

TWO New Species of The **Foraminiferal** Genus  
**Lockhartia** From Turkey \*)

by A. TEN DAM<sup>2)</sup>

**Türkiye'de iki yeni Lockhartia** Eepesi . •

i — Introduction

During the course of a monographical study of the Cretaceous-Paleocene Germav - Formation in SE Turkey, numerous specimens of two new species of the Foraminiferal 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 Lockhartia-horizon in the upper part of the Paleocene portion of the German 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 occurrence, as well as a series of characteristic axial sections are given in this paper,

.11 — Systematic Description

Two new species of the genus Lockhartia are described,

Genus LOCKHARTIA Davies 1932

- Genotype Dictyoconoides haimei Davies 1927 Davies-Transact Roy. Soc. Edinb.-Vol. 57, pt 82, no, 13<sup>1932</sup>-pp. 406-407\*

LOCKHARTIA DAVIESI Ten Dam n.sp.

Derivatio nominis : named after Lieut. Col. L\* 1, Davies, pioneer in studies on the Indian Paleocene.

i) Paper presented during the annual Meeting of the Geological Society of Turkey on. 20-23 February .1952. . . . .

1) 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 slightly convex in the adult. Periphery rounded, clearly marked by an imperforate limbate rim. Dorsal side showing 3 to 3<sup>+</sup> whorls with numerous chambers, up to 12\*14 in the last formed 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 band\*. Ventral side showing only part of the last whorl, the older chambers almost, completely covered by small, towards the ventre by larger pillars or granules, Only the two last formed chambers are for the greatest part without granular, ornamentation. 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 finished 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 base of the last formed chambers on, the ventral side,

The real structure of this species can only be well observed in thin sections« The chambers are distinctly as high as broad, increasing rapidly from one whorl to another. The umbilical 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 continuous 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 chamber - walls almost of constant thickness, recurved where they join the umbilical pillars; . •

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

Hoîotype : MTA Coll. No. TF 251  
 Pa-ratypes : 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 Paleocenö 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 (Dévies) 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 appearance. It is distinctly a representative of Davies Lockhartia haimei-tipperi group- of the Lockhartia species,

**LOCKHARTIA RAMANAE** ten Dam n. sp.

Denvatio nominis : named after Ramandağ, the first  $\alpha^{\text{TM}}$  producing structure in Turkey.

Description : Test. of medium size for the genus, unequally biconvex or almost plano-convex in the adult Dersai side convex, flatly conical in the **adult**, less convex in younger specimens, ventral side slightly convex 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 thiji imperforate bands, even in the older whorls, flush with the 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 dep« ressed 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 van-

tral side, Aperture very difficult 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 from one whorl to another« The umbilical cavity is relatively small, in diameter  $1/3$  of the diameter of the test and in depth reaching  $j$  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) .  
thickness : 0.59 mm (holotype)

Holotype: MTA Coll. No. TF 366,

Paratypes: MTA \*Coll. No.- TF'369.

Type-locality: Ramadağ well No.1-3170-13180\

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* (Nuttall) var. *roae* (Davies)\* but it differs distinctly in its narrower umbilical filling and its less embracing chambers. It would be difficult to 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 common ancestors with the representatives of both groups« Its exterior characters approach the genus *Rotalia*, however without 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 occurring in several limestones of Cretaceous and Eocene age in Turkey, we established the

synonymy of the hitherto described -species, with their occurrence and stratigraphic range.

Only references with figures are taken into account as synonyms, since reference to one of the species 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, pi. 18,  
fig. 8, . . .

A species of the newboldi-conditi group of Davies\*

Occurrence: 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. 64-64, pl 92, fig. 1-5.

1946 — *Lockhartia bermudezi* Ooie<sup>1</sup>

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,

Occurrence: 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) on 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 88, pi 2  
p. 279, pl. 21, fig, 10-12, pl. 22, fig. 5,

- 1930 — *Dictyoconoides conditi* Nuttall  
 Bavies - Mem, Geol Survey India \* n\*g,, Vol. 15 - p... 16,  
 • pi. 10, fig.'9.
- 1931 ~ *Dictyoconoides conditi* Nuttall  
 Nuttall - Rec. Geol Survey India - Vol. 65-p. **812\***
- 1982 ~- *Lockhartia conditi* (Nuttall)  
 Davies » Transact. Roy..Soc. Edinburgh - Vol. 57, pt. 2 -  
 p. 408, pi. % fig. 7, pi. 4, fig. 7.
- 1934 — *Lockhartia conditi* (Nuttall)' .  
 - Pfender - Bull. Soc. Geol France » Series 3, Vol 4 -p. **281**.
- 1937 — *Lockhartia' conditi* (Nuttall)  
 Davies and Pinfold - Mem« Geol Surrey India - n. s\*,  
 Vol. 24, No. I « p. 47, pi. 5, fig. 24
- 1146 — *Lockhartia conditi* (Nuttall)  
 Ovey-Ann, Mag, NatrL Hist.-Series II, Vol, IS-  
 pp. 573-575, pi. 10, fig. 7-8.

*Doubtful! reference:*

- 1942 — *Lockhartia conditi* (Nuttall)  
 - ' Silvestri-Pal. Italica\*Vol. 32, suppl No. 5, - pp. **7G-78**,  
**pi. 21**, fig. 7.-

One of the typical species of the newboldi - conditi group of Bavies,

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 doubtful record is of Silvestri from the Middle Eocene of Italian Soraaliland\* Silvestri's figures leaves considerable doubt whether Ms reference should be included in our synonymy,

Occurrence : Upper Ranikot series (Paleocene) of Sind and Thai, India,

Type locality: 5y- miles-SE of Meting, Sind, India»

*LOCKHARTIA CONDITI* (Nuttal) var. *ROAE* (Davies) 1930

- 1980 — *Dictyoconoides conditi* Nuttall var, roae Davies Davies-  
 Mem, Geol Survey India - n. s\*, Vol 15, pi 6-p. 76,  
 pi. 10, fig 9.

- 1932 — *Lockhartia conditi* (Nuttall) var. *roae* (Davies) Davies-  
Transact Roy. Soc. Edinburgh - Vol. 157 - p. 407,  
1948 — *Lockhartia conditi* (Nuttall), var. *roae* (Davies) Övey - Ann  
Mag. Natl. Hist - Series 11, Vol. 13-p. 575,.

*Doubt fail reference :*

- 1942 — *Lockhartia conditi* (Nuttall) var. *roae* (Davies). Silvestri -  
- Pal. Italica-Vol. 32, suppl. No. 5»pp. 78-79, pi. 5, fig.  
4, pi. 18, fig. 12. ' •

À 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 Middle Eocene  
age,

Occurrence; 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. Survey-13 th Ann« Rep\*-p\* 52,  
pi« 3, figs, 1a-b.  
1944 — *Lockhartia* species?  
Applin. and Applin - Bull. AAPG - Vol. 28, No, 12, pi. 3,  
figs, 1-a b, 2, -  
1945 — *Lockhartia cushmani* Applin and Jordan Applin and  
Jordan - Journ. Pal. » Vol. 19- pp. 143 \*\* 144, ' pi. 21,  
fig, 5 a-b.  
1947 — *Rotalia cushmani* (Applin and Jordan) Oole - Bull  
Amer, Pal. - Vol 81, 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, pi. 86,  
figs. 1 - 7. " -

A species belonging to-the newboldit-conditi group of Davies  
It is-the two representatives of the genes in the Western hemi-  
sphere,

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

Occurrence : abundant in the Lake City Limestone (early Middle Eocene) of Florida, frequently, common in the Lower portion of the Oldsmar Limestone (Lower Eocene) of Florida

Type locality : 1067<sup>f</sup> and 1078<sup>2</sup> in the Dundee Petroleum Comp. «Bushnell Well», Sumter County, Florida (**Fla.G.S.No.W-3**)

**LODKHARTIA HAIMEI** (Davies) 1927 "

1853 — *Rotalia newboldi* d'Archiac Haime (pars)  
d'Archiac and Haime-Descr, Anim, Foss\* groupe Nammultque Indie-b, 347«

1927 — *Dictyoconoides haimeii* Davies  
Davies-Quart. Jeorun, Geol Soc\* London- Vol, 83 - p. **280**,  
pi. 21, fig. 1345, pi. 22, fig. 6,

JL9SQ — *Dictyocnoides haimeii* Davies  
Davies - Mem, Geol Survey India - n. s., vol. 15 - p. 75,  
pi. 10 fig, 6»7, , .

**1931** — *Dictyoconoides haimeii* Davies  
Nuttall-Rec'Geol. Survey **India-Vol'** 65»p\* 312,

1932 — *Lockhartia haimeii* Davies  
. Davies-Transact. Roy, Soc\* Edinburgh-Vol.'57-P. 407,  
pi. % fig. 4\*6\*

1937<sup>^</sup> — *Lockhartia haimeii* (Davies)  
Davies & Pinfold-Mem. Geol Survey India-n. s., Vol.  
. 24, No. 1, p. 45, pi. 7, fig.. 9-13, 15.

**194&** — *Lockhartia haimeii* (Davies)  
ÖYey-Ânn, Mag» Natrl. Hist, - Series 11, **Vol.** 18 pp. 573-  
574, pi 10, fig/ 12.

- not *Lockhartia haimeii* Silvestri 1942

Typical representative of Davies' *haimeii*-tippèri group of species, characteristic for the Paleocene of India and **Tibet.**,

The species referred to by Silvestri as *Lockhartia haimeii* is not identical with Davies<sup>5</sup> species according to the figures? but seems closely related to *Lockhartia huntii* Ovey.



Occurrence : Uppermost Manikot-beds (Paleocene) at Thai and Sind, India; Upper Lower Ranikot and Lower Upper Ranikot) Paleocene of the Samana Range, India; Paleocene of Bhak Pass, Kala Ohitta Range of India and of Kampa-Bzong of Tibet.

Type locality; Thai, long. 70° 33, E, lat. 33°22, K K W, Frontier Province^ India.

#### LOCKHARTIA HUNTI Ovey 1946

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

1946 — *Lockhartia hunti* Ovey ovey - Ann, Mag. Natrl. Hist, - Series 11, Vol. 18 - pp« 571 - 570, pi. 10, figs. 1 - 6, pi. 11.

À 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»

Occurrence : Uppermost Lower Eocene (Allah -. kajid beds of the Auradu Series) of British Somaliland ; probably Middle Eocene (Lower Lutetian) of Italian Somaliland: Piana di Garr had, Dafur Ieroi.

Type locality: Balad Agagwein, British Somaliland.

#### LOOKHARTIA NEWBOLDI (d'Archiac and Haime) 1853

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

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

1930 — *Dictyoconoides newboldi* (d'Archiac and Haime) Davies - Mem. Geol. Survey' India - n. s., Vol. 15- p. 74, pi. 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* (cf. Archiac and Haime) Ovey-Ann.  
 • "Mag\* NatrL" Hist - Series 11, Vol. 8 - p. 573 - 574, pi.  
 10, fig. 9. ..

*Doubtful! reference :*

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

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

According to the figures of Nuttall and bright on there is considerable doubt whether their reference should be included in the synonymy of this species, also because their material is from the Middle Eocene of Semaliland.

Occurrence : Uppermost Ranikot beds of Thai, India {Paleocene) In the yellow limestone of the Hala *Mange*, India«

Type locality : Hala Range.

• LOCKHARTIA RETICULATA Silvestri 1939..

- 1939 '— *Lockhartia reticulata* Silvestri . •  
 .Silvestriä-Pal. Italica-Vol. 32, suppl. No. 4\*p, 80;

This species was only mentioned as new species by Silvestri, without giving a description or figures. It has to be considered as *nomen nudum*.

occurrence : Middle Eocene (Middle Luian) of Italian Soma»  
 liland.

Typelocality : Wadi Baladé.

- LOOKHARTIA TIPPERI (Davies) 1920.

- 1926 — *Comilites tipperi* Davies,  
 Davies-Ree. Geol.'Survey India-Vol.-59, p. 247, fig. 8.

- 1931 — *Dictyoconeides tipperi* (Davies)  
 Nuttall and Brighton - Geol. Magazine-Vol. 68-p. 56,  
 pi. 3, fig, 14-17.

- 1932 — *Lockhartia tipperi* ..(Davies)  
 Davies-Transact Toe, Edinburg- Vol 57, pi % No, 13,-  
 .. p. 408,

1946 — *Lockhartia tipperi* (Davies)

Ovey-Ann, Mag« NatrL Hist-Seriş 11, Vol. 13., p. 574,  
 . ' pi. 10, flg. 13, •

Typically belonging in the haimei » tipperi group of *Lockhartia* species. One of the the very few species of the- genus oc-  
 curing higher than the top of the Paleocene\*

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

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

#### IV — Relationships

One of the two new species^ *Lockhartia daviesi*, enters eas-  
 ily in the genus *Lockhartia* and belongs decidedly in the haimei--  
 tipperi group, although as one of the primitive forms, morp-  
 hologicajly more close to *Rotalia* than the other representatives  
 of the group. The continuous pillars and the absence of the as-  
 tral lobe, known in the genotype of *Rotalia*, *Rotalia trochidi-*  
*formis* 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 *Lockhartia* s.l. in *Lockhartia Lockhartia* for the  
 representatives of the haimei-tipperi group and a new subgenus  
 for the newboldi-conditi proup, but ihe data at our disposition  
 do not permit the proposal of such a division»

## LITERATURE ON *LOCDHARTIA*

- E, R. **APPUN** and P, L. **APPLIN** : Regional Subsurface Stratigraphy and Structure of Florida and Southern Georgia - **Bull.** Am. Ass. Petrol. Geol - Vol. 28 - pp. 1673 - 1753, pi. 3, **fig.** 1-2, - 1944. .
- J.E. R. **APPLIN** and L. **JORDAN** : *Loekhartia cushmani* Applin and Jordan and notes on two previously described **Foraminifera** from the Tertiary rocks of Florida - Journ\* of PaL Vol. 24-.pp. 474-478, pi. 66, 1950.
- E, R. **APPLIN** and L. **JORDAN** : Diagnostic Foraminifera from subsurface Formations in Florida - Journ. of PaL Vol. 19, PP. 129-148, pi. 18-21, 1945.
- A. D'ARCHIAK** and J, **HAIME** : Descriptions des animaux fossiles du groupes des Nummulites de Finde pp<sub>e</sub> 847, pi. 36, figs. 17 a - c<sub>3</sub> 1853.
- W. STORES COLE** : *Loekhartia* in Cuba-Journ. of PaL Vol. 16, pp. 640-742, pi. 92.
- W. STOORS GOLE** : Internal structure of some Floridan Foraminifera **Bull.** Amer. PaL Vol. 31, no. 126, pp. 227 - 254, pi. 1-5, 1947. . .
- J. A, **GUGHMAN** : Foraminifera from the deep wells in Florida-Florida Geol Survey, 13 th Ann. Rep, pp. 33-70, pi. 1-3, 1921.
- L. M, **DA VIES** : Remarks on Garters genus *Conulites-Dictyoconoides* Nuttall with descriptions of some new species from the Eocene of North West India ~ Ree. Geol Survey India, **Vol.** 59, pt. 2, pp. 237-243, pi." 16-20, 1926.
- L. M. **DAVIES** : The Ranikot beds at Thai (North - West Frontier provinces of India) - Quart. Journ. Geol Vol. 83, pt. 2, pd. 260-288, pi. 18 - 21, 1927.
- L. M. **DAVIES** : The fossil fauna of the Saman Range and some Neighbouring areas Part VI The Paleocene Foraminifera-Mem. Geol Survey India » pal. Indica-N. S., Vol. 15 - pp. 67-79, pi. 10, 1930,
- L. M. **DAVIES** : The genera *Dictyoconoides* Nuttall, *Loekhartia* n-ov. spec, and *Rotalia* Lamarck: their type species, generic difference and fundamental distinction from the *Dictyoconus* group of forms - Transact. Roy. Soc. Edinburgh - Vol. 57, pt 2, no. 13 - pp. 397 - 428, pi. 1-4, 1932,

- L. M. DA VIES and K S. PINFOLD : The Eocene beds of the Punjab **Salt-Range** - Mem. Geol. Survey India - N. S., ' Vol. 24 no. 1 - pp. **1-79**, pi. 1-7, 1937.
- W. A. **MAGPADYEN** : The Geology of British Somaliland - Part I of the Geology and Paleontology of British Somaliland - Publ. Govt. Somaliland Protectorate - pp. 68-69, 1938.
- W. L. F\* **NUTTAL** : The larger Foraminifera of the Upper Ranikot Series - **Geol. Magazine** - Vol. 63 - pp. 112-121, pi. **10-11**, 1926/  
• „,'
- W. L. F. **NUTTAL** : The stratigraphy of the Upper Ranikot series (Lower Eocene) of Sind, India - Rec, Geol. Survey India Vol. 65, pt. 25 p. 312, 1931.
- W. L. F. **NUTTAL** and A. G. **BRIGHTON** : Larger Foraminifera from the Tertiary of Somaliland - Geol. Magazine - Vol. 68 - pp. 49 - 65, pi. 1 - 4, 1931.
- G. D. **ÖVEY** : A new species of Lockhartia Davies from British Somaliland, with notes on other species of the genus - Ann« Mag. Natrl. Hist - Series 11, Vol. **8** - pp. **571-576**, pL **10-11**, 1946. -
- G. D. **ÖVEY** : Amendment to the diagnosis of Lockhartia huntii Ovey - Gont. Gushman Lab. For. Res. Vol. 24, pt. 4 p. 99, 1948.
- J. **PFENDER** : A propos de Siderloites vidali Douville et quelques autres - Bull. Soc. Géol. France - Series 3, Vol. 5, p. 231, 19E4.
- A. **SILVESTRI** : Foraminiferi dell'Eocene della Somalia - Paleontogr. Italica - Vol. 32, suppl, 4 - p. 80, 1939.
- A. **SILVESTRI** : Foraminifera dell'Eocene della Somalia - ibidem - Vol. 32, suppl. 5 - pp. 76-79, pi. 1, fig. 6, pi. 5, fig. 5 pi. 9, fig. 4, pi. 13, fig. 12, pi. 18, fig. 8, pi. 21, fig. 7, pi. 22, fig. 6. - 1942.

Two new species of the **Foraminiferal Genus.**  
**Loekhartia** from Turkey

**P L A T E - 1**

*Axial sections of all described species of Loekhartia.*

- Fig\* 1 — *Loekhartia alveolata* Silvestri 1942 » Lutetian  
Fig« 2 — *Loekhartia tlppsri* (Davies) 1928 - Ypresian  
Fig# 3 —• *Loekhartia hunti* Ovey 1948 - Ypresian..  
Fig» 4 — *Loekhartia cushmani* Applin et Jordan 1945 • Lutetian - Ypresian  
Fig« 5 — *Loekhartia daviesi* ten Dam n, sp. <sup>TM</sup> Paleocene  
Figs 6 — *Loekhartia cooditi* (Nuttall) 1926 - Paleocene - Ypresian  
*Fig.* 7 — *Loekhartia haimei* (Davies) 1927 » Paleocene  
*Fig\**. ^ 8 — *Loekhartia newboldi* (d'Ârchiac et Haime) 1853 <sup>ra</sup> Paleocene  
*Pig*® 9 — *Loekhartia condi.ti* (Nuttall) var, *roae* (Davies) 1930 <sup>M</sup> Paleocene  
*Fig*". 10 — *Loekhartia bermudezi* Cole 1942 - Paleocene • Danian  
*Fig*« 11 — *Loekhartia ramanae* ten' Dam n, sp\* - Maestrichtian

TWO new species of the 'Foraminiferal' genus  
**Lockhartia** from Turkey

P L A T E - 2

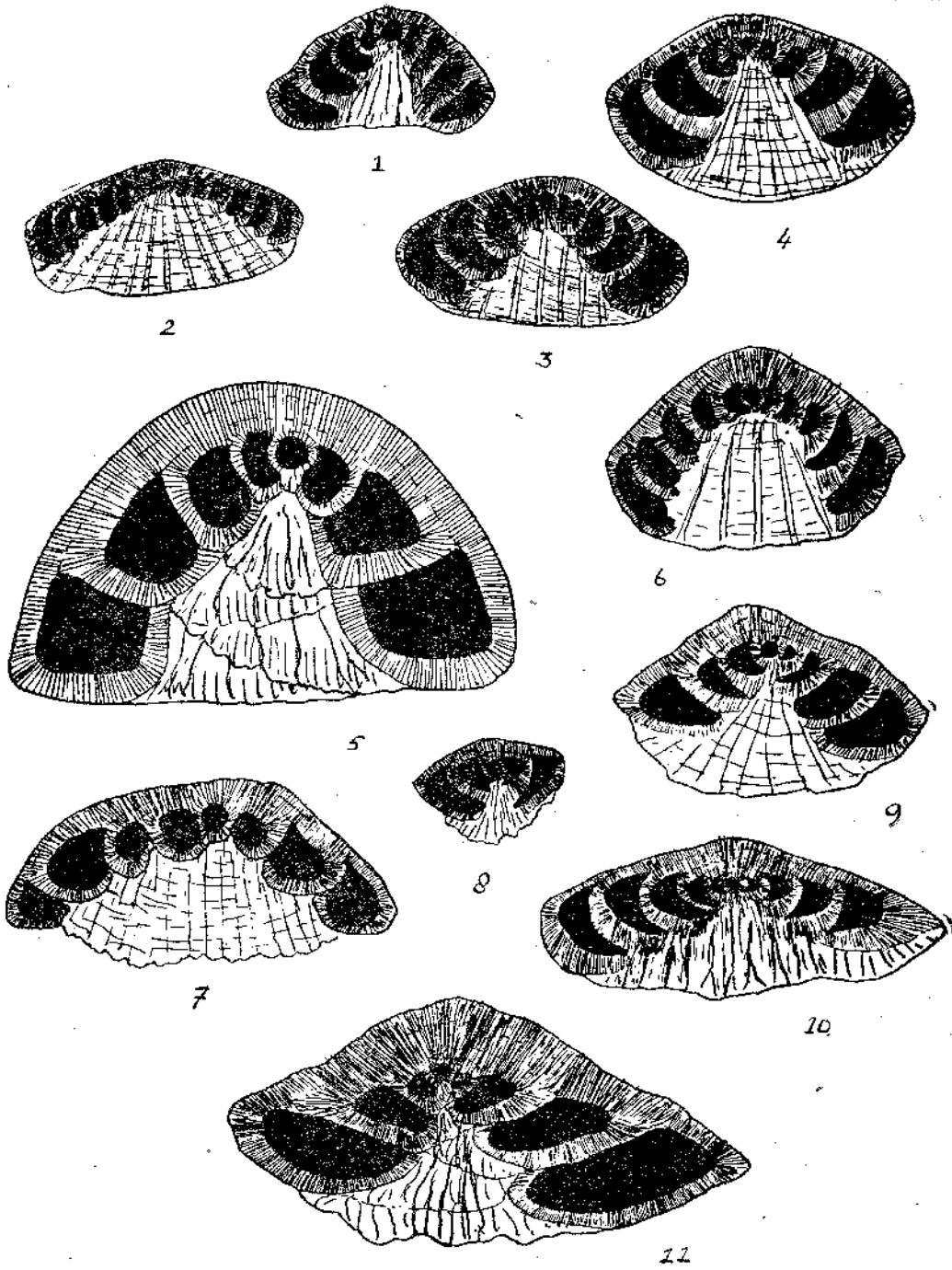
*New species of Lockhartia (Photographs)*

Fig. 1 — *Lockhartia daviesi* ten Dam n° sp. » axial section<sup>m</sup> Holotype M.T.À«  
Coll. No. TF 251

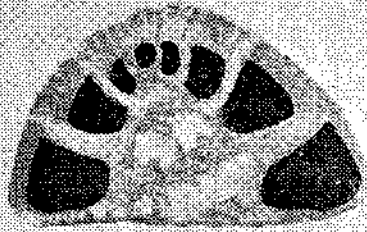
Fig. 2<sup>a-d</sup> — *Lockhartia daviesi* ten Dam n° sp. - ;  
a« dorsal side adult specimen  
b« ventral side adult specimen  
e\* oblique view ventral side  
d\* dorsal side young specimen

Fig. 3 — *Lockhartia ramanae* ten Dam n° sp\* - axial section - Holotype M.T.À«  
Coll. No. TF 366

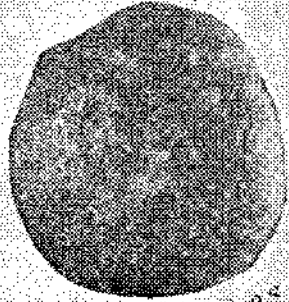
Fig. 4 P<sup>na</sup> — *Lockhartia ramanae* ten Dam n° sp<sub>8</sub> -  
a. dorsal side adult specimen  
b, ventral side adult specimen  
c. oblique view ventral side young specimen  
d, dorsal side adult specimen®



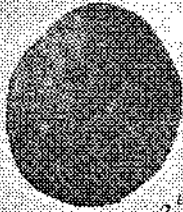




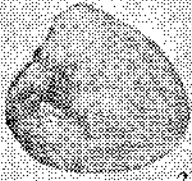
1



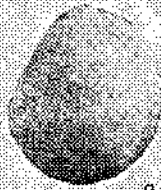
2<sup>a</sup>



2<sup>b</sup>



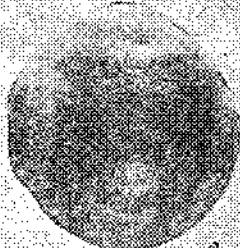
2<sup>c</sup>



2<sup>d</sup>



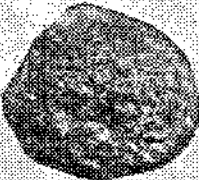
3



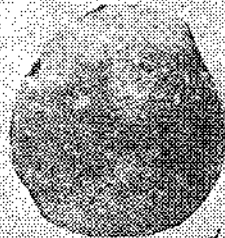
4<sup>a</sup>



4<sup>b</sup>



4<sup>c</sup>



4<sup>d</sup>

