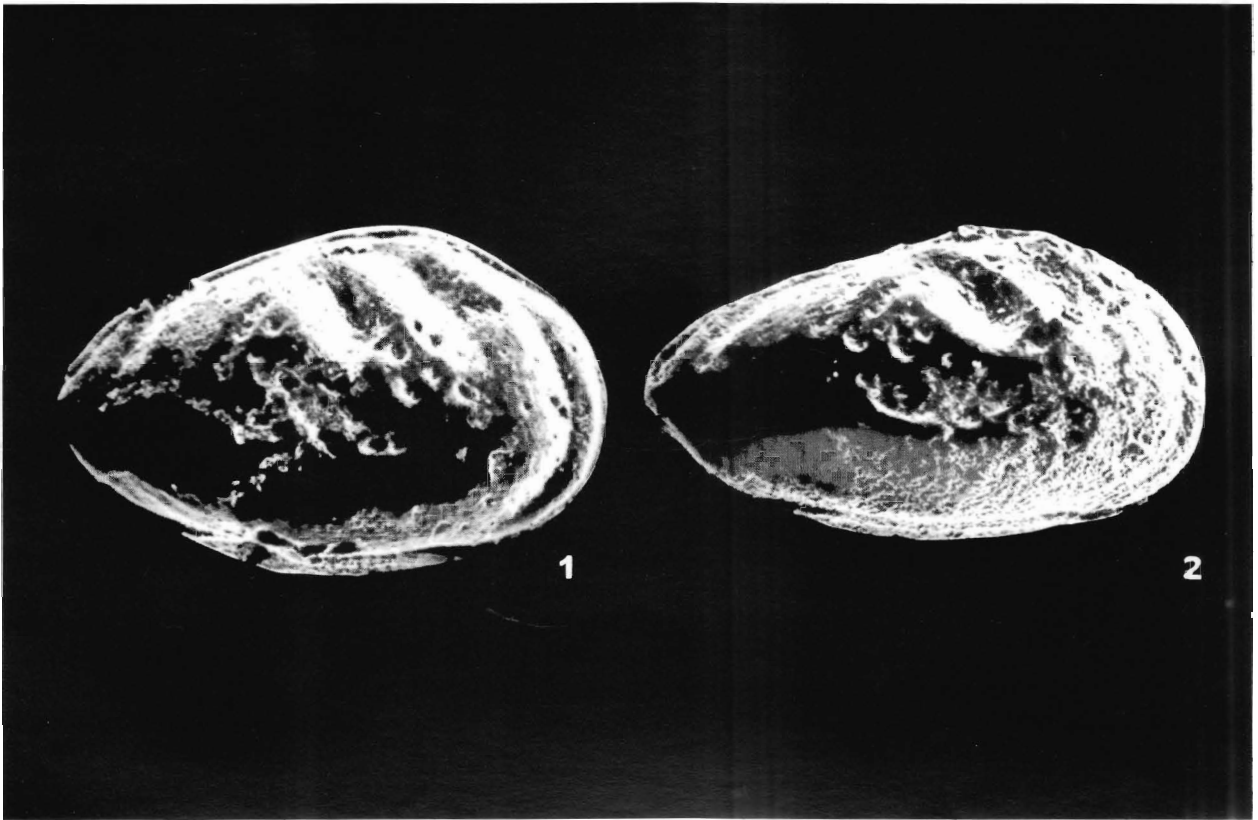
Locality and horizon: North of Lodrani Village, Bela Island, Kachchh. *Corbula lyrata* bearing reddish-brown siltstone (Sample No. BV/6), Hadibhadang Shale Member (mid-late Bathonian), Khadir Formation.

Diagnostic characters: Carapace subtriangular in lateral outline. Dorsal margin distinctly angulate near middle in left valve and straight in right valve. Valve surface marked by two transverse sulci in anterodorsal and dorsomedian regions; 2-3 longitudinal ribs in lower half, parallel to ventral outline and a longitudinal depression in ventromedian region; rest of the area sparsely reticulated. Mpc 7-8 anteriorly and 3-4 posteriorly. Hinge entomodont, anteromedian element in LV comprising 2 teeth.

Dimensions (mm): Carapace (SUGDMF No. 796), L 0.41, H. 0.30, W. 0.29. Carapace (SUGDMF No. 1019), L 0.47, H. 0.30, W. 0.26. Carapace (SUGDMF No. 1020), L. 0.44, H. 0.31, W. 0.27. LV (SUGDMF No. 1021), L. 0.41, H. 0.28.

Distribution: Jurassic of Majunga Basin, Madagascar and Northern Island Belt, Kachchh.

Figures 1-4. 1, carapace, RVV, x 178; 2, carapace, LVV, x147; 3, carapace, DV, x 173 ; 4, LV, Int.V, x185.



Fastigatocythere (Habocythere) elongata Khosla and Manisha Kumari
Plate 69, figures 1-2

Fastigatocythere elongata Khosla and Manisha Kumari, in Khosla *et al.*, 2005, p. 49, pl. 4, figs. 16-17.

Locality and horizon: North of Mouwana Village, Bela Island, Kachchh. Fossiliferous yellowish-brown siltstone with interbedded shale (Sample No. BIX/16), Gadhada Sandstone Member (early-mid Callovian), Khadir Formation.

Diagnostic characters: Carapace elongate-subrectangular in lateral outline, with greatest height about half the length at middle. Valve surface marked by two narrow transverse sulci in anterior half extending down from dorsal margin to mid-height; 2-3 longitudinal ribs in ventral half; rest of area faintly reticulate.

Dimensions (mm): Holotype (SUGDMF No. 797), carapace, L. 0.62, H. 0.29, W. 0.28.

Distribution: *F. (H.) mouwanaensis* Range Zone, Mouwana Hill, Bela Island, Kachchh.

Figures 1-2. Holotype, carapace; 1, RVV, x 123; 2, DV, x 121.

Fastigatocythere (Habocythere) jakhari Khosla, Darwin Felix and Manisha Kumari
Plate 70, figures 1-2

Habocythere sp. Khosla *et al.*, 1997, p. 18, pl. 4, fig. 10.

Fastigatocythere sp. 1 Mette and Geiger, 2004b, p. 70, pl. 2, fig. 9.

Fastigatocythere jakhari Khosla, Darwin Felix and Manisha Kumari, in Khosla *et al.*, 2005, pp. 50-51, pl. 5, figs. 7-8.

Locality and horizon: Near Bambhanka Village, Khadir Island, Kachchh. Calcareous sandstone (Sample No. KII/48), Bambhanka Member (mid-late Callovian), Khadir Formation.

Diagnostic characters: Valve elongate-subtriangular in lateral outline. Posterior margin drawn out below mid-height. Valve surface marked by two elongate vertical sulci in anterodorsal and dorsomedian regions; 2-3 oblique ribs in posterior half extending downward from mid-dorsal region; and sparse pits over rest of the area. Mpc 7-8 anteriorly and 3-4 posteriorly. Hinge entomodont.

Dimensions (mm): Holotype (SUGDMF No. 694), LV, L. 0.54, H. 0.32. Paratype (SUGDMF No. 804), carapace, L. 0.44, H. 0.24, W. 0.20.

Distribution: *F. (H.) mouwanaensis* Range Zone and *M. perforata kachchhensis* - *G. remota* Concurrent Range Zone of Kachchh; early-mid Callovian of Morondava Basin, Madagascar.

Figures 1-2. 1, holotype, LV, Lat.V, x 143; 2, paratype, carapace, DV, x 170.



Fastigatocythere (Habocythere) juglandica malgachica (Grekoff)

Plate 71, figures 1-4

Progonocythere juglandica malgachica Grekoff, 1963, pp. 1731-1733, pl.3, figs. 56-62; pl. 8, fig. 216.

Fastigatocythere juglandica malgachica (Grekoff). - Wienholz, 1967, p. 25. - Whatley and Ballent, 1996, p. 933. - Khosla *et al.*, 2005, p. 51, pl. 5, fig. 9. - Khosla *et al.*, 2006, p. 23, pl. 4, fig. 13.

Hutsonia asiatica Neale and Singh, 1985, pp. 357-358, pl. 3, figs. 3-4.

Habocythere malgachica (Grekoff). - Khosla *et al.*, 1997, p. 18, pl. 4, figs. 2-6.

Fastigatocythere (Fastigatocythere) malgachica Grekoff. - Mette and Geiger, 2004a, p. 52, pl. 1, figs. 1-8.

Locality and horizon: Near Habai Village, Habo Dome, Kachchh. Greyish-yellow shale (Sample No. H15/3). Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subpyriform in lateral outline. Valve surface marked by two vertical sulci in anterodorsal and dorsomedian region, a transverse rib near anterior margin, extending down from ocular region; 2-3 prominent V-shaped ribs in posterior half with apices backwardly directed; reticulation over rest of the area. Mpc 8-9 anteriorly and 3-4 posteriorly. Hinge entomodont, anteromedian element in LV comprising 2 bifid teeth.

Dimensions (mm): Female carapace (SUGDMF No. 494), L. 0.48, H. 0.30, W. 0.28. Male LV (SUGDMF No. 495), L. 0.50, H. 0.28. Male LV (SUGDMF No. 496), L. 0.52, H. 0.32. Female RV (SUGDMF No. 497), L. 0.46, H. 0.28.

Distribution: *T. hadibhadangensis*, *P. laeviscula* and *F. (H.) mouwanaensis* Range Zones, Kachchh and Jaisalmer; Bajocian-Bathonian of Majunga and Morondava basins, Madagascar.

Figures 1-4. 1, female carapace, RVV, x 158; 2, male LV, Lat. V, x 154; 3, male LV, DV, x 147; 4, female RV, Int. V, x 165.

Fastigatocythere (Habocythere) mouwanaensis Khosla and Manisha Kumari

Plate 72, figures 1-2

Fastigatocythere mouwanaensis Khosla and Manisha Kumari, in Khosla *et al.*, 2005, p. 53, pl. 5, figs. 12-13.

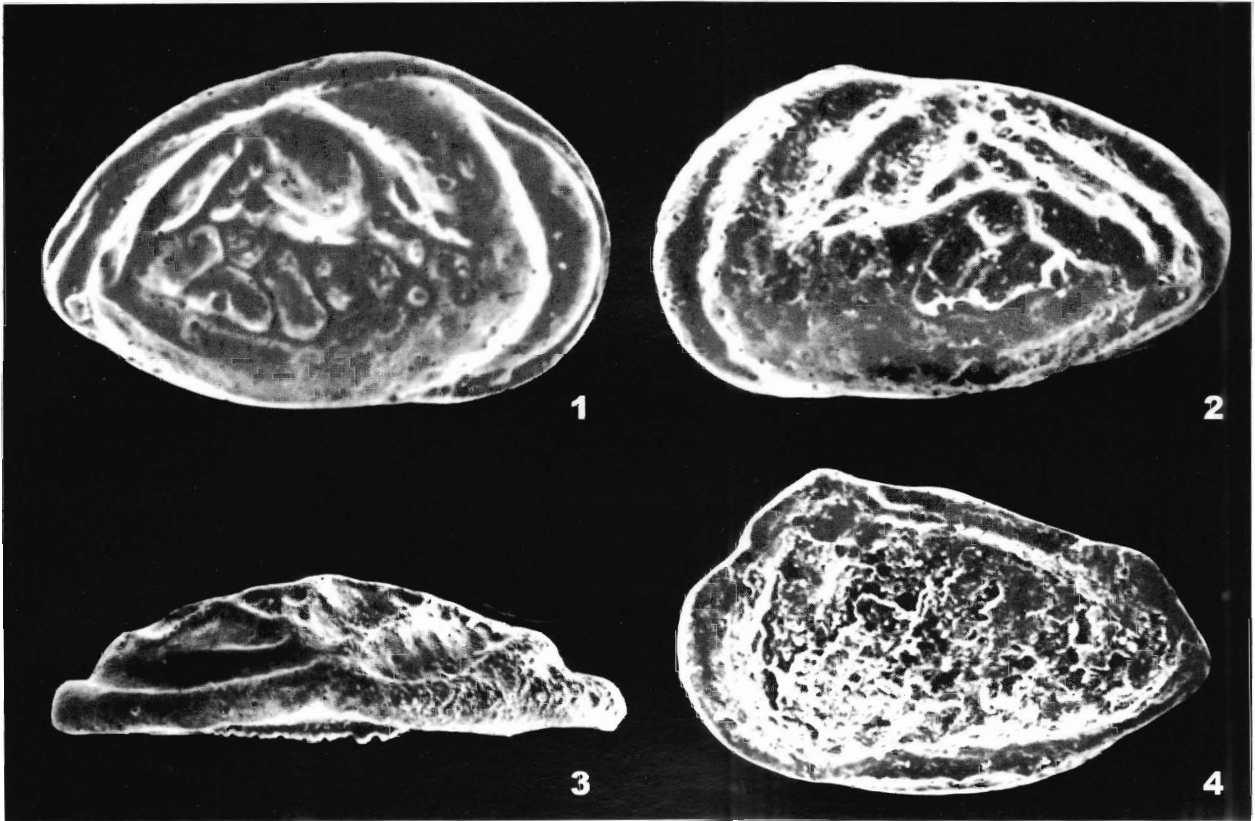
Locality and horizon: North of Mouwana Village, Bela Island, Kachchh. Fossiliferous yellowish-brown siltstone with interbedded shale (Sample No. BIX/16), Gadhada Sandstone Member (early-mid Callovian), Khadir Formation.

Diagnostic characters: Carapace subrhomboidal in lateral outline, with greatest height at anterior 1/3rd of length. Posterior margin subangulate, concave in upper half and truncated in lower half. Valve surface marked by two vertical sulci in anterodorsal and dorsomedian regions; 3-4 weak longitudinal ribs in ventral half parallel to the margin; rest of the area faintly reticulate.

Dimensions (mm): Holotype (SUGDMF No. 807), carapace, L. 0.56, H. 0.32, W. 0.31. Paratype (SUGDMF No. 808), carapace, L. 0.56, H. 0.33, W. 0.30.

Distribution: *F. (H.) mouwanaensis* Range Zone, Mouwana Hill, Bela Island, Kachchh.

Figures 1-2. 1, holotype, carapace, RVV, x 136; 2, paratype, carapace, DV, x 136.



Fastigatocythere (Habocythere) ventrisulcata (Khosla, Jakhar and Mohammed)

Plate 73, figures 1-2

Habocythere ventrisulcata Khosla, Jakhar and Mohammed, 1997, p. 18, pl. 4, figs. 7-9.

Fastigatocythere ventrisulcata (Khosla *et al.*). - Khosla *et al.*, 2005, p. 54, pl. 6, fig. 2.

Fastigatocythere (Fastigatocythere) trisulcata Mette and Geiger, 2004b, pp. 70-74, pl. 1, figs. 4-10.

Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Greyish-yellow gypsiferous shale (Sample No. D2/39), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subpyriform in lateral outline. Surface of each valve marked by two transverse sulci in anterodorsal and dorsomedian regions; a distinct longitudinal depression in ventromedian and posteromedian regions; and pits over rest of the area. Mpc 8-9 anteriorly and 3-4 posteriorly. Hinge entomodont.

Dimensions (mm): Holotype (SUGDMF No. 498), LV, L. 0.54, H. 0.36. Paratype II (SUGDMF No. 500), carapace, L. 0.48, H. 0.32, W. 0.28.

Distribution: *M. perforata kachchhensis* - *G. remota* Concurrent Range Zone of Kachchh; early-mid Callovian of Morondava Basin Madagascar.

Figures 1-2. 1, holotype, LV, Lat.V, x 141; 2, paratype II, carapace, DV, x 158.

Fastigatocythere (Habocythere) sp.

Plate 74, figures 1-2

Habocythere sp. B Khosla *et al.*, 2004, p. 26, pl. 1, fig. 10.

Locality and horizon: Southwest of Jhura Village, Jhura Dome, Kachchh. Yellow-grey gypsiferous shale (Sample No. J2/31), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Valve subpyriform in lateral outline. Surface marked by two vertical sulci in anterodorsal and mid-dorsal regions; a transverse rib extending down from ocular region near anterior margin; a longitudinal depression in a median region; 3-4 ribs parallel to ventral outline in lower half; and dense reticulation over rest of the area. Mpc 8 anteriorly and 3 posteriorly. Hinge entomodont.

Remarks: The species is herein renamed as *Fastigatocythere (Habocythere) sp.*

Dimensions (mm): RV (SUGDMF 724), L. 0.44, H. 0.26.

Distribution: *M. perforata kachchhensis* - *G. remota* Concurrent Range Zone, Jhura Dome, Kachchh.

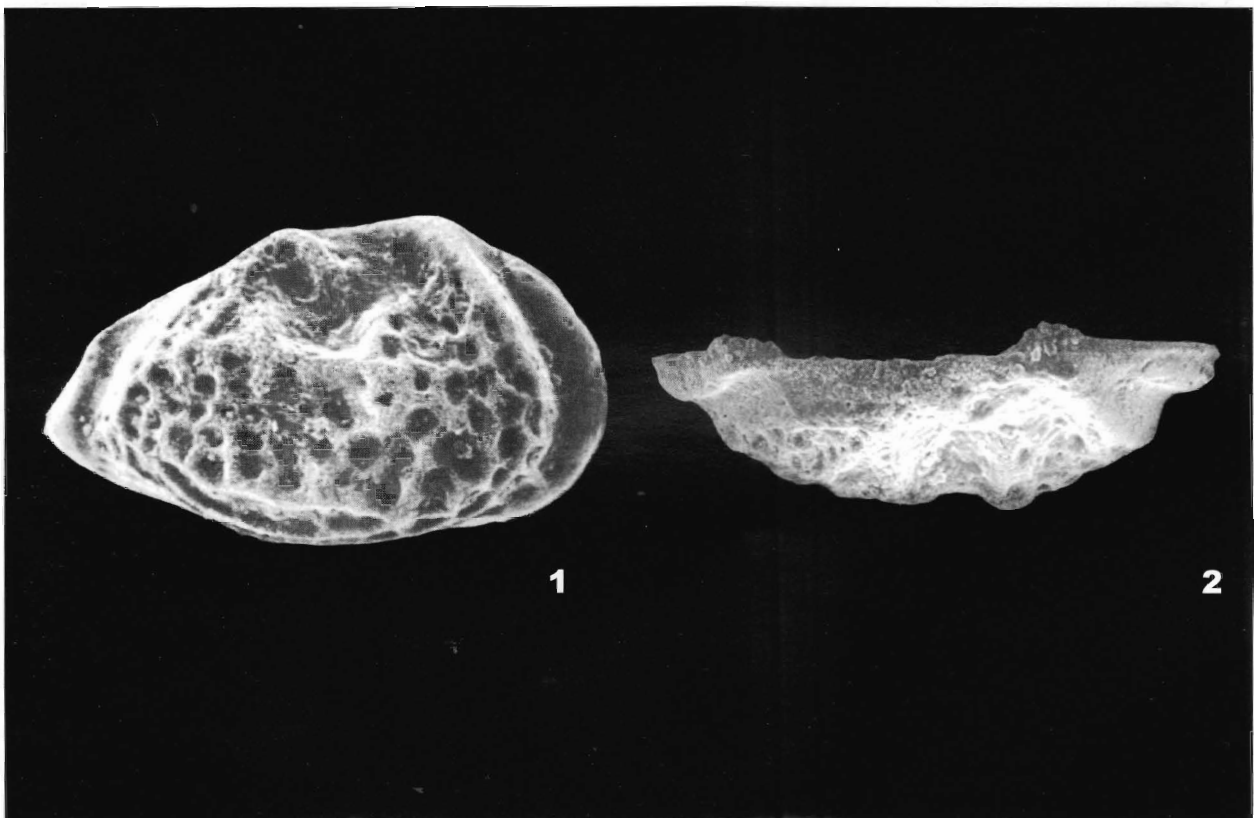
Figures 1-2. RV; 1, Lat.V, x 171; 2, DV, x 173.

PLATE 73 *Fastigatocythere (Habocythere) ventrisulcata* (Khosla, Jakhar and Mohammed)



PLATE 74

Fastigatocythere (Habocythere) sp.



Galliaecytheridea grekoffi Khosla and Jakhar
Plate 75, figures 1-4

Galliaecytheridea? sp. juv. Neale and Singh, 1985, p. 355, pl. 1, fig. 16.

Galliaecytheridea grekoffi Khosla and Jakhar, in Khosla *et al.*, 2006, pp. 14-16, pl. 1, figs. 17-19.

Locality and horizon: Western bank of Masurdi Nadi, about 1 km NNW of Khethari Talab, Kuldhar, Jaisalmer. Clay bed (Sample No. KC/7), Kuldhar Member (early Callovian), Jaisalmer Formation.

Diagnostic characters: Carapace small, elongate-subovate in lateral outline and biconvex in the dorsal; greatest height and width near middle. Left valve larger than right valve and except mid-dorsal region overlapping all along margin. Dorsal margin distinctly arched; ventral margin weakly convex; anterior margin broadly rounded, apex at mid height; posterior margin narrowly rounded below mid-height. Valve surface smooth. Hinge antimerodont.

Dimensions (mm): Holotype (SUGDMF No. 912), carapace, L. 0.48, H. 0.24, W. 0.18. Paratype I (SUGDMF No. 913), carapace, L. 0.46, H. 0.24, W. 0.18. Paratype II (SUGDMF No. 914), LV, L. 0.40, H. 0.21.

Distribution: *M. perforata kachchensis* - *F. (B.) falcula* Concurrent Range Zone and *M. perforata kachchensis* - *G. remota* Interval Zone, Jaisalmer.

Figures 1-4. 1-2 holotype, carapace; 1, RVV, x 160; 2, LVV, x 160; 3, paratype I, carapace, DV, x 165; 4, paratype II, LV, Int.V, x 190.

Galliaecytheridea gujaratensis Khosla and Darwin Felix
Plate 76, figures 1-2

Galliaecytheridea gujaratensis Khosla and Darwin Felix, in Khosla *et al.*, 2005, pp. 36-37, pl. 1, figs. 16-17.

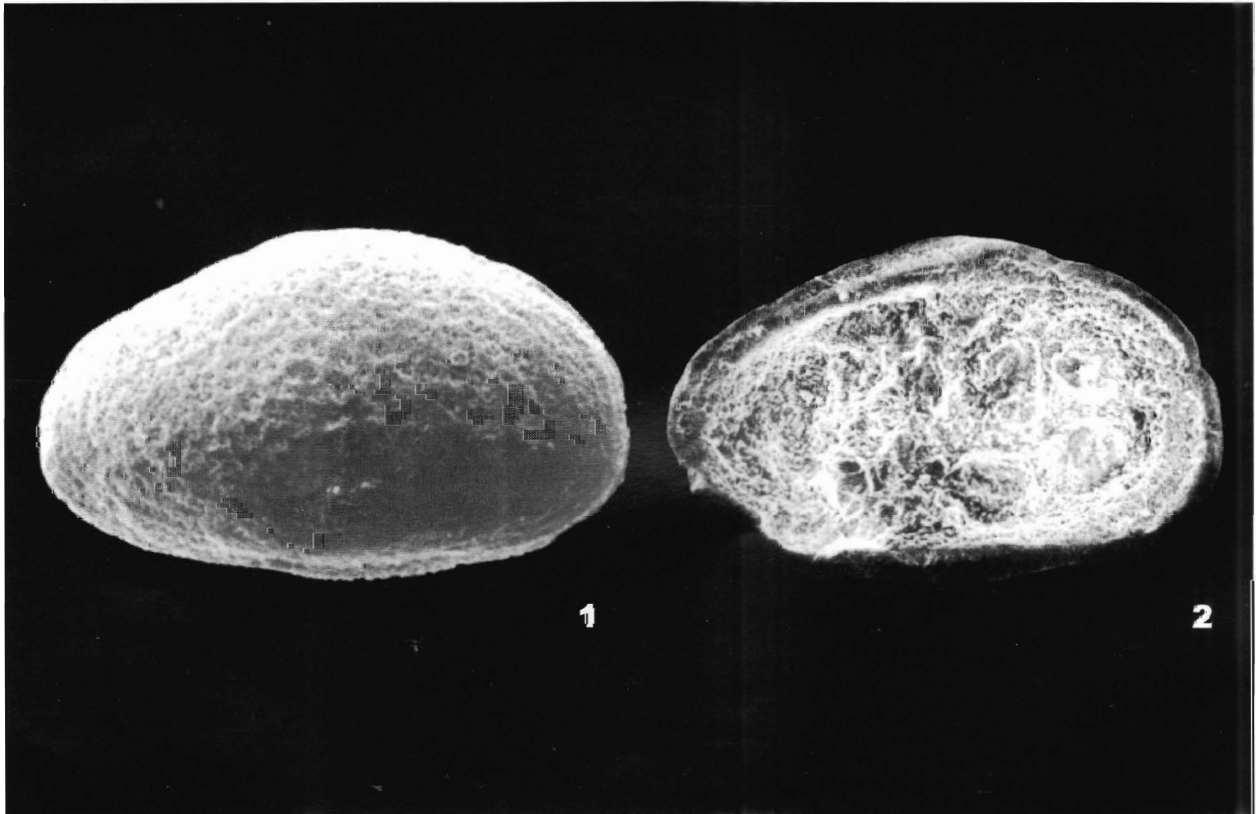
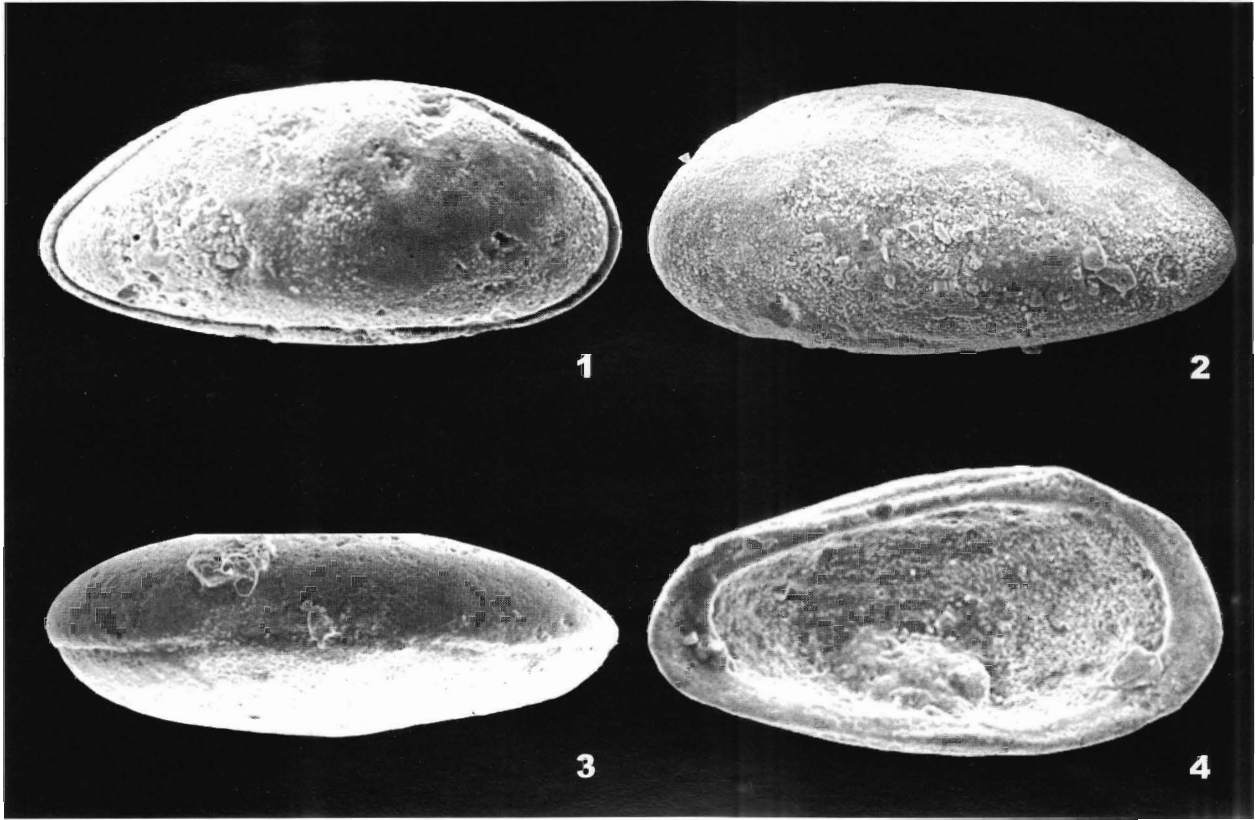
Locality and horizon: Sadhara Dome, Pachchham Island, Kachchh. Coral bearing greyish-white sandy limestone (Sample No. SI/1), Sadhara Coral Limestone Member (Bajocian-Bathonian), Khavda Formation.

Diagnostic characters: Carapace subovate in lateral outline and biconvex in the dorsal, greatest height and maximum width near middle. Left valve slightly larger than right valve. Dorsal margin arched; ventral margin weakly convex; anterior margin broad and obliquely rounded; posterior margin narrowly rounded. Valve surface finely pitted.

Dimensions (mm): Holotype (SUGDMF No. 754), carapace, L. 0.48, H. 0.30, W. 0.28. Paratype (SUGDMF No. 755), LV, L. 0.52, H. 0.33.

Distribution: *T. hadibhadangensis* Range Zone, Sadhara Dome, Kachchh.

Figures 1-2. 1, holotype, carapace, RVV, x 163; 2, paratype, LV, Int.V, x 142.



Galliaecytheridea lodraniensis Khosla and Manisha Kumari
Plate 77, figures 1-4

Galliaecytheridea lodraniensis Khosla and Manisha Kumari, in Khosla *et al.*, 2005, p. 37, pl. 2, figs. 1-4. -Khosla *et al.*, 2006, p. 16, pl. 2, figs. 1-2.

Locality and horizon: North of Lodrani Village, Bela Island, Kachchh. Reddish-brown siltstone with interbedded shale (Sample No. BV/20), Hadibhadang Sandstone Member (late Bathonian-early Callovian), Khadir Formation.

Diagnostic characters: Carapace subovate in lateral outline and biconvex in the dorsal; greatest height and maximum width at middle. Left valve larger than right valve, overlapping distinctly all along margin. Dorsal margin convex, sloping posteriorly; ventral margin slightly convex medially; anterior margin broad and evenly rounded; posterior margin narrowly rounded in lower half. Valve surface smooth. Mpc 10-12 anteriorly and 4-5 posteriorly. Hinge antimerodont.

Dimensions (mm): Holotype (SUGDMF No. 756), female carapace, L. 0.52, H. 0.33, W. 0.27. Paratype I (SUGDMF No. 757), male carapace, L. 0.56, H. 0.32, W. 0.25. Paratype II (SUGDMF No. 758), female LV, L. 0.52, H. 0.33. Paratype III (SUGDMF No. 759), male carapace, L. 0.52, H. 0.33, W. 0.26.

Distribution: *P. laeviscula* Range Zone, Bela Island, Kachchh; *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-4. 1, holotype, female carapace, RVV, x 142; 2, paratype I, male carapace, RVV, x 138; 3, paratype II, female LV, Int.V, x 144; 4, paratype III, male carapace, DV, x 150.

Galliaecytheridea remota Grekoff
Plate 78, figures 1-2

Galliaecytheridea remota Grekoff, 1963, pp.1745-1746, pl. 6, figs. 152-155. -Khosla *et al.*, 2005, p. 37, pl. 2, fig. 5. -Khosla *et al.*, 2006, p. 16, pl. 2, fig. 3.

Pirileberis prognata Guha, 1977, p. 89, pl., 2, figs. 8a-e (not *Pirileberis prognata* Grekoff, 1963, p. 1750, pl. 6, figs. 156-161).

Galliaecytheridea wahii Neale and Singh, 1985, pp. 354-355, pl. 2, figs. 6-9.

Pirileberis remota (Grekoff). -Khosla *et al.*, 1997, p. 28, pl. 6, figs. 13-15.

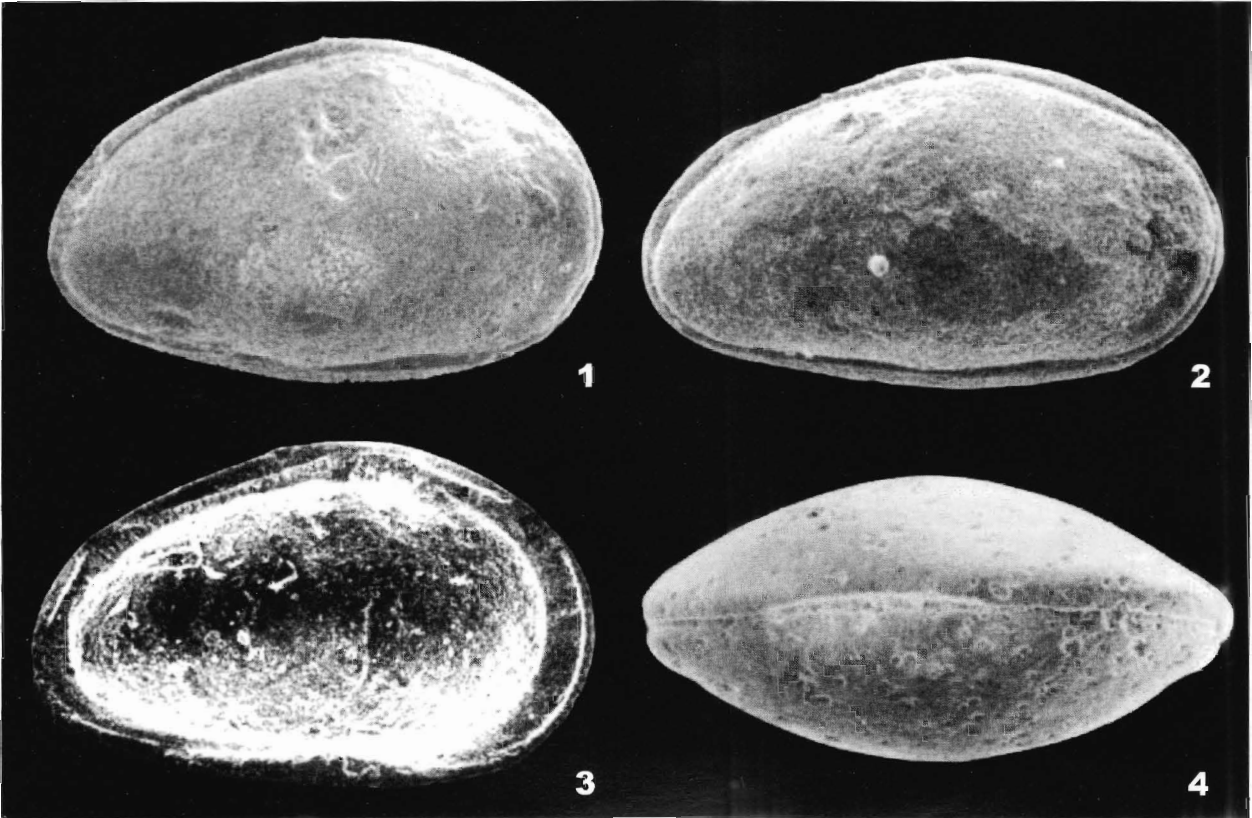
Locality and horizon: Near Kotai Village, Habo Dome, Kachchh. Greyish-yellow gypsiferous shale (Sample No. K4/21), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace elongate-subovate in lateral outline and biconvex in the dorsal; greatest height and maximum width near middle. Dorsal margin arched to straight; ventral margin convex, slightly upturned posteriorly; anterior margin broadly rounded; posterior margin much less so. Valve surface sparsely pitted. Mpc about 12-13 anteriorly. Cms consist of a vertical row of 4 adductor scars and a subrounded frontol scar. Hinge antimerodont.

Dimensions (mm): Male carapace (SUGDMF No. 534), L 0.78, H. 0.40, W. 0.34. Female LV (SUGDMF No. 535), L. 0.64, H. 0.40.

Distribution: *M. perforata kachchhensis* - *G. remota* Concurrent Range Zone, Kachchh and Jaisalmer.

Figures 1-2. 1, carapace, RVV, x 97; 2, LV, DV, x 120.



Galliaecytheridea satyendrai (Khosla, Jakhar and Mohammed)

Plate 79, figures 1-2

Pirileberis satyendrai Khosla, Jakhar and Mohammed, 2004, pp. 26-27, pl. 1, figs. 11-13.

Galliaecytheridea satyendrai (Khosla *et al.*). - Khosla *et al.*, 2005, p. 37, pl. 2, fig. 6.

Locality and horizon: Southwest of Jhura Village, Jhura Dome, Kachchh. Yellow-grey gypsiferous shale (Sample No. J2/34), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subovate in lateral outline and biconvex in the dorsal; greatest height and maximum width near middle. Dorsal and ventral margins weakly convex, somewhat converging backwardly; anterior margin broad and obliquely rounded; posterior margin narrowly rounded. Valve surface sparsely pitted. Mpc about 7-9 anteriorly and 3-4 posteriorly. Cms consist of a vertical row of 4 adductor scars and a frontol scar. Hinge antimerodont.

Dimensions (mm): Holotype (SUGDMF 725), carapace, L. 0.51, H. 0.30, W. 0.24. Paratype I (SUGDMF 726), RV, L. 0.51, H. 0.27.

Distribution: *P. laeviscula* Range Zone, Khadir Island and *M. perforata kachchhensis* - *G. remota* Concurrent Range Zone, Jhura Dome, Kachchh.

Figures 1-2. 1, holotype, carapace, RVV, x 155; 2, paratype I, RV, Int.V, x 147.

Glabellacythere hussaini Khosla, Darwin Felix and Manisha Kumari

Plate 80, figures 1-4

Glabellacythere hussaini Khosla, Darwin Felix and Manisha Kumari, in Khosla *et al.*, 2005, pp. 37-38, pl. 2, figs. 7-9. - Khosla *et al.*, 2006, p. 16, pl. 2, fig. 4.

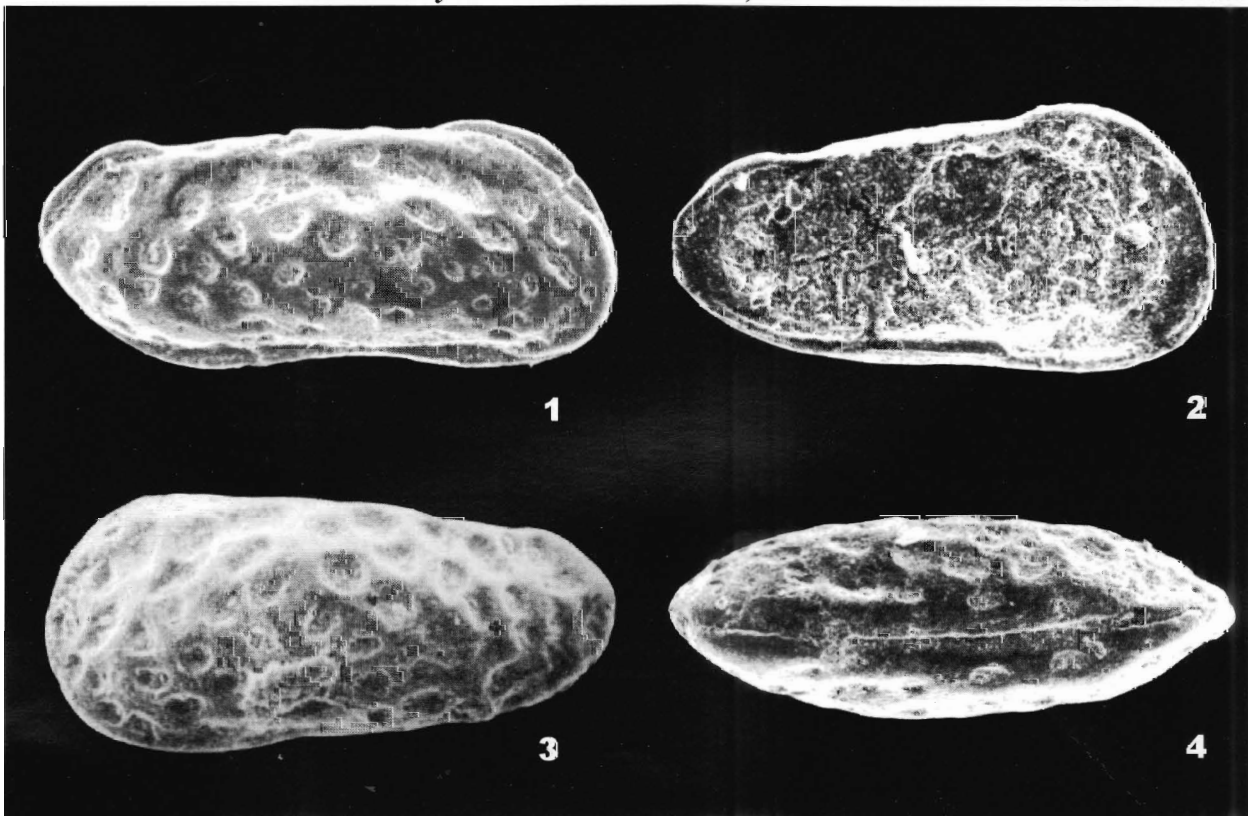
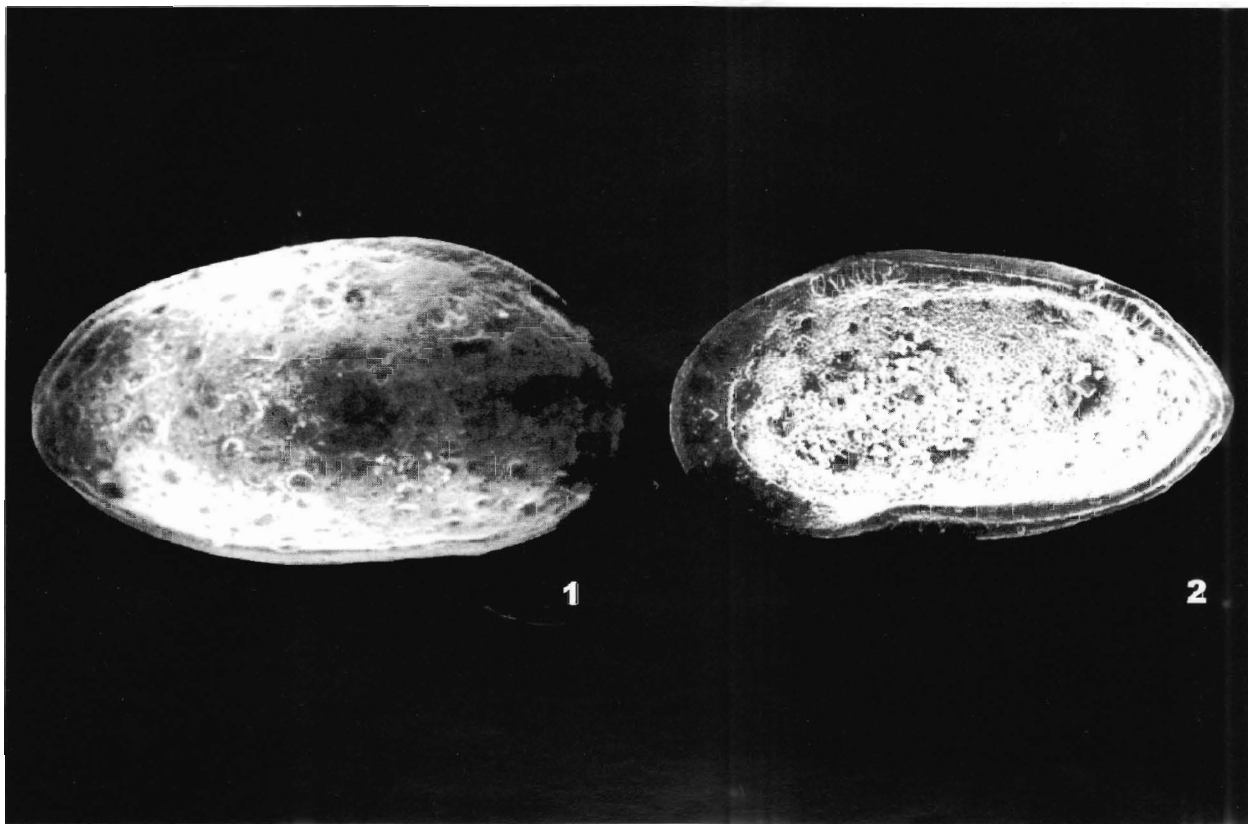
Locality and horizon: Amrapar Village, Khadir Island, Kachchh. Limestone with interbedded shale (Sample No. KIII/7), Hadibhadang Sandstone Member (late Bathonian-early Callovian), Khadir Formation.

Diagnostic characters: Carapace elongate-subquadrate in lateral outline and biconvex in the dorsal. Left valve larger than right valve, however right valve over-reaches left valve in mid-dorsal margin. Dorsal margin straight, with anterior and posterior hinge-ears; ventral margin concave medially; anterior margin broad, evenly rounded; posterior margin narrowly rounded to angulate. Valve surface ornamented by a coarse reticulation and a shallow, longitudinal depression extending from posterodorsal to anterodorsal region. Mpc about 8-9 anteriorly and 3-4 posteriorly. Hinge antimerodont.

Dimensions (mm): Holotype (SUGDMF No. 761), carapace, L. 0.60, H. 0.25, W. 0.19. Paratype I (SUGDMF No. 762), LV, L. 0.56, H. 0.24. Paratype II (SUGDMF No. 763), carapace, L. 0.59, H. 0.25, W. 0.22.

Distribution: *P. laeviscula* Range Zone, Khadir and Bela islands, Kachchh; *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-4. 1, holotype, carapace, RVV, x 128; 2, paratype I, LV, Int.V, x 129; 3-4, paratype II, carapace; 3, LVV, x 129; 4, DV, x 127.



Glabellacythere mathuri (Khosla, Jakhar and Mohammed)

Plate 81, figures 1-4

Mesocytheridea? mathuri Khosla, Jakhar and Mohammed, 1997, pp. 26-28, pl. 6, fig. 16; pl. 7, figs. 1-2.

Glabellacythere mathuri (Khosla *et al.*). - Khosla *et al.*, 2005, p. 38, pl. 2, fig. 10. - Khosla *et al.*, 2006, p. 16, pl. 2, fig. 5.

Locality and horizon: Near Fulae Village, Habo Dome, Kachchh. Grey shale (Sample No. F16/3), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace elongate-subquadrate in lateral outline and biconvex in the dorsal. Left valve larger than right valve, but along mid-dorsal margin right valve over-reaches left valve. Dorsal margin nearly straight; ventral margin slightly sinuate; anterior margin obliquely rounded; posterior margin narrowly rounded. Valve surface reticulate; certain specimens lack reticulation and appear smooth. Mpc about 9-10 anteriorly and 3-4 posteriorly. Hinge antimerodont.

Dimensions (mm): Holotype (SUGDMF No. 531), LV, L. 0.74, H. 0.38. Paratype I (SUGDMF No. 532), carapace, L. 0.74, H. 0.38, W. 0.37. Paratype II (SUGDMF No. 533), RV, L. 0.72, H. 0.33.

Distribution: *P. laeviscula* Range Zone of Kachchh; *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-4. 1, holotype, LV, Lat.V, x 103; 2-3, paratype I, carapace; 2, RVV, x 101; 3, DV, x 101; 4, paratype II, RV, Int.V, x 104.

***Glabellacythere* sp.**

Plate 82, figures 1-2

Glabellacythere sp. Khosla *et al.*, 2005, p. 38, pl. 2, fig. 11.

Locality and horizon: Near Amrapar Village, Khadir Island, Kachchh. Limestone interbedded with shale (Sample No. KIII/7), Hadibhadang Sandstone Member (late Bathonian-early Callovian), Khadir Formation.

Diagnostic characters: Carapace elongate-subquadrate in lateral outline and biconvex in the dorsal; greatest height at anterior 1/3rd of length. Left valve larger than right valve, but right valve over-reaches left valve in mid-dorsal margin. Valve surface ornamented by net-like reticulation.

Dimensions (mm): Carapace (SUGDMF No. 765), L. 0.51, H. 0.25, W. 0.24

Distribution: *P. laeviscula* Range Zone, Khadir Island, Kachchh.

Figures 1-2. Carapace; 1, RVV, x 149; 2, DV, x 149.



Lophocythere mannikerii Khosla and Jakhar

Plate 83, figures 1-2

Bhatiana sp. A Mannikeri, 1966, pp. 402-404, pl. 1, fig. 2; pl. 2, fig. 4.

Lophocythere mannikerii Khosla and Jakhar, in Khosla *et al.*, 2006, pp. 23-24, pl. 4, figs. 15-16.

Locality and horizon: Opposite to Indira Stadium / Town Hall, 3 km from Jaisalmer Fort. Yellow fossiliferous Limestone (Sample No. FG/2), Fort Member (Bajocian-Bathonian), Jaisalmer Formation.

Diagnostic characters: Carapace elongate-subquadrate in lateral outline. Dorsal and ventral margins converging posteriorly. Valve surface marked by a subcentral tubercle; a thick rib extending downwards from ocular region parallel to anterior margin, in anteroventral region it turns posteriorly overhanging ventral margin, runs up to posteroventral region; a prominent inverted V-shaped node at posterodorsal region; and except for anterior margin faint reticulation over rest of the area.

Dimensions (mm): Holotype (SUGDMF No. 966), carapace, L. 0.66, H. 0.37, W. 0.29. Paratype (SUGDMF No. 967), carapace, L. 0.64, H. 0.39, W. 0.27.

Distribution: *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-2. 1, holotype, carapace, RVV, x 117; 2, paratype, carapace, DV, x 122.

Lophocythere vertipolycostata Khosla and Manisha Kumari

Plate 84, figures 1-4

Lophocythere vertipolycostata Khosla and Manisha Kumari, in Khosla *et al.*, 2003a, pp. 72-73, pl.3, figs. 1-8; figs. 3A-B. - Khosla *et al.*, 2005, p. 54, pl. 6, fig. 3. - Khosla *et al.*, 2006, p. 24, pl. 4, fig. 17.

Locality and horizon: North of Gadhada Ruins, Bela Island, Kachchh. *Corbula lyrata* bearing reddish brown siltstone (Sample No. BVI/2), Gadhada Sandstone Member (early-mid Callovian), Khadir Formation.

Diagnostic characters: Carapace elongate-subrhomboidal in lateral outline and compressed in the dorsal, ends pointed; greatest height at anterior cardinal angle. Valve surface ornamented by 6-8 vertical ribs, a ventrolateral carina parallel to ventral outline, 8 distinct reticules in between vertical ribs near their junctions with ventrolateral carina. Mpc about 8 anteriorly and 3 posteriorly. Hinge entomodont, anteromedian element in LV with 4 bifid teeth.

Dimensions (mm): Holotype (SUGDMF No. 708), female carapace, L. 0.67, H. 0.35, W. 0.26. Paratype II (SUGDMF No. 710), male LV, L. 0.56, H. 0.26. Paratype V (SUGDMF No. 713), female carapace, L. 0.45, H. 0.26, W. 0.14.

Distribution: Bajocian-early Callovian of Northern Island Belt, Kachchh; *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-4. 1-2, holotype, carapace; 1, RVV, x 112; 2, DV, x 113; 3, paratype II, male LV, Lat. V, x 139; 4, paratype V, female carapace, RVV, x 140.



***Majungaella perforata* Grekoff**

Plate 85, figures 1-2

Majungaella perforata Grekoff, 1963, pp. 1743-1744, pl. 5, figs. 134-140; pl. 9, figs. 230, 233. - Bate, 1977a, p. 182, pl. 5, figs. 12-15. - Guha, 1977, p. 87, pl. 1, figs. 5a-c; pl. 3, figs. 15a-b. - Khosla *et al.*, 1997, pp. 18-19, pl. 4, fig. 11. - Mette and Geiger, 2004c, pp. 96-98, pl. 4, figs. 4-7.

Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Dark brown sandstone with shale (Sample No. D/46), Katrol Formation (Kimmeridgian).

Diagnostic characters: Carapace robust, subovate in lateral outline and biconvex in the dorsal; valves inflated ventrally; greatest height slightly anterior to middle. Anterior and posterior margins with peripheral rim. Valve surface coarsely pitted, pits arranged in rows which in upper half diverging down from mid-dorsal region and in lower half parallel to ventral outline. Mpc about 16-17 anteriorly and 5-6 posteriorly.

Dimensions (mm): Carapace (SUGDMF No. 502), L. 0.72, H. 0.50, W. 0.44.

Distribution: Upper Jurassic of Majunga and Morondava basins, Madagascar and Kachchh, India.

Figures 1-2. Carapace; 1, RVV, x 106; 2, DV, x 107.

***Majungaella perforata kachchhensis* Khosla, Jakhar and Mohammed**

Plate 86, figures 1-4

Majungaella nematis Guha, 1977, p. 87, pl. 3, figs. 23a-c (not *Manungaella nematis* Grekoff, 1963, p. 1744, pl. 5, figs. 141-145).

Majungaella biswasi Neale and Singh, 1985, p. 356, pl. 2, figs 13-16.

Majungaella mundula Kulshrestha, Singh and Tewari, 1985, p. 127, figs. 6.13, 6.16 (not *Progonocythere mundula* Grekoff, 1963, p. 1738, pl. 4, figs. 92-95).

Majungaella perforata kachchhensis Khosla, Jakhar and Mohammed, 1997, pp. 19-20, pl. 4, figs. 12-14. - Khosla *et al.*, 2005, p. 54, pl. 6, fig. 4. - Khosla *et al.*, 2006, p. 24, pl. 4, fig. 18.

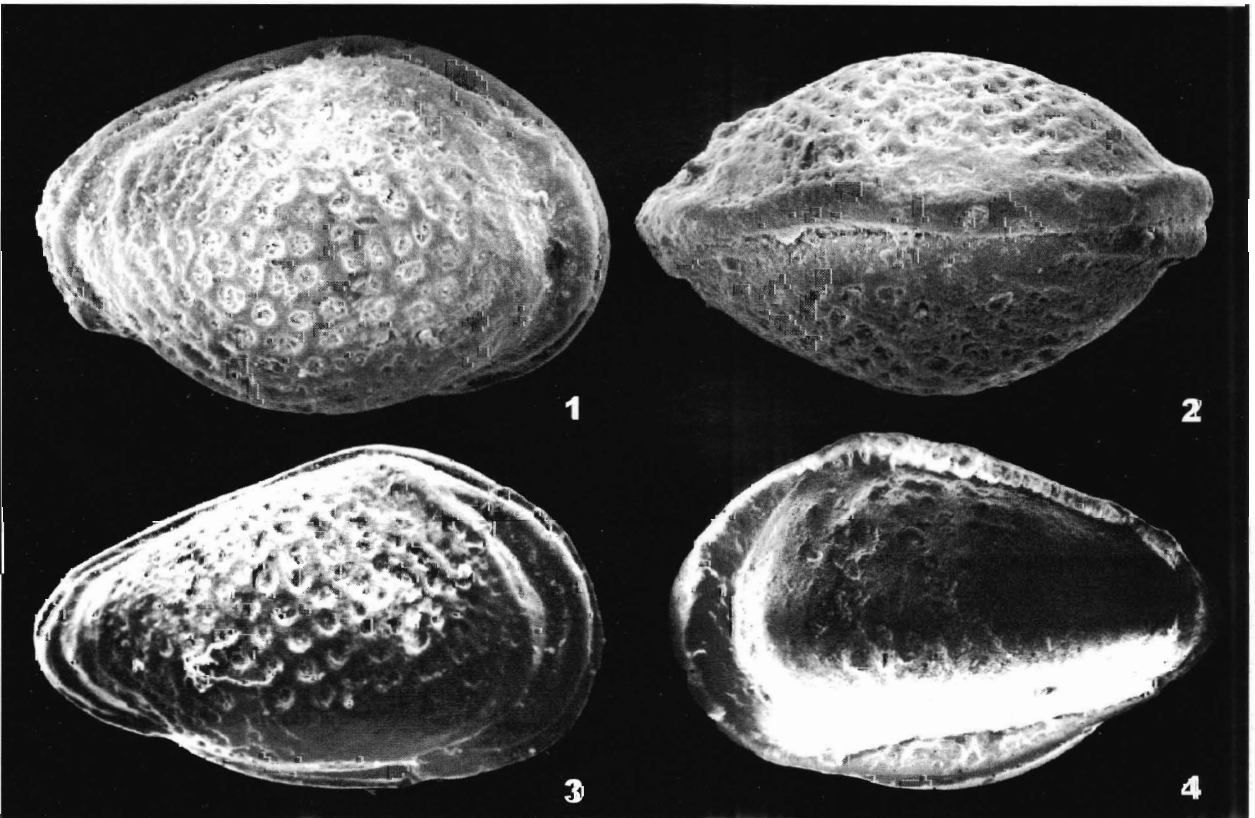
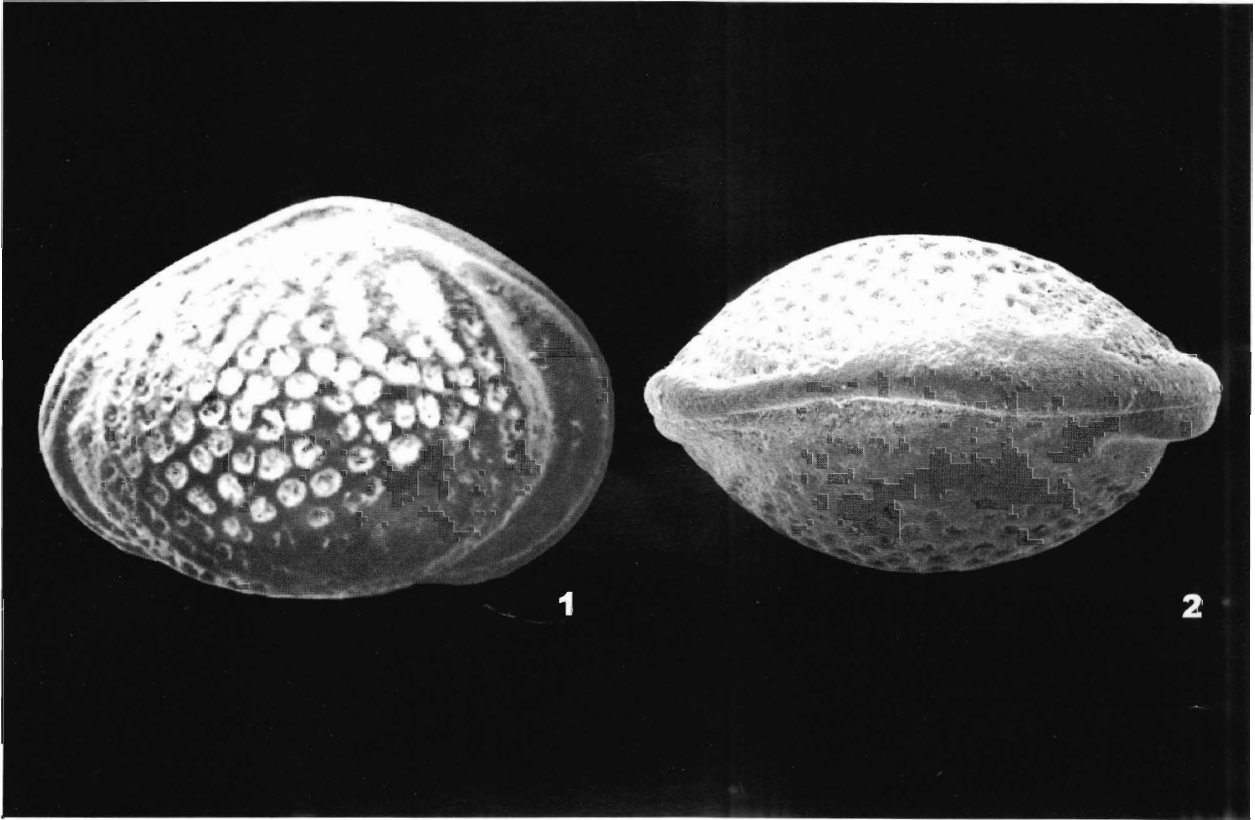
Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Greyish-yellow gypsiferous shale (Sample No. D4/36), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subovate in lateral outline and inflated ventrally; greatest height anterior to middle. Left valve larger than right valve and except for ventral overlapping all along margin; in dorsal view carapace biconvex, with maximum width near middle, anterior end compressed. Valve surface densely pitted; in females pits arranged in triangular pattern. Mpc 18-19 anteriorly and 5-6 posteriorly. Hinge entomodont, anteromedian element in RV socket with 3 prominent loculi.

Dimensions (mm): Holotype (SUGDMF No. 503), female carapace, L. 0.56, H. 0.40, W 0.36. Paratype I (SUGDMF No. 504), male carapace, L. 0.62, H. 0.36, W. 0.29. Paratype II (SUGDMF No. 505), female RV, L. 0.52, H. 0.33.

Distribution: Occurs widely in Callovian of Kachchh and Jaisalmer.

Figures 1-4. 1-2, holotype, female carapace; 1, RVV, x 136; 2, DV, x 136; 3, paratype I, male carapace, RVV, x 123; 4, paratype II, RV, Int. V, x 142.



Majungaella rasilis Khosla, Jakhar and Mohammed
Plate 87, figures 1-2

Majungaella rasilis Khosla, Jakhar and Mohammed, 1997, p. 20, pl. 4, figs. 15-17.

Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Greyish-yellow gypsiferous shale (Sample No. D2/39), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subovate in lateral outline and inflated ventrally; greatest height 2/3rd of length slightly anterior to middle. Left valve larger than right valve and overlapping it all along margin. In dorsal view carapace biconvex, with maximum width near middle, anterior end compressed. Valve surface almost smooth. Mpc 18-19 anteriorly and 5-6 posteriorly. Hinge entomodont.

Dimensions (mm): Holotype (SUGDMF No. 506), carapace, L. 0.54, H. 0.38, W. 0.32. Paratype I (SUGDMF No. 507), LV, L. 0.54, H. 0.36.

Distribution: *M. perforata kachchhensis* - *G. remota* Concurrent Range Zone of Kachchh.

Figures 1-2. 1, holotype, carapace, RVV, x 139; 2, paratype I, LV, DV, x 139.

Mandawacythere curvicosta Neale and Singh
Plate 88, figures 1-2

Mandawacythere? curvicosta Neale and Singh, 1985, p. 360, pl. 3, fig. 13.
Mandawacythere chariensis Khosla, Jakhar and Mohammed, 2004. p. 27, pl. 1, figs. 14-15.

Locality and horizon: Near Kamaguna Village, Jhura Dome, Kachchh. Yellowish-grey gypsiferous shale (Sample No. K2/21), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace elongate-subrectangular in lateral outline and biconvex in the dorsal, constricted medially; greatest height near anterior 1/4th of length and width in posterior half. Left valve slightly larger than right valve. Valve surface ornamented by 10-11 longitudinal ribs, converging toward anterior and posterior ends; inter-spaces between ribs sparsely punctuate.

Dimensions (mm): Holotype (SUGDMF No. 728), carapace, L. 0.43, H. 0.20, W. 0.18. Paratype (SUGDMF No. 729), carapace, L. 0.44, H. 0.22, W. 0.19.

Distribution: *M. perforata kachchhensis* - *G. remota* Concurrent Range Zone, Jhura Dome, Kachchh.

Figures 1-2. 1, holotype, carapace, RVV, x 177; 2, paratype, carapace, DV, x 173.



Mandawacythere kachchhensis Khosla, Manisha Kumari and Darwin Felix
Plate 89, figures 1-2

Mandawacythere kachchhensis Khosla, Manisha Kumari and Darwin Felix, in Khosla *et al.*, 2005, p. 57, pl. 8, figs. 2-3. - Khosla *et al.*, 2006, p. 27, pl. 5, figs. 16-17.

Locality and horizon: 1 km northwest of Bela Village, Bela Island, Kachchh. Brownish-yellow siltstone with shell fragments (Sample No. BVII/12), Hadibhadang Sandstone Member (late Bathonian-early Callovian), Khadir Formation.

Diagnostic characters: Carapace elongate-subrectangular in lateral outline and posterior 1/4th of length strongly compressed in the dorsal. Left valve slightly larger than right valve. Dorsal and ventral margins slightly concave medially, otherwise straight and subparallel; anterior margin evenly rounded; posterior margin subangulate. Valve surface ornamented by 7-8 longitudinal ribs; interarea between ribs feebly reticulate.

Dimensions (mm): Holotype (SUGDMF No. 824), carapace, L. 0.51, H. 0.20, W. 0.16. Paratype (SUGDMF No. 825), carapace, L. 0.50, H. 0.20, W. 0.16.

Distribution: *P. laeviscula* Range Zone, Khadir and Bela islands, Kachchh; *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-2. 1, holotype, carapace, RVV, x 153; 2, paratype, carapace, DV, x 156.

Mandawacythere multicostata Khosla and Manisha Kumari
Plate 90, figures 1-2

Mandawacythere multicostata Khosla and Manisha Kumari, in Khosla *et al.*, 2005, pp. 57-59, pl. 7, figs. 4-6.

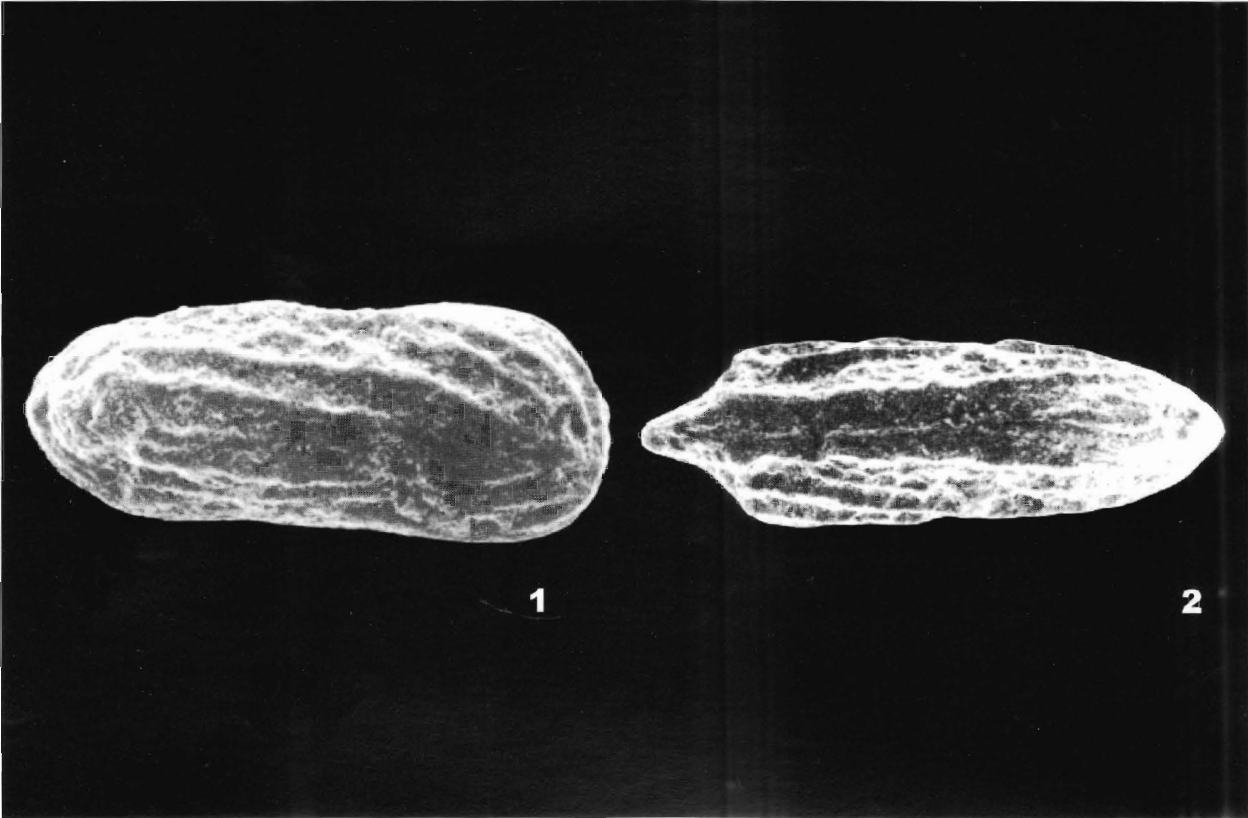
Locality and horizon: Northern escarpment of Bela Island, Kachchh. Highly fossiliferous brown siltstone (Sample No. BVIII/9), Hadibhadang Sandstone Member (late Bathonian-early Callovian), Khadir Formation.

Diagnostic characters: Carapace elongate-subquadrate in lateral outline and biconvex in the dorsal; greatest height at anterior 1/4th of length, and width slightly posterior to middle. Dorsal and ventral margins straight, slightly converging backwardly; anterior margin evenly rounded; posterior margin subangulate near mid-height. Valve surface ornamented by 7 subparallel longitudinal ribs extending over whole surface and converging anteriorly; interspaces between ribs indistinctly pitted. Hinge antimerodont.

Dimensions (mm): Holotype (SUGDMF No. 826), carapace, L. 0.54, H. 0.26, W. 0.23.

Distribution: *P. laeviscula* Range Zone, Bela Island, Kachchh.

Figures 1-2. Holotype, carapace; 1, RVV, x 143; 2, DV, x 144.



Mandelstamia banniensis (Neale and Singh)

Plate 91, figures 1-4

Progonocythere banniensis Neale and Singh, 1985, p. 357, pl. 3, fig. 2.

Mandelstamia sp. Dépêche, in Dépêche *et al.*, 1987, p. 237, pl. 6, fig. 7.

Mandelstamia depecheae Khosla, Jakhar and Mohammed, 1997, pp. 30-32, pl. 5, figs. 8-10. - Khosla *et al.*, 2005, p. 45, pl. 3, fig. 18. - Khosla *et al.*, 2006, p. 20, pl. 3, fig. 10.

Locality and horizon: Near Fulae Village, Habo Dome, Kachchh. Grey shale (Sample No. F16/3), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace elongate-subquadrate in lateral outline and biconvex in the dorsal; greatest height at anterior cardinal angle and width posterior to middle. Dorsal margin with an anterior hinge ear in left valve; posterior margin narrowly rounded in lower part. Valve surface strongly reticulated, meshes arranged in somewhat triangular pattern. Mpc 7-9 anteriorly and 3-4 posteriorly. Hinge hemimerodont, median groove in RV narrow and smooth.

Dimensions (mm): Holotype (SUGDMF No. 538), LV, L. 0.70, H. 0.38. Paratype II (SUGDMF No. 540), carapace, L. 0.60, H. 0.34, W. 0.33. RV (SUGDMF No. 1027), L. 0.58, H. 0.32. LV (SUGDMF No. 1028), L. 0.56, H. 0.32.

Distribution: *P. laeviscula* Range Zone of Kachchh; *T. hadibhadangensis* Range Zone, *M. Perforata kachchhensis* - *F. (B.) Falcula* Concurrent Range Zone and *M. perforata kachchhensis* - *G. remota* Interval Zone, Jaisalmer.

Figures 1-4. 1, holotype, LV, Lat.V, x 111; 2, paratype II, carapace, DV, x 120; 3, RV, Lat.V, x 129; 4, LV, Int.V, x 134.

Mandelstamia biswasi Khosla, Manisha Kumari and Darwin Felix

Plate 92, figures 1-2

Mandelstamia biswasi Khosla, Manisha Kumari and Darwin Felix, in Khosla *et al.*, 2005, pp. 43-45, pl. 3, figs. 16-17. - Khosla *et al.*, 2006, p. 20, pl. 3, fig. 9.

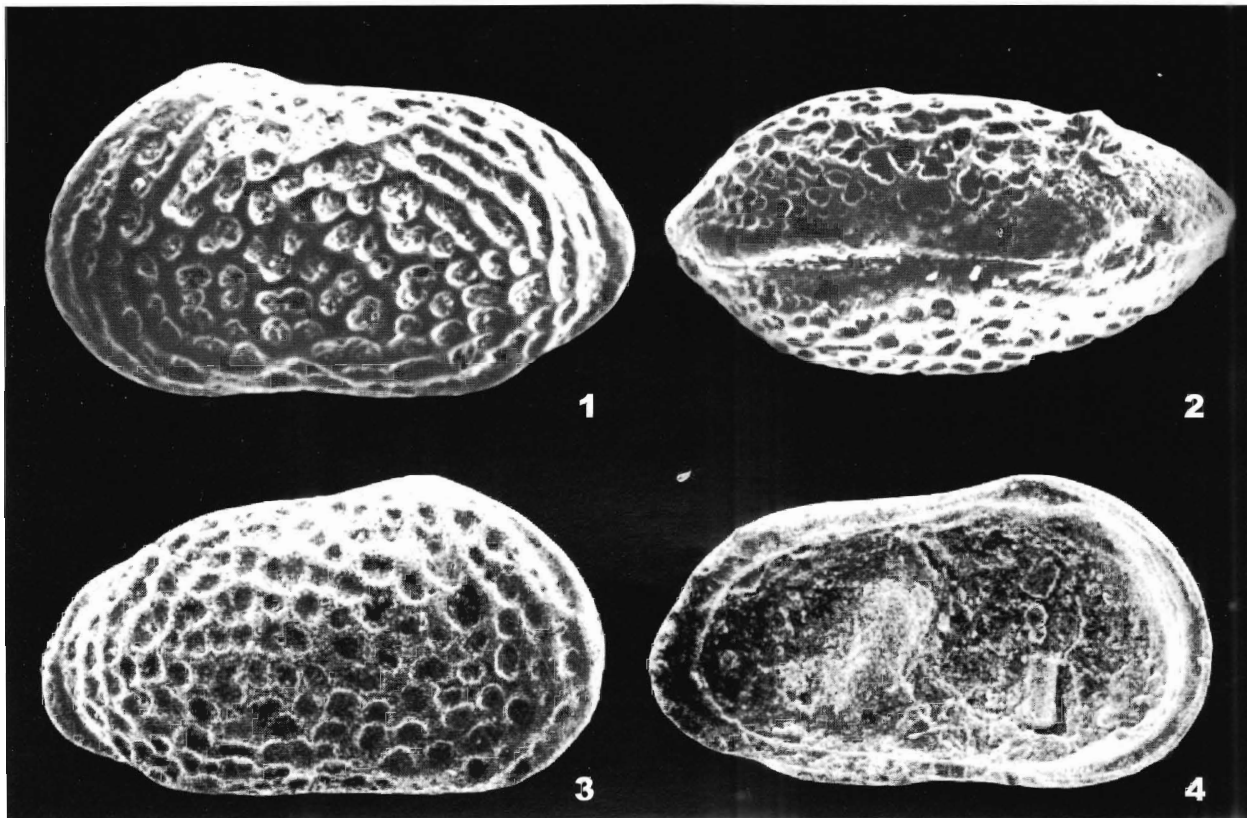
Locality and horizon: North of Lodrani Village, Bela Island, Kachchh. *Corbula lyrata* bearing reddish-brown siltstone (Sample No. BV/7), Hadibhadang Shale Member (mid-late Bathonian), Khadir Formation.

Diagnostic characters: Carapace elongate-subovate in lateral outline, with greatest height at anterior 1/3rd of length. Dorsal margin arched, sloping posteriorly; ventral margin almost straight; anterior margin broad and obliquely rounded; posterior margin sloping in upper half and narrowly rounded below mid-height in lower half. In dorsal view carapace biconvex, with median constriction; maximum width in posterior half. Valve surface ornamented by a shallow vertical depression extending down from mid-dorsal to ventromedian regions; and pits, coarse in median region and fine towards periphery, arranged somewhat in concentric pattern.

Dimensions (mm): Holotype (SUGDMF No. 786), carapace, L. 0.56, H. 0.38, W. 0.32. Paratype (SUGDMF No. 787), carapace, L. 0.48, H. 0.25, W. 0.19.

Distribution: *T. hadibhadangensis* and *C. micropunctata* Range Zones, Northern Island Belt, Kachchh and Jaisalmer.

Figures 1-2. 1, holotype, carapace, RVV, x 138; 2, paratype, carapace, DV, x 158.



Mandelstamia kachchhensis Khosla, Darwin Felix and Manisha Kumari
Plate 93, figures 1-2

Mandelstamia kachchhensis Khosla, Darwin Felix and Manisha Kumari, in Khosla *et al.*, 2005, p. 45, pl. 4, figs. 1-2. - Khosla *et al.*, 2006, p. 20, pl. 3, fig. 11.

Locality and horizon: North of Lodrani Village, Bela Island, Kachchh. *Corbula lyrata* bearing reddish-brown siltstone (Sample No. BV/7), Hadibhadang Shale Member (mid-late Bathonian), Khadir Formation.

Diagnostic characters: Carapace subrectangular in lateral outline, height almost equal in anterior and posterior halves. Dorsal margin nearly straight; ventral margin medially concave; anterior margin broadly rounded; posterior margin sloping in upper part and rounded in the lower. In dorsal view carapace biconvex, with a shallow median constriction, maximum width in posterior half. Valve surface ornamented by pits, arranged in concentric pattern, coarse in median region and fine towards periphery.

Dimensions (mm): Holotype (SUGDMF No. 788), carapace, L. 0.57, H. 0.27, W. 0.20. Paratype (SUGDMF No. 789), carapace, L. 0.60, H. 0.28, W. 0.22.

Distribution: *C. micropunctata* Range Zone, Khadir and Bela islands, Kachchh; *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-2. 1, holotype, carapace, RVV, x 137; 2, paratype, carapace, DV, x 132.

Micropneumatocythere masurdiensis Khosla and Jakhar
Plate 94, figures 1-4

Micropneumatocythere masurdiensis Khosla and Jakhar, in Khosla *et al.*, 2006, p. 24, pl. 4, figs. 19-21.

Locality and horizon: Western bank of Masurdi Nadi, north of Khethari Talab, Kuldhar, Jaisalmer. Gypsiferous clay (Sample No. KB/1), Kuldhar Member (mid-late Callovian), Jaisalmer Formation.

Diagnostic characters: Carapace elongate-subovate in lateral outline and biconvex in the dorsal. Left valve moderately overlaps right valve along dorsal and anterior margins. Dorsal margin arched; ventral margin obscured by ventrolateral inflation; anterior margin very obliquely rounded; posterior margin much narrow, concave in upper part and rounded in the lower. Valve surface reticulated and with a shallow depression in dorsomedian region.

Dimensions (mm): Holotype (SUGDMF No. 969), female carapace, L. 0.48, H. 0.30, W. 0.29. Paratype I (SUGDMF No. 970), male carapace, L. 0.51, H. 0.27, W. 0.26. Paratype II (SUGDMF No. 971), female carapace, L. 0.50, H. 0.29, W. 0.27. Paratype III (SUGDMF No. 1029), male RV, L. 0.50, H. 0.27.

Distribution: *M. perforata kachchhensis* - *G. remota* Concurrent Range Zone, Jaisalmer.

Figures 1-4. 1, holotype, female carapace, RVV, x 158; 2, paratype I, male carapace, RVV, x 149; 3, paratype II, female carapace, DV, x 152; 4, male RV, Int. V, x 149.

Micropneumatocythere rasilis Khosla and Jakhar
Plate 95, figures 1-2

Micropneumatocythere rasilis Khosla and Jakhar, in Khosla *et al.*, 2006, pp. 24-26, pl. 5, figs. 1-2.

Locality and horizon: Western bank of Masurdi Nadi, about 1 km NNW of Khethari Talab, Kuldhar, Jaisalmer. Clay bed (Sample No. KC/3), Kuldhar Member (early Callovian), Jaisalmer Formation.

Diagnostic characters: Carapace subovate in lateral outline, with greatest height at middle; valves inflated ventrally. Left valve slightly overlaps right valve along dorsal and anterior margins. Dorsal margin symmetrically arched; ventral margin obscured by ventrolateral inflation; anterior margin obliquely rounded; posterior margin sloping down in upper part and forwardly inclined in the lower. Valve surface smooth. Hinge in RV comprises 2 terminal teeth connected by a median groove widening anteriorly.

Dimensions (mm): Holotype (SUGDMF No. 972), carapace, L. 0.32, H. 0.26, W. 0.22. Paratype (SUGDMF No. 973), RV, L. 0.35, H. 0.22.

Distribution: *M. perforata kachchhensis* - *F. (B.) falcula* Concurrent Range Zone, Jaisalmer.

Figures 1-2. 1, holotype, carapace, RVV, x 238; 2, paratype, RV, Int. V, x 220.

Monoceratina fortensis Khosla and Jakhar
Plate 96, figures 1-2

Monoceratina fortensis Khosla and Jakhar, in Khosla *et al.*, 2006, p. 13, pl. 1, figs. 12-13.

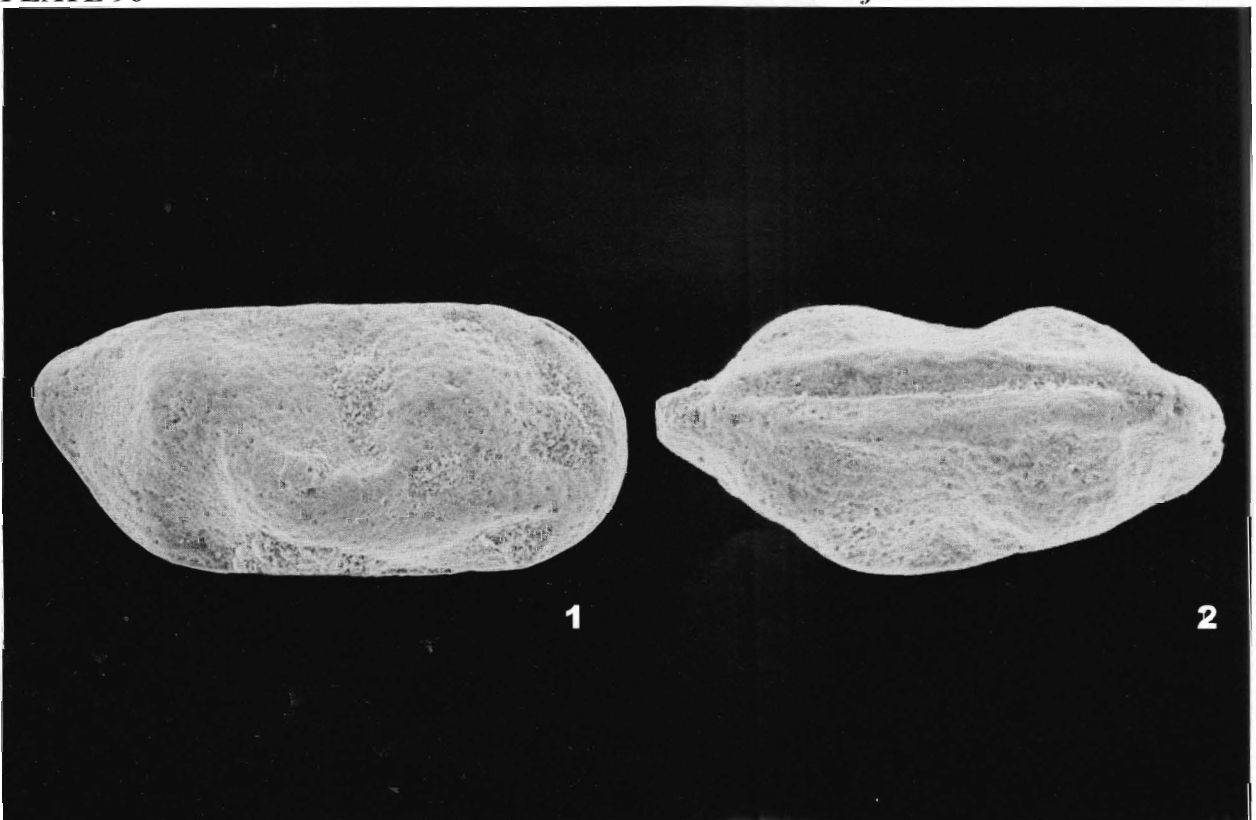
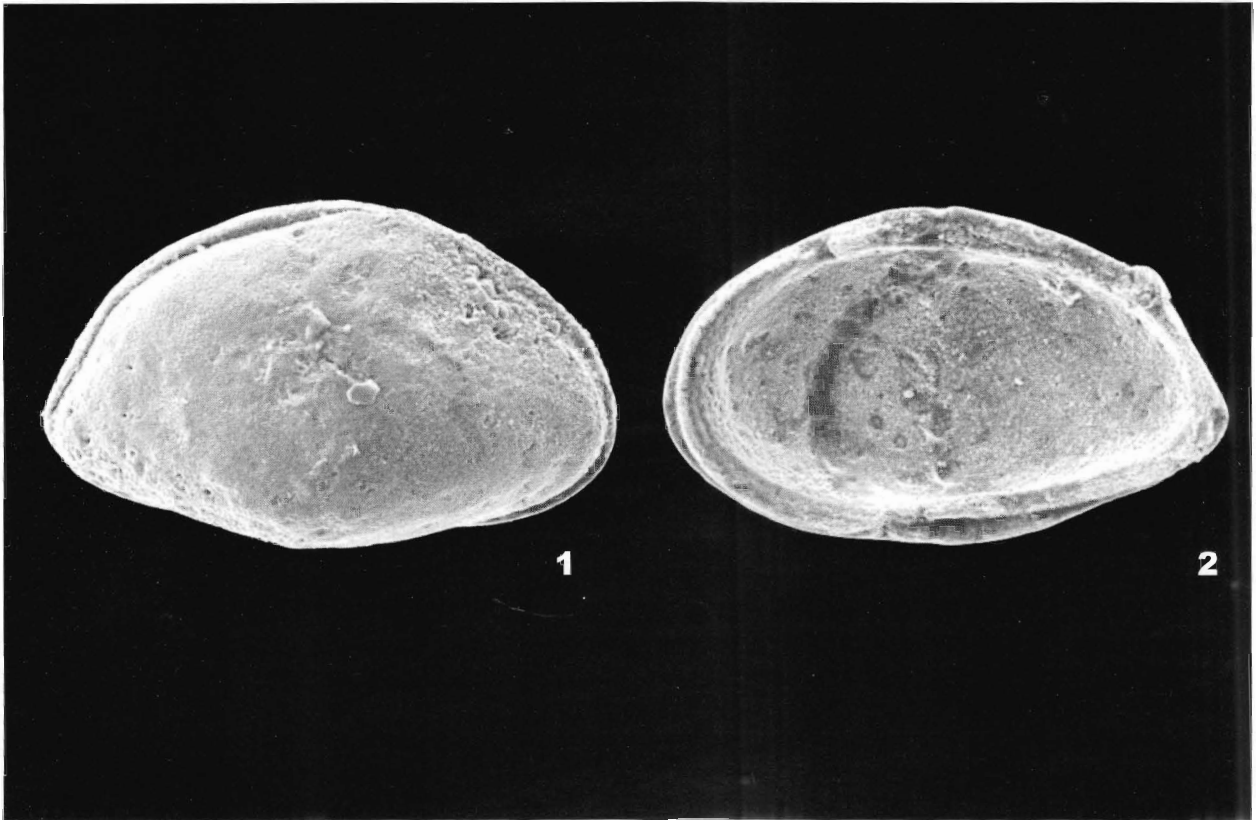
Locality and horizon: Escarpment of the fort hill about 1 km NNW of Jaisalmer Railway Station. Shale bed (Sample No. FM/5), Fort Member (Bajocian-Bathonian), Jaisalmer Formation.

Diagnostic characters: Carapace subrhomboidal in lateral outline, height almost equal in anterior and posterior halves. Dorsal and ventral margins straight and parallel; anterior margin broad and evenly rounded; posterior margin drawn out in a subdorsal caudal process. In dorsal view carapace biconvex with a prominent median constriction; posterior end compressed. Valve surface marked by a vertical sulcus, extending down from mid-dorsal to median region, bounded by a rib-like prominent swelling on its anterior, ventral and posterior sides; rest of the area faintly pitted

Dimensions (mm): Holotype (SUGDMF No. 907), carapace, L. 0.56, H. 0.29, W. 0.24. Paratype (SUGDMF No. 908), carapace, L. 0.56, H. 0.25, W. 0.22.

Distribution: *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-2. 1, holotype, carapace, RVV, x 141; 2, paratype, carapace, DV, x 141.



Monoceratina mouwanaensis Khosla and Manisha Kumari
Plate 97, figures 1-2

Monoceratina mouwanaensis Khosla and Manisha Kumari, in Khosla *et al.*, 2005, pp. 35-36, pl. 1, figs. 12-13. - Khosla *et al.*, 2006, pp. 13-14, pl. 1, fig. 14.

Locality and horizon: Northern escarpment of Mouwana Hill, Bela Island, Kachchh. Brownish-yellow shale with interbedded limestone (Sample No. BIX/8). Hadibhadang Sandstone Member (late Bathonian-early Callovian), Khadir Formation.

Diagnostic characters: Carapace elongate-subquadrate in lateral outline; height almost equal in anterior and posterior halves. Dorsal margin nearly straight; ventral margin straight, parallel to dorsal margin anteriorly, but sharply turned upward at posterior 2/5th of length; posterior margin drawn out in a subdorsal caudal process. Valve surface marked by a shallow, vertical sulcus in median region; posteroventral region compressed; rest of the area smooth.

Dimensions (mm): Holotype (SUGDMF No. 750), carapace, L. 0.48, H. 0.24, W. 0.21. Paratype (SUGDMF No. 751), carapace, L. 0.51, H. 0.24, W. 0.22.

Distribution: *P. laeviscula* Range Zone, Mouwana Village, Bela Island, Kachchh; *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-2. 1, holotype, carapace, RVV, x163; 2, paratype, carapace, DV, x 155.

Monoceratina parascrobiculata Khosla and Jakhar
Plate 98, figures 1-4

Monoceratina scrobiculata Kushreshtha, Singh and Tewari, 1985, p. 126, figs. 5.7, 5.10, 5.11 (not *Monoceratina scrobiculata* Triebel and Bartenstin, pp. 508-509, pl. 1, figs. 5-6).

Monoceratina parascrobiculata Khosla and Jakhar, in Khosla *et al.*, 2006, p. 14, pl. 1, figs. 15-16.

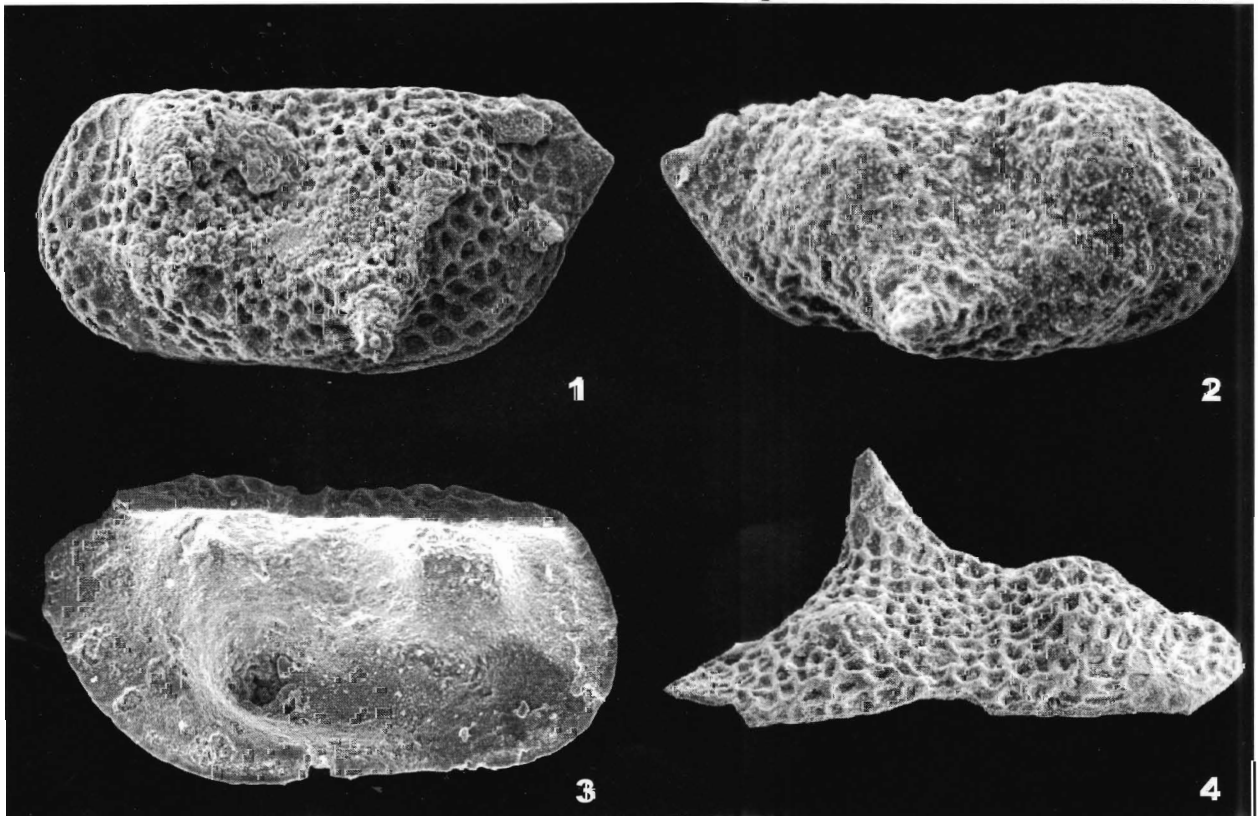
Locality and horizon: Western bank of Masurdi Nadi, about 1 km NNW of Khethari Talab, Kuldhara, Jaisalmer. Clay bed (Sample No. KC/7), Kuldhara Member (early Callovian), Jaisalmer Formation.

Diagnostic characters: Carapace subrhomboidal in lateral outline, with greatest height posterior to middle. Dorsal margin medially concave in right valve and straight in left valve; ventral margin partially obscured by overhanging surface ornamentation in right valve and straight, slightly converging in left valve; anterior margin broad and evenly rounded; posterior margin drawn out in an agulated, subdorsal caudal process. Valve densely pitted all over the surface and with a median vertical sulcus and two nodes each on its anterior and posterior sides, posteroventral node being produced in a prominent backwardly directed spine.

Dimensions (mm): Holotype (SUGDMF No. 910), LV, L. 0.67, H. 0.32. Paratype I (SUGDMF No. 911), RV, L. 0.70, H. 0.34. Paratype II (SUGDMF No. 1030), LV, L. 0.61, H. 0.32.

Distribution: *M. perforata kachchhensis* - *F. (B.) falcula* Concurrent Range Zone, Jaisalmer.

Figures 1-4. 1, holotype, LV, Lat.V, x 115; 2, paratype I, RV, Lat.V, x 116; 3-4, LV; 3, Int.V., x 126; 4, DV, x 128.



Monoceratina rannensis Khosla and Manisha Kumari
Plate 99, figures 1-2

Monoceratina rannensis Khosla and Manisha Kumari, in Khosla *et al.*, 2005, p. 36, pl. 1, figs. 14-15.

Locality and horizon: Northern escarpment of Mouwana Hill, Bela Island, Kachchh. Brownish-yellow siltstone (Sample No. BIX/3), Hadibhadang Sandstone Member (late Bathonian-early Callovian), Khadir Formation.

Diagnostic characters: Carapace elongate-subquadrate in lateral outline, with greatest height at about posterior 1/4th of length. Dorsal margin straight, gently sloping anteriorly; ventral margin nearly straight, swinging upwards backwardly; posterior margin broad, drawn out in a subdorsal caudal process. Valve surface densely pitted and marked by a median vertical sulcus with swellings on either sides; posteroventral region distinctly compressed.

Dimensions (mm): Holotype (SUGDMF No. 752), carapace, L. 0.60, H. 0.29, W. 0.24. Paratype I (SUGDMF No. 753), carapace, L. 0.60, H. 0.29, W. 0.21.

Distribution: *P. laeviscula* Range Zone, Bela Island, Kachchh.

Figures 1-2. 1, holotype, carapace, RVV, x 128; 2, paratype, carapace, DV, x 130.

Morkhovenicythereis rectangularis Khosla, Manisha Kumari and Darwin Felix
Plate 100, figures 1-4

Morkhovenicythereis rectangularis Khosla, Manisha Kumari and Darwin Felix, in Khosla *et al.*, 2005, pp. 38-39, pl. 2, figs. 12-14. - Khosla *et al.*, 2006, p. 16, pl. 2, figs. 6-7.

Locality and horizon: 1 km northwest of Bela Village, Bela Island, Kachchh. Pale-yellow siltstone (Sample BVII/5), Hadibhadang Sandstone Member (late Bathonian-early Callovian), Khadir Formation.

Diagnostic characters: Carapace subrectangular in lateral outline, height almost equal in anterior and posterior halves. Valve surface ornamented by distinct reticulation and sinuate ribs; two transverse subparallel ribs in anterior half, two transverse ribs in posterior half, two longitudinal ribs in lower half parallel to ventral outline; and a sigmoidal-shaped rib in posterodorsal and median regions. Hinge antimerodont.

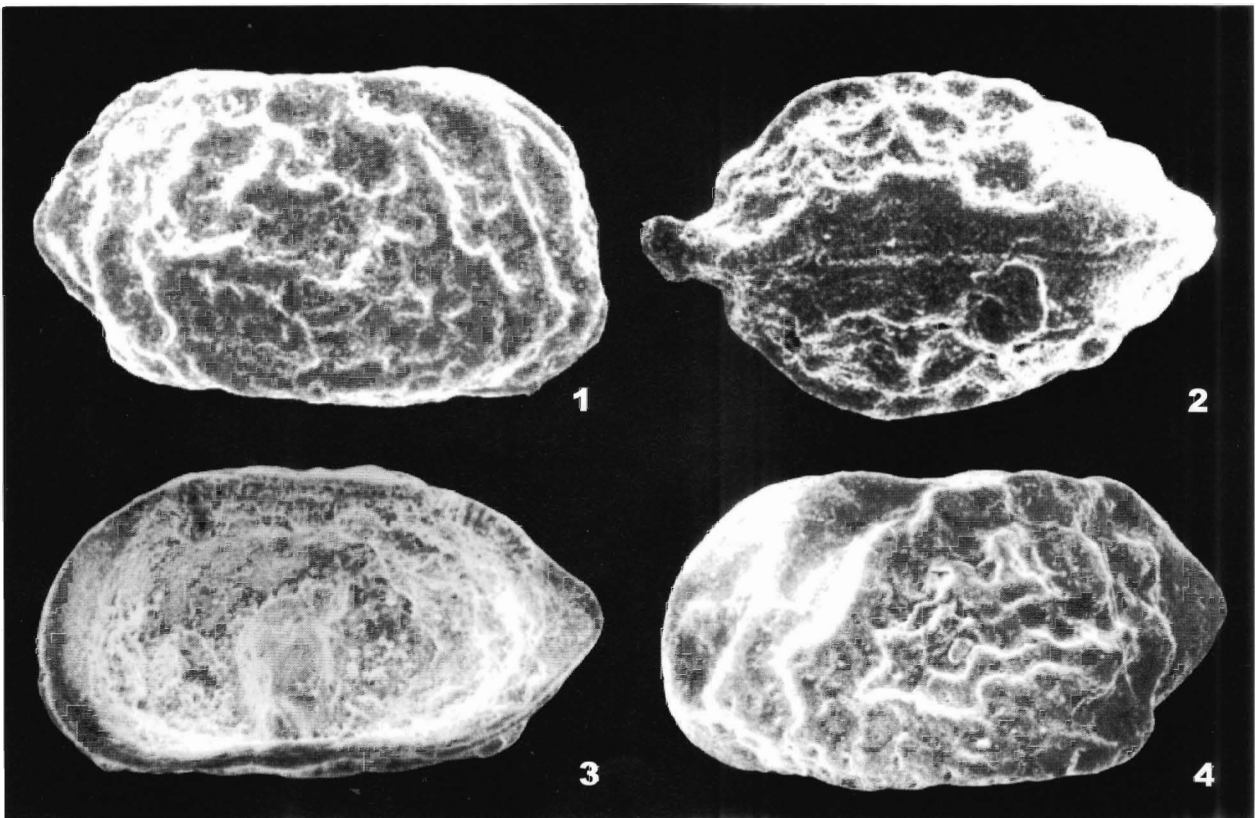
Dimensions (mm): Holotype (SUGDMF No. 766), carapace, L. 0.43, H. 0.28, W. 0.26. Paratype I (SUGDMF No. 767), carapace, L. 0.47, H. 0.26, W. 0.30. Paratype II (SUGDMF No. 768), RV, L. 0.44, H. 0.24. Paratype III (SUGDMF No. 1032), carapace, L. 0.41, H. 0.24, W. 0.26.

Distribution: *P. laeviscula* Range Zone, Khadir and Bela islands, Kachchh; *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-4. 1, holotype, carapace, RVV, x 179; 2, paratype I, carapace, DV, x 161; 3, paratype II, RV, Int. V, x 177; 4, paratype III, carapace, LVV, x 187.



PLATE 100 *Morkhovenicythereis rectangularis* Khosla, Manisha Kumari and Darwin Felix



Neurocythere denticulata (Kulshreshtha, Singh and Tewari)

Plate 101, figures 1-2

Lophocythere denticulata Kulshreshtha, Singh and Tewari, 1985, pp. 138-140, figs. 8.8- 8.12.

Nophrecythere denticulata (Kulshreshtha *et al.*). - Khosla *et al.*, 1997, p. 20, pl. 5, figs. 1-2.

Neurocythere denticulata (Kulshreshtha *et al.*). - Khosla *et al.*, 2006, p. 26, pl. 5, fig. 3.

Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Yellow gypsiferous shale (Sample No. D14/13), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subrectangular in lateral outline. Dorsal margin in left valve with a distinct hinge ear. Anterior margin fringed with 5-6 denticles. Valve surface ornamented by reticulation and four longitudinal ribs, one each in dorsal and median regions and two in ventral region; dorsal and median ribs join in mid-posterior region. Mpc 8-10 anteriorly and 4-5 posteriorly. Hinge entomodont, anteromedian socket in RV with 3-4 loculi.

Dimensions (mm): Carapace (SUGDMF No. 509), L. 0.50, H. 0.29, W. 0.27. Carapace (SUGDMF No. 510), L. 0.50, H. 0.29, W. 0.27.

Distribution: *P. laeviscula* Range Zone, Habo and Jhura domes and *M. perforata kachchhensis* Partial Range Zone, Jhura Dome, Kachchh; *T. hadibhadangensis* Range Zone, *M. perforata kachchhensis* - *F. (B.) falcu* Concurrent Range Zone, Jaisalmer.

Figures 1-2. 1, carapace, RVV, x 156; 2, carapace, DV, x 154.

Neurocythere kachchhensis Khosla and Manisha Kumari

Plate 102, figures 1-2

Neurocythere kachchhensis Khosla and Manisha Kumari, in Khosla *et al.*, 2005, pp. 54-55, pl. 6, figs. 6-7.

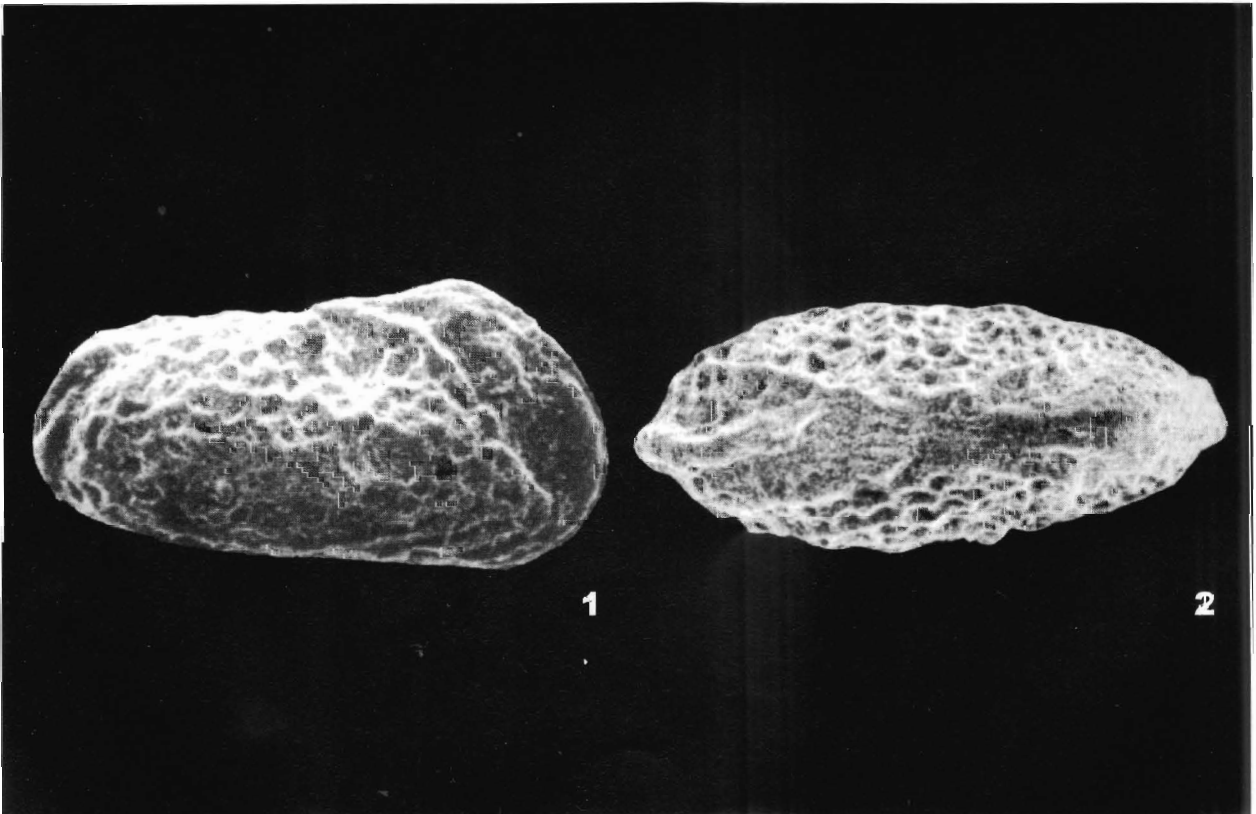
Locality and horizon: 1 km northwest of Bela Village, Bela Island, Kachchh. Pale yellow siltstone (Sample BVII/5), Hadibhadang Sandstone Member (late Bathonian-early Callovian), Khadir Formation.

Diagnostic characters: Carapace elongate-subquadrate in lateral outline and biconvex in the dorsal; greatest height at anterior cardinal angle; maximum width slightly posterior to middle. Dorsal margin straight, sloping down posteriorly and with distinct anterior and posterior cardinal angles; Valve surface ornamented by prominent network type longitudinally arranged reticulation; a distinct oblique anterodorsal rib extending from mid-dorsal region to anteroventral region. Hinge entomodont.

Dimensions (mm): Holotype (SUGDMF No. 813), male carapace, L. 0.48, H. 0.24, W. 0.20. Paratype (SUGDMF No. 814), female carapace, L. 0.47, H. 0.28, W. 0.21.

Distribution: *P. laeviscula* Range Zone, Bela Island, Kachchh.

Figures 1-2. 1, holotype, male carapace, RVV, x 160; 2, paratype, female carapace, DV, x 168.



Neurocythere kuldharensis Khosla and Jakhar
Plate 103, figures 1-4

Neurocythere kuldharensis Khosla and Jakhar, in Khosla *et al.*, 2006, p. 26, pl. 5, figs. 4-7.

Locality and horizon: Western bank of Masurdi Nadi, about 1 km NNW of Khethari Talab, Kuldhar, Jaisalmer. Clay bed (Sample No. KC/7), Kuldhar Member (early Callovian), Jaisalmer Formation.

Diagnostic characters: Carapace subrectangular in lateral outline and biconvex in the dorsal, with posterior end conspicuously compressed. Valve Surface ornamented by four longitudinal ribs in median and posterior regions; a depression in anteromedian region; a vertical rib descending downwards from ocular region; intercostal region with net work type reticulation; rest of the area along dorsal, anterior and posterior margins smooth. Hinge entomodont.

Dimensions (mm): Holotype (SUGDMF No. 975), carapace, L. 0.46, H. 0.22, W. 0.22. Paratype I (SUGDMF No. 976), carapace, L. 0.41, H. 0.22, W. 0.22. Paratype II (SUGDMF No. 977), LV, L. 0.41, H. 0.22. Paratype III (SUGDMF No. 978), carapace, L. 0.46, H. 0.23, W. 0.22

Distribution: *M. perforata kachchhensis* - *F. (B.) falcula* Concurrent Range Zone, Jaisalmer.

Figures 1-4. 1, holotype, carapace, LVV, x 169; 2, paratype I, carapace, DV, x 185; 3, paratype II, LV, DV, x 190; 4, paratype III, carapace, RVV, x 169.

Neurocythere whatleyi (Khosla and Jakhar)
Plate 104, figures 1-2

Lophocythere 323b Grekoff, 1963, p. 1730, pl. 2, fig. 48.

Nophrecythere whatleyi Khosla and Jakhar, in Khosla *et al.*, 1997, pp. 20-22, pl. 5, figs. 6-7.

Neurocythere whatleyi (Khosla and Jakhar). - Mette and Geiger, 2004b, p. 83, pl. 5, figs. 5-8, 10. - Khosla *et al.*, 2005, p. 55, pl. 6, fig. 8. - Khosla *et al.*, 2006, p. 26, pl. 5, fig. 8.

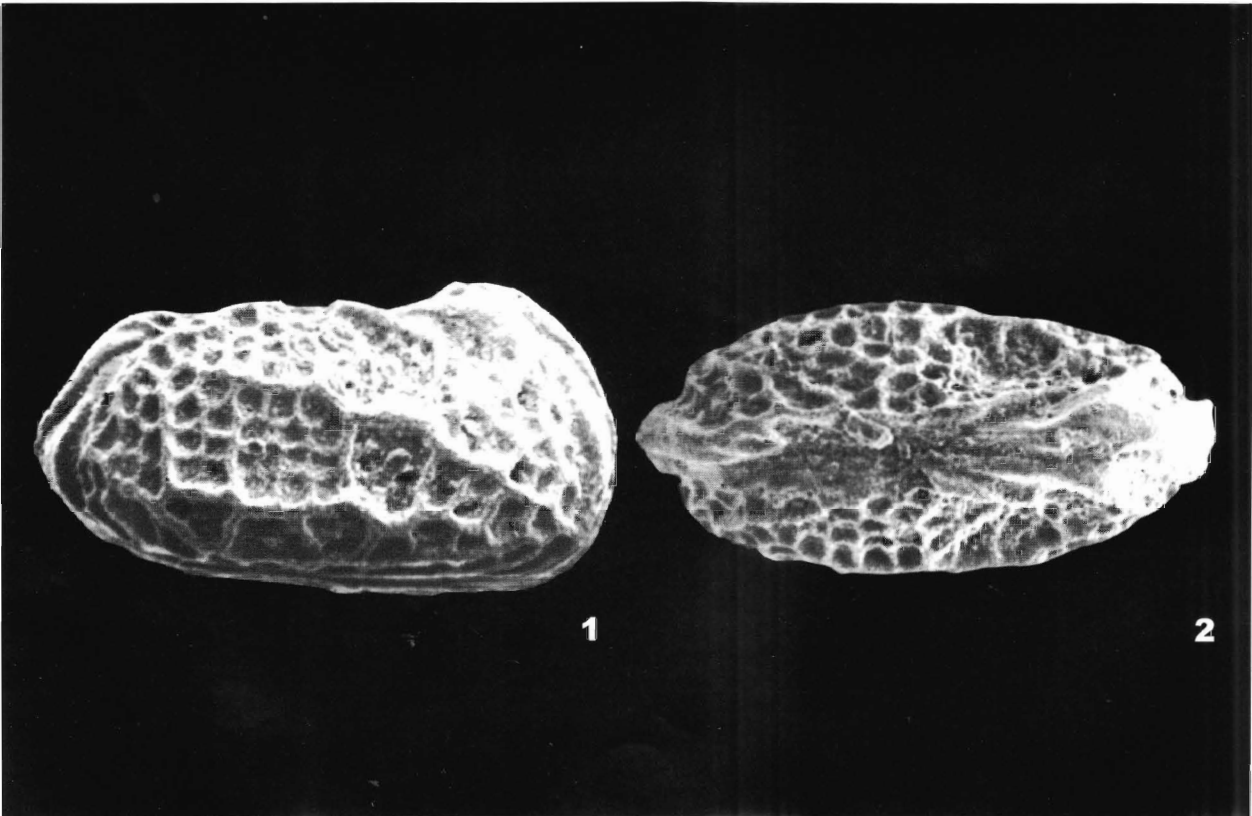
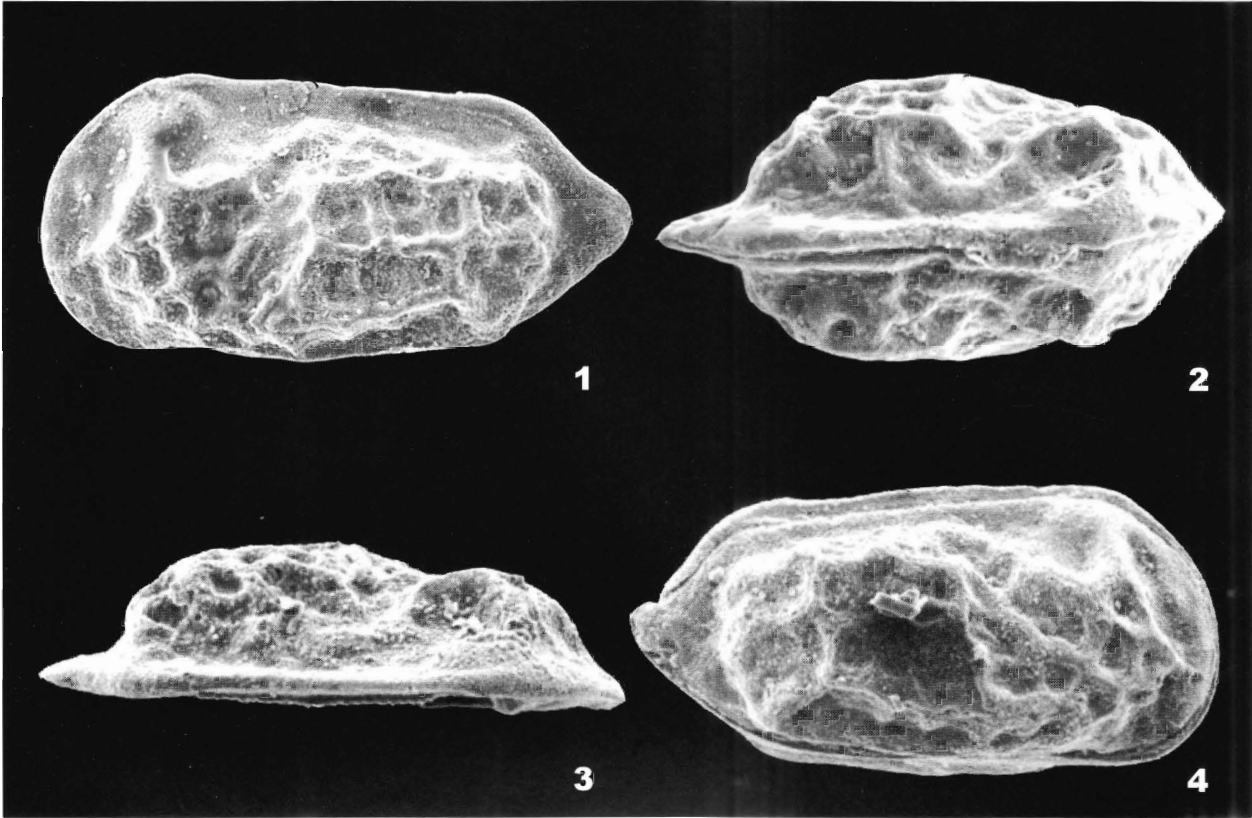
Locality and horizon: Near Habai Village, Habo Dome, Kachchh. Greyish-yellow gypsiferous shale (Sample No. H12/9). Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace elongate-subquadrate in lateral outline, with greatest height at anterior cardinal angle. Dorsal margin with a distinct hinge ear in left valve. Valve surface ornamented by four longitudinal ribs, a dorsal, a median and two ventral; an oblique anterodorsal rib and prominent net work type reticulation.

Dimensions (mm): Holotype (SUGDMF No. 514), carapace, L. 0.48, H. 0.26, W. 0.25.

Distribution: Late Bathonian-Callovian of Kachchh and Jaisalmer; Callovian of Majunga and Morondava basins, Madagascar.

Figures 1-2. Holotype, carapace; 1, RVV, x 160; 2, DV, x 160.



Oligocythereis minuta Kulshreshtha, Singh and Tewari
Plate 105, figures 1-4

Oligocythereis minuta Kulshreshtha, Singh and Tewari, 1985, pp. 148-149, figs. 4.1-4.6. - Khosla *et al.*, 2006, p. 16, pl. 2, figs. 8-9.

Locality and horizon: Western bank of Masurdi Nadi, about 1 km NNW of Khethari Talab, Kuldhar, Jaisalmer. Clay bed (Sample No. KC/3), Kuldhar Member (early Callovian), Jaisalmer Formation.

Diagnostic characters: Carapace subquadrate in lateral outline, greatest height at anterior cardinal angle. Dorsal and ventral margins nearly straight converging posteriorly; anterior margin broadly rounded; posterior margin narrow, angulate. In dorsal view carapace biconvex, ends pointed. Valve surface ornamented by two prominent nodes at posterodorsal and posteroventral regions, a median longitudinal rib extending 2/3 of length, an oblique rib in anterodorsal region and a few less prominent tubercles over rest of the area.

Dimensions (mm): Carapace (SUGDMF No. 922), L. 0.30, H. 0.16, W. 0.14. Carapace (SUGDMF No. 923), L. 0.32, H. 0.17, W. 0.13. Carapace (SUGDMF No. 1032), L. 0.32, H. 0.17, W. 0.14. LV (SUGDMF No. 1033), L. 0.32, H. 0.16.

Distribution: *M. perforata kachchhensis* - *F. (B.) falcula* Concurrent Range Zone, Jaisalmer.

Figures 1-4. 1, carapace, LVV, x 263; 2, carapace, RVV, x 234; 3, carapace, DV, x 240; 4, LV, Int.V, x 240.

Paracypris contermia Lyubimova and Mohan
Plate 106, figures 1-2

Paracypris contermia Lyubimova and Mohan, in Lyubimova *et al.*, 1960, pp. 22-23, pl. 2, fig. 2. Guha, 1977, p. 86, pl. 3, fig. 19. - Kulshreshtha *et al.*, 1985, p. 125, figs. 5.14, 5.17. - Khosla *et al.*, 1997, p. 36, pl. 7, fig. 16. - Khosla *et al.*, 2005, p. 33, pl. 1, fig. 5. - Khosla *et al.*, 2006, p. 13, pl. 1, fig. 9.

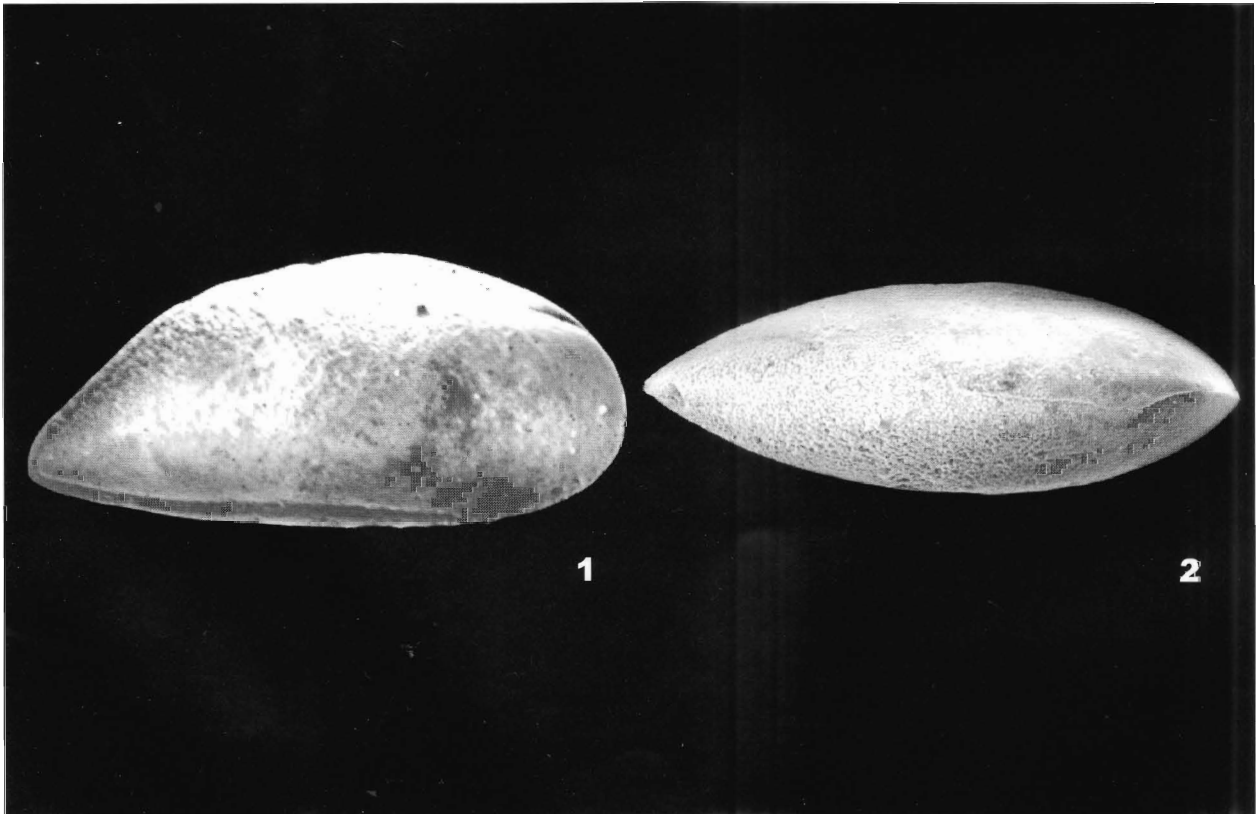
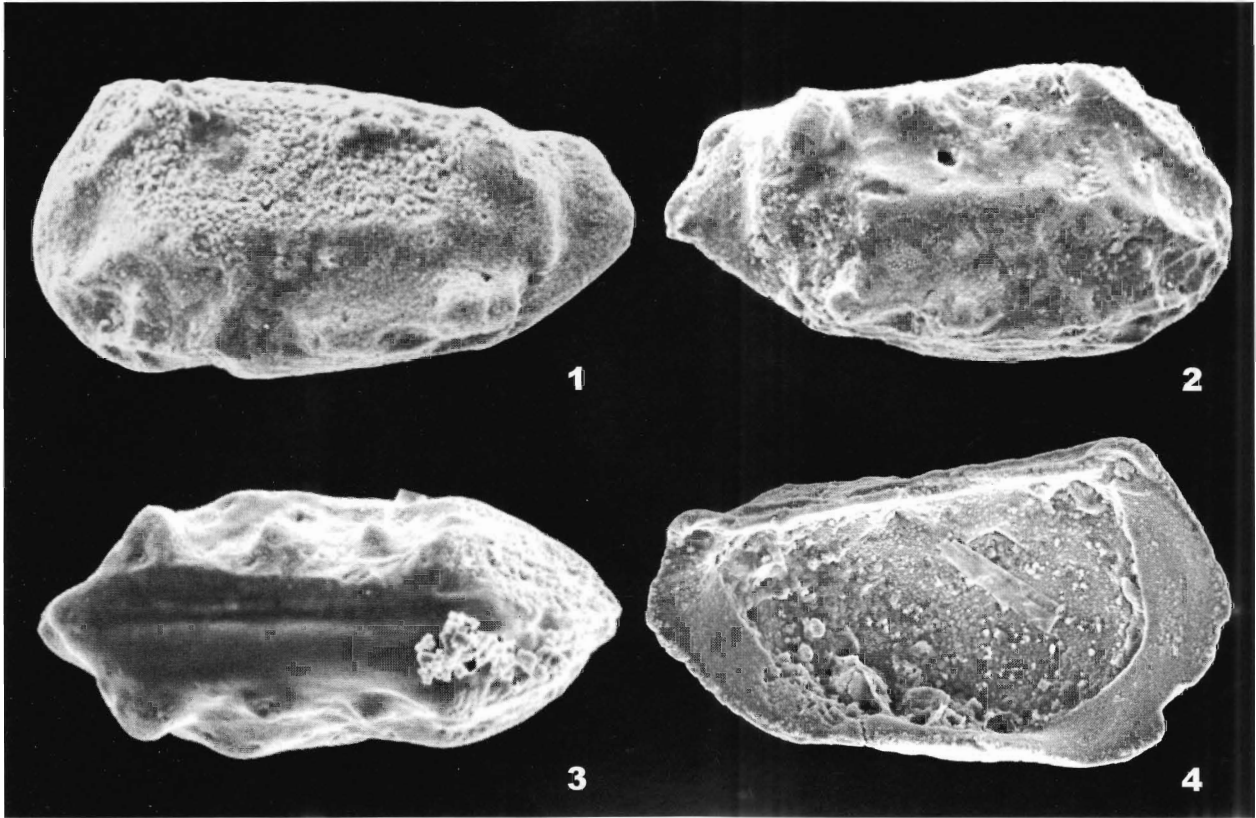
Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Yellow gypsiferous shale (Sample No. D14/13), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace elongate-subtriangular in lateral outline, with greatest height near middle. Left valve overlaps right valve all along margin. Dorsal margin convex, sloping down backwardly; ventral margin straight in left valve; anterior margin broad and evenly rounded; posterior margin drawnout and narrowly rounded ventrally. In dorsal view carapace biconvex, with maximum width slightly anterior to middle. Valve surface smooth.

Dimensions (mm): Carapace (SUGDMF No. 553), L. 0.74, H. 0.34, W. 0.28.

Distribution: *P. laeviscula* Range Zone, *M. perforata kachchhensis* - *F. (B.) falcula* and *M. perforata kachchhensis* - *G. remota* Concurrent Range Zones, Kachchh and Jaisalmer.

Figures 1-2. Carapace; 1, RVV, x 107; 2, DV, x 105.



Paracypris kachchhensis Khosla and Darwin Felix
Plate 107, figures 1-2

Paracypris kachchhensis Khosla and Darwin Felix, in Khosla *et al.*, 2005, p. 33, pl. 1, figs. 6-7. - Khosla *et al.*, 2006, p. 13, pl. 1, fig. 10.

Locality and horizon: Sadhara Dome, Pachchham Island, Kachchh. Coral bearing greyish-white sandy limestone (Sample SI/1), Sadhara Coral Limestone Member (Bajocian-Bathonian), Khavda Formation.

Diagnostic characters: Carapace elongate-subtriangular in lateral outline and biconvex in the dorsal; greatest height and width near middle. Left valve slightly larger than right valve. Dorsal margin uniformly arched; ventral margin straight; anterior margin broadly rounded; posterior margin steeply sloping in upper part and rounded in the lower. Valve surface smooth.

Dimensions (mm): Holotype (SUGDMF No. 744), carapace, L. 0.65, H. 0.30, W. 0.25. Paratype (SUGDMF No. 745), carapace, L. 0.62, H. 0.28, W. 0.25.

Distribution: *T. hadibhadangensis* Range Zone, Sadhara Dome, Pachchham Island, Kachchh and Jaisalmer.

Figures 1-2. 1, holotype, carapace, RVV, x 118; 2, paratype, carapace, DV, x 122.

Paracypris mohani Khosla, Darwin Felix and Manisha Kumari
Plate 108, figures 1-2

Paracypris mohani Khosla, Darwin Felix and Manisha Kumari, in Khosla *et al.*, 2005, pp. 33-35, pl. 1, figs. 8-9. - Khosla *et al.*, 2006, p. 13, pl. 1, fig. 11.

Locality and horizon: North of Lodrani Village, Bela Island, Kachchh. *Corbula lyrata* bearing reddish-brown siltstone (Sample BV/6), Hadibhadang Shale Member (mid-late Bathonian), Khadir Formation.

Diagnostic characters: Carapace elongate-subtriangular in lateral outline and biconvex in the dorsal; greatest height about half of the length near middle and maximum width slightly anterior to middle. Left valve larger than right valve. Dorsal margin convex, sloping posteriorly; ventral margin straight; anterior margin broad and evenly rounded; posterior margin moderately rounded in lower half. Valve surface smooth.

Dimensions (mm): Holotype (SUGDMF No. 746), carapace, L. 0.75, H. 0.36, W. 0.25. Paratype (SUGDMF No. 747), carapace, L. 0.78, H. 0.36, W. 0.25.

Distribution: *T. hadibhadangensis*, *C. micropunctata*, *P. laeviscula* and *F. (H.) mouwanaensis* Range Zones, Northern Island Belt, Kachchh and Jaisalmer.

Figures 1-2. 1, holotype, carapace, RVV, x 104; 2, paratype, carapace, DV, x 97.



Paracypris salmiformis Neale and Singh

Plate 109, figures 1-2

Paracypris salmiformis Neale and Singh, 1986, pp. 353-354, pl. 1, fig. 14. - Khosla *et al.*, 2005, p. 35. pl. 1, fig. 10.

Locality and horizon: About 1 km NW of Bela Village, Bela Island, Kachchh. Raimalro limestone (Sample No. BVII/5), Hadibhadang Sandstone Member (late Bathonian-early Callovian), Khadir Formation.

Diagnostic characters: Carapace elongate-reniform in lateral outline, with greatest height about 1/3rd of length anteriorly. Overlap indistinct. Dorsal margin arched, gently sloping posteriorly; ventral margin concave; anterior margin broadly rounded; posterior margin drawn out and narrowly rounded. Valve surface smooth.

Dimensions (mm): Carapace (SUGDMF No. 748), L. 0.77, H. 0.28, W. 0.24.

Distribution: Middle Jurassic beds of Banni well No. 2 and *P. laeviscula* Range Zone, Bela Island, Kachchh.

Figures 1-2. Carapace; 1, RVV, x 100; 2, DV, x 100.

***Paranotacythere* sp.**

Plate 110, figures 1-2

Paranotacythere sp. Khosla *et al.*, 2005, p. 42, pl. 3, fig. 11.

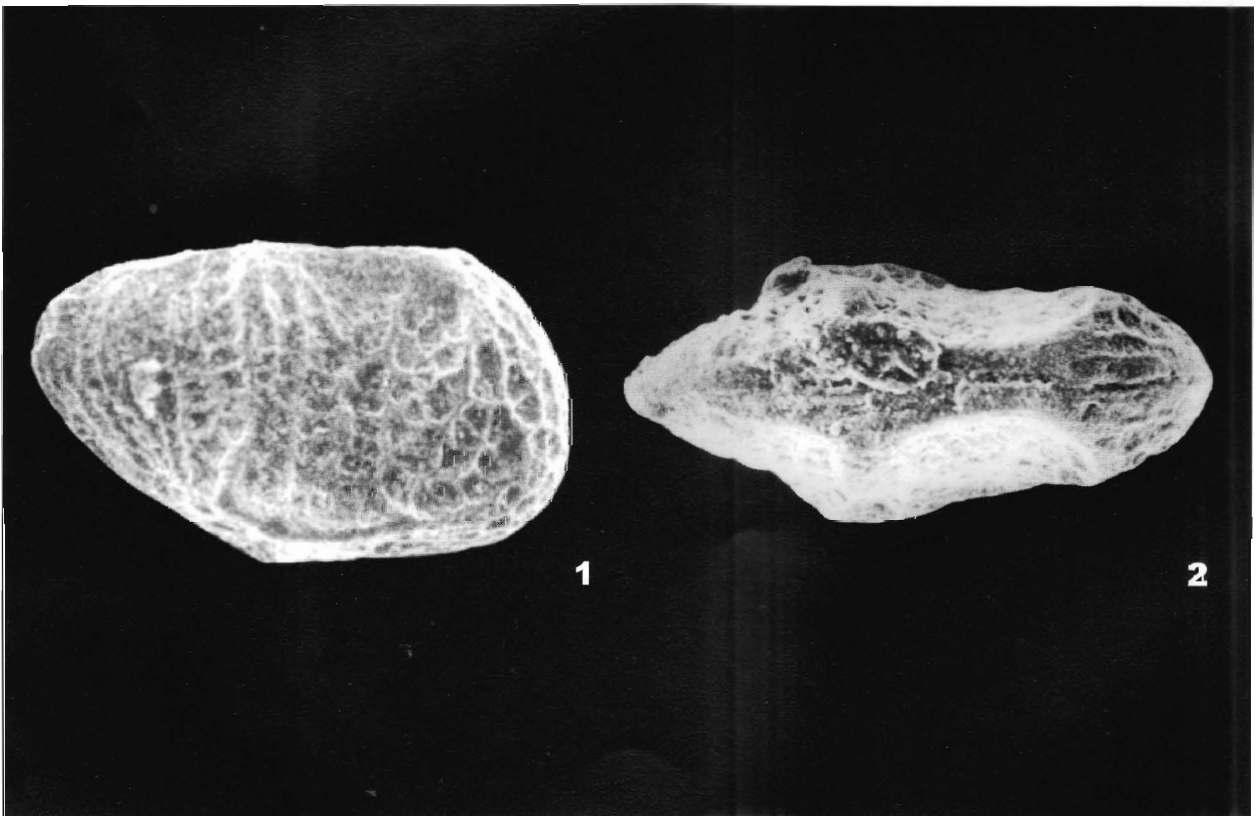
Locality and horizon: 1 km NW of Gadhada ruins, Bela Island, Kachchh. Calcareous sandstone overlying the Coralline Limestone (Sample No. BVI/2), Gadhada Sandstone Member (early-mid Callovian), Khadir Formation.

Diagnostic characters: Carapace subquadrate in lateral outline, with greatest height in anterior half. Valve surface marked by a vertical sulcus extending down from mid-dorsal region, vertical sinuate ribs posterior to it, merging with a short horizontal rib in ventral region, a tubercle in anteromedian region and prominent reticulation over rest of the area.

Dimensions (mm): Carapace (SUGDMF No. 781), L. 0.36, H. 0.22, W. 0.16.

Distribution: *C. micropunctata* Range Zone, Khadir Island and *F. (H.) mouwanaensis* Range Zone, Bela Island, Kachchh.

Figures 1-2. Carapace; 1, RVV, x 211; 2, DV, x 222.



Procytheridea ihopyensis Grekoff

Plate 111, figures 1-2

Procytheridea ihopyensis Grekoff, 1963, pp. 1747-1749, pl. 6, figs. 164-172; pl. 10, fig. 237.-
Dépêche, in Dépêche *et al.*, 1987, pl. 2, figs. 15. - Khosla *et al.*, 1997, p. 11, pl. 2, figs. 12. - Khosla *et al.*, 2005, p. 39, pl. 2, fig. 15.

Locality and horizon: Near Fulae Village, Habo Dome, Kachchh. Grey shale (Sample No. F.16/3), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace elongate-subovate in lateral outline and biconvex in the dorsal. Left valve distinctly overlapping right valve all along margin. Valve surface marked by an anterodorsal furrow and ornamentation comprising pronounced reticulation arranged in triangular pattern with apices towards dorsal margin. Mpc about 12-14 anteriorly. Hinge hemimerodont, median bar in LV smooth.

Dimensions (mm): Carapace (SUGDMF No. 461), L. 0.84, H. 0.48, W. 0.48. LV (SUGDMF No. 462), L. 0.76, H. 0.46.

Distribution: *P. laeviscula* Range Zone, Kachchh.

Figures 1-2. 1, carapace, RVV, x 91; 2, LV, DV, x 102.

Procytheridea kachchhensis Khosla, Jakhar and Mohammed

Plate 112, figures 1-4

Procytheridea kachchhensis Khosla, Jakhar and Mohammed, 1997, pp. 11-12, pl. 2, figs. 3-5.

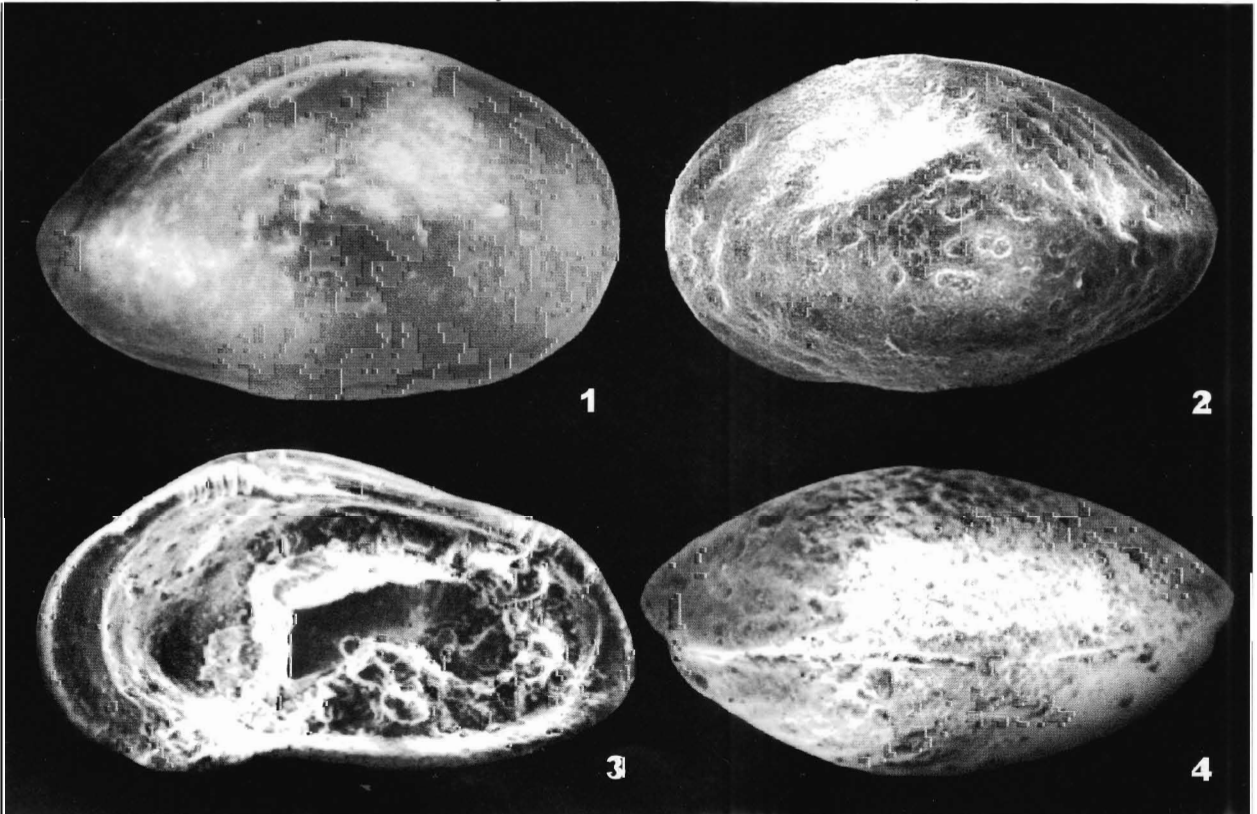
Locality and horizon: Near Fulae Village, Habo Dome, Kachchh. Grey shale (Sample No. F.16/3), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subovate in lateral outline and biconvex in the dorsal; greatest height and maximum width near middle. Left valve overlapping right valve all along margin. Valve surface marked by an anterodorsal furrow and faint reticulation arranged in triangular pattern with apices towards dorsal margin, ventral margin being smooth. Mpc 12-14 anteriorly and 5-6 posteriorly. Hinge hemimerodont.

Dimensions (mm): Holotype (SUGDMF No. 463), female carapace, L. 0.58, H. 0.36, W. 0.34. Paratype I (SUGDMF No. 464), male RV, L. 0.64, H. 0.35. Paratype II (SUGDMF No. 465), female carapace, L. 0.60, H. 0.36, W. 0.34.

Distribution: *P. laeviscula* Range Zone, Habo and Jhura domes, Kachchh.

Figures 1-4. 1-2, holotype, female carapace, 1, RVV, x 132; 2, LVV, x 125; 3, paratype I, male RV Int. V, x 123; 4, paratype II, female carapace, DV, x 131.



Progonocythere haboensis Khosla and Jakhar
Plate 113, figures 1-2

Progonocythere haboensis Khosla and Jakhar, in Khosla *et al.*, 1997, p. 22, pl. 6, figs. 1-2.

Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Yellow gypsiferous shale (Sample No. D14/13), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace elongate-subovate in lateral outline; greatest height at anterior 1/3rd of length. Left valve overlapping right valve all along margin. Dorsal margin strongly arched, sloping down posteriorly; ventral margin weakly convex; anterior margin broad and obliquely rounded; posterior margin narrowly rounded below mid-height. In dorsal view carapace biconvex, with maximum width slightly posterior to middle. Valve surface ornamented by indistinct pits. Mpc 10-11 anteriorly and 5-6 posteriorly. Cms a vertical row of 4 adductor scars and a frontal scar. Hinge entomodont, loculate median groove in RV wide anteriorly and narrow posteriorly.

Dimensions (mm): Holotype (SUGDMF No. 515), carapace, L. 0.66, H. 0.38, W. 0.38. Paratype (SUGDMF No. 516), carapace, L. 0.64, H. 0.36, W. 0.37.

Distribution: *P. laeviscula* Range Zone, Habo Dome, Kachchh.

Figures 1-2. 1, holotype, carapace, RVV, x 118; 2, paratype, carapace, DV, x 119.

Progonocythere jaisalmerensis Khosla, Jakhar, Nagori and Darwin Felix
Plate 114, figures 1-2

Progonocythere jaisalmerensis Khosla, Jakhar, Nagori and Darwin Felix, 2003c, p. 173, pl. 1, figs. 7-8; fig. 3c. - Khosla *et al.*, 2005, p. 46, pl. 4, figs. 3-4. - Khosla *et al.*, 2006, p. 20, pl. 3, figs. 12-13.

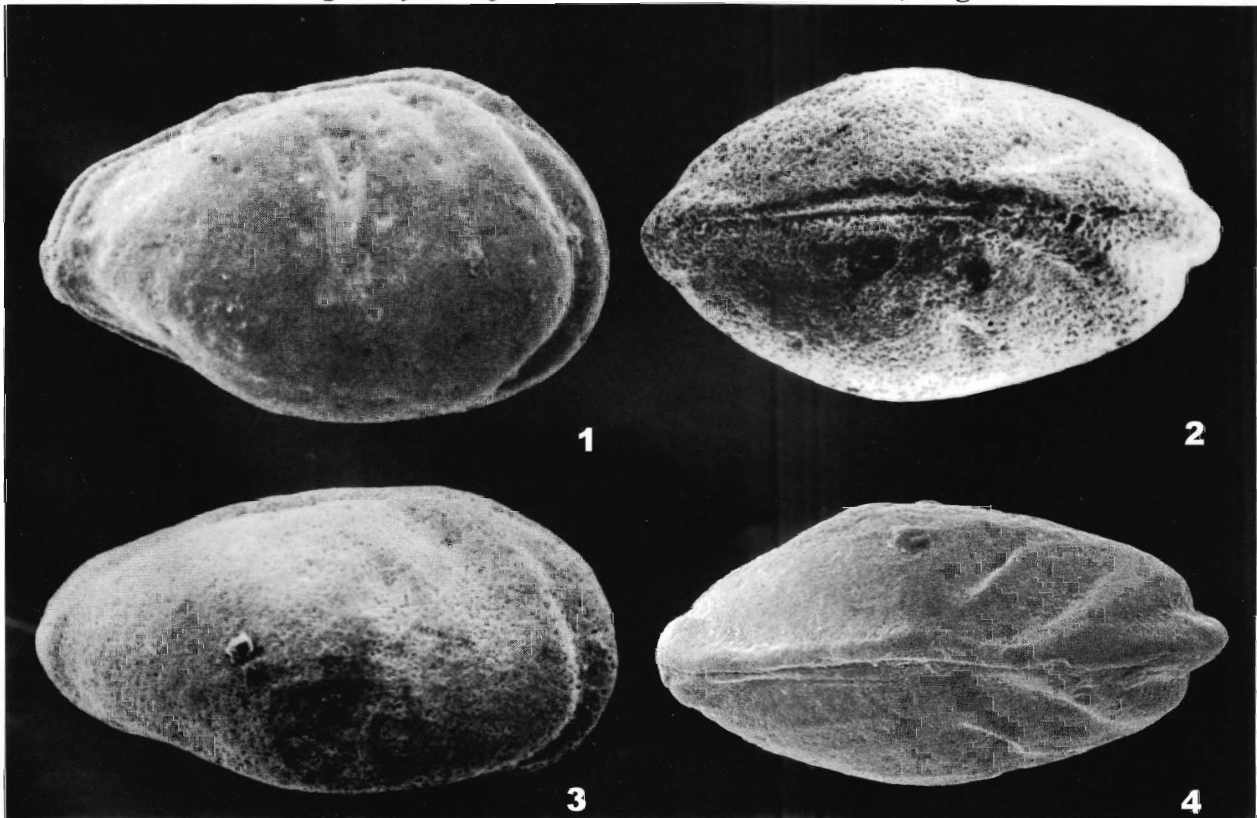
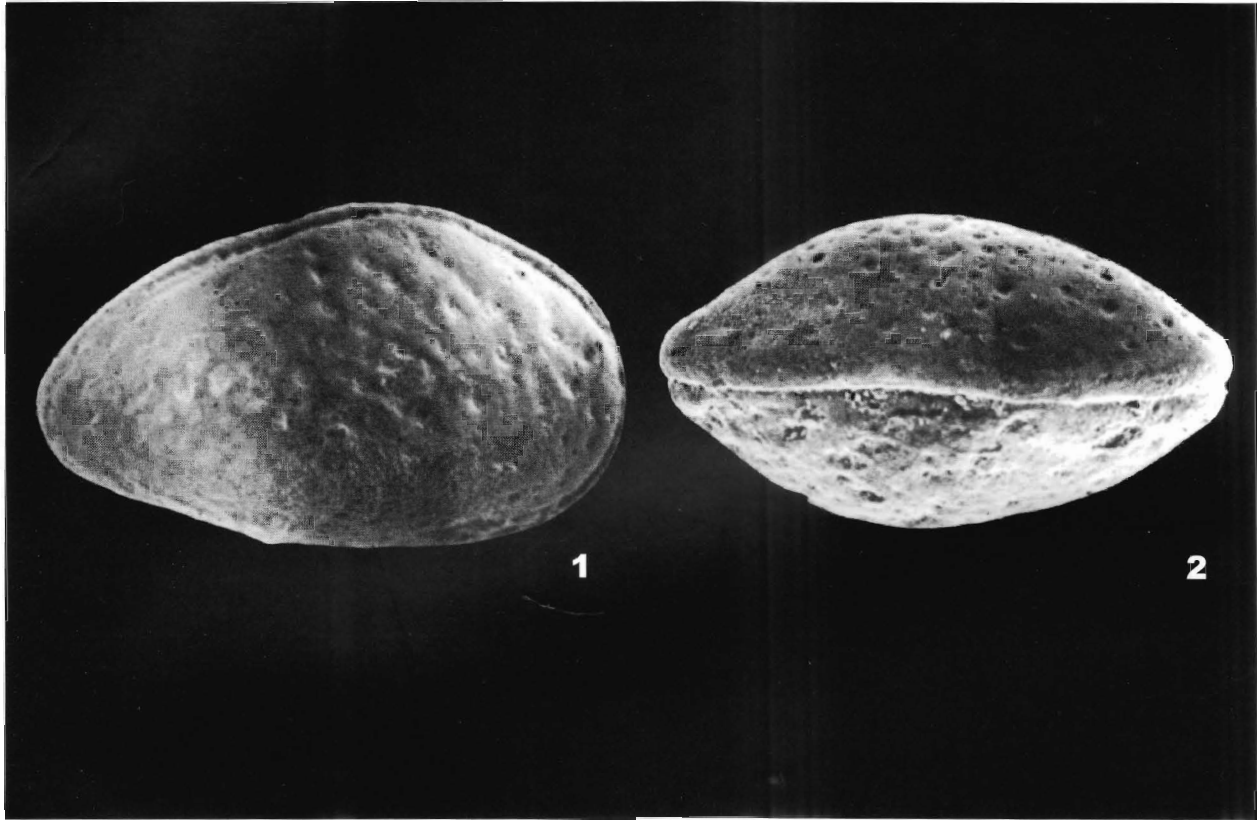
Locality and horizon: Escarpment at Kishanghat, north of Jaisalmer Fort. Yellow fossiliferous limestone (Sample No. FD/4), Fort Member (Bajocian-Bathonian), Jaisalmer Formation.

Diagnostic characters: Carapace elongate-subovate in lateral outline, inflated ventrally; greatest height at anterior angle. Left valve larger than right valve, overlapping conspicuously along dorsal and posterior margins. Dorsal margin straight, sloping down backwardly; ventral margin obscured by ventral inflation; anterior margin broadly rounded; posterior margin narrowly rounded. In dorsal view carapace biconvex, with maximum width at middle. Valve surface marked by two vertical sulci in anterodorsal and dorsomedian regions; rest of the area smooth. Hinge entomodont.

Dimensions (mm): Holotype (SUGDMF No. 738), female carapace, L. 0.54, H. 0.40, W. 0.35. Female carapace (SUGDMF No. 1034), L. 0.51, H. 0.33, W. 0.29. Male carapace (SUGDMF No. 1035), L. 0.62, H. 0.33, W. 0.32. Paratype (SUGDMF No. 945), male carapace, L. 0.65, H. 0.35, W. 0.32.

Distribution: *T. hadibhadangensis* Range Zone, Sadhara Dome, Pachchham Island, Kachchh and Jaisalmer.

Figures 1-4. 1, holotype, female carapace, RVV, x 138; 2, paratype, female carapace, DV, x 151; 3, male carapace, RVV, x 124; 4, male carapace, DV, x 117.



Progonocythere laeviscula Lyubimova and Mohan
Plate 115, figures 1-4

Progonocythere laeviscula Lyubimova and Mohan, in Lyubimova *et al.*, 1960, pp. 47-48, pl. 4, fig. 5. - Grekoff, 1963, pp. 1739-1740, pl. 4, figs. 98-104; pl. 8, figs. 224-226. - Guha, 1977, p. 88, pl. 2, figs. 11, 14 a-b. - Kulshreshtha *et al.*, 1985, p. 127, figs. 7.15-7.17. - Dépêche, in Dépêche *et al.*, 1987, p. 229, pl. 6, figs. 9-12. - Khosla *et al.*, 1997, pp. 22-24, pl. 5, figs. 14-16. - Khosla *et al.*, 2003c, p. 168, pl. 1, figs. 1-2; fig. 3a. - Khosla *et al.*, 2005, p. 46, pl. 4, fig. 5.

Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Yellow gypsiferous shale (Sample No. D14/13), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace elongate-subovate in lateral outline and biconvex in the dorsal; valve inflated ventrally, ends compressed; greatest height at anterior 1/3rd of length and width posterior to middle. Valve surface marked by a vertical sulcus extending downwards from mid-dorsal region to the mid-height, rest of the area smooth. Mpc 14-16 anteriorly and 4-6 posteriorly. Hinge entomodont.

Dimensions (mm): Female carapace (SUGDMF No. 517), L. 0.66, H. 0.44, W. 0.36. Male carapace (SUGDMF No. 1036), L. 0.73, H. 0.41, W. 0.37. Female RV (SUGDMF No. 1037), L. 0.66, H. 0.41. Male LV (SUGDMF No. 1038), L. 0.68, H. 0.42.

Distribution: Occurs widely in *P. laeviscula* Range Zone of Kachchh, Majunga Basin, Madagascar and Central Saudi Arabia

Figures 1-4. 1, female carapace, RVV, x 107; 2, male carapace, RVV, x 111; 3, female RV, Int. V, x 109; 4, male LV, DV, x 117.

Progonocythere sadharaensis Khosla, Jakhar, Nagori and Darwin Felix
Plate 116, figures 1-4

Progonocythere sadharaensis Khosla, Jakhar, Nagori and Darwin Felix, 2003c, pp. 168-173, pl. 1, figs. 3-6; fig. 3b. - Khosla *et al.*, 2005, p. 46, pl. 4, figs. 6-7.

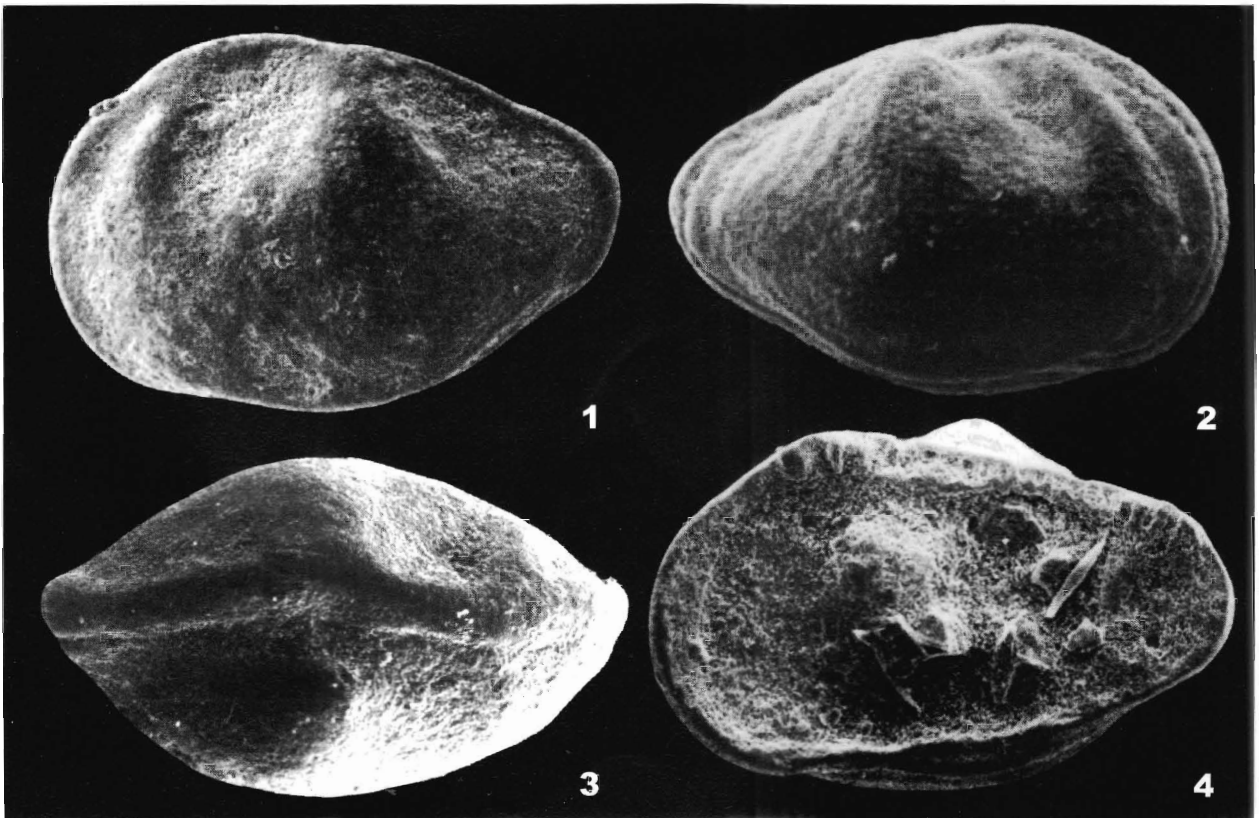
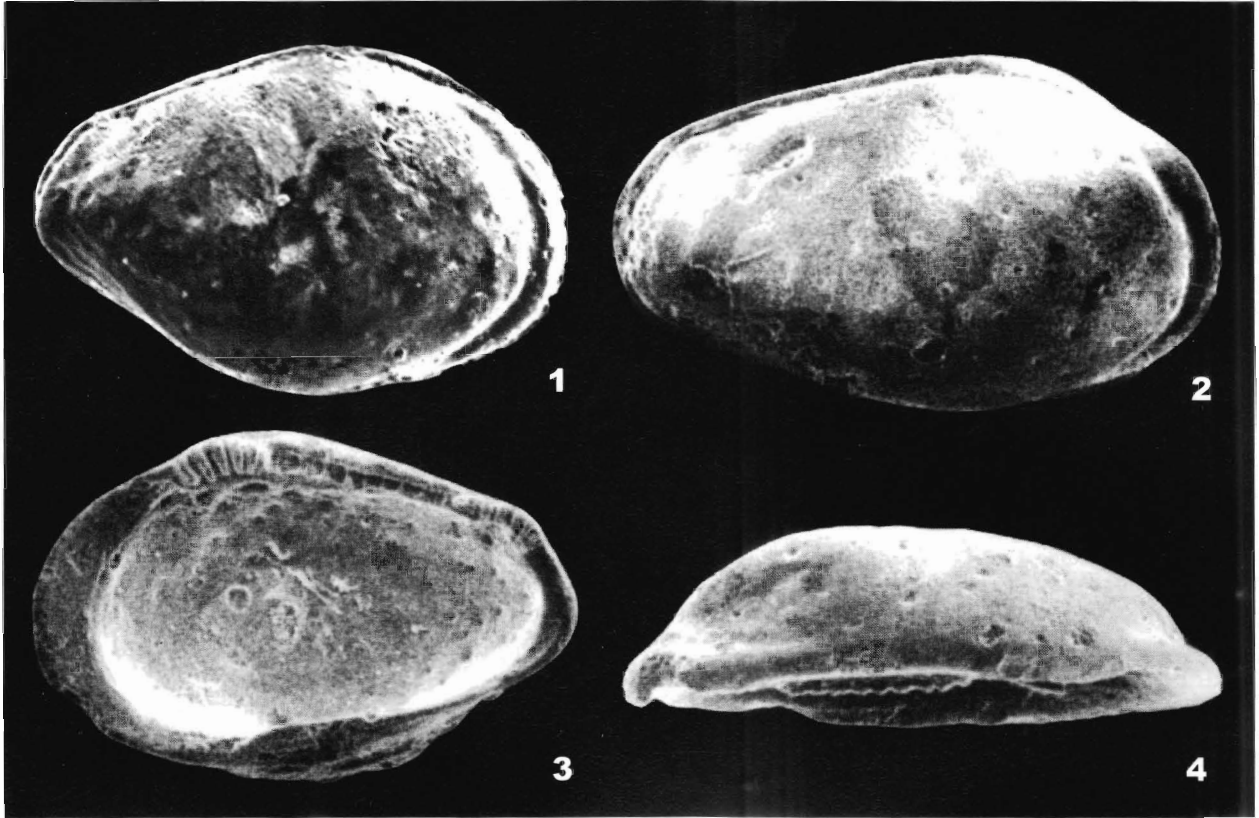
Locality and horizon: Sadhara Dome, Pachchham Island, Kachchh. Coral bearing grayish-white limestone (Sample No. SI/1), Sadhara Coral Limestone Member (Bajocian-Bathonian), Khavda Formation.

Diagnostic characters: Carapace elongate-subovate in lateral outline, inflated ventrally; greatest height at anterior 1/3rd of length. Left valve overlapping right valve all along margin. In dorsal view carapace biconvex, with maximum width near middle, ends compressed. Valve surface marked by a wide furrow extending down from anterodorsal margin to mid-height, a prominent swelling posterior to it, protruding as a node over mid-dorsal margin in right valve; swelling low and without node in left valve; 3-4 V-shaped feeble ribs, with apices backwardly directed, in posterior region. Mpc 7-8 anteriorly and 3-4 posteriorly. Hinge entomodont.

Dimensions (mm): Holotype (SUGDMF No. 734), carapace, L. 0.72, H. 0.48, W. 0.43. Paratype II (SUGDMF No. 736), carapace, L. 0.75, H. 0.49, W. 0.43. Paratype III (SUGDMF No. 737), RV, L. 0.62, H. 0.43.

Distribution: *T. hadibhadangensis* Range Zone, Sadhara Dome, Pachchham Island, Kachchh.

Figures 1-4. 1, holotype, carapace, LVV, x 104; 2-3, paratype II, carapace, 2, RVV, x 96; 3, DV, x 104; 4, paratype III, RV, Int. V., X 125.



Progonocythere tharensis Khosla and Jakhar
Plate 117, figures 1-4

Progonocythere tharensis Khosla and Jakhar, in Khosla *et al.*, 2006, pp. 20-22, pl. 3, figs. 14-16.

Locality and horizon: Escarpment at Kishanghat, north of Jaisalmer Fort. Yellow fossiliferous limestone (Sample No. FD/8), Fort Member (Bajocian-Bathonian), Jaisalmer Formation.

Diagnostic characters: Carapace subquadrate in lateral outline, with greatest height at anterior cardinal angle. Left valve indistinctly overlaps right valve. Dorsal margin straight, sloping down posteriorly; ventral margin obscured by ventrolateral inflation; anterior margin broadly rounded; posterior margin narrow, straight in upper 2/3rd part and rounded in the lower. In dorsal view carapace biconvex, anterior end somewhat compressed, maximum width slightly anterior to middle. Valve surface with an indistinct anterodorsal furrow; otherwise smooth. Hinge entomodont, median element in RV loculate groove broadening anteriorly.

Dimensions (mm): Holotype (SUGDMF No. 946), carapace, L. 0.78, H. 0.46, W 0.38. Paratype I (SUGDMF No. 947), carapace, L. 0.78, H. 0.39, W 0.38. Paratype II (SUGDMF No. 948), RV, L. 0.86, H. 0.46.

Distribution: *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-4. 1-2, holotype, carapace, 1, RVV, x 97; 2, LVV, x 96; 3, paratype I, carapace, DV, x 100; 4, paratype II, RV, Int.V, x 88.

Progonocythere tenuisulcata (Mette and Geiger)
Plate 118, figures 1-2

Progonocythere sp. Khosla *et al.*, 1997, p. 24, pl. 5, fig. 13.

Pirileberis tenuisulcata Mette and Geiger, 2004c, pp. 112-113, pl. 6, figs. 1-5.

Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Dark brown sandstone with shale (Sample No. D/46), Katrol Formation (Kimmeridgian).

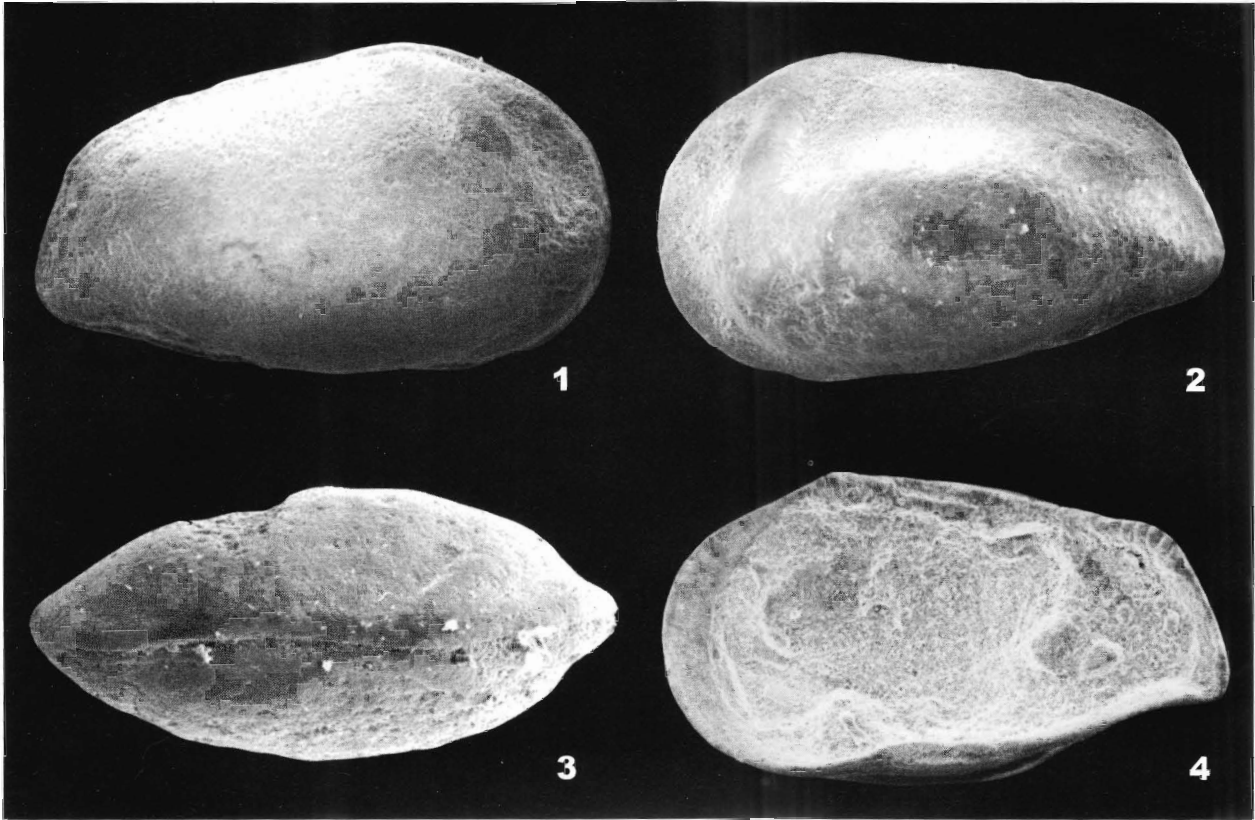
Diagnostic characters: Valve elongate-subovate in lateral outline and inflated ventrally; greatest height about 3/5th of length anterior to middle. Dorsal margin arched, gently sloping down posteriorly; ventral margin obscured by ventrolateral inflation; anterior margin broadly rounded; posterior margin narrow and subangulate at mid-height. In dorsal view valve convex, with maximum width near middle. Valve surface marked by a median vertical sulcus and fine pits over rest of the area. Cms consist of a vertical row of 4 adductor scars and a rounded frontal scars. Hinge entomodont.

Dimensions (mm): RV (SUGDMF 520), L. 0.90, H. 0.56.

Remarks: The species has been described as *Pirileberis tenuisulcata* Mette and Geiger, 2004c. On the basis of outline and entomodont hinge it is herein transferred to the genus *Progonocythere*.

Distribution: Basal part of Katrol Formation, Dhrang Village, Habo Dome, Kachchh; Morondava Basin, Madagascar.

Figures 1-2. RV; 1, Lat.V, x86; 2, DV, x 86.



***Protobuntonia* sp.**

Plate 119, figures 1-2

Protobuntonia sp. Khosla *et al.*, 2006, p. 27, pl. 5, figs. 19-20.

Locality and horizon: Western bank of Masurdi Nadi, north of Khethari Talab, Kuldhar, Jaisalmer. Gypsiferous clay (Sample No. KB/1), Kuldhar Member (mid-late Callovian), Jaisalmer Formation.

Diagnostic characters: Carapace subtriangular in lateral outline and biconvex in the dorsal; valves slightly inflated ventrally; greatest height and width anterior to middle. Dorsal and ventral margins straight, converging posteriorly; anterior margin broad and evenly rounded; posterior margin 1/3rd of the anterior, rounded at mid-height. Valve surface with a faint downwardly curved rib near ventral margin giving it an angulated look, otherwise smooth.

Dimensions (mm): Carapace (SUGDMF No. 990), L. 0.56, H. 0.32, W 0.27. Carapace (SUGDMF No. 991), L. 0.62, H. 0.38, W 0.29.

Distribution: *M. perforata kachchhensis* - *G. remota* Interval Zone, Jaisalmer.

Figures 1-2. 1, carapace, RVV, x 139; 2, carapace, DV, x 126.

***Pseudoperissocytheridea concentrica* Khosla, Manisha Kumari and Darwin Felix**

Plate 120, figures 1-4

Mandelstamia sp. Khosla *et al.*, 1997, p. 32, pl. 5, figs. 11-12.

Pseudoperissocytheridea concentrica Khosla, Manisha Kumari and Darwin Felix, in Khosla *et al.*, 2005, pp. 59-61, pl. 7, figs. 7-8.

Locality and horizon: North of Lodrani Village, Bela Island, Kachchh. Yellowish-brown siltstone with interbedded shale (Sample No. BV/24), Hadibhadang Sandstone Member (late Bathonian-early Callovian), Khadir Formation.

Diagnostic characters: Valve elongate-subquadrate in lateral outline, with greatest height about 1/2 of length at anterior cardinal angle. Dorsal and ventral margins medially concave; posteroventral margin obscured by ventral swelling; anterior margin broad and obliquely rounded; posterior margin narrowly rounded at mid-height. Valve surface ornamented by 7-8 concentrically arranged distinct ribs. Mpc about 7-8 anteriorly and 3-4 posteriorly. Hinge hemimerodont.

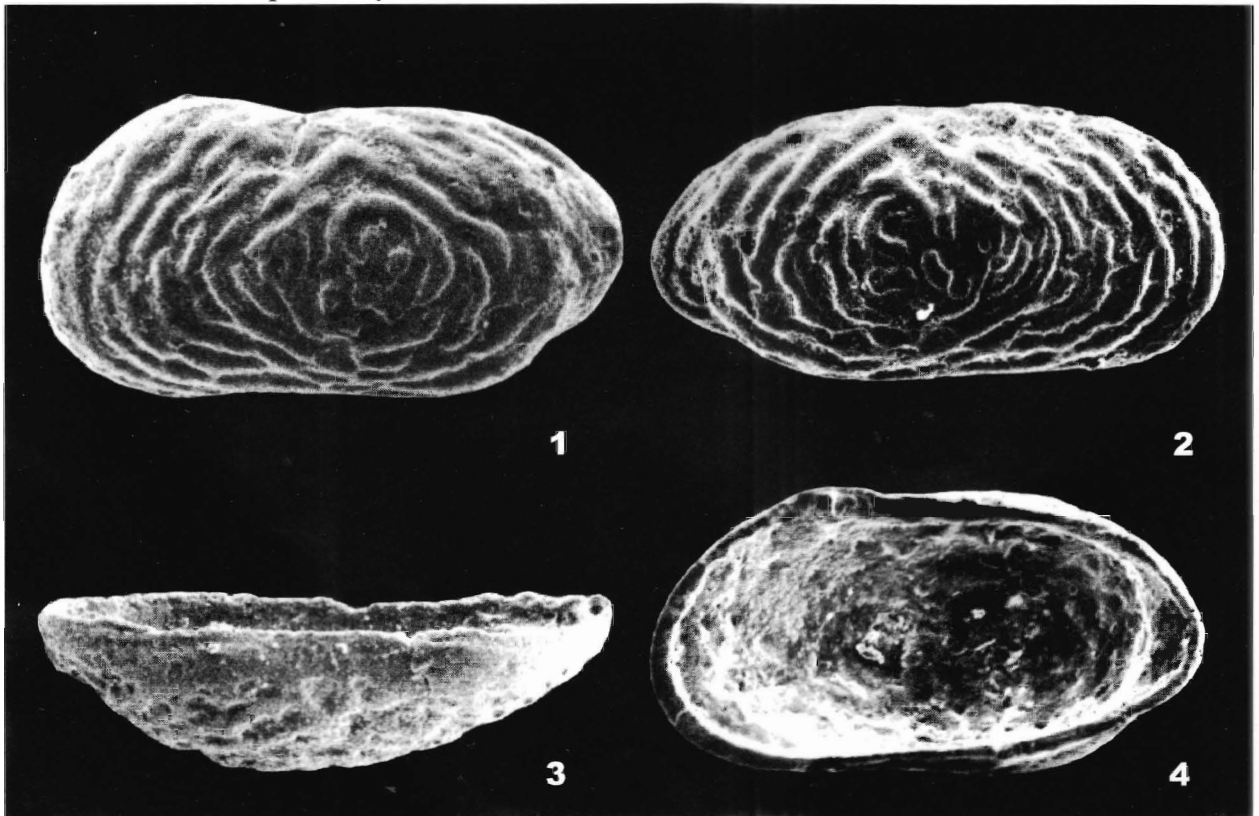
Dimensions (mm): Holotype (SUGDMF No. 828), LV, L. 0.57, H. 0.30. RV (SUGDMF No. 1039), L. 0.56, H. 0.27. RV (SUGDMF No. 1040), L. 0.58, H. 0.28. RV (SUGDMF No. 542), L. 0.58, H. 0.28.

Distribution: *P. laeviscula* Range Zone, Kachchh.

Figures 1-4. 1, holotype, LV, Lat.V, x 136; 2, RV, Lat.V, x 136; 3, RV, DV, x 132; 4, RV, Int.V, x 131.



PLATE 120 *Pseudoperissocytheridea concentrica* Khosla, Manisha Kumari and Darwin Felix



Schuleridea (Eoschuleridea) soodani Khosla, Jakhar and Mohammed
Plate 121, figures 1-2

Schuleridea (Eoschuleridea) soodani Khosla, Jakhar and Mohammed, 1997, pp. 28, pl. 7, figs. 3-5.

Locality and horizon: Near Kamaguna, Jhura Dome, Kachchh. Greyish-yellow gypsiferous shale (Sample No. K2/2), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subovate in lateral outline and biconvex in the dorsal; greatest height and width in median region. LV strongly overlapping RV along dorsal and ventral margins and less so along other margins. Valve surface smooth. Mpc fan shaped, curved, narrowly spaced, about 24-26 anteriorly and 9-10 posteriorly. Cms consist of a vertical row of 4 adductor scars and a rounded frontal scar. Hinge paleomerodont.

Dimensions (mm): Holotype (SUGDMF 536), carapace, L. 0.56, H. 0.40, W. 0.30.

Distribution: *M. perforata kachchhensis* - *G. remota* Concurrent Range Zone, Habo and Jhura domes, Kachchh.

Figures 1-2. Holotype, carapace; 1, RVV, x 135; 2, DV, x134.

***Theriosynoecum* sp.**
Plate 122, figures 1-2

Theriosynoecum sp. Khosla *et al.*, 2006, pp. 18-20, pl. 3, fig. 8.

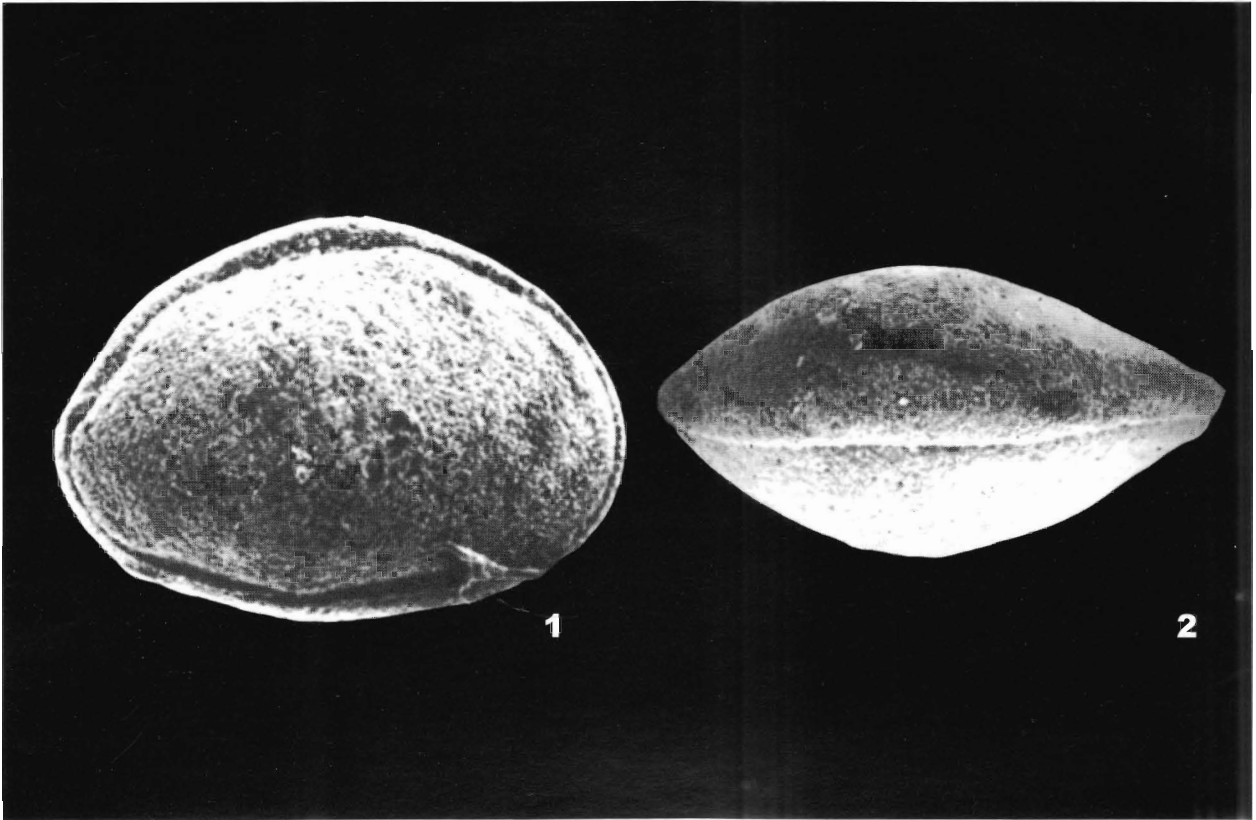
Locality and horizon: Escarpment of the fort hill, 1/2 km NW of Jaisalmer Railway Station. Fossiliferous sandstone (Sample No. FA/4), Fort Member (Bajocian-Bathonian), Jaisalmer Formation.

Diagnostic characters: Carapace hemispherical in lateral outline, with greatest height about 2/3rd of length at middle. Overlap indistinct. Dorsal margin arched; ventral margin obscured medially by ventrolateral swelling, otherwise straight; anterior end broadly rounded and compressed; posterior end narrow and bluntly rounded. Valve surface ornamented by concentrically arranged fine pits and a mid-ventral node.

Dimensions (mm): Carapace (SUGDMF No. 941), L. 0.82, H. 0.50, W. 0.41.

Distribution: *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-2. Carapace; 1, RVV, x 94; 2, DV, x 94.



Timiriasevia khadirensis Khosla and Darwin Felix
Plate 123, figures 1-4

Timiriasevia khadirensis Khosla and Darwin Felix, in Khosla *et al.*, 2005, pp. 42-43, pl. 3, figs. 12-15.

Locality and horizon: Northern escarpment of Hadibhadang Hill, close to Khara Talao, Khadir Island, Kachchh. Greyish-yellow siltstone (Sample No. KII/1), Hadibhadang Shale Member (Bajocian-Bathonian), Khadir Formation.

Diagnostic characters: Carapace subtrapezoidal in lateral outline and heart-shaped in the dorsal, with anterior end narrow, posterior end much broader and with a distinct groove; greatest height and width behind middle; valves inflated, overhanging along part of ventral and posterior margins. Valve surface ornamented by numerous fine ribs (20-25), running parallel to margins, giving finger print-like impression; a distinct ventrolateral carina extending from the mid-anterior region to posteroventral margin present in some specimens. Hinge lophodont.

Dimensions (mm): Holotype (SUGDMF No. 782), LV, L. 0.54, H. 0.35. Paratype I (SUGDMF No. 783), RV, L. 0.60, H. 0.37. Paratype II (SUGDMF No. 784), LV, L. 0.48, H. 0.30. Paratype III (SUGDMF No. 785), carapace, L. 0.56, H. 0.30, W. 0.48.

Distribution: *T. hadibhadangensis* Range Zone, Khadir Island, Kachchh.

Figures 1-4. 1, holotype, LV, Lat.V, x 131; 2, paratype I, RV, Lat.V, x 120; 3, paratype II, LV, Int.V, x 127; 4, paratype III, carapace, DV, x 142.

Trichordis amraparensis Khosla and Darwin Felix
Plate 124, figures 1-4

Trichordis cf. *T. triangulata* Neale and Singh, 1985, p. 357, pl. 3, fig.

Trichordis amraparensis Khosla and Darwin Felix, in Khosla *et al.*, 2005, p. 55, pl. 6, figs. 9-10.

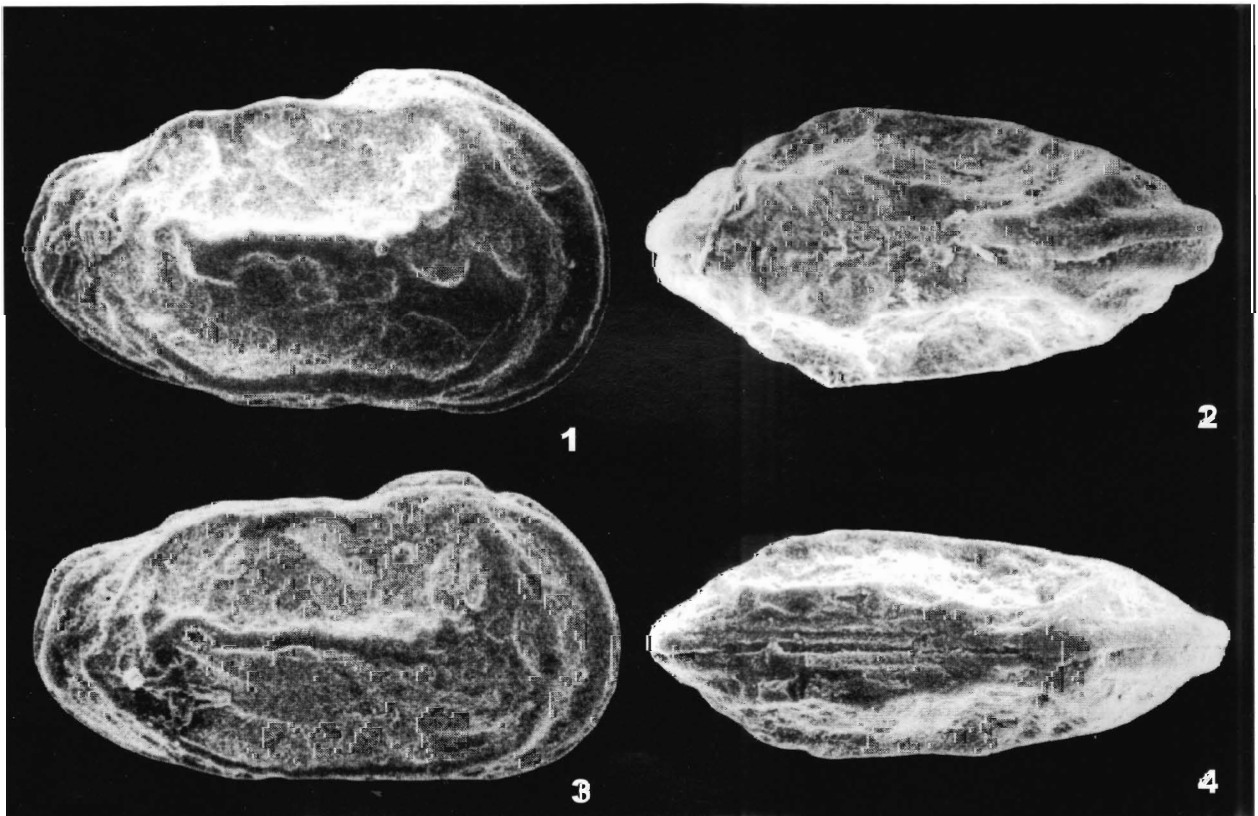
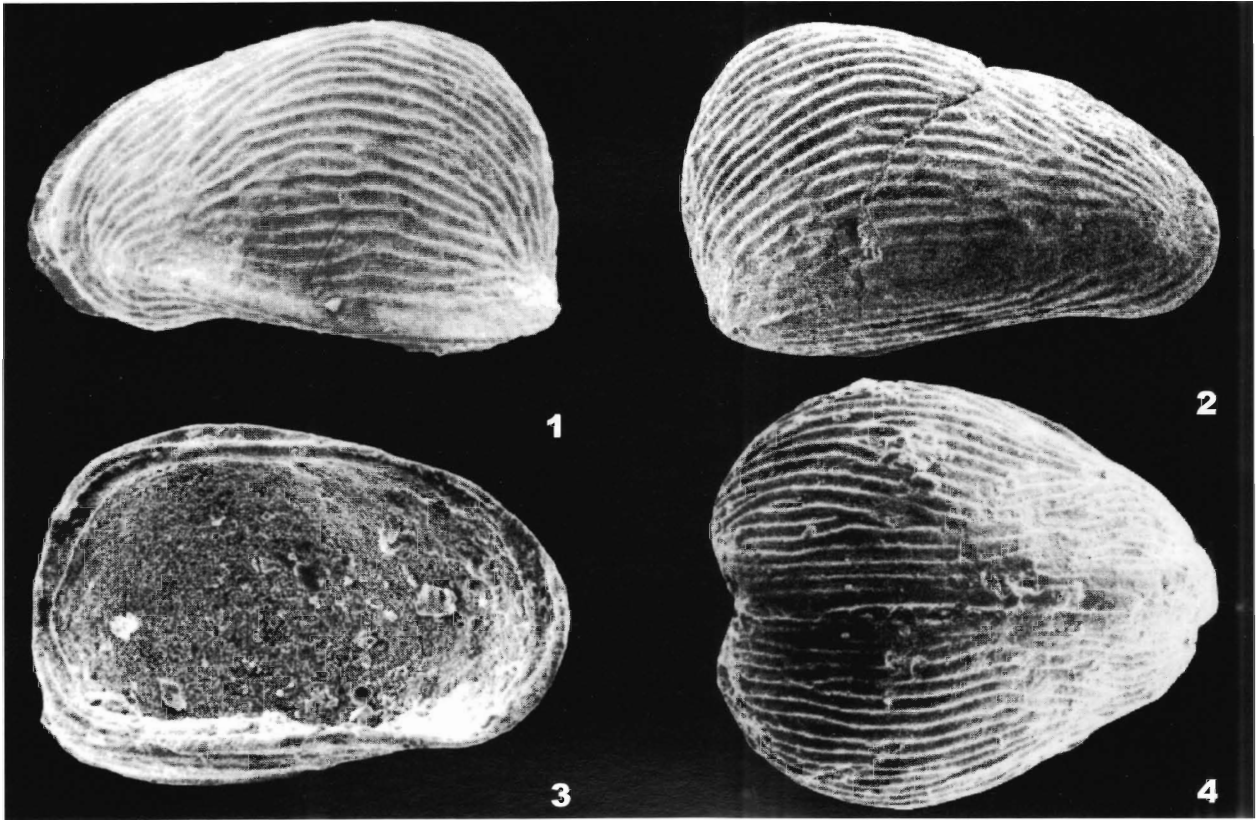
Locality and horizon: Amrapar Village, Khadir Island, Kachchh. *Corbula lyrata* bearing Shale (Sample No. KIII/4), Hadibhadang Shale Member (mid-late Bathonian), Khadir Formation.

Diagnostic characters: Carapace elongate-subquadrate in lateral outline. Valve surface ornamented by a curved anteromarginal rib; three longitudinal ribs, dorsal, median and ventral, running nearly parallel for greater part of length, anteriorly all joining with marginal rib, while posteriorly dorsal and ventral ribs converging to meet in posteromedian region, median rib remaining distinctly separate; rest of the area faintly reticulated or smooth. Mpc about 12-14 anteriorly and 3-4 posteriorly. Hinge entomodont.

Dimensions (mm): Holotype (SUGDMF No. 816), female carapace, L. 0.65, H. 0.40, W. 0.32. Paratype I (SUGDMF No. 817), female carapace, L. 0.64, H. 0.38, W. 0.30. Male carapace (SUGDMF No. 1041), L. 0.60, H. 0.30, W. 0.22. Male carapace (SUGDMF No. 1042), L. 0.62, H. 0.32, W. 0.25.

Distribution: *C. micropunctata* Range Zone, Khadir Island, Kachchh.

Figures 1-4. 1, holotype, female carapace, RVV, x 120; 2, paratype I, female carapace, DV, x 120; 3, paratype II, male carapace, RVV, x 130; 4, paratype III, male carapace, DV, x 124.



Trichordis devexa (Grekoff)

Plate 125, figures 1-2

Lophocythere devexa Grekoff, 1963, pp. 1729-1730, pl. 2, figs. 49-52.

Trichordis (Paratrachordis) devexa (Grekoff). - Khosla and Jakhar, 1993, p. 149, figs. 5.1-5.

Trichordis devexa (Grekoff). - Mette and Geiger, 2004b, pp. 82-83, pl. 4, figs. 9-10; pl. 5, figs. 1-4. - Khosla *et al.*, 2005, pp. 55-56, pl. 6, fig. 11. - Khosla *et al.*, 2006, pp. 26-27, pl. 5, fig. 9.

Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Yellow gypsiferous shale (Sample No. D14/13), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace elongate-subquadrate in lateral outline. Valve surface ornamented by three longitudinal ribs, a transverse anterior marginal rib and prominent reticulation; of longitudinal ribs, dorsal rib arcuate; median rib oblique, thick in anterior half; ventral rib nearly straight; all three longitudinal ribs join both anteriorly and posteriorly. Mpc about 15-17 anteriorly and 6-7 posteriorly. Cms consist of a vertical row of 4 scars and a V-shaped frontal scar. Hinge entomodont, anteromedian socket in RV with 2 distinct loculi.

Dimensions (mm): Carapace (SUGDMF No. 526), L. 0.60, H. 0.38, W. 0.31. Carapace (SUGDMF No. 1043), L. 0.56, H. 0.37, W. 0.32.

Distribution: Occurs widely in *P. laeviscula* Range Zone, Kachchh; *M. perforata kachchhensis* - *F. (B.) falcata* Concurrent Range Zone, Jaisalmer; Callovian of Majunga and Morondava basins, Madagascar.

Figures 1-2. 1, carapace, RVV, x 130; 2, carapace, DV, x 138.

Trichordis grumosa (Lyubimova and Mohan)

Plate 126, figures 1-2

Progonocythere grumosa Lyubimova and Mohan, in Lyubimova *et al.*, 1960, pp. 46-47, pl. 4, fig. 4.

Trichordis (Paratrachordis) grumosa (Lyubimova and Mohan). - Khosla and Jakhar, 1993, pp. 149-150, figs. 3B, 5.6-8, 6.1-3.

Trichordis grumosa (Lyubimova and Mohan). - Khosla *et al.*, 2005, p. 56, pl. 6, fig. 12.

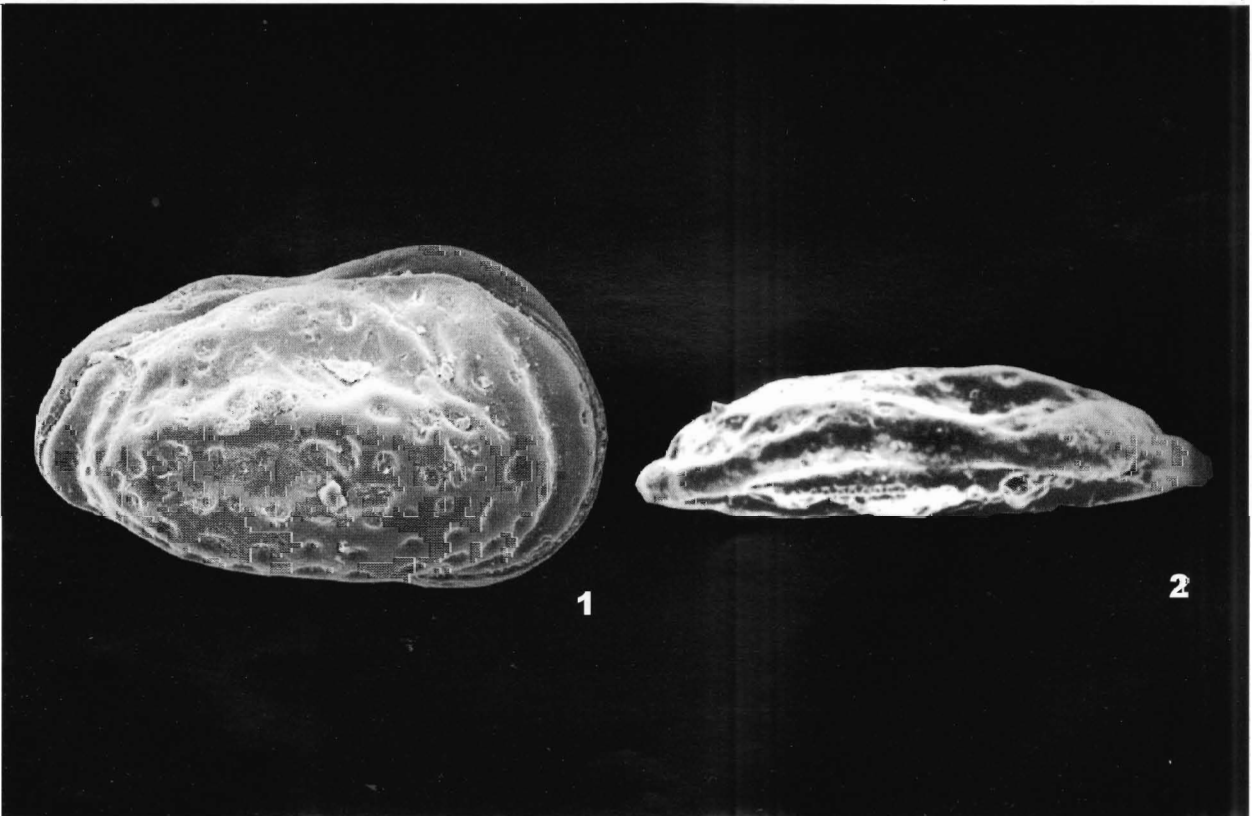
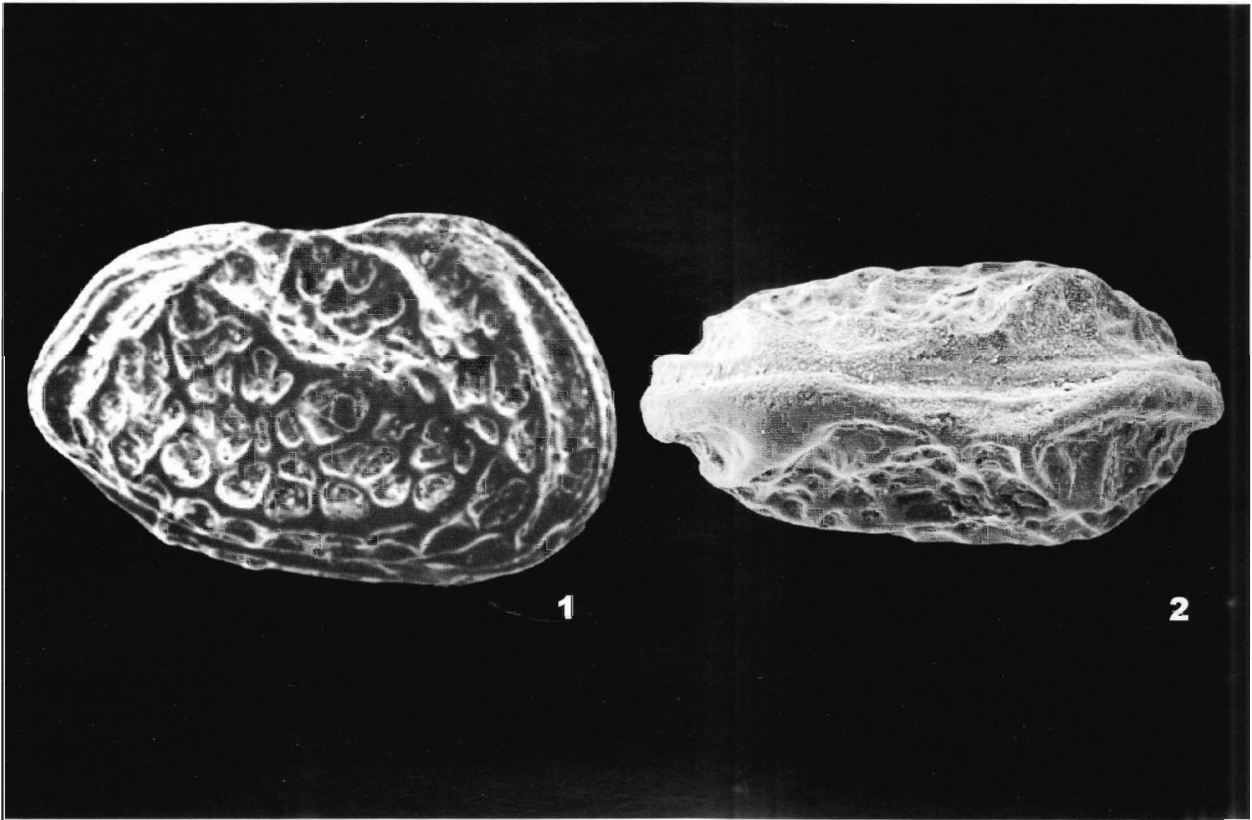
Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Yellow gypsiferous shale (Sample No. D14/13), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subquadrate in lateral outline. Valve surface ornamented by three longitudinal thick ribs, a transverse anterodorsal rib, with a furrow behind it, and coarse pits; of the longitudinal ribs, dorsal rib commences from anterodorsal region making an arch overhangs mid-dorsal margin and then descends to posterodorsal region; median rib extends from anteromedian region to posteromedian region where it joins dorsal rib; ventral rib runs from anteroventral region to posteroventral region. Mpc about 12-14 anteriorly and 3-4 posteriorly. Cms consist of a vertical row of 4 adductor scars and a large, nearly rounded frontal scar. Hinge entomodont.

Dimensions (mm): Female carapace (SUGDMF No. 527), L. 0.50, H. 0.30, W. 0.28. Male LV (SUGDMF No. 528), L. 0.68, H. 0.32.

Distribution: Except for Sadhara Dome, occurs widely in *P. laeviscula* Range Zone, Kachchh.

Figures 1-2. 1, female carapace, RVV, x 156; 2, male LV, DV, x 113.



Trichordis gujaratensis Khosla, Jakhar and Mohammed

Plate 127, figures 1-2

Afrocytheridea? sp. Neale and Singh, 1985, p. 355, pl. 2, fig. 10.

Trichordis (Trichordis) gujaratensis Khosla, Jakhar and Mohammed, 1997, pp. 24-26, pl. 6, figs. 3-5.

Trichordis gujaratensis Khosla *et al.* - Khosla *et al.*, 2005, p. 56, pl. 6, fig. 13.

Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Yellow gypsiferous shale (Sample No. D14/13), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subrectangular in lateral outline. Dorsal margin in left valve with a distinct hinge ear. Valve surface ornamented by coarse pits and a crescent-shaped depression extending from dorsomedian region anteriorly for a short distance and then turns downwards up to mid-height. Mpc about 10-11 anteriorly and 3-4 posteriorly. Hinge modified entomodont, in RV anteromedian socket with 2 wide loculi and posteromedian groove long and smooth.

Dimensions (mm): Holotype (SUGDMF No. 521), carapace, L. 0.64, H. 0.36, W. 0.35. Paratype II (SUGDMF No. 523), carapace, L. 0.64, H. 0.36, W. 0.34.

Distribution: Occurs widely in middle Jurassic of Kachchh and Jaisalmer.

Figures 1-2. 1, holotype, carapace, RVV, x 120; 2, paratype II, carapace, DV, x 122.

Trichordis hadibhadangensis Khosla, Darwin Felix and Manisha Kumari

Plate 128, figures 1-4

Trichordis hadibhadangensis Khosla, Darwin Felix and Manisha Kumari, in Khosla *et al.*, 2005, p. 56, pl. 6, figs. 14-17. - Khosla *et al.*, 2006, p. 27, pl. 5, figs. 11-12.

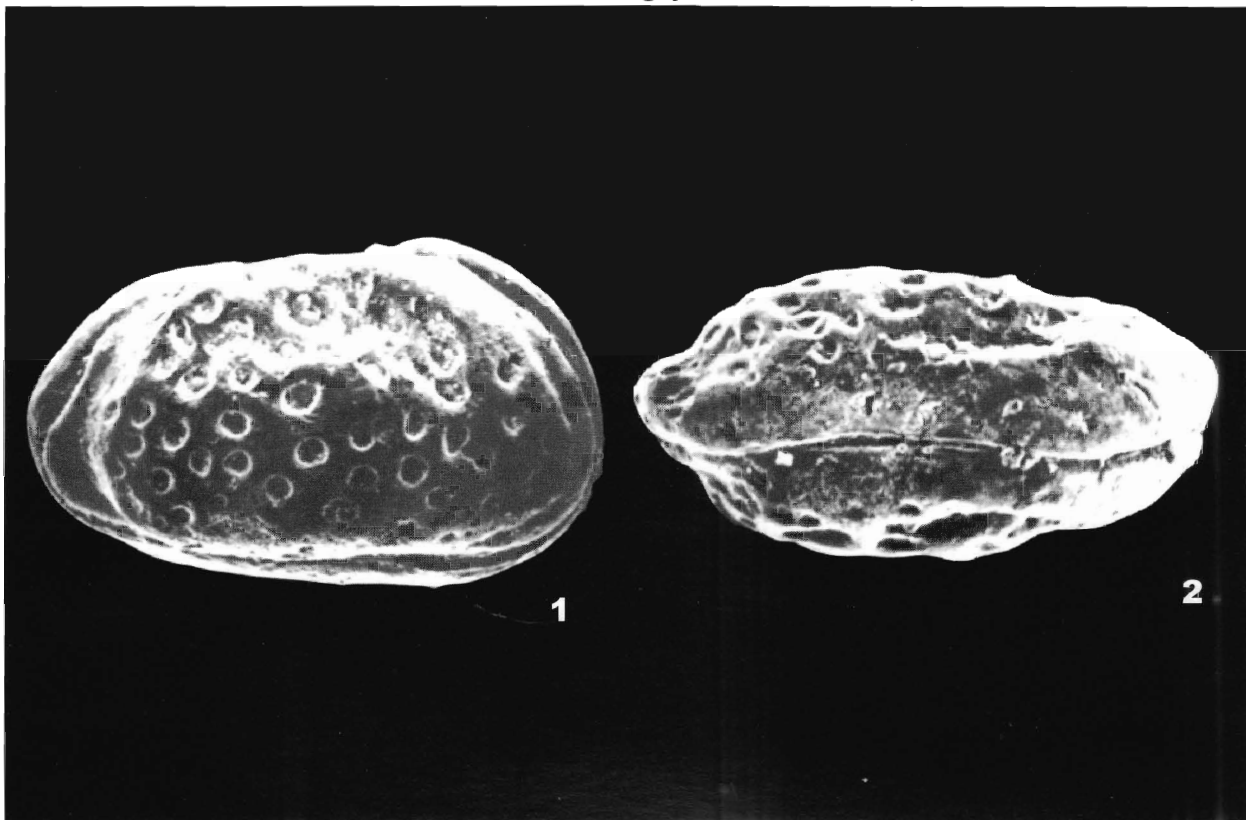
Locality and horizon: Northern escarpment of Hadibhadang Hill, close to Khara Talao, Khadir Island, Kachchh. Greyish-yellow siltstone (Sample No. KII/1), Hadibhadang Shale Member (Bajocian-Bathonian), Khadir Formation.

Diagnostic characters: Carapace elongate-subquadrate in lateral outline. Valve surface ornamented by three longitudinal ribs, an anterior marginal rib, an anterodorsal furrow and reticulation over rest of the area. Of the longitudinal ribs, dorsal rib strongly convex, overhangs a part of margin, in posterior half it turns downwardly and joins median and ventral ribs in posteromedian region; median and ventral ribs straight, nearly parallel for greater part of their length, both meeting with anteromarginal rib in mid-anterior and anteroventral regions. Mpc about 7-8 anteriorly and 3-4 posteriorly. Hinge entomodont.

Dimensions (mm): Holotype (SUGDMF No. 820), female carapace, L. 0.78, H. 0.49, W. 0.33. Paratype I (SUGDMF No. 821), male carapace, L. 0.81, H. 0.48, W. 0.41. Paratype II (SUGDMF No. 822), female LV, L. 0.75, H. 0.49.

Distribution: *T. hadibhadangensis* Range Zone, Northern Island Belt, Kachchh and Jaisalmer.

Figures 1-4. 1, holotype, female carapace, RVV, x 99; 2-3, paratype I, male carapace; 2, RVV, x 96; 3, DV, x 96; 4, paratype II, female LV, DV, x 103.



Trichordis jaisalmerensis (Kulshreshtha, Singh and Tewari)

Plate 129, figures 1-4

Lophocythere jaisalmerensis Kulshreshtha, Singh and Tewari, 1985, pp. 140-142, figs. 3.7, 3.10-3.12.

Nophrecythere jaisalmerensis (Kulshreshtha *et al.*) - Khosla *et al.*, 1997, p. 20, pl. 5, figs. 3-5.

Oligocythereis? sp. Mette and Geiger, 2004b, p. 62, pl. 8, fig. 5.

Trichordis jaisalmerensis (Kulshreshtha *et al.*) - Khosla *et al.*, 2005, pp. 56-57, pl. 7, fig. 1. - Khosla *et al.*, 2006, p. 27, pl. 5, figs. 13-14.

Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Yellow gypsiferous shale (Sample No. D14/13), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace elongate-subtriangular in lateral outline, with greatest height at anterior cardinal angle. Dorsal margin straight, sloping down backwardly; mid-dorsal obscured by overhanging surface rib; ventral margin nearly straight, turning sharply upward from posterior 1/3rd of length. Valve surface ornamented by three longitudinal ribs, converging posteriorly, a vertical rib near anterior margin extending down from eye tubercle, an anterodorsal furrow and prominent reticulation over rest of the area. Mpc 9-11 anteriorly and 3-4 posteriorly. Hinge entomodont, anteromedian socket in RV with 4-5 loculi.

Dimensions (mm): Female carapace (SUGDMF No. 984), L. 0.74, H. 0.44, W. 0.37. Male carapace (SUGDMF No. 985), L. 0.77, H. 0.43, W. 0.36. Female carapace (SUGDMF No. 511), L. 0.72, H. 0.44, W. 0.36. Female RV (SUGDMF No. 512), L. 0.72, H. 0.40.

Distribution: Occurs throughout the middle Jurassic of Kachchh and Jaisalmer, and early Callovian of Morondava Basin, Madagascar.

Figures 1-4. 1, female carapace, RVV, x 104; 2, male carapace, RVV, x 101; 3, female carapace, RVV, x 104; 4, female RV, Int. V, x 108.

Trichordis parvicarinata Khosla and Jakhar

Plate 130, figures 1-2

Trichordis parvicarinata Khosla and Jakhar, 1993, pp. 150-152, figs 6.4-8. - Mette and Geiger, 2004b, p. 62, pl. 4, figs. 5-8.

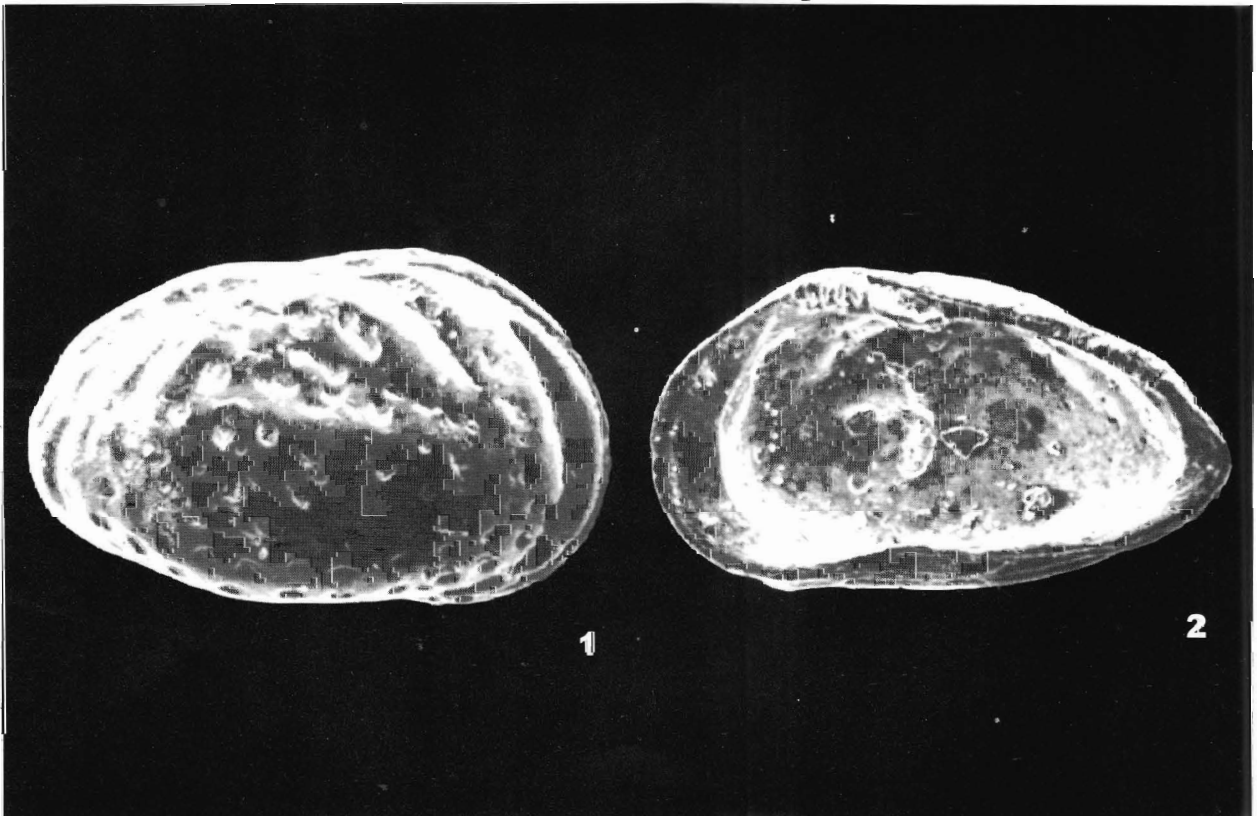
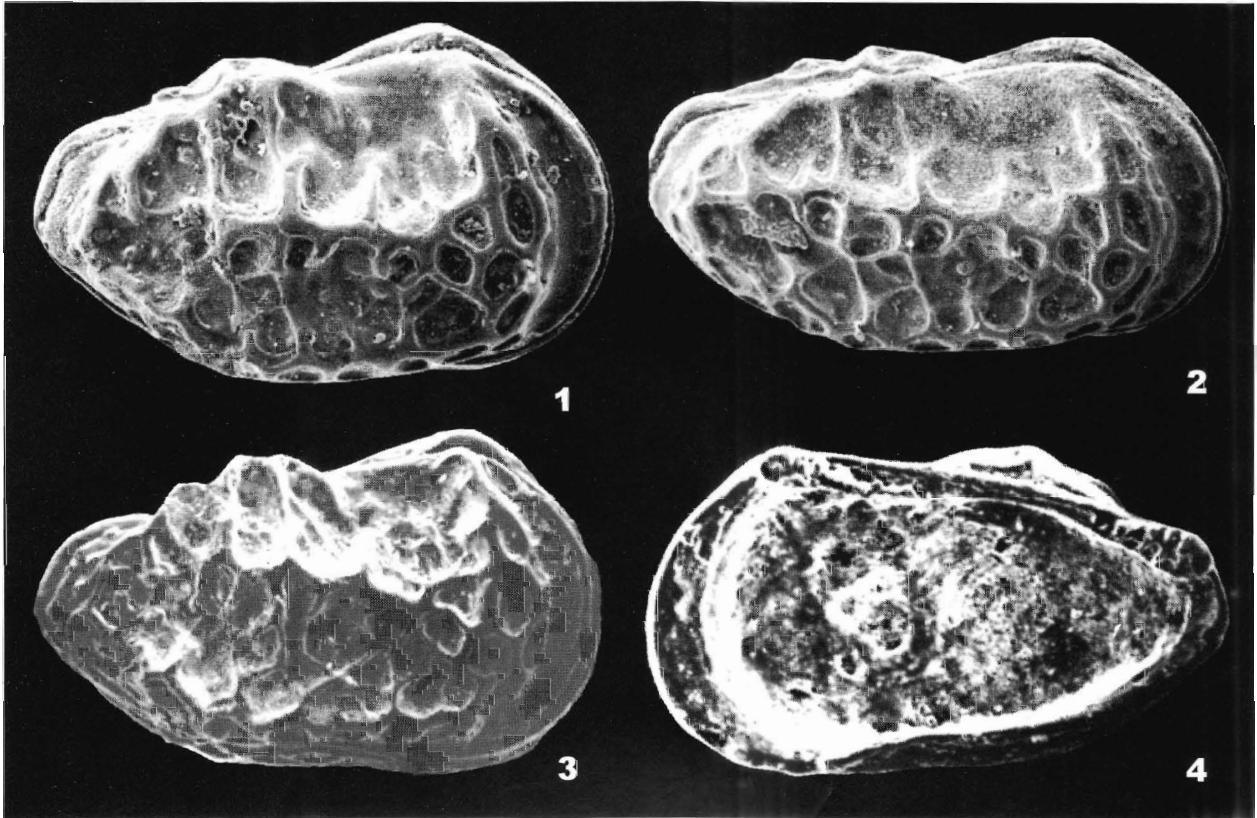
Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Yellow gypsiferous shale (Sample No. D14/13), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subquadrate in lateral outline, with greatest height at anterior cardinal angle. Valve surface ornamented by coarse pits, an anterodorsal transverse rib, with a furrow posterior to it, and three indistinct longitudinal ribs, of which only one fairly defined. Mpc 16-17 anteriorly and 4-5 posteriorly. Cms consist of a vertical row of 4 scars and a frontal scar. Hinge entomodont.

Dimensions (mm): Holotype (SUGDMF No. 529), carapace, L. 0.58, H. 0.34, W. 0.32. Paratype (SUGDMF No. 530), RV, L. 0.58, H. 0.33.

Distribution: *P. laeviscula* Range Zone, Habo Dome, Kachchh, early Callovian of Morondava Basin, Madagascar.

Figures 1-2. 1, holotype, carapace, RVV, x 133; 2, paratype, RV, Int. V, x 136.



Trichordis praetexta Grekoff

Plate 131, figures 1-2

Trichordis praetexta Grekoff, 1963, p. 1742, figs. 109-123; pl. 9, figs. 227-229. - Khosla *et al.*, 2006, p. 27, pl. 5, fig. 15.

Trichordis sp. cf. *T. praetexta crispa* Grekoff. - Guha, 1977, p. 89, pl. 3, fig. 17.

Pokornya kuldharaensis Singh and Kulshreshtha, 1972 in Kulshreshtha *et al.*, 1985, p. 127, figs. 4.7-4.11.

Trichordis (Trichordis) praetexta Grekoff. - Khosla *et al.*, 1997, p. 26, pl. 6, figs. 6-7.

Trichordis praetexta magna Mette and Geiger, 2004b, pp. 80-82, pl. 3, figs. 7, 9-10; pl. 4, figs. 1-4.

Locality and horizon: Near Dhrang Village, Habo Dome, Kachchh. Yellow gypsiferous shale (Sample No. D14/13), Chari Formation (late Bathonian-Callovian).

Diagnostic characters: Carapace subrectangular in lateral outline and biconvex in the dorsal; greatest height at anterior cardinal angle. Left valve larger than right valve overlapping all along margin, more conspicuously along anterodorsal and posterodorsal margins. Valve surface ornamented by a peripheral rib along dorsal, anterior and ventral margins, a median longitudinal rib, a depression between peripheral and median ribs, and rest of the area pitted.

Dimensions (mm): Carapace (SUGDMF No. 524), L. 0.62, H. 0.35, W. 0.34. RV (SUGDMF No. 525), L. 0.62, H. 0.32.

Distribution: Late Bathonian-early Callovian Mainland Kachchh and Jaisalmer and Majunga and Morondava basins, Madagascar.

Figures 1-2. 1, carapace, RVV, x 126; 2, RV, Int. V, x 124.

Genus A

Plate 132, figures 1-2

Genus A Khosla *et al.*, 2006, pp. 28-29, pl. 6, figs. 18-19.

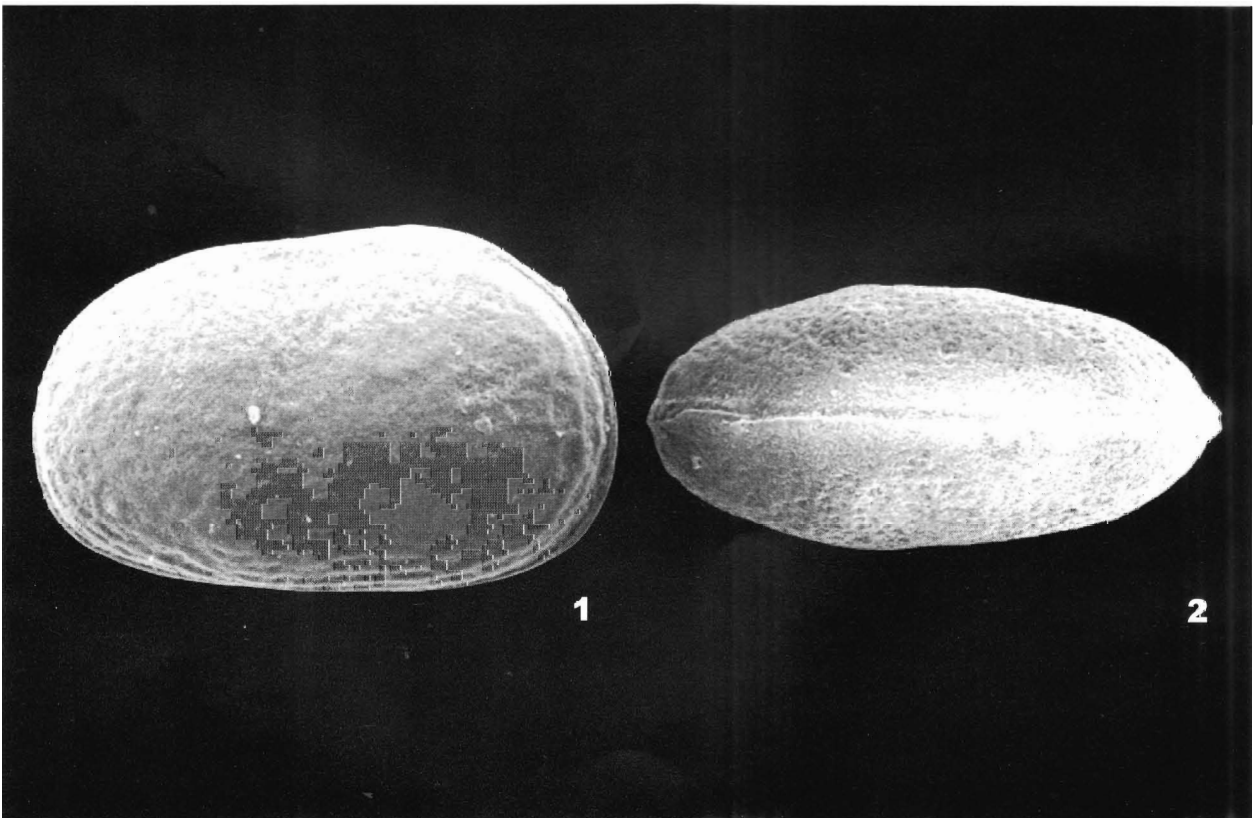
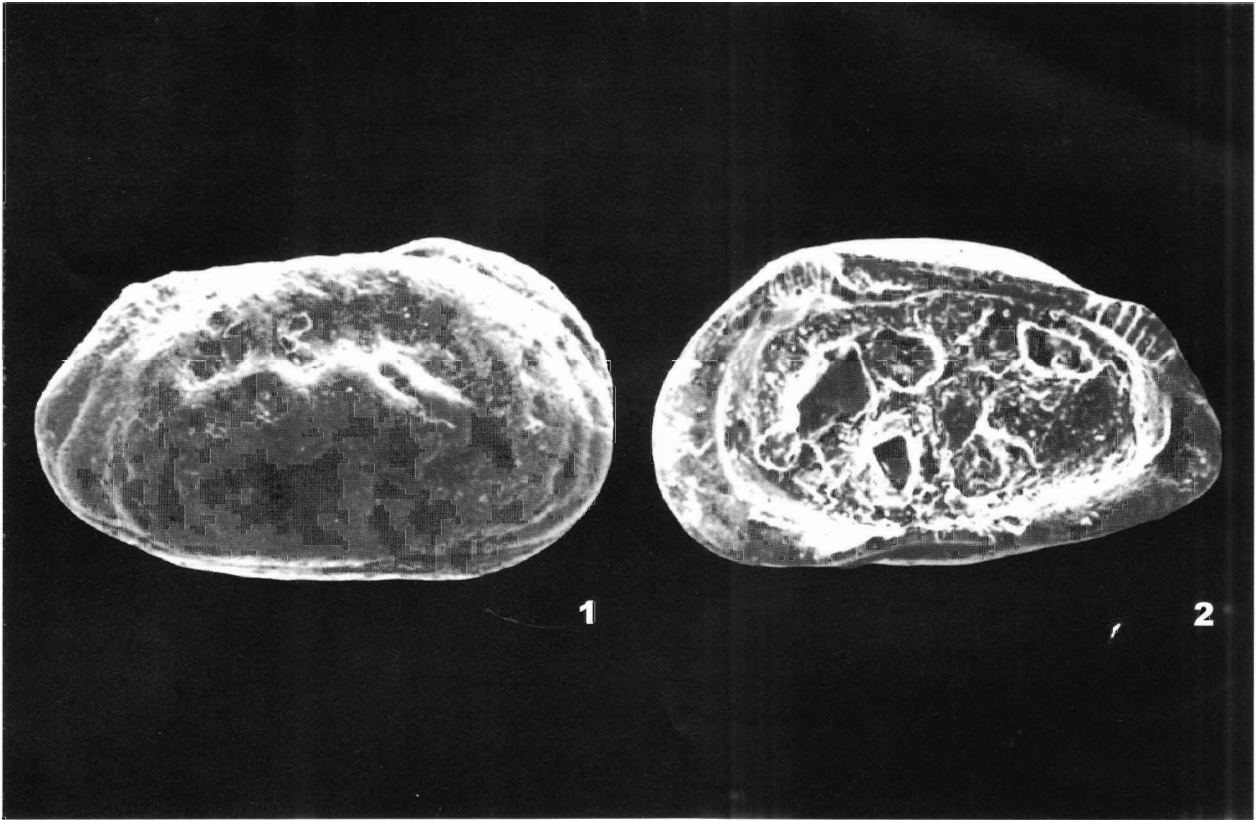
Locality and horizon: Escarpment of the fort hill, 1/2 km NW of Jaisalmer Railway Station. Fossiliferous sandstone (Sample No. FA/4), Fort Member (Bajocian-Bathonian), Jaisalmer Formation.

Diagnostic characters: Carapace subquadrate in lateral outline; with greatest height and width anterior to middle. Left valve slightly larger than right valve, overlapping along anterior margin. Dorsal margin straight, sloping down posteriorly; ventral margin weakly convex; anterior margin broad and obliquely rounded; posterior somewhat narrowly rounded. Valve surface faintly pitted with 2-3 fine ribs along anterior and ventral peripheries.

Dimensions (mm): Carapace (SUGDMF No. 1009), L. 0.48, H. 0.30, W. 0.22. Carapace (SUGDMF No. 1010), L. 0.50, H. 0.32, W. 0.24.

Distribution: *T. hadibhadangensis* Range Zone, Jaisalmer.

Figures 1-2. 1, carapace, RVV, x 160; 2, carapace, DV, x 152



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