Two New Species of The Foraminiferal Genus Lockhartia From Turkey [1])

by A. TEN DAM [2])

Türkiye'de iki yeni Lockhartia Espesi

I — Introduction

During the course of a monographical study of the Cretaceous-Paleocene Germav-Formation in SE Turkey numerous speciemens of two new species of the Forminiferal genus Lockhartia were encountered, both of them characteristic index-fossils for a special horizon. The first species: Lockhartia daviesi ten Dam n, sp. is the typical Lockhartia in the main Lockhartiahorizon in the upper part of the Paleocene portion of the Germav Formation. The second species: Lockhartia ramanae ten Dam n. sp. is a typical form in the basal part of the Maestrichtian portion of the Germav Formation and in shaly intercalations in the Maestrichtian Orbitoidal Limestone.

To facilitate future work in the genus Lockhartia, complete synonymy and data on occurence, as well as a series of characteristic axial sections are given in this paper.

II — Systematic Description

Two new species of the genus Lockhartia are deseribed.

Genus LOCKHARTIA Davies 1932

Genotype Dictyoconoides haimei Davies 1927 Davies-Transact.Roy. Soc.Edinb.-Vol. 57, pt. 32, no. 13-1932-pp. 406-407.

LOCKHARTIA DAVIESI Ten Dam n.sp.

Derivatio nominis: named after Lieut. Col. L. M. Davies, pioneer in studies on the Indian Paleocene.

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(1) Pape presented during the annual Meeting of tht Geological Society of Turkey on 20-23 February 1952.

(2) Senior-Paleontologist MTA Enstitüsü.

Description: Test of medium size for the genus, generally plano-convex in the adult. Dorsal side strongly convex, almost semiglobular in adult specimens, less convex in younger specimens, ventral side flat or sligbtly convex in the adult. Periphery rounded, clearly marked by an imperforate limbate rim. Dorsal side showing 3 to 3½ whorls with numerous chambers, up to 12-14 in the lastformed whorl of adult specimens. Chambers of the last-formed whorl only showing vaguely through the thick wall, previous whorls almost completely invisible. Chambers only very slightly embracing. Sutures oblique, flush with the surface, mostly less perforate than the rest of the test, spiral sutures, if visible, marked by an imperforate hand. Ventral side showing only part of the last whorl, the older chambers almost comletely covered by small, towards the ventre by larger pillars or granules. Only the two last formed chambers are for the greatest part without granular ornementation. Umbilical pillars numerous, showing clearly as granules, increasing in size towards the centre. Wall thick, specially in the earliest chambers, coarsely perforate on the dorsal side, coarser in the thick wall over the initial chambers, finer towards the adult chambers, due to the widening of the pores in the thick wall over the initial part. Imperforate or less perforate zones marking the sutures. Medium or finely perforate in the last chambers on the ventral side. Surface smoothly finisched on the dorsal side, except for the pitted appearance due to the pores, granulate on the ventral side. Aperture very difficult to observe, probably at the hase of the lastformed chambers on the ventral side.

The real structure of this species can only be well observed in thin sections. The chambers are distincly as high as broad, increasing rapidly from one whorl to another. The umblical cavity is large, almost 1/2 of the diameter of the test and deep, reaching 2/3 of the total thickness of the test. The cavity is filled with numerous continous pillars. The wall is thin in the adult chambers and it is clear that each new whorl the whole dorsal side of the test was covered with a new layer of perforate shell material, the pores widening as the wall becomes thicker. Inner ends of the charnber -walls almost of constant thickness, recurved where they join the umbilical pillars;

Dimensions : diameter: 1.33 mm (holotype)
thickness 0.68 mm (holotype)

Holotype: MTA Coll No. TF 251

Paratypes: MTA Coll.No. TF 263-270

Type-locality: Ramandağ well No. 1-1805

Stratigraphic distribution: characteristic and locally represented by numerous specimens in the Upper part of the Paleocene portion of the Germav Formation of SE Turkey.

Remarks: young specimens of this species are less convex dorsally equally than adult specimens, and are often even nearly equally biconvex. The pillars are less numerous and the pores are fine.

This species seems closely related to Lockhartia haimei (Devies) by its general appearance but differs in having an almost semiglobular dorsal side, a deeper and narrower umbilicus and higher chambers, whereas the dorsal side is smooth except for the pitted appearence. It is distincly a represntative of Davies Lockhartia haimei-tipperi group of the Lockhartia species.

LOCKHARTIA RAMANAE ten Dam n. sp.

Derivatio nominis: named after Ramandağ, the first oilproducing structure in Turkey.

Description: Test of medium size for the genus, unequally biconvex or almost plano-convex in the adult. Dersal side convex, flatly conical in the adult, less convex in younger specimens, ventral side slightly convec to almost flat. Periphery angular, rounded, marked by a narrow imperforate rim. Dorsal side showing 3 to 4 whorls with numerous chambers, up to 8 -11 in the lastformed whorl of adult specimens. Chambers more or less distinct, not embracing at all. Sutures gently curved backwards, marked by thin imperforate bands, even in the older whorls, flush with ihe surface, spiral sutures showing as a broader imperforate band. Ventral side showing the chambers of the last whorl. Chambers triangular, near the periphery occasionally covered by small granules, the umbilicus filled by a few larger pillars, showing as larger granules. Sutures very slightly depressed near the periphery, radial. Wall relatively thick especially over the initial chambers, finely perforate on both dorsal and ventral side, with imperforate zones marking the sutures. Surface smoothly finished on the dorsal side, granulate on the ventral side. Aperture very

difficul to observe, supposed to be at the base of the last formed chambers, on the ventral side.

The real structures of this species can only be studied in axial sections. The chambers appear to be much broader than high, increasing rapidly in size frorn one whorl to another. The umbilical cavity is relatively small, in diameter 1/3 of the diameter of the test and in depth reaching 4 to 2/3 of the total thickness of the test. The cavity is filled with few continuous pillars. The wall is thin in the adult chambers and it is obvious from sections that with each new whorl the whole dorsal side of the test was covered with a new layer of perforate shell material. The pores are not widening with the thickening of the wall. The inner ends of the chambers walls are of constant thickness and are flattened, only slightly recurved where they join the umbilical pillars.

Dimensions: diameter: 1.48 mm (holotype) thicknes: 0.59 mm (holotype)

Holotype: MTA Coll. No. TF 366.

Paratypes: MTA Coll. No. TF 369.

Type-locality: Ramandağ well No.l-3170-13180'.

Stratigraphical distribution: locally characteristic, represented by numerous specimens, in the Lower parts of the Maestrichtian of SE Turkey.

Remarks: at first view, especially in axial section. this species resembles slightly Lockhartia conditi (Nttall) var. roae (Davies). but it differs distinctly in its narrowor umbilical filling and its less embracing chambers. It would be difficult io include this species in one of the two groups of Davies and as one of the oldest recorded species it is probable that it is more likely that this species is ancestral to both groups or has commen ancestors with the representitives of both groups. It exterior characters approach the genus Rotalia, liowever with out the typical umbilical characters of genus.

III — Other Species of Lockhartia:

To facilitate future work on species of the genus Lockhartia, representatives of which are occuring in several limestones of Cretaceous

and Eocene age in Turkey, we established the synonymy of the hitherto described species, with their occurence and stratigraphic range.

Only references with figures are taken into account as synonyms, since reference to one of the speeies of the genus without figures cannot be controlled for sure.

LOOKHARTIA ALVEOLATA Silvestri 1942 1942—Lockhartia alveolata Silvestri

Silvestri-Pal. Italica-Vol.32-suppl. No. 5-p. 77, pl. 18, fig. 8.

A species of the newboldi-conditi proup of Davies. Occurence: Middle Eocene (Middle Lutetian) of Italian Somaliland.

Type locality: Wadi Balade.

LOOKHARTIA BERMUDEZI Cole 1942

1942 — Lockhartia bermudezi Cole

Cole-Journ. of Pal.-Vol. 16-pp. 641-642, pl. 92, fig. 1-5.

1946 — Lockhartia bermudezi Cole

Ovey-Ann. Mag. Natrl. Hist.-Series 11, Vol. 13-p. 575, pl. 10, fig. 10-11.

1950 — Lockhartia bermudezi Cole

Applin and Jordan-Journ. of Pal.-Vol. 24-pp. 376-477, pl. 66, fig. 8-10.

One of the two species of the genus from the Western hemisphere,-belonging to the newboldi-conditi group of Davies.

Occurence: Upper Cretaceous-Lower Tertiary(Habana-formation) of Cuba.

Type locality: Kilometer 10 (Bermudez station 537) and 200 m N 23 W of kilometer 9 (Bermudez station 538) ou the road from Pinar del Rio to Luis Lazo.

LOCKHARTIA CONDITI (Nuttall) 1926

1926 — Dictyoconoides conditi Nuttall

Nuttall-Geol. Magazine-Vol. 63-p. 119, pl. 11, fig. 7-8.

1927 — Dictyoconoides conditi Nuttall

Davies-Quart. Journ. Geol. Soc. London-Vol 83, pt. 2 p. 279, pl. 21,

fig. 10-12, pl. 22, fig. 5.

1930 — Dictyoconoides conditi Nuttall

Davies-Mem. Geol. Survey India-n.s., Vol. 15-p. 16, pl. 10, fig. 9.

1931 — Dietyoconoides conditi Nuttall

Nuttall-Rec. Geol. Survey India-Vol. 65-p. 812.

1932 — Lockhartia conditi (Nuttall)

Davies-Transact. Roy..Soc. Edinburgh-Vol. 57, pt. 2-p. 408, pl. 2, fig. 7, pl. 4, fig. 7.

1934 — Lockhartia conditi (Nuttall)

Pfender-Bull. Soc. Geol. France-Series 3, Vol. 4 -p. 231.

1937 — Lockhartia conditi (Nuttall)

Davies and Pinfold-Mem. Geol. Survey India-n. s., Vol. 24, No.-p. 47, pl. 5, fig. 24.

1946 — Lockhartia conditi (Nuttall)

Ovey-Ann. Mag. Natrl. Hist-Series 11, Vol, 13-pp. 573-575, pl. 10, fig. 7-8.

Doubtfull reference:

1942 — Lockhartia conditi (Nuttall)

Silvestri-Pal. Italica–Vol. 32, suppl. No. 5, pp. 76-78, pl. 21, fig. 7.

One of the typical species of the newboldi conditi group of Davies.

All records are from the Paleocene of India although the species is known to occur in the Upper Paleocene or Lower Ypresian (Lower Eocene) of Turkey. The only doubtfull record is of Silvestri from the Middle Eocene of Italian Somaliland. Silvestri figures leaves considerable doubt whether his reference should be included in our synonymy.

Occurence: Upper Ranikot series (Paleocene) of Sind and Thal, India.

Type loeality: 5½ miles SE of Meting, Sind, India.

LOGHARTIA CONDITI (Nuttal) var. ROAE (Davies) 1930

1930 — Dictyoconoides conditi Nuttal var. roae Davies DaviesMem. Geol. Survey India-n. s., Vol. 15, pt. 6-p. 76, pl. 10, fig 9.

1932 — Lockhartia conditi (Nuttal) var. roae (Davies) DaviesTrans-act. Roy. Sic. Edinburgh-Vol. 157-p. 407.

1946 — Lockhartia conditi (Nuttall) var. roae (Davies)Ovey-Ann

Mag. Natrl. Hist.-Series 11, Vol. 13-p. 575.

Doubtfull reference:

1942 — Lockhartia conditi (Nuttall) vur. roae (Davies) Silvestri-Pal. Italica-Vol. 32, suppl. No. 5-pp. 78-79, pl. 5, fig. 4, pl. 13, fig. 12.

A representative of the newboldi-conditi group of the genus. Silvestri's figures leave sincere doubt if this reference should also be included, also because his material is of Middlle Eocene age.

Occurence; Lockhart Limestone: Uppermost portion of the Lower and portion of the Upper Ranikot (Paleocene) of India (Samana Range).

Type locality: Hangu breccia of the Samana Range.

LOCKHARTIA CUSHMANI Applin and Jordan 1945

1921 — Truncatulina species

Cushman-Florida Geol. Suirvey-13 th Ann. Rep.-p. 52, pl. 3, figs. la-b.

1944 — Lockhartia species?

Applin and Applin-Bull. AAPG-Vol. 28, No. 12, pl. 3, figs. l-a b, 2.

1945 — Lockhartia cushmani Applin and Jordan Applin and

Jordan-Journ. Pal.-Vol. 19-pp. 143-144, pl. 21, fig. 5 a b.

1947 — Rotalia cushmani (Applin and Jordan) Cole-Bull.

Amer. Pal,-Vol. 31, No. 126-pp. 15-18, pl. 5, figs. 2-8.

1950 — <<Lockhartia>> cushmani Applin and Jordan Applin and Jordan Journal of Pal.-Vol. 24-pp. 174-177, pl. 66, figs. 1-7.

A species belonging to the newboldit-conditi group of Davies It is the two representatives of the genus in the Western hemisphere.

There has been some discussion about he generic position of this species, but according to the published figures and to material in our collection it seem certain that this is a typical Lockhartia.

Occurence: abundant in the Lake City Limestone (early Middle Eocene) of Florid, frequently common in the Lower portion of the Olds-

mar Limestone (Lower Eocene) of Florida.

Type locality: 1067' and 1078' in the Dundee Petrolum Comp. <<Bushnell Well>>, Sumter County. Florida (Fla.G.S.No.W-3).

LOCKHARTIA HAIMEI (Davies) 1927

1853 — Rotalia newboldi d'Archiac Haime (pars)

d'Archiac and Haime-Descr. Anim. Foss. groupe Nammultque Indie-b. 347.

1927 — Dictyoconoides haimei Davies

Davies-Quart. Jeorun. Geol. Soc. LondonVol, 83-p. 280, pl. 21, fig. 13-15, pl. 22, fig. 6.

1930 — Dictyoconoides haimei Davies

Davies Mem. Geol. Survey India-n. s., vol. 15-p. 75, pl. 10 fig. 6-7.

1931 — Dictyoconoides haimei Davies

Nuttall-Rec. Geol. Suvrey India-Vol 65-p. 312.

1932 — Lockhartia haimei Davies)

Davies-Transact. Roy. Soc. Edinburgh-Vol. 57-P. 407, pl. 2, fig. 4-6.

1937 — Lockhartia haimei (Davies)

Davies and Pinfold-Mem. Geol. Survey India-n. s., Vol. 24, No. 1, p. 45, pl. 7, fig. 9-13, 15.

1946 — Lockhartia haimei (Davies)

Ovey-Ann. Kag. Natrl. Hist,-Series 11, Vol. 13 pp. 573574, pl 10, fig. 12. not Lockhartia haimei Silvestri 1942

Typical representative of Davies' liaimei-tipperi group of species, charreteristic for the Paleocene oe India and Tibet.

The species referred to by Silvestri as Lockhartia haimei is not identical with Davies' species according to the figures, but seems closely related to Lockhartia hunti Ovey.

Occurence: Uppermost Ranikot-beds (Paleocene) at Thal and sind, India; Upper Lower Ranikot and Lower Upper Ranikot) Paleocene of the Samana Range, India; Paleocene of Dhak Pass, Kala Chitta Rangea of India and of Kampa-Dzong of Tibet.

Type locality; Thal, long. 70°33, E,lat.33°22, N.N.W. Frontier Province, India.

LOCKHARTIA HUNTI Ovey 1946

1940 — Lockhartia haimei Silvestri (not Davies) Silvestri-Pal. Italica-Vol 32, suppl. No. 5-p. 79, pl. 1, fig. 6, pl 22, fig. 6.

1946 — Lockhartia hunti Ovey

Ovey-Ann. Mag. Natrl. Hist.-Series 11, Vol 13-pp. 571-576, pl. 10, figs. 1-6, pl. 11.

A species that should probably be included in the newboldi-conditi group. It seems identical with Lockhartia haimei Silvestri 1942, from the Lower Lutetian of Italian Somaliland.

Occurence: Uppermost Lower Eocene (Allah kajid beds of the Auradu Series) of British Somaliland; probably Middle Eocene (Lower Lutetian) of Italian Somaliland: Piana di Garrihad, Dafur leroi.

Type locality: Balad Agagwein, Britsh Somaliland.

LOCKHARTIA NEWBOLDI (d'Archiac and Haime) 1853

1853 — Rotalia newboldi d'Archiac and Haime (pars) d'Archiac and Haime Descr. Anim. Foss. Groupe Numulitique Inde-p. 347, pl. 36, fig. 17 a-c.

1927 — Dictyoconoides newboldi (d'Archiac and Haime) Davies Quart. Journ. Geol. Soc. London-Vol 83-p. 279 pl. 22 fig. 1-4.

1930 — Dictyoconoides newboldi (d'Archiac and Haime) Davies-Mem. Geol. Survev India-n. s., Vol. 15-p.74, pl. 10, fig. 8.

1932 — Lockhartia newboldi (d'Archiac and Heime) Davies-Transact. Roy. Soc. Edinburgh-Vol 57, p. 2, No. 13-p. 408.

1946 — Lockhartia newboldi (d'Archiac and Haime) Ovey-Ann. Mag. Natrl Hist. Series 11, Vol. 8-p. 573-574, pl. 10, fig. 9.

Doubtfall reference:

1931 — Dictyoconoides newboldi (d'Archiac and Haime) Nuttall and Brighton Geol. Magazine-Vol 68,-p. 57, pl. 4, figs. 1-3.

A typical representative of the newboldi conditi group of Lockhartia-species.

Aceording to the figures of Nuttall and brighton there is considerable doubt whether their referenee should be included in the synonymy of this species, also because their material is from the Middle Eocene of Somaliland.

Occurence: Uppermost Ranikot beds of Thal, India (Paleocene) In the yellow limestone of the Hala Range, India.

Type locality: Hala Range.

LOCKHARTIA RETICULATA Silvestri 1939.

1939 — Lockhartia reticulata Silvestri

Silvestria-Pal. Italica-Vol. 32, suppl. No. 4-p. 80.

This species was only mentioned as new species by Silvestri, withaut giving a description or figures. It has to be considered as nomen nudum.

Occurence: Middle Eocene (Middle Luian) of Italian Somaliland.

Typelocality: Wadi Balade.

LOCKHARTIA TIPPERI (Davies) 1926.

1926 — Conulites tipperi Davies.

Davies-Rec. Geol. Survey India-Vol. 59, p. 247, fig. 8.

1931 — Dictyoconeides tipperi (Davies)

Nuttall and Brighton-Geol. Magazine-Vol.68-p.56, pl. 3, fig, 14-17.

1932 — Lockhartia tipperi (Davies)

Davies-Transact, Toc, Edinbourg-Vol. 57, pt. 2, No. 13, p. 408.

1946 — Lockhartia tipperi (Davies)

Ovey-Ann. Mag. Natrl. Hist.-Seris 11, Vol. 13, p. 574, pl. 10, fig. 13.

Typically belonging in the haimei tipperi group of Lockhartia species. One of the the very few species of the genus occuring higher than the top of the Paleocene.

Occurence: Middle or Upper Ypresian (Lower Laki Series of India); Upper part of the Lower Eocene of British Somalilan.

Type locality: Petiani, 10 miles W of Kotri, or about W 14 miles of Hyderabae, Sind, India.

IV — Relationships

One of the two new species, Lockhartia daviesi, enters easily in the genus Lockhartia and belongs decidedly in the haimeitipperi group, although as one of the primitive forms, morphologicajly more close to Rotalia than the other representatives of the group. The continuous pillars and the absence of the astral lobe, known in the genotype of Rotalia, Rotalia trochidiformis Lamarck 1804, range thig species definitely in the genus Lockhartia.

The second new species, Lockhartia ramanae is much more primitive and shows a much narrower umbilicus, with only small granules towards the periphery and a few continuous pillars in the centre, bringing this species closer to Rotalia than the previous species. Its continuous pillars and the distinct absence of astral lobes proves that it has to be included in genus Lockhartia as an early ancestral to the more evolved species of the genus in both groups, constituing some kind of link between Rotalia and Lockhartia.

It is possible that future work will make it necessary to split the genus Loekhartia s.l. in Lockhartia Lockhartia for the representatives of the haimei-tipperi group and a nevv subgenus for the newboldi-conditi proup, but ihe data at our disposition do not permit the proposal of such a division.

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A. SILVESTRI : Foraminifera dell'Eocene della Somalia - ibidem Vol. 32, suppl. 5 pp. 76-79, pl. 1, fig. 6, pl. 5, fig. 5 pl. 9, fig. 4, pl. 13, fig. 12, pl. 18, fig. 8, pl. 21, fig. 7, pl. 22, fig. 6. 1942.

Two New Species of The Foraminiferal Genus Lockhartia From Turkey

P L A T E 1

Axial sektions of all deecribed species of Lockhartia

Fig. 1 — Lockhartia alveolata Silvestri 1942 Lutetian

Fig. 2 — Lockhartia tipperi (Davies) 1926 Ypresian

Fig. 3 — Lockhartia hunti Ovey 1946 Ypresian

Fig. 4 — Lockhartia cushmani Applin et Jordan 1945 Lutetian Ypresian

Fig. 5 — Lockhartia daviesi ten Dam n. sp. Paleocene

Fig. 6 — Lockhartia conditi (Nuttall) 1926 Paleocene-Ypresian

Fig. 7 — Lockhartia haimei (Davies) 1927 Paleocene

Fig. 8 — Lockhartia newboldi (d'Archiac et Haime) 1853 - Paleocene

Fig. 9 — Lockhartia conditi (Nuttall) var. roae (Davies) 1930 P a l e - ocene

Fig. 10 — Lockhartia bermudezi Cole 1942 Paleocene Danian

Fig. 11 — Lockhartia ramanae ten Dam n. sp. Maestrichtian

Two New Species of The Foraminiferal Genus Lockhartia From Turkey

P L A T E 2

Neiv species of Lockhartia (Photographs)

Fig. 1 — Lockhartia daviesi ten Dam n. sp. axial section Holotype M.T.A Coll. No TF 25t

Fig. 2 [a-d] — Lockhartia daviesi ten Dam n. sp, -

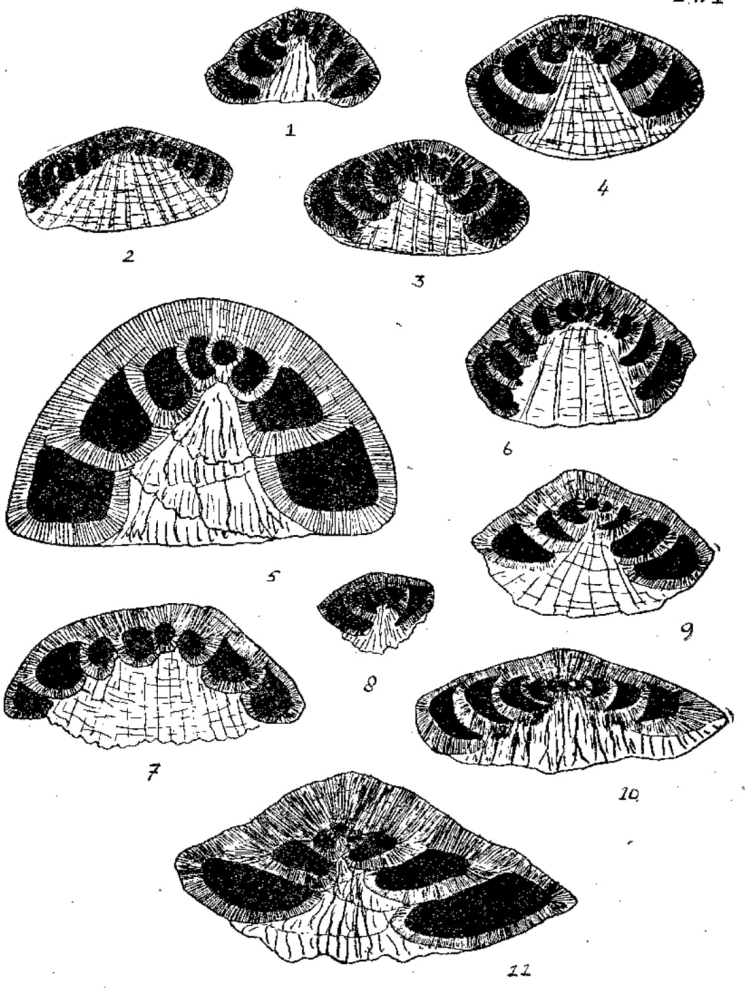
a. dorsal side adult specimen
b. ventral side aduIt specimen
c. oblique view ventral side
d. dorsal side young specimen

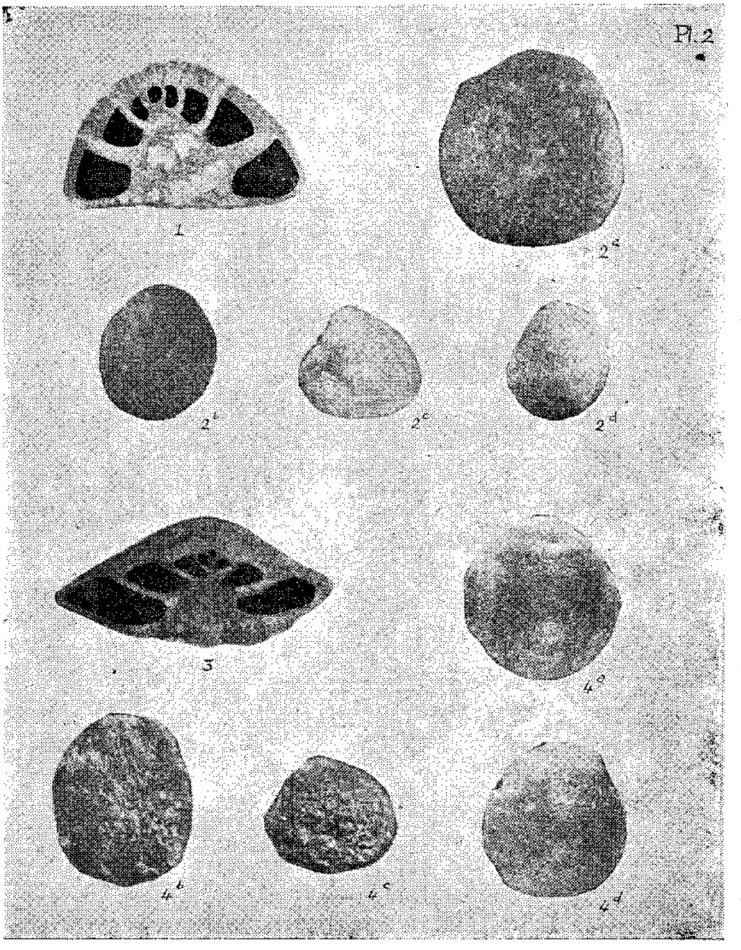
Fig. 3 — Lockhartia ramanae ten Dam n. sp. acial section Holotype M.T.A Coll. No. TF 366

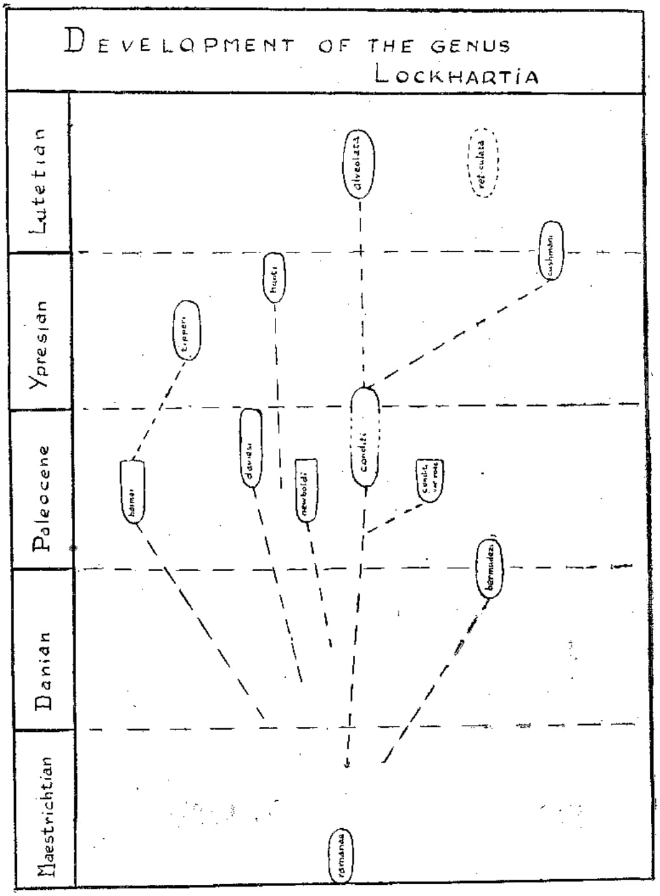
Fig 4 [p-a] — Lockhartia ramanae ten Dam n. sp. -

a. dorsal side adult specimen
b. ventral side adult specimen
c. oblique view ventral side ydung specimen
d. dorsal side adult specimen.

Pl. 1




1
2a
2b
2c
2d
3
4a
4b
4c
4d


DEVELOPMENT OF THE GENUS LOCKHARTIA
Lutetian
Ypresian
Paleocene
Danian
Maestrichtian
alveolata
reticulata
cushmani
hunti
tipperi
conditi
daviesi
newboldi
haimei
bermudezi