TWO ABERRANT TYPES OF NUMMULITIDAE FROM THE EOCENE OF RAJASTHAN, INDIA

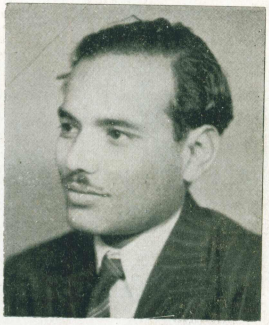
S. N. SINGH

Department of Geology, University of Lucknow, India

ABSTRACT—Two aberrant types of *Nummulitidae—Eoassilina elliptica* gen. et sp. nov. and *Nummulites asymmetrica* sp. nov., from the Eocene of Rajasthan are figured and described in this paper. The new genus *Eoassilina* is characterised by its elliptical form and slight trochoid coiling. In *N. asymmetrica* sp. nov., the polar region is eccentric instead of being centrally placed.

INTRODUCTION

DURING the course of a detailed study of the Eocene foraminiferal fauna of Rajasthan, the author noticed two unusual forms of Nummulitidae which have not hitherto been recorded. One of the forms is described in this paper as *Nummulites asymmetrica* sp. nov. This comes from the Kirthar (Middle Eocene) formation exposed near Kolayat, a village about 30 miles south-west of Bikaner. It is distinguished from all other species of *Nummulites* by the eccentric position of the polar region, asymmetrical form of the test and an unequal development of the flange. The other aberrant form described here under the name *Eoassilina elliptica* gen. et sp. nov. is from the Laki (Lower Eocene) horizon of Palano, which is about 10 miles south of Bikaner. This new genus is distinguished by the elliptical form of the test and the noticeable departure from the planispiral coiling of the Nummulitidae to a slight trochoid and shifting of planes of coiling.



SYSTEMATIC DESCRIPTION

Family NUMMULITIDAE

Genus NUMMULITES Lamark, 1801

NUMMULITES ASYMMETRICA sp. nov.

Pl. 25, figs. 1–4, text-fig. 1

Description: The test is not circular but irregular in shape and markedly asymmetrical. The polar portion is eccentric in position. About three-fourth portion of the polar region is surrounded by flange, which is absent on one side. This is well seen in the axial section figured in Plate 25. Since the test is not circular, the diameters are not uniform. In one test the maximum diameter measured 13.8 mm., and the minimum 11.2 mm. The thickness of the test at the pole is 3.8 mm. and the margin 1.25 mm. The septal filaments meander slightly and the pillars are situated along them (text-fig. 1).

Due to the irregular nature of the test a complete equatorial section is difficult to obtain. The whorls near the centre are irregular and closely coiled, near the periphery the coiling is very irregular and loose. In a radius of 2 mm. from the centre there are 6–7 whorls; in a radius of 7 mm. there are about 11–12 whorls. The width of the

whorl lamina increases gradually from centre to periphery. The height of the chambers upto seventh whorl is always more than the width but after the seventh whorl the dimensions vary, generally the width being more than the height. Number of septa in 1/8 of a whorl is as follows:—

In 1/8 of the	3rd	whorl	there	are	.. 2	septa
,, ,, ,, ,,	4th	,,	,,	,,	.. 2–3	,,
,, ,, ,, ,,	5th	,,	,,	,,	.. 3–4	,,
,, ,, ,, ,,	6th	,,	,,	,,	.. 4–5	,,
,, ,, ,, ,,	7th	,,	,,	,,	.. 5	,,
,, ,, ,, ,,	8th	,,	,,	,,	.. 6	,,
,, ,, ,, ,,	9th	,,	,,	,,	.. 8	,,
,, ,, ,, ,,	10th	,,	,,	,,	.. 9–10	,,
,, ,, ,, ,,	11th	,,	,,	,,	.. 11–12	,,

In axial section the whorls are seen to be enveloping. The whorl lamina on one side is 'V' shaped and on the other 'U' shaped; on the side where the whorl lamina

TEXT–FIG. 1—*Nummulites asymmetrica* sp. nov. x 9.

is 'V' shaped, the marginal card is well developed, and the nucleoconch is placed eccentrically. The pillars are prominent and start from the earliest whorls reaching the surface.

Comparison. The irregular nature of the whorl lamina of the present species can be compared with that of the two species *N. irregularis* Deshayes described by Davies from the Salt Range Lower Eocene, and *N. somaliensis* Nuttall and Brighton described from the Eocene of Somaliland. The number of septa and the variation in the width of the whorl lamina is very similar to *N. maculatus* Nuttal, but the size and the shape of the chambers are different. The number of septa in $\frac{1}{4}$ of each whorl is similar to that in *N. maculatus* and *N. somaliensis*, but the species differs in all other characters from both. The distinguishing character of the species under description is the eccentric position of the polar region which does not appear to have been noticed in any other species of *Nummulites* described so far.

Locality: Near Kolayat, Bikaner, Rajasthan.

Originals: Author's collection.

Occurrence: *Nummulites asymmetrica* sp. nov. is from a white arenaceous limestone full of foraminiferal tests. The associated foraminifera are: *Nummulites maculatus* Nuttall, *N. stamineus* Nuttal, *Dictyoconoides cooki* (Carter), *Linderina kolayatensis* Singh, *L. bikanerensis* Singh, *L. kirtharensis* Singh, *L. rajasthanensis* Singh, and *Alveolina* (*Flosculina*) spp., besides other foraminifers. The presence of the restricted species *Nummulites maculatus* and *N. stamineus* fixes the age of the bed as lower part of Middle Kirthar. Seven specimens of *N. asymmetrica* sp. nov. are in my collection.

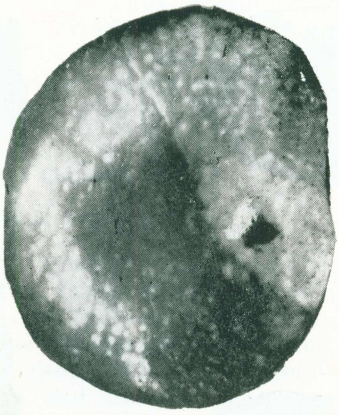
Genus EOASSILINA gen. nov.,

Genotype EOASSILINA ELLIPTICA Singh, sp. nov.

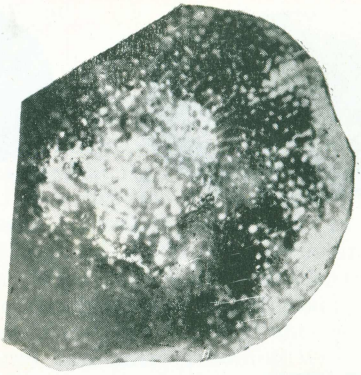
Diagnosis: Test ellipitcal with coarse granules, which are disposed in an elliptical spiral; whorl lamina loose, non-enveloping and irregular with a tendency toward trochoid coiling; septa slightly thicker in the centre, irregular in shape near the

EXPLANATION OF PLATE 25

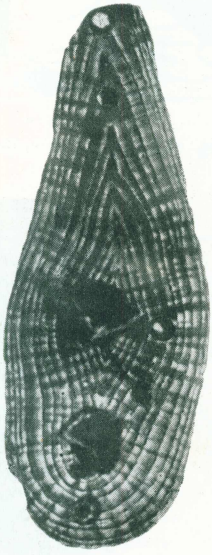
FIG. 1—*Nummulites asymmetrica* sp. nov. external view, showing form of the test. x7.
2—*Nummulites asymmetrica* sp. nov. external view, slightly abraided specimen, showing nature of septal filaments and disposition of pillars. x7.
3—*Nummulites asymmetrica* sp. nov. axial section. x7.
4—*Nummulites asymmetrica* sp. nov. horizontal section. x10.



1



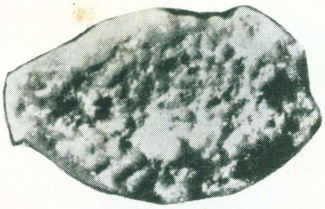
2



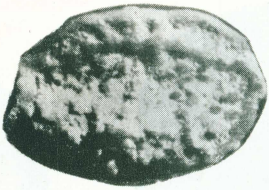
3

4

SINGH : ABERRANT NUMMULITES FROM EOCENE, RAJASTHAN



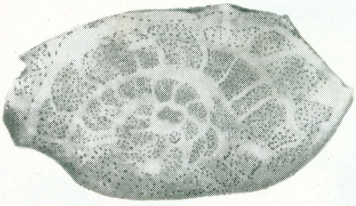
1



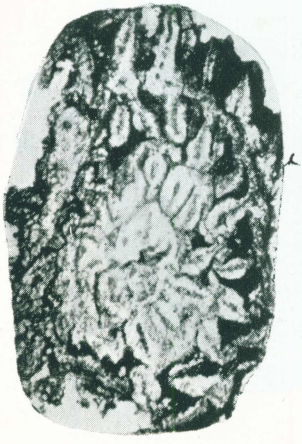
2

4

3

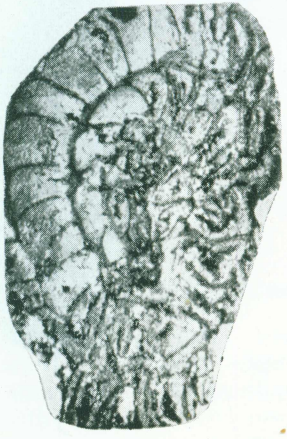


5



6

7



8

SINGH : ABERRANT NUMMULITES FROM EOCENE, RAJASTHAN

periphery; marginal cord present and well developed.

Remarks: The new genus *Eoassilina* is characterised by its irregular coiling along shifting planes and axes and also in showing slight trochoid tendency; shape of the septa irregular in the later whorls.

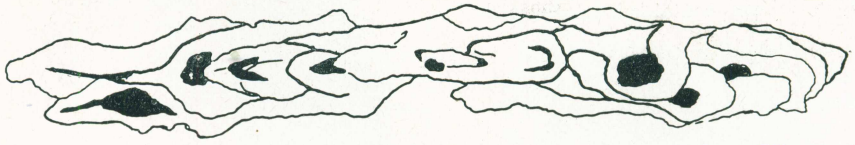
EOASSILINA ELLIPTICA sp. nov.

Pl. 26, figs. 1–6, text-fig. 2

Description: Test small, elliptical, irregular and wavy with a sharp margin; surface covered with coarse granules smaller near the centre, bigger at the periphery and arranged in an elliptical spiral at the junction of the septa and the whorl lamina. Measurements of ten specimens are given in the accompanying Table.

Four equatorial and two axial sections were studied for internal structures.

Owing to the slight trochoid nature of the test, it is difficult to obtain a complete equatorial section with nucleoconch. The form is megalospheric. The nucleoconch is composed of two subequal chambers separated by a straight septum. The initial chamber measured at right angles to septum is $\pm 90\ \mu$ and parallel to the septum $\pm 145\ \mu$, the second chamber measured as before is $\pm 125\ \mu$ and $\pm 145\ \mu$. The coiling is elliptical. There are 4 to 5 whorls, the first and second whorls are coiled practically in the same plane, but the later ones have different planes and axes of coiling with a trochoid tendency; chambers are higher than broad, the septa in the earlier whorls are curved with a slight thickening in the middle, in the later whorls the septa are irregular and wavy in shape.



TEXT–FIG. 2—*Eoassilina elliptica*, gen. et sp. nov. x 30. Type locality : Palana, Bikaner, India

TABLE 1

Specimen No.	Longer diameter	Shorter diameter	Thickness
1	5 mm.	3.2 mm.	.88 mm.
2	4 mm.	2.5 mm.	.63 mm.
3	3.2 mm.	2 mm.	.43 mm.
4	4 mm.	3 mm.	.55 mm.
5	6 mm.	3.5 mm.	.73 mm.
6	3.8 mm.	2.6 mm.	.73 mm.
7	4 mm.	2.6 mm.	.62 mm.
8	6 mm.	4 mm.	.9 mm.
9	4.5 mm.	3 mm.	.5 mm.
10	3.5 mm.	2.5 mm.	.45 mm.

In axial section the whorls are seen to be non-enveloping, the axis of coiling of each whorl is different and the marginal cord is well developed (text-fig. 2).

Originals: Author's collection.

Occurrence: *Eoassilina elliptica* gen. et sp. nov. occurs in the Fuller's earth (Lower Eocene), Palana, Bikaner. The associated foraminifera are *Assilina granulosa* d'(Archiac), *Assilina leymeriei* d'Archiac and *Operculina* spp.

EXPLANATION OF PLATE 26

FIG. 1—*Eoassilina elliptica* gen. et sp. nov.; external view. x12.
2—*Eoassilina elliptica* gen. et sp. nov.; external view. x12.
3—*Eoassilina elliptica* gen et sp. nov.; external view, slightly abraided specimen, showing irregular nature of coiling. x12.
4—*Eoassilina elliptica* gen. et sp. nov.; axial section. x24.
5—*Eoassilina elliptica* gen. et sp. nov.; horizontal section. x12.
6—*Eoassilina elliptica* gen. et sp. nov.; horizontal section. x25.
7—*Eoassilina elliptica* gen. et sp. nov.; horizontal section. x25.
8—*Eoassilina elliptica* gen. et sp. nov.; horizotnal section. x25.

ACKNOWLEDGEMENT

I am indebted to Prof. S. R. Narayan Rao for guidance and encouragement during the work.

REFERENCES

COLE, W. S., 1953, Criteria for recognition of certain assumed Camerinid genera. *Bull. Amer. Pal.*, vol. 35, No. 147, pp. 3–15, pls. 1–3.

CUSHMAN, J. A., 1955, Foraminifera, their classification and Economic use, 4th edition.

DAVIES, L. M., and PINFOILD, E. S., 1937, The Eocene beds of Punjab Salt-Range. *Pal. Ind.*, N.S. Vol. 24, Mem. 1.

GILL, W. D. 1953, The genus *Assilina* in the Laki series (Lower Eocene) of the Kohat Potwar basin, Northwest Pakistan. *Contr. Cush. Found. Foram. Res.*, Vol. IV, pt. 2, pp. 76–84, pls. 13–14

NUTTAL, W. L. F., 1925, The Stratigraphy of Laki series (Lower Eocene) of parts of Sind and Baluchistan, India, with a description of the larger foraminifera contained in those beds. *Quart. Journ. Geol. Soc.*, vol. 81, pp. 417–453, Pls. 23–27.

NUTTAL, W. L. F., 1926, The Zonal distribution and description of the larger Foraminifera of the (Middle) and Lower Kirthar series (Middle Eocene) of parts of Western India. *Rec. Geol. Surv. Ind.*, vol. 59, pt. 1, pp. 115–164, pls. 1–8.

NUTTALL, W. L. F., and BRIGHTON, A. G., 1931, Larger Foraminifera from the Tertiary of Somaliland. *Geol. Mag.*, Vol. 68, No. 800, pp. 49–65, pls. 1–4.

MME. DE CIZANCOURT, and COX, L. R., 1937, Contribution a l'étude des faunes tertiares de l'Afghanistan. *Mem. Soc. Geol. France.*, N. S. *Mem.* No. 39.

MEM DE CIZANCOURT, 1948, Nummulites de L'ile de la Barhade, *Mem. Soc. Geol. France.*, *N. S. Mem.* No. 57.

SINGH, S. N., 1953, Geology of area W.S.W. of March village near Kolayat, Bikaner, Rajasthan, *Proc. Nat. Acad. Sci.*, Vol. 23, sec. B, pts. 1–III, pp. 13–20.

———— 1952, On the extension of Kirthar sea to Rajasthan., *Proc. Nat. Acad. Sci.*, Vol. 22, sec. B, pts. 1–4, pp. 7–10.