

GENUS ANOMALINELLA FROM MIDDLE EOCENE AND OLIGOCENE ROCKS OF SOUTH-WESTERN KUTCH, WESTERN INDIA.

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ABSTRACT

This paper records the presence of *Anomalinella* (*Preanomalinella*) Singh (1972) from Middle Eocene and Oligocene rocks of Kutch. The presence of *Anomalinella* (*Preanomalinella*) *motaberensis* sp. nov., throughout the Babia Stage, Middle Eocene, and *Anomalinella* (*Preanomalinella*) *kutchensis* sp. nov. in the rocks of Lakhpatt Series of Oligocene provides evidence for a continuous evolution of the genus *Anomalinella* s. l. in the Palaeogene succession of western India.

INTRODUCTION

This paper includes two new species of genus *Anomalinella* (*Preanomalinella*) Singh (1972), *Anomalinella* (*Preanomalinella*) *motaberensis* sp. nov. from the Middle Eocene rocks of Kutch, Babia stage of Biswas (1965) and *Anomalinella* (*Preanomalinella*) *kutchensis* sp. nov. from the Oligocene rocks of Kutch, Lakhpatt series of Tandon (1970). An attempt has also been made to establish a continuous evolutionary series on the basis of the three species described from the western Indian region. Besides the generic characters of *Anomalinella* s. s., the subgenus *Preanomalinella* Singh, exhibits variation mainly in the asymmetry of the test and the primary aperture. The Middle Eocene form *Anomalinella* (*Preanomalinella*) *motaberensis* and the Upper Eocene form *Anomalinella* (*Preanomalinella*) *sureshi* show asymmetry of the test and extension of the primary aperture on the ventral side and in the Oligocene form *Anomalinella* (*Preanomalinella*) *kutchensis*, the asymmetry of the test is less pronounced but the aperture extends more on the dorsal side. The supplementary aperture is present in all the forms without any visible variation.

Since all the forms belonging to the pre-Miocene genus *Anomalinella* have been designated to the Subgenus *Preanomalinella*, the forms from Miocene to Recent are designated as *Anomalinella* (*Anomalinella*).

Genus *Anomalinella* Cushman 1927

Subgenus *Preanomalinella* Singh 1972

Anomalinella (*Preanomalinella*) *motaberensis* sp. nov.

(Pl. I—1-4; Pl. III—1-3)

Description. Test free, early stage slightly trochoid, adult nearly planispiral, involute, biumbonate, asymmetrical, ventral side more convex, wall calcareous, hyaline, coarsely perforate, granular in microstructure with nonperforate keel and sutures, chambers 8-9 gradually increasing in size, sutures distinct, raised, gently curved on the ventral side, strongly curved on the dorsal side. Primary aperture interiomarginal, suboval, asymmetrical, extending more on the ventral side with a prominent lip, resting against the periphery of the previous whorl, apertural face slightly depressed, supplementary apertures present on the dorsal side only, running parallel to the periphery, consisting of elongate slits in between the thick keel and a thin imperforate plate in each chamber, covered by a single row of pores, the one on the last chamber being open.

Measurements in mm.

	Max. diameter	Min. diameter	Thick- ness
Holotype No. LUIP 1001	0.587	0.5	0.275
Paratype No. LUIP 1002	0.536	0.463	0.275
LUIP 1003	0.5	0.463	0.25
LUIP 1004	0.463	0.387	0.25
LUIP 1005	0.4	0.336	0.2
LUIP 1006	0.525	0.451	0.25

SYSTEMATIC DESCRIPTION

<i>Super family</i>	Cassidulinacea	d'Orbigny 1839
<i>Family</i>	Anomalinidae	Cushman 1927
<i>Subfamily</i>	Almaeninae	Myatlyule 1959

Comparison and Remarks. *Anomalinella (Preanomalinella) motaberensis* sp. nov. differs from *Anomalinella (Preanomalinella) sureshi* Singh in having suboval aperture and more convex form, from *Anomalinella (Preanomalinella) kutchensis* sp. nov. in less coarse perforation and in aperture extending on the ventral side.

Type Horizon: Babia Stage (Middle Eocene)

Type locality: About 1.5 Km east of Jhadwa village (23°30'30": 68°36'30") in a nala section, district Kutch, Western India.

Repository: Author's collection, Holotype No. LUIP 1001 and Paratypes No. LUIP 1002 to 1006.

Anomalinella (Preanomalinella) kutchensis sp. nov.

(Pl. II—1-4; Pl. III—4-6)

Description. Test free, early stage slightly trochoid, adult nearly planispiral, involute, biumbonate, asymmetrical to nearly symmetrical, ventral side more convex, perforation very coarse, wall calcareous, hyaline, granular in microstructure with nonperforate keel and sutures, chambers 9 to 10, gradually increasing in size, sutures distinct, thick and raised, gently curved on the ventral side while strongly curved on the dorsal side. Primary aperture, interiomarginal, suboval, asymmetrical, extending more on the dorsal side, with a prominent lip, resting against the periphery of the previous whorl, apertural face depressed; supplementary apertures present on the dorsal side only, running parallel to the periphery consisting of elongate slits in between the thick keel and a thin imperforate plate in each chamber, covered by a single row of pores, the one on the last chamber being open.

Measurement in mm.

	Max. diameter	Min. diameter	Thick- ness
Holotype No. LUIP 1007	0.513	0.436	0.25
Paratypes No. LUIP 1008	0.563	0.475	0.3
1009	0.551	0.487	0.275
1010	0.513	0.436	0.275
1011	0.563	0.487	0.275
1012	0.663	0.551	0.3

Comparison and Remarks. *Anomalinella (Preanomalinella) kutchensis* sp. nov. differs from *Anomalinella (Preanomalinella) sureshi* Singh and *Anomalinella (Preanomalinella) motaberensis* sp. nov. in the test being slightly asymmetrical and the asymmetrical aperture extending more on the dorsal

side. It differs from *Anomalinella (Anomalinella) rostrata (Brady)* in coarse perforation and in having asymmetrical test and aperture.

Type horizon: Lakhpat Series (Oligocene).

Type Locality: Type locality 0.5 Km East of village Bermota, (23°27'45": 68°38'25") district Kutch, Western India.

Repository: Author's collection Holotype No. LUIP 1007 and Paratype No. LUIP 1008 to 1012.

DISCUSSION AND REMARKS

Tracing the variational trends in the species of subgenus *Preanomalinella* from the Middle Eocene through Oligocene (Text Fig. 1), *Anomalinella (Preanomalinella) motaberensis* is seen to be more convex on the ventral side, primary aperture suboval extending on the ventral side. The Upper Eocene form *Anomalinella (Preanomalinella) sureshi* is again convex towards the ventral side, but shows maximum asymmetry in aperture, being sub-quardangular in shape and extending more on the ventral side. The Oligocene form *Anomalinella (Preanomalinella) kutchensis* is closer in appearance to *Anomalinella (Anomalinella)*, is slightly asymmetrical in shape, but the aperture is suboval to oval extending on the dorsal side instead. This reduction in the asymmetry of the test, shape of the primary aperture and fluctuation in the extension of aperture shows a tendency in the evolutionary trend of *Anomalinella (Preanomalinella)* towards the achievement of a nearly symmetrical form in *Anomalinella (Anomalinella)* in the Miocene period.

The supplementary aperture is open in the final chamber of all the species of *Anomalinella* s. l., but in the earlier chambers, it is covered by a narrow perforate plate with single row of pores, bordered by a narrow imperforate plate and the peripheral keel. The perforate plate if removed, shows an elongate slit similar in appearance to the supplementary aperture in the last chamber.

It is interesting to note that the genus *Anomalinella* s. l. with most of its generic characters remaining the same, has been reported from the Middle Eocene to Oligocene rocks only from the Western coast of India (Kutch and Surat), while it shows a wide geographical distribution from Miocene to Recent.

Except for the involute nature of the test, *Anomalinella* shows great similarity to the genus *Queraltina* in coarse perforations, microstructure of the wall, presence and position of primary and supplementary apertures. It appears that both the genera have evolved from the same stock.

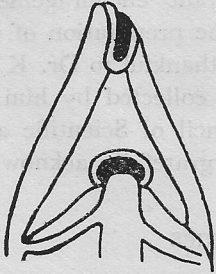
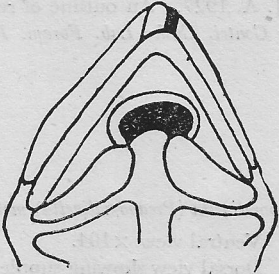
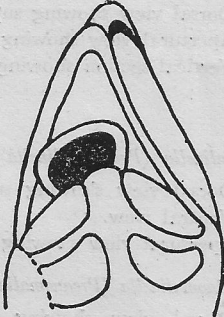
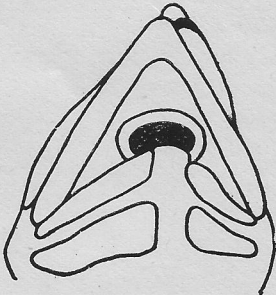
<p>MIOCENE TO RECENT</p>	<p><u>Anomalinella</u>(<u>Anomalinella</u>) <u>rostrata</u> (Brady)</p>	
<p>OLIGOCENE</p>	<p><u>Anomalinella</u>(<u>Preanomalinella</u>) <u>kutchensis</u> sp. nov.</p>	
<p>UPPER EOCENE</p>	<p><u>Anomalinella</u>(<u>Preanomalinella</u>) <u>sureshi</u> Singh</p>	
<p>MIDDLE EOCENE</p>	<p><u>Anomalinella</u>(<u>Preanomalinella</u>) <u>motaberensis</u> sp. nov.</p>	

Fig. 1—Probable evolutionary trends in shape of test and apertural character in the genus *Anomalinella* s. l.

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EXPLANATION OF PLATES

PLATE I

Anomalinella (*Preanomalinella*) *motaberensis* sp. nov.

1. Ventral view $\times 104$.
2. Dorsal view showing supplementary aperture $\times 104$.
3. Apertural view showing the primary aperture $\times 128$.
4. Vertical section showing early trochoid and late planispiral coiling.

PLATE II

Anomalinella (*Preanomalinella*) *kutchensis* sp. nov.

1. Ventral view $\times 105$.
2. Dorsal view showing supplementary aperture $\times 105$.
3. Apertural view showing the primary aperture $\times 124$.
4. Vertical section showing early trochoid and late planispiral coiling.

PLATE III

Anomalinella (*Preanomalinella*) *motaberensis* sp. nov. $\times 123$.

1. Dorsal view showing supplementary aperture.
2. Ventral view.
3. Apertural view showing the primary aperture.

Anomalinella (*Preanomalinella*) *kutchensis* sp. nov. $\times 113$.

4. Dorsal view showing supplementary aperture.
5. Ventral view.
6. Apertural view showing the primary aperture.

