SYSTEMATIC STUDY OF NEW SPECIES OF THE GENERA FABULARIA AND KATHINA FROM PALEOCENE

(Paleosen'de Fabularia ve Kathina'ya ait yeni türlerin etüdü)

Ercüment Sirel
Mineral Research and Exploration Institute of Turkey, Ankara

Öz. — Kars Bölgesi (NE Türkiye) Paleosen'inde bulunan Fabularia ve Kathina'nın yeni türleri ve bunlarla beraber bulunan Foraminiferlerin sistematik etüdleri verilmiştir.

Abstract. — Systematic study of new species of the genera Fabularia and Kathina with associated Foraminifera in Paleocene of Kars Region (NE TURKEY), are given.

INTRODUCTION

In the samples collected by geologist M. Şenalp in 1967 from the Kars Region (Fig. 1), yielded new species of the genera Fabularia (Family Miliolidae) and Kathina (Family Rotaliidae) and other rare species of foraminifers.

The specimens are deposited at the Paleontological section of the Mineral Research and Exploration Institute of Turkey, Ankara

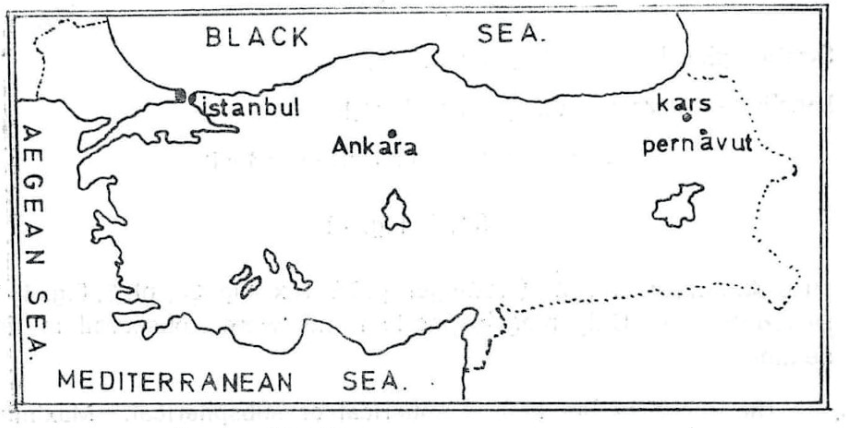

Fig. 1 : Location map

SYSTEMATIC DESCRIPTION

Family ALVEOLINIDAE Ehrenberg 1839

Genus Alveolina d'Orbigny 1826

Alveolina globula Hottinger 1960

(PI. I, Fig. 1 -2)

1960. **A. globula** Hottinger, (Hott., p. 81, text Fig. 38 a - c; pl. 3, Fig. 11) **Description.** — In the thin sections only megalospheric forms are observed.

Test is subspheric with an axial diameter of 3.55 mm. It is formed of 8 whorls. Equatorial diameter is 3 38 mm. Indice of prolongation (axial diameter/equatorial diameter) is 1.05.

Internal characters : Proloculum is ovate and rather big with a dimension of 336x413 µ. The following 3 chambers are very compressed and have very thin basal layer. The three whorls which follow the first three ones, increase suddenly in width and this corresponds to the flosculinisation period of the test. In the whorls, after flosculinisation period, the width of the coiling becomes slightly narrower and later on stays constant. Chamberlets in the first and flosculinised whorls are very small with a generally rounded or slightly compressed cross-section. In the last whorls, the chamberlets are irregular in shape and greater in size; but contrary to the first whorls, their height is always greater than their width.

Stratigraphic level. — Upper Paleocene.

Locality. — Pernavut Village (South of Kars).

Alveolina aramaea Hottinger 1960

(PI. I, Fig. 4)

1960. A. aramamea Hott. (Hottinger, p. 72, Text Fig. 36; pl. 3, Fig. 4-7) Description. — Only megalospheric forms were observed in thin sections.

The shape of the test is spherical or subspherical. Maximum

diameter (equatorial) is 4.35 mm. In a sample with 8 whorls, equatorial diameter is 4.25 mm and axial diameter is 4.06 mm. Indice of prolongation is between 0.9 -1

Internal characters : The proloculum ise ovate and very big. The maximum diameter of megalosphere is about 513x 635 µ. In the first five whorls, the spire interval is large and the basal layer of the latest whorls is thicker. The following five whorls, the spire interval, becomes narrower and stays constant till the last whorl. The chanv berlets are small and are arranged closely in the first whorl. Their width is greater than their height. In the latest whorls, chamberlets become larger and contrary to the first whorls, their height becomes greater than their width.

Stratigraphic.— Upper Paleocene.

Locality. — Pernavut Village (South of Kars).

Subgenus Glomalveolina Reichel 1937

Alveolina (Glomalveolina) minutula Reichel & Renz 1936

(PI. I, Fig. 3)

1936. **A. minutula** Reich. & Renz (Reich. & Renz 1936, p. 138; pl. 12„ Fig. 2).

1960. A. **(Giomalveolina) minutula** Reich. & Renz, (Hottinger, P. 62, Text Fig. 29; PI. 1, Fig. 31)

Description. — Test is very small and spherical. For a 1.65 mm; diameter 11 whorls are counted. Indice of prolongation is 1.

Internal characters : Proloculum is very small and spherical with' a diameter of about 32 µ The first and second whorls which follow the proloculum, show a milioline stage. The following whorls are coiled normally. The species can be distinguished very easily from the other species of **Glomalveolina** by its thiny and delicate test. The basal layer is very thin and its thickness is always less than the diameter of the chamberlets. Chamberlets are spaced and big. Their cross-sections are generally rounded.

Chamberlets of the last whorls show various shapes and their height is slightly more than their width.

Stratigraphic level. — Upper Paleocene.

Locality. — Pernavut Village, (South of Kars).

Family MILIOLIDAE d'Orbigny 1839

Genus Fabularia Defrance 1820

Fabularia alpani n. sp.

(Pl. II, Fig. 1-6)

Derivatio nominis. — The species is dedicated to Dr. Sadrettin Alpan, General Director of the Mineral Research and Exploration Institute of Turkey.

Diagnosis. — Test subspheric, shape of the equatorial and axial sections compressed circle, average length and width in axial section: 2.35 mm and 2.06 mm, average largest and smallest diameter in equatorial section: 2.66 mm and 2.55 mm, proloculum spheric, very large, average diameter 475 µ, rather thick «goulot» (see Pl. II, Fig. 6), biloculine arranged chambers divided into chamberlets, apertures at the end of the chambers.

Description. — Shape of the test is subspherical. The measurements show that the equatorial and axial section of this species have the form of a slightly compressed circle.

Internal characters : Proloculum is spherical and very large, diameter of megalosphere varies between 350 µ and 650 µ, (average 475 p). This species has a thick «goulot» which can be observed in some well oriented cross-sections. This «goulot» is characteristic for the Alveolina genus. Chamber arrangement is biloculine and it is kept so throughout its development. There are 12 chambers in a diameter of 3,2 mm. With transmitted light chamber wall's exhibit grayish-yellow colour. Their thickness is approximately 42 µ. It reaches 52 µ in 11 th. and in 12 th. whorls. Another dark coloured layer of the test envelopes this grayish-yellow coloured layer. This layer has a thickness of 62 µ in the first, 72 µ in the third, 104 µ in the fifth, seventh, nineth and eleventh chambers. The chambers are divided into chamberlets.

Table I (Distribution of chamberlets in each chamber).

Chambers' number.	1	2	3	4	5	6	7	8	9	10	11	12
Number of chamberlets	2	5	8	11	12	13	17	17	19	19	21	21

The shape of the cross-sections of the chamberlets is low elliptical. Their height is more than their width. In the first chamber, the height of chamberlets is four times of their width. Chamberlets increase in size from the center towards the periphery. Apertures are at the end of the chambers (Pl. II, Fig. 2, 3, 4,).

Measurements of holotype (In mm):

Greatest diameter———— 3.2

Smallest diameter———— 3

Measurements on axial sections (average of 20 samples, in mm) :

	Maximum	Minimum	Average
Length ————	2.76	1.72	2.35
Breadth ————	2.48	1.51	2.06

Measurements on equatorial sections (average of 20 samples, in mm):

	Maximum	Minimum	Average
Greatest diameter—	3.20	2.08	2.66
Smallest diameter—	3.00	1.82	2.06

Comparisons and Remarks: Cole (1956, p. 256) gathered under the species Fabularia matleyi (Vaugh.), the species Borelis matleyi Vaugh., Borelis jamaicensis Vaugh. and Borelis jamaicensis var. truncata Vaugh. described by Vaughan (1929, p. 337) and Fabularia vaughani Cole & Ponton described previously by himself and Ponton (Cole & Ponton, 1934). Indeed, those new species and new variety closely resemble each other. In this paper Fabularia alpani n. sp. is compared with Fabularia matleyi (Vaugh.) This species resembles Fabularia matleyi (Vaugh.) with its regular coiling and reg-

ular arrangement of chamberlets observed especially in the equatorial sections; but, it is distinguished from it by its coarser texture. Fabularia alpani n. sp. has smaller amount of chamber within a larger diameter, i.e. in an equatorial section of 3x3.2 mm. Fabularia alpani n. sp. has 12 chambers while Fabularia matleyi (Vaugh.) has 15 chambers in an equatorial section of 1.75x 1.64 mm Furthermore chamberlets are more numerous in Fabularia matleyi (Vaugh.) and they differ in shape from those Fabularia alpani n. sp. The chamberlets of Fabularia matleyi (Vaugh.) are circular in cross-section in the first whorl. The height of the chamberiets becomes greater than their width in following whorls (this is not the case for Fabularia alpani n. sp.). Wall of chambers of Fabularia matleyi (Vaugh.) is 3 times thinner than that of Fabularia alparsi n. sp. The new species has a very large proloculum. These two species also differ from each others in their general shape. Fabularia matleyi (Vaugh.) is slightly elongated ovoid in shape, while Fabularia alpani n. sp. is subspherical. The new species occurs in lower stratigraphical levels than Fabularia matleyi (Vaugh.).

Stratigraphic level. — Upper Paleocene.

Locality. — Pernavut village (South of Kars).

Genus Lacazina Munier & Chalmas 1882

Lacazina blumenthali Reichel & Sigal 1969

(Pl. VI, Fig. 1 - 4; Pl. VII, Fig. 1 - 3)

1969 Reichel & Sigal (in Reich., Sigal, Monod, 1969, P. 317, Pl. I, Fig, 1 - 14; Pl. II. Fig. 1 -9)

Description. — Megalospheric form. — It is more frequent than the microspheric form. The test is ovate. Proloculum is rather big and spherical, average diameter is about 425 µ. Chambers, which follows proloculum, are arranged in biloculine shape. In the type description of Lacazina blumenthali Reichel & Sigal had accepted this character as a specific one to distinguish it from Lacazina wichmanni Schlumberger. Biloculine stage in our samples, has 8-9 chambers. The chambers which follow are completely involute. In axial sections, chambers are arranged as ellipsoids encircling each

others. The aperture of these chambers are placed in rounded cavity, trematophores and they alternate on the poles. They have, in their middle, a protuberance of the precedent chamber wall which, Schlumberger mentioned in his paper (1894, p. 296) as a primitive teeth for this trematosphore apertures. Because of these apertures it seems that these chambers are not completely involute. In equatorial sections,proloculum, biloculine stage and concentric chambers can be observedin this order. All chambers are divided into chamberlets which are regular and very closely spaced. The chamber wall is very thin, especially last chamber's wall is not well preserved. Chamber wallbecomes thicker near the apertures.

Measurements. — On axial sections :

	Maximum	Minimum	Average
Axial diameter	— 4 mm	1.9 mm	2.5 mm
Equatorial dimater	— 3.4 mm	1.6 mm	2.1 mm

Indice of prolongation varies between 1.18 — 1.26.

Microspheric form. — It is rather rare. We were able to find only 6 microspheric forms. The test is ovate, the prolocuium can not be observed. The chambers which follow the prolocuium, are coiled in milioline (quinqueloculina?) type. The chambers which follow this milioline (quinqueloculina?) stage are coiled in biloculine pattern and later on they become completely involute. The other characters of the microspheric form are the same of the megalospheric form.

Measurements : (on axial sections).

	Maximum	Minimum	Average
Axial diameter	— 7.4 m	4.8 mm	6.1mm
Equatorial diameter	— 5.2 m	3.8 mm	4.3 mm

Stratigraphic level. — Upper Paleocene

Locality. — Pernavut Village, (South of Kars.).

Family PENOROPL.IDAE Schultze 1854

Genus Saudie Henson 1945

Saudia labyrinthica Grimsdale 1952

(PI. Ill, Fig. 1 -5)

1952. Saudia labyrinthica Grims. (Grimsdale, 1952, P. 223, Pl. 21. Fig. 1 - 4 Pl. 22, Fig. 1 - 2)

Description. — Only microspheric forms were observed. The shape fof the test is biconcave discoid. Diameter is 6.2 - 7 mm. Thickness is 0.759 mm on the periphery and 0.207 mm at the center.

Internal characters : The test is calcareous, microgranular and imperforate. It grows by addition of annular chambers and is composed of three different parts. Subepidermal layer is followed externally by an epidermal layer. The subepidermal layer contains alveols, approximately at the same size. The third and inner layer shows labyrinthic pattern. This labyrinthic pattern is probably the result of a complex of apertures and channel systems. In axial section, the continuity of the annular walls can not be well distinguished in this labyrinthic zone.

Measurements. — (made on axial section, in microns).

Thickness of epidermis ———— 30 — 35

Thickness of subepidermis ———— 40 — 45

Diameter of alveolar cells ———— 10 — 25

Stratigraphic level. — Upper Paleocene.

Locality. — Pernavut Village, (South of Kars).

Family MISCELLANEIDAE Sigal 1952

Genus Miscellanea Pfender 1934

Miscellanea miscella (d'Archiac & Haime)

(Pl. IV, Fig. 1-7)

1853 Nummulites miscella d'Archiac & Haime (pp. 345, Pl. 35, fig. 4 a - c)

1916 Siderolites miscella (d'Arch. & Haime), Douville, (pp. 38 fig. 1-16)

1926 Siderolites stampi n. sp. Davies, (pp. 278, Pl. 21, fig. 1 -8)

1934 Miscellanea miscella (d'Arch. & Haime), Pfender, (pp. 231, Pl. 11, fig. 6-7, Pl. 13, fig. 2-4)

1937 Miscellanea stampi (Davies). Davies & Pinfold, (pp. 43, Pl. 6,- fig. 4, 6, 9)

1937 Miscellanea miscella (d'Arch. & Haime), Davies & Pinfold, (pp. 43, Pl. 6, fig. 1 -3, 5, 7, 8)

1941 Miscellanea miscella (d'Arch. & Haime), Vaughan & Coler (pp. 32, Pl. 5, fig. 1 -2)

1954 Miscellanea miscella (d'Arch. & Haime), Smout, (pp. 72)

1956 Miscellanea miscella (d'Arch. & Haime), Cole, (pp. 240, p1. 33 fig. 2- 3, 10 -11, Pl. 34, fig. 1 - 3)

1962 Miscellanea miscella (d'Aroh. & Haime), Hanzawa, Micropal. (Vol. 18, No. 2, pp. 129-186)

1962 Ranikothalia stampi (Davies), Hanzawa, (pp. 160, Pl. 5, fig. 15)

1970 Miscellanea miscella (d'Arch. & Haime), Kaever, (pp. 96, Pl. 8, fig. 8-10)

Description. — Microspheric forms. They are found rather rare by compared to the megalospheric forms. They are globular and lenticular in shape. They have 7 whorls in a diameter of 8 mm. Their surface shows an irregular reticulate septal filaments and granules. Their test is calcareous hyaline and it resembles to rotalid walls. The coarse pores, which can be seen on the surface, continue inward as tubes. The coiling is involute. In a nearly equatorial section can be observed an irregular coiling and variable spire interval. The septa are double and bifurcate towards the periphery, (Pl. IV, Fig. 2). Intraseptal channels are not well visible in our samples. Intercameral foramens are present as a slit at the base of the septum.

Measurements. —

	Maximum	Minimum	Average
Diameter	10 mm	6 mm	7.8 mm
Thickness	2.24 mm	1.7 mm	1.97 mm
D/T	4.4	3.5	3.9

Proloculum was not obtained.

Megalospheric forms. — Very abundant, more globular than the microspheric forms. Equatorial periphery is subacute. Rather strong test is covered with granules on its surface. These granules are bigger in the center. The test is calcareous hyaline and shows approximately the same characteristics of the rotalid tests. The coarse pores, which can be seen on the surface, continue inward as tubes. Intercameral foramens are present as a slit, of the base of the septum. The septa are double and bifurcate towards periphery. (PI. IV, Fig. 4). The spire interval enlarges slightly and gradually throughout the coiling. The shape of the chambers are irregular, mostly their tops are The shape of the chambers are irregular, mostly their tops are rounded and their heigths are always more than their widths. There are 7-8 chambers in the first, 17-18 chambers in the second whorl. Sometimes prolocul'um is double, and the average diameter is 290 μ.

Dimensions. —

	Maximum	Minimum	Average
Diameter	— 2.82 mm	1.72 mm	2.25 mm
Thickness	— 1.82 mm	1.00 mm	1.32 mm
D/T	— 1.5	1.72	1.6

Discussion. — The foundation of Miscellanea miscella (d'Arch. & Haime) is rather confused. d'Archiac & Haime (1854) in their work on the specimen of a megalospheric form from India, described as Nummulites miscella d'Arch. & Haime. Later, Douville (1916) redescribed this species as Siderolites miscella (d'Arch. & Haime) considering it as a species of the genus Siderolites Davies (1927 pp. 272). During his detailed study in India he named as Siderolites stampi n. sp. a microsperic form he found together with Siderolites miscella (d'Arch. & Haime). He presented it as microspheric companion of Siderolites miscella (d'Arch. & Haime). Pfender (1934, pp. 225) founded Miscellanea miscella (d.Arch. & Haime) pointing out that Siderolites miscella (d'Arch. & Haime), which possess some common characteristics with the genera Nummulites, Siderolites, Rotalia, might be accepted as a separate genus.

Davies & Pinfold (1937, pp. 47), basing on their work in India,

studied Miscellanea miscella and Siderolites stampi Davies and renamed Siderolites stampi Davies as Miscellanea stampi (Davies). They claimed that genus Miscellanea and Nummulites are allied and Nummulites nuttali Davies and Miscellanea stampi (Davies) are similar in many ways. Vaughan and Cole (1941, p. 32) Considered Miscellanea miscella and Miscellanea stampi (Davies) as different species.

Smout (1954, p. 71), discussed genus Miscellanea and species Miscellanea miscella. Cole (1956, p. 241) restudied Miscellanea miscella in 1956. Later Hanzawa (1962, p. 129) introduced Ranikothalia stampi (Davies). Kaever (1970) during his work in Afghanistan studied Miscellanea miscella and Miscellanea stampi Davies and considered them as microspherical and megalospherical forms of Miscellanea miscella.

The microspherical form illustrated in plate IV, figs. 1, 2, 6, 7 closely resemble Miscellanea stampi Davies in having irregular coiling, similar external reticulate and granular ornamentation, spire intervals of irregular thickness in every each whorl, whorls of equal number and equal size and in having almost equal diameter-thickness ratio. For the adoption of Kaever seems plausible, despite of these close similarities, we classify our specimen as microspherical form of **Miscellanea miscella** (d'Arch. & Haime).

Stratigraphic level. — Upper Paleocene.

Locality. — Pernavut Village (South of Kars).

Family ROTALIIDAE Ehrenberg 1839

Genus Kathina Smout 1954

Kathina subsphaerica n. sp

(Pl. V, Fig. 1 -5)

Diagnosis. — Test biconvex and calcareous hyaline, very thick, average diameter and thickness 1.23 mm and 1.07 mm, diameter/thickness ratio nearly 1.1; coiling trochospiral, chambers evolute dorsally, coiled in 3 whorls, subrectangular chambers, with a number of 18-19 at the last whorl. Proloculum ovate or spherical, with average of diameter 121 µ.

Description. — The test is unequally biconvex, being deeper ventrally. The equatorial periphery is not acute but well rounded. The

value of the diameter/thickness ratio being nearly equal to 1, is an important character for this species. The coiling is trochospiral. The spire is very thick. The test is calcareous hyalme. The chambers are evolute dorsally. There is a great dorsal thickening. Ventral plug is very big and solid, divided by pillars. It has three whorls and there are 18-19 chambers in the last whorl. Subrectangular chambers are separated by the double layered septa. Intraseptal channel can be seen well. The proloculum is ovate or spheric and rarely double, average diameter, 121 μ in the single, 70 μ and 110 μ when it is double.

Measurements of holotype.—

Diameter ———— 1.4 mm

Thickness ———— 1.1 mm

D/T ———— 1.2

Measurements. — (in 22 samples)

	Maximum	Minimum	Average
Diameter	1.48 mm	0.80 mm	1.23 mm
Thickness	1.08 mm	0.69 mm	1.07 mm
D/T	1.3	1.1	1.2

Apical angle is about 160 degrees.

Comparisons and remarks. — It is easily distinguished from all other speoies of Kathina by subspherical appearance, thick spire and having nearly the same value for diameter and thickness in axial section.

It resembles Kathina selveri Smout in having thick chamber walls and great dorsal thickening. It is distinguished from it by more rounded equatorial periphery, by globular general shape, by having a ventral plug divided by pillars (Kathina selveri Smout has a simple solid ventral pfug.)

Stratigraphic level. — Upper Paleocene.

Locality. — Pernavut Village (South of Kars).

Kathina pernavuti n. sp.
(Pl. V, Fig. 7)

Derivatio nominis. — Pernavut, a village from Kars region.

Diagnosis. — Shape globular discoidal, average diameter 1.3 mm and thickness 0.69 mm; equatorial periphery arcuate, coiling trochospiral, chambers evolute dorsally, ventral plug thick and solid, proloculum spheric and very small.

Description. — In the thin section, some axial sections of Kathina Smout species exhibit characters different from the other known Kathina species. We have accepted it as a new species of the genus Kathina Smout with the following characters : The test is almost globular discoidal, equatorial periphery is arcuate and its coiling is trochospiral. Test structure is in the typical rotalid manner. Under high power magnification, the wall of the ultimate chamber shows a porous structure. The chambers are evoiute dorsally but in spite of a thick ventral plug, the chambers are involute ventrally.

Measurements of holotype. —

Diameter ———— 1.3 mm

Thickness ———— 0.69 mm

D/T ———— 1.8

Proloculum is very small and about 15 µ. Apical angle is about 170 degrees.

Comparisons and remarks. — It resembles Kathina delseota Smout in general appearance. But it has a solid ventral plug and its chambers are more arcuate in shape in axial sections. The shape of its ventral pillars is similar to that of Kathina major Smout. The similarity with Kathina major Smout is limited and Kathina pernavuti n. sp. is easily distinguished from Kathina major Smout by general shape and by having the same amount of whorls despite of its smaller size. On the other hand it is distinguished from Kathina subsphaerica n. sp. by having greater amount of whorls for a same diameter and by agreater diameter/thickness ratio.

Stratigraphic level. — Upper Paleocene.

Locality. — Pernavut Village (South of Kars).

Kathina selveri Smout 1954

(Pl. V, Fig. 6)

1954 Kathina selveri Smout (Smout, 1954 p. 62, Pl. VI, Fig. 11 - 13). Description. — The test is unequally biconical. The dorsal side is very low and the ventral side deep conical. Equatorial periphery is acute. The test is calcareous hyaline. The lamination is not well seen in the structure of the test. The coiling is trochospiral. The spire is very thick. The chambers are evolute dorsally and they form a great dorsal thickening. This thickening is noticable and reach 1/3 of the thickness. Ventral plug is solid and single.

Measurements. —

Diameter ———— 1.31 mm

Thickness ———— 1.10 mm

D/T ———— 1.1

Apical angle is about 160 degrees. Proloculum is spherical and big, its diameter is about 138 µ.

Stratigraphic level. — Upper Paleocene.

Locality. — Pernavut Village (South of Kars).

Associated Foraminifers

Family ORBITOLINIDAE Martin 1890

Genus **Dictyoconus** Blanckenhorn 1900

Dictyoconus sp.

(Pl. VIII, Fig. 1, 2, 4)

Dictyoconus sp.

(Pl. VIII, Fig. 3, 5, 6)

Stratigraphic level. — Upper Paleocene.

Locality. — Pernavut Village, (South of Kars).

Family ROTALIIDAE Ehrenberg 1839

Genus **Sakesaria** Davies & Ponfold 1937

Sakesaria sp.

(PI. VIII, Fig. 7, 8, 9)

Stratigraphic level. — Upper Paleocene.
Locality. — Pernavut Village (South of Kars).

Family NUMMULITIDAE Carpenter 1859

Genus **Ranikothalia** Caudri 1944

Ranikothalia sp.

(PI. VIII, Fig. 10)

Ranikothalia sp.

(PI. VIII, Fig. 11)

Stratigraphic level. — Upper Paleocene.
Locality. — Pernavut Village, (South of Kars)

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PLATE I

1 — **Alveolina globula** Hottinger.
Axial section, x 20.

2 — **Alveolina globula** Hottinger.
Slightly oblique axial section, x 20.

3 — **Alveolina (Glomalveolina) minutula** Reichel & Renz
Axial section, x 47.

4 — **Alveolina aramaea** Hottinger.
Axial section, x 18.

PLATE II

Fabularia alpani n. sp.

1 — Equatorial section, holotype (Es. K. 3), x 22.

2 to 5 — Axial sections, paratypes (Es. K. 4, 5, 6, 7), x 17.

6 — Equatorial section, paratype (Es. K. 8), x 26.

PLATE III

Saudia labyrinthica Grimsdale

1 to 2 — Axial sections, x 15

3 — Tangential section, x15

4 — Tangential section, x15

5 — Partly magnified of fig. 3, x23

PLATE IV

Miscellanea miscella (D'Archiac & Haime)

1 — Axial section, microspheric form, x11

2 — Subequatorial section, incomplete, microspheric form, y 10

3 and 5 — Axial sections, megalospheric forms, x 20

4 — Equatorial section, megalospheric form, x20

6 to 7 — Subaxial sections, microspheric forms, x11

PLATE V

Kathina subsphaerica n. sp.

1 — Axial section, holotype (Es. K. 9), x44

2 and 3 — Axial sections, paratypes (Es. K. 10, 11), x 44

4 — Subequatorial section, paratype (Es. K. 12), x 30

5 — Equatorial section, paratype (Es. K. 13), x30

6 — Kathina selveri Smout
Axial section, x46

7 — Kathina pernavuti n. sp.
Axial section, holotype (Es. K. 14), x 44

PLATE VI

Lacazina blumenthali Reichel & Sigal
(Megalospheric form)

1 — Axial section, x 25

2 — Axial section, x 14

3 — Axial section, x 14

4 — Equatorial section, x 27

PLATE VII

Lacazina blumenthali Reichel & Sigal
(Microspheric form)

1 — Subequatorial section very close to proloculum, x11

2 — Oblique section, x 17

3 — Subaxial section, x 14

PLATE VIII

1,2,4 — **Dictyoconus** sp (1)
Axial sections, x 14

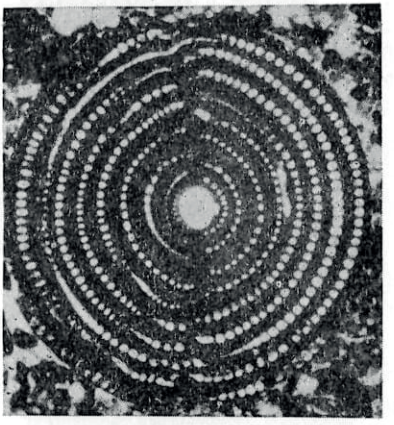
3,5,6 — **Dictyoconus** sp. (2)
3, 5 axial sections, 6 equatorial section, x 20

7 to 9 — **Sakesaria** sp.
7, 9 axial sections, 8 equatorial section, x 26

10 — **Ranikothalia** sp. (1)
Axial section, x 18

11 — **Ranikothalia** sp. (2)
Axial section, x 10

PLATE I



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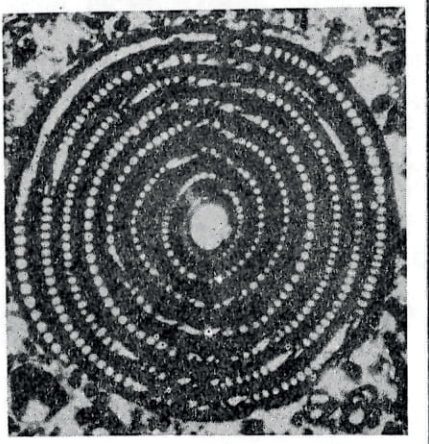

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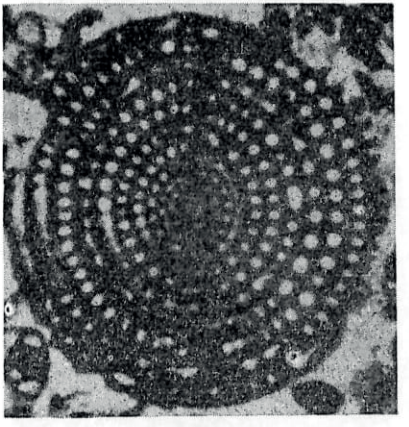

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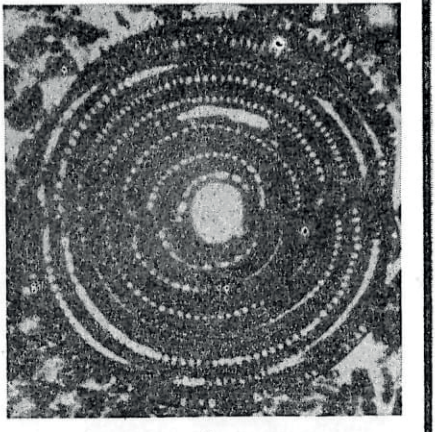

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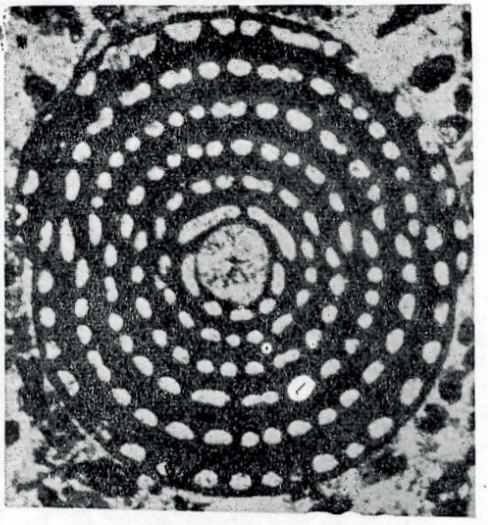

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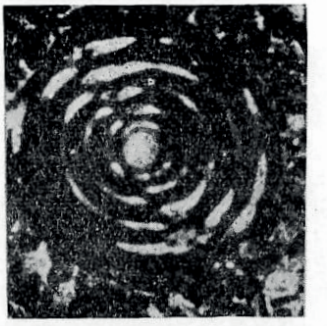

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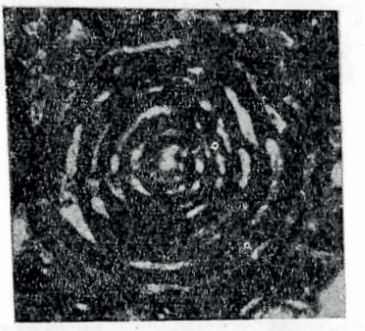

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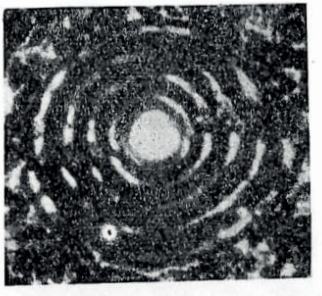

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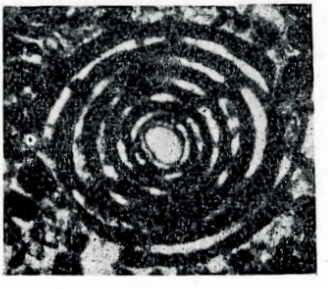

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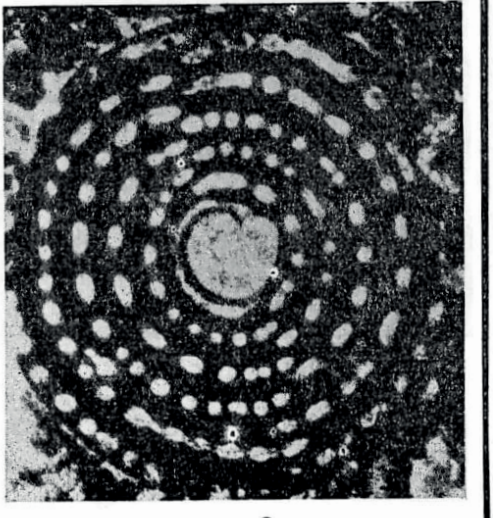

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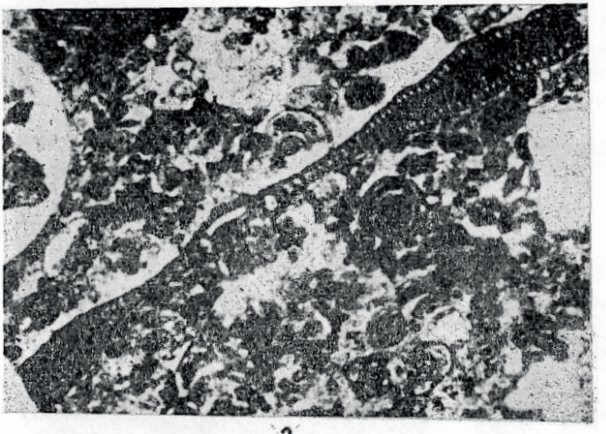

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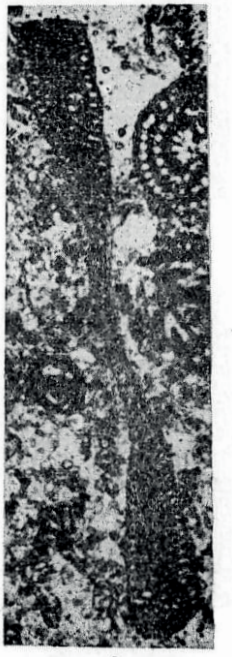

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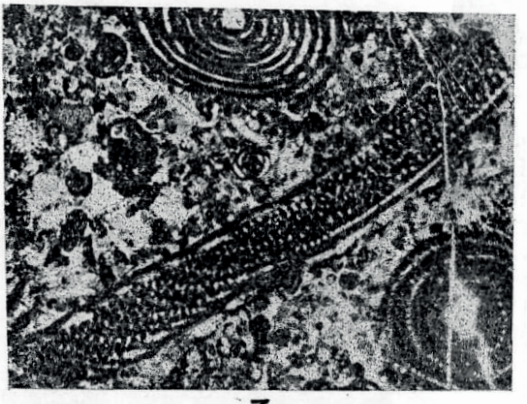

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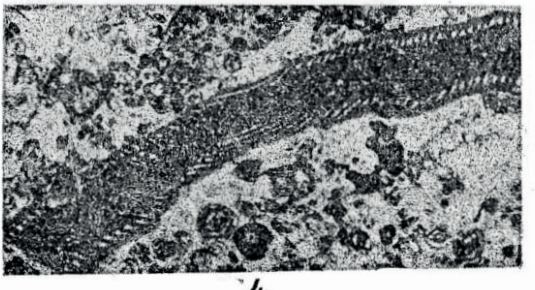

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PLATE IV

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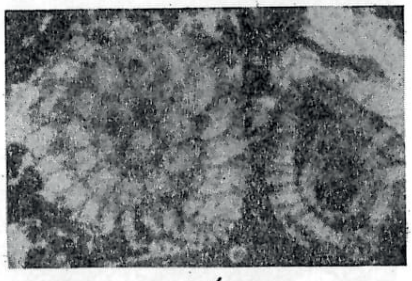

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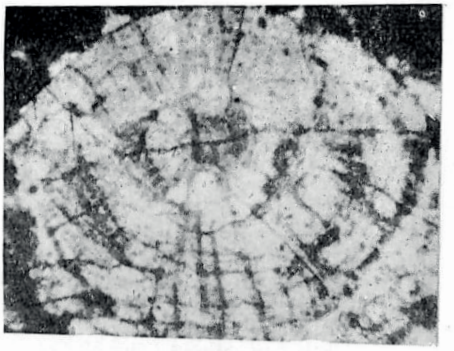
PLATE V



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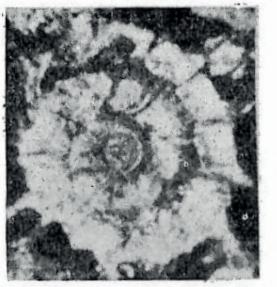

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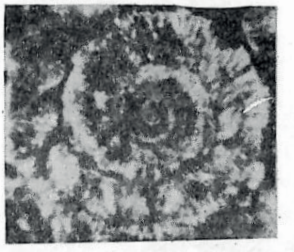

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PLATE VI

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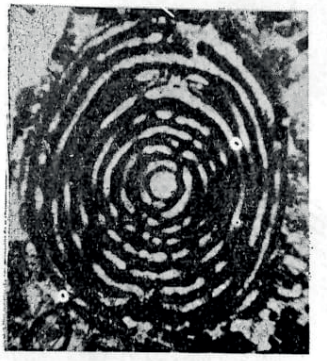

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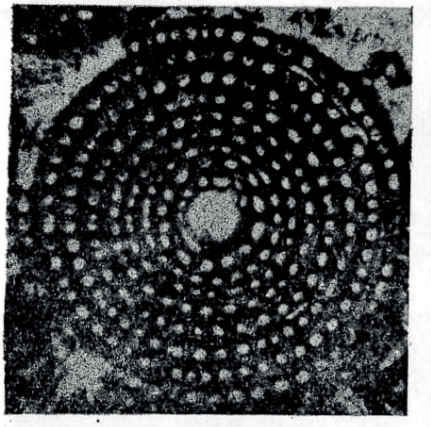

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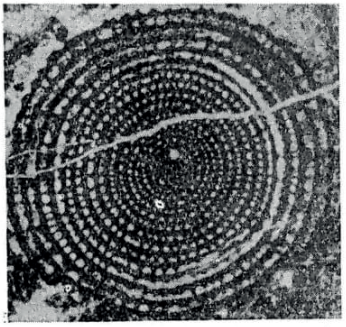

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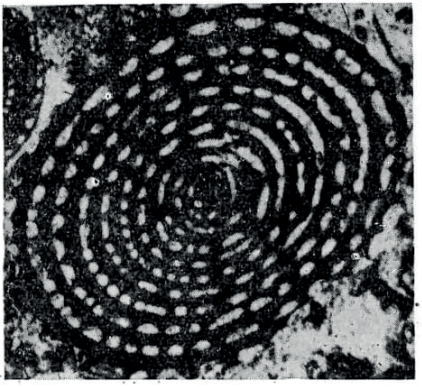

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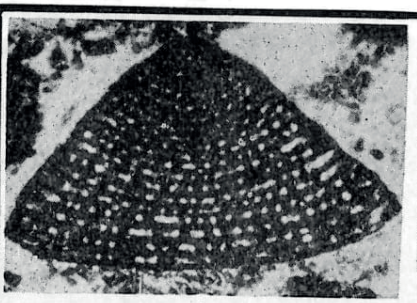

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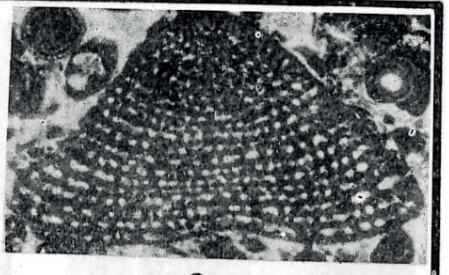

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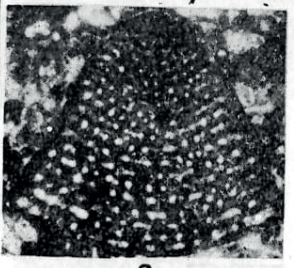

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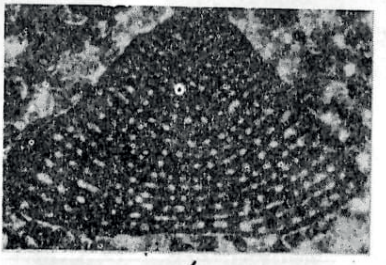

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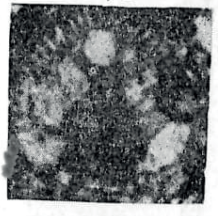

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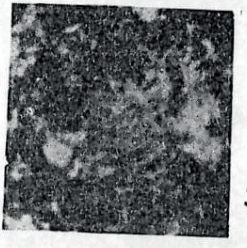

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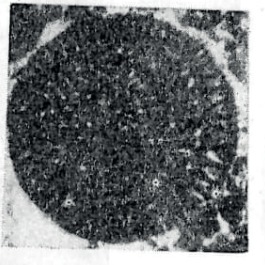

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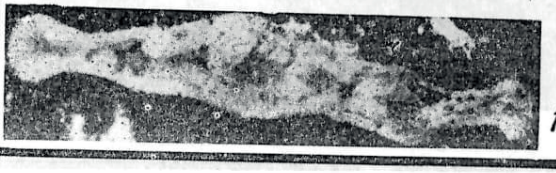

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