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No. 3

AUGUST, 1938

THE OCCURRENCE OF *LACAZINA* AND *BIPLANISPIRA* IN THE MANDATED TERRITORY OF NEW GUINEA

(with 2 plates),

AND

A LOWER MIOCENE LIMESTONE FROM THE OK TI RIVER, PAPUA

(with 1 plate).

By

IRENE CRESPIN, B.A.,
Commonwealth Palaeontologist.

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THE OCCURRENCE OF *LACAZINA* AND *BIPLANISPIRA* IN THE MANDATED TERRITORY OF NEW GUINEA.

1. INTRODUCTION.

A discovery of importance to the geology of the Mandated Territory of New Guinea, and especially as far as the Tertiary foraminifera-bearing rocks are concerned, was recently made by N. H. Fisher, Esq., M.Sc., Government Geologist of New Guinea. During a short stay at the Chimbu aerodrome, whilst the aeroplane was being unloaded, Mr. Fisher collected specimens of a limestone from a small creek near the aerodrome, which is in the Wahgi River area, New Guinea. In a communication to the writer, he stated that " these limestones form steep escarpments along the Bismarck Range on the northern side of the Wahgi Valley ". The elevation of the locality is 5,100 feet above sea level. When a microscopic study of thin sections of this limestone, which was sent to Canberra for examination, was carried out, it was found that the rock contained two foraminiferal genera that had not been previously recorded from the Mandated Territory. These genera were *Lacazina* and *Biplanispira*. *Lacazina* has been recorded by Dutch geologists from the Eocene of Dutch New Guinea but *Biplanispira*, as far as is known, has previously been determined only from the Eocene of Borneo.

2. EOCENE FORAMINIFERAL ROCKS IN NEW GUINEA AND PAPUA.

Limestones of Eocene age are not well developed *in situ* in the Mandated Territory nor in Papua. In New Guinea small outcrops of rocks, consisting of Nummulitic and *Discocyclina* limestones, are recorded from a few localities in the Wanimo and Aitape areas. Numerous large limestone pebbles, ultimately derived from the weathering out of conglomerates, and which are rich in beautifully preserved *Nummulites*, occur in many of the creek beds. Rich *Fasciolites* (=*Alveolina*) limestones were collected, *in situ*, by G. A. V. Stanley, of Oil Search Limited, from the head-waters of the Yalingi River.

Eocene foraminifera represented in the limestones from these areas include the following :—

Discocyclina dispansa.
,, *pratti.*
,, *californica.*
,, *douvillei.*
Asterocyclina stella.
Actinocyclina aster.

Fasciolites javanus.
,, *subpyrenaica* var. *globosa.*
,, *lepidulus.*
Nummulites sub-brongniarti.
,, *bagelensis.*
,, *javanus.*
,, *djokdjokartae.*
Assilina aff. *spira.*
Pellatispira madaraszi
,, ,, var. *provalei.*

The calcareous alga, *Lithothamnium ramosissimum*, is frequently associated with the above genera.

In Papua, Eocene foraminiferal limestones have been recorded from the vicinity of Port Moresby, where extensive collections were made in 1929 by the geologists of the Anglo-Persian (now Anglo-Iran) Oil Company. These rocks comprised Nummulitic and *Discocyclina* limestones. In a recent publication (1936), Dr. Rutten mentions a locality along the Fly River. He has kindly referred me to a paper by R. Buller Newton (1918) in which the author states that " The material studied, comprising foraminifera and Nullipore (*Lithothamnium*) remains, has been obtained from some rolled limestone pebbles which were collected in river-beds of the upper reaches of the Fly River by the Right Honorable Sir William Macgregor, G.C.M.G., during an expedition carried out in the years 1889 and 1890 ".

The forms recorded by Buller Newton are as follows :—

Alveolina wichmanni = *Fasciolites wichmanni.*
Lacazina wichmanni.
Orthophragmina sp. = *Discocyclina* sp.
Miliolines.

Typical Eocene foraminifera present in the Port Moresby beds are as follows : —

Discocyclina dispansa.
,, *douvillei.*
,, *pratti.*
Asterocyclina stellata.
,, *stella.*
Actinocyclina sp.
Fasciolites javanus.
Nummulites bagelensis.
,, *pengaronensis.*
,, *javanus.*
Assilina spira.
,, *granulosa.*
Pellatispira madaraszi var. *provalei.*
,, *inflata.*

3. DESCRIPTION OF THE LIMESTONE AND COMPARISON WITH OTHER LOCALITIES.

The rock from near the Chimbu Aerodrome is a hard, compact, grey limestone, with abundant calcareous algae (*Lithothamnium*), and numerous foraminifera showing on the weathered surface. On polishing the surfaces of this rock, numerous sections of beautifully preserved foraminifera are seen including many of *Lacazina*, with a few tests of *Biplanispira* and a luxurious growth of *Lithothamnium*. In thin section, the limestone is found to contain abundant algae and foraminifera in a calcitic groundmass.

The fossils recorded are as follows :—

Plantae—

Lithothamnium ramosissimum.
Lithophyllum sp.

Foraminifera—

Quinqueloculina sp.
Valvulammina sp.
Textularia sp.
Guembelina sp.
Rhapydionina sp.
Carpentaria sp.
Planorbulina sp.
Acervulina inhaerens.
Anomalina sp.
Amphistegina cf. *radiata.*
Lacazina wichmanni.
cf. *Chapmanina* sp.
Peneroplis sp.
Pellatispira sp.
Coskinolina sp.
Biplanispira mirabilis.

Ostracoda—

Macrocypris sp.

Typical Eocene species include—

Valvulammina sp.
Rhapydionina sp.
Lacazina wichmanni.
cf. *Chapmanina* sp.
Coskinolina sp.
Biplanispira mirabilis.

As has been stated, the genus *Lacazina* has not previously been recorded from the Mandated Territory of New Guinea but Buller Newton (1918) refers his figures 1, 2 and 3 on pl. ix. in his paper on the limestones from the Fly River to *L. wichmanni.* On examination, these forms have the characters of *Fasciolites* rather than *Lacazina.* Martin (1911) discovered *Lacazina* in a limestone at Setakwa in the south-west of Dutch New Guinea. There it was accompanied by *Nummulites, Fasciolites* (= *Alveolina*) and *Lithothamnium.* A *Lacazina* limestone also occurs in the south-west of Dutch New Guinea at Triton Bay, Dramai Island (Rutten, 1914). This writer (1924), in his paper on the foraminifera of the " Vogelkop " of New Guinea, records a limestone containing *Fasciolites* and *Lacazina* from Sjeri-Ingsim. Associated with these two genera are Miliolines, *Textularia* and Rotalines. He figures a section of the rock showing numerous specimens of *Lacazina* and a large *Fasciolites,* and resembling closely the material from Chimbu Aerodrome. Rutten (1914) has also recorded *Lacazina* from Wilhelminatop, which lies a little to the west of meridian 139 degrees, whilst his most recent discovery (Rutten, 1936) comes from the Island of Pisang (east of Misool), where rocks were collected during the voyage of Their Royal Highnesses Prince and Princess Leopold of Belgium in 1929.

4. NOTES ON TYPICAL FORAMINIFERA.

Family MILIOLIDAE.

Genus **Lacazina** Munier-Chalmas, 1892.

LACAZINA WICHMANNI Schlumberger.

Pl. I., Figs. 1–7.

Lacazina wichmanni Schlumberger, 1894, p. 295, pl. xii. Rutten, 1914, p. 44, pl. viii., figs. 8, 9. 1927, p. 78, fig. 19. 1936, p. 3, pls. ii., iii., figs. 18–19.

Observations.—Sections of tests of *Lacazina* are abundant in this limestone from the Chimbu Aerodrome. Many of them are perfectly preserved and are present as transverse, longitudinal and oblique sections. They are, for the most part, identical with the specimens figured by Rutten (1936) from the Island of Pisang. *Lacazina* was originally described by Schlumberger from the Cretaceous, but throughout north-west and south-west Dutch New Guinea it has been found associated with typical Eocene foraminifera (*Nummulites* and *Fasciolites*) and abundant *Lithothamnium*. In the material from the Island of Pisang, *Discocyclina* is also present. In the Chimbu rock *Lacazina wichmanni* is associated with the rare and only recently recorded genus *Biplanispira*.

Rutten suggests a Middle Eocene age for the *Lacazina* limestones from Pisang and north-western New Guinea.

Family UNKNOWN.

Genus **Biplanispira** Umbgrove, 1937.

BIPLANISPIRA MIRABILIS (UMBGROVE).

Pl. II., Figs. 9–18.

Heterospira mirabilis Umbgrove, 1936, p. 155, pl. 1.

Biplanispira mirabilis (Umbgrove), 1937.

Observations.—The discovery, in the Chimbu limestone, of this unique and only recently recorded genus of Umbgrove's is of considerable importance. My thanks are due to W. J. Parr, Mines Department, Melbourne, for calling my attention to this very recent paper by Umbgrove (1936), who had discovered this remarkable form in thin sections of some Tertiary limestones from Borneo. He called it *Heterospira* but found it necessary to alter the name in 1937 to *Biplanispira*, *Heterospira* being preoccupied.

Umbgrove considers the structure of the test of *Biplanispira* to be unique and at present is unable to suggest to which family of the foraminifera the form belongs. *Biplanispira* is represented only in thin section in the Chimbu limestone just as Umbgrove discovered it in Borneo, no friable material being available in either locality. It appears mainly as beautifully preserved vertical sections, only one perfect section being recorded in the transverse direction (Fig. 11). In making a comparison with Umbgrove's original figures, the present specimens appear to be more completely preserved and it is hoped that they may be of assistance to Dr. Umbgrove in the further study of this interesting genus.

Biplanispira mirabilis, in the Chimbu limestone, is found associated with *Lacazina wichmanni*, fragments of *Pellatispira*, miliolines and abundant *Lithothamnium*. In Borneo, the associated forms are *Discocyclina*, *Nummulites*, *Pellatispira*, *Spiroclypeus* and *Lithothamnium*. Umbgrove suspected a Miocene age for these Bornean specimens due to the presence of *Spiroclypeus*, the Eocene forms being derived, but Tan Sin Hok (1936), after much detailed field work, has proved Eocene *Spiroclypeus* in Borneo.

Family VALVULINIDAE.

Genus **Coskinolina** Stache, 1875.

COSKINOLINA SP.

Pl. I., Fig 13.

Observations.—A moderately complete vertical section of *Coskinolina* is present in this limestone, as well as a few fragmentary specimens. It is a typical Eocene form in India and Europe; and has been recorded (Chapman and Crespin, 1935) from the Middle to Upper Eocene beds in the Bullara area in north-western Australia.

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6. EXPLANATION OF PLATES.

PLATE I.

Figs. 1–7.—*Lacazina wichmanni* Schlumberger, Chimbu Aerodrome, New Guinea. Eocene.

Fig. 1.—Top right, oblique section. Lower left, oblique section, passing through proloculum. X 22.

Fig. 2.—Transverse section passing through proloculum. X27.

Fig. 3.—Ditto. X21.

Fig. 3a.—Transverse section passing near the proloculum. X22

Fig. 4.—Longitudinal section, through proloculum. X25.

Fig. 5.—Transverse section, near proloculum. X22.

Fig. 6.—Oblique section, near proloculum. X27.

Fig. 7.—Longitudinal section, near proloculum. X30.

Fig. 8.—*Coskinolina* sp., Chimbu Aerodrome, New Guinea, Eocene, Vertical section. X35.

PLATE 2.

Figs. 9–18.—*Biplanispira mirabilis* Umbgrove, Chimbu Aerodrome, New Guinea. Eocene.

Fig. 9.—" Nearly equatorial section, through primary coil and equatorial pores ". X30.

Fig. 10.—Vertical section near margin of specimen. X21.

Fig. 11.—" Nearly parallel to equatorial plane, showing primary coil and one of the layers of secondary chambers winding in an opposite direction to the primary chambers ". X10.

Fig. 12.—Vertical section near proloculum. X20.

Fig. 13.—Vertical non-radial section of a form which may represent another species. X16.

Fig. 14.—Vertical radial section showing proloculum. X24.

Fig. 15.—Centre, slightly oblique section, showing pillars protruding on surface of specimen. Top left, longitudinal section of *Lacazina wichmanni* showing proloculum. X11.

Fig. 16.—Vertical section near proloculum, showing connexion between equatorial and lateral pores; possibly representing another species similar to Fig. 13. X17.

Fig. 17.—Centre—Vertical non-radial section. Lower left—transverse section of *L. wichmanni*. X20.

Fig. 18.—Similar to centre specimen of Fig. 15, but less oblique. X24.

NOTE.—All specimens figured are in the Commonwealth Palaeontological Collection, at Canberra.

A LOWER MIOCENE LIMESTONE FROM THE OK TI RIVER, PAPUA.

1. INTRODUCTION.

In 1922 Mr. Leo Austin, whilst Assistant Resident Magistrate in Papua, made a trip to the Tedi River District in Western Papua, which he described in a paper in the *Royal Geographical Journal* in 1923, Vol. LXII. The area visited included the Ok Ti River, which is the local name for the higher portion of the Upper Tedi or Alice River, and which has its headwaters in the Star Mountains. The Upper Tedi or Alice River joins the Fly River at latitude 6° 30′. Austin made a small collection of fossil mollusca, fossiliferous limestones and mudstones along the Ok Ti River, the location being given as " about latitude 5° 15′ and about longitude 141° 10′."

This collection of fossiliferous material was forwarded to the Department of Home and Territories in Melbourne, and later to the National Museum, Melbourne, for palaeontological examination, where, unfortunately, it was never dealt with. The specimens are now incorporated in the Commonwealth Palaeontological Collection at Canberra.

The only fossiliferous material described from a locality adjacent to the border of Dutch New Guinea is by Buller Newton in 1919, who recorded limestones of Eocene age from the headwaters of the Fly River. In view of the activities of various oil companies prospecting for oil in Papua and of the paucity of literature relating to the fossiliferous rocks of Papua and the Mandated Territory of New Guinea, a short paper on this limestone from the Ok Ti River seemed advisable.

Associated with the limestone and overlying it are fossiliferous mudstones, which contain a Mio-Pliocene fauna of molluscan shells similar to those which occur in the Blue Marl Group throughout Papua and New Guinea, and extending west through the Dutch East Indies and the Philippines to Japan.

2. DESCRIPTION OF LIMESTONE.

" From limestone deposit beneath the fossiliferous mudstone grit series, right bank (western) of Ok Ti River, near Suspension Bridge ". This rock is a hard, buff coloured, foraminiferal limestone, with numerous tests of *Lepidocyclina* and calcareous algae showing on the weathered surface. Thin sections of the rock contain calcarous algae and beautifully preserved foraminifera, including *Lepidocyclina*, in a calcitic matrix.

The following forms are present :—

Plantae—*Lithothamnium ramosissimum* (c).
Foraminifera—*Quinqueloculina* cf. *seminulum* (r).
Quinqueloculina sp. (r).
Trillina howchini (r).
Elphidium sp. (r).

Acervulina inhaerens (c).
Gypsina globulus (r).
Planorbulinella larvata (r).
Cycloclypeus sp. (r).
Heterostegina borneënsis (c).
Amphistegina lessonii (c).
Lepidocyclina (*Eulepidina*) *murrayana* (c).
Lepidocyclina (*Eulepidina*) *insulae-natalis* (r).
Noelveolina pygmaea (r).

This rock, with abundance of *Heterostegina borneënsis*, *Lepidocyclina* (*Eulepidina*) *murrayana*, and *Neoalveolina pygmaea* is practically identical with a limestone collected by Professor Yabe in Java in 1929 from a " limestome cliff at the northern foot of Pasir Pabeasan lying to the west of the Village Tajojopoe ". A similar rock is recorded from the Island of Soemba.

Pebbles of limestone containing a fauna identical with the Ok Ti River material are recorded from the Numbim Creek and Aramap Creek in the Matapau area, New Guinea. These were collected by G. A. V. Stanley, B.Sc., of Oil Search Limited, in 1931. The presence of the numerous tests of *Lepidocyclina* (*Eulepidina*) *murrayana* in association with *Heterostegina borneënsis* indicates a Lower Miocene age for this limestone. The Eulepidines are characteristic of stage " e " of the Dutch East Indian zoning of the Tertiaries.

3. NOTES ON TYPICAL FORAMINIFERA.

Genus **Neoalveolina** Silvestri.

NEOALVEOLINA PYGMAEA (Hanzawa).

Pl. 3., Figs. 3, 5.

Borealis (*Fasciolites*) *pygmaea* Hanzawa, 1930, pl. xxvi. (1), figs. 14–15.
Neoalveolina pygmaea (Hanzawa) Bakx, 1932, pl. III., figs. 18–20.

Observations.—*Neoalveolina pygmaea* is not common in the rock from the Ok Ti River and is represented by a few transverse sections. Its occurrence here is similar to that recorded by Hanzawa in the limestone from Pabeasan, Java, where it is associated with numerous tests of *Heterostegina borneënsis*. The type locality for this species is S. Oema, north-eastern Borneo.

Genus **Heterostegina** d'Orbigny, 1826.

HETEROSTEGINA BORNEËNSIS Van der Vlerk.

Pl. 3., Figs. 6, 7, 8, 9.

Heterostegina borneënsis Van der Vlerk, 1929, pl. xvi., figs. 6a–c, 25a–b, Hanzawa, 1930, pl. xxvi. (1), figs. 11–19, pl. xxvii. (1), figs. 4–8.

Observations.—This form occurs as horizontal and vertical sections, the specimens being for the most part fragmentary. Hanzawa suggests that this particular type of *Heterostegina* is characteristic of the *Eulepidina* limestones in the East Indies and Philippines. The species in the present rock measures 7 mm. in diameter as compared with the type specimen of Van der Vlerk which averages 3 mm. and 5.5 mm. of Hanzawa. The larger size of Hanzawa's specimen from Java and of the present ones from the Ok Ti River, Papua, may represent the microspheric form of the species.

Genus **Lepidocyclina** Gümbel, 1868.

Sub-genus **Eulepidina** H. Douvillé, 1911.

Lepidocyclina (Eulepidina) insulae-natalis Jones and Chapman.

Pl. 3., Fig. 1.

Lepidocyclina insulae-natalis Jones and Chapman, 1900, pl. xx., fig. 5, pl. xxi., fig. 16, non pl. xxi., fig. 13.

Lepidocyclina (*Eulepidina*) *insulae-natalis* Nuttall, 1926, pl. iv., figs. 2, 5 and 6.

Observations.—This specimen of *L.* (*E.*) *insulae-natalis* is represented by a vertical section through a large test, which just failed to pass through the proloculum. It is definitely comparable with the type specimen figured by Jones and Chapman from Christmas Island. It is recorded from limestones near Port Moresby, Papua, and in the Mandated Territory of New Guinea.

Lepidocyclina (Eulepidina) murrayana Jones and Chapman.

Pl. 3, figs. 2, 3, 4, 9.

Lepidocyclina murrayana Jones and Chapman, 1900, pp. 252–253, pl. xxi., fig. 10.
Lepidocyclina formosa Schlumberger, 1902, p. 251, pl. vii., figs. 1–3.
Lepidocyclina murrayana Chapman, 1914, p. 296, pl. viii., fig. 7.
Lepidocyclina (*Eulepidina*) *formosa* Yabe, 1919, p. 43, (7), pl. vi., (1), figs. 1B, 2, 4B, 6, 7–B, 8–B ; pl. vii., (II.), figs. 4–6, 12–B, 14–B, Hanzawa, 1930, p. 90 (6), pl. xxvi. (1), fig. 13.
Lepidocyclina (*Eulepidina*) ? *formosa* Nuttall, 1926, p. 29.

Observations.—Beautifully preserved transverse sections of *L.* (*E.*) *murrayana* are present as four-rayed specimens. The nucleoconch appears as the typical Eulepidine type, and measures 1 mm. in diameter. Vertical sections are also represented. *L. murrayana* Jones and Chapman (1900) has priority over *L. formosa* Schlumberger (1902), a name which has come into general use in literature. Nuttall (1926) realizes this but states that " since *L. formosa* is a well-established species it is better to retain this name and discard *L. murrayana*, which was based on a single specimen giving inadequate data for a precise diagnosis ". The fact that Jones and Chapman did give a description of *L. murrayana* and did figure a specimen fixes that species under the rule of priority.

The slight variation in the shape of the equatorial chambers in the specimen from Borneo, from those in *L. murrayana*, induced Schlumberger to create a new species, *L. formosa*. The slight variation was possibly due to the direction in which the section of his form was cut and possible curvature of the equatorial plane. An examination of the type figure of *L. murrayana* and a comparison with that of *L. formosa* convinces me that the latter is synonymous with *L. murrayana*.

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5. EXPLANATION OF PLATE.

PLATE 3.

Fig. 1.—*Lepidocyclina* (*Eulepidina*) *insulae-natalis*. Jones and Chapman. Vertical section. X10.

Fig. 2.—*Lepidocyclina* (*Eulepidina*) *murrayana* Jones and Chapman, equatorial section showing four arms and eccentric position of proloculum. X11.

Fig. 3.—(*a*) *L.* (*E.*) *murrayana* Jones and Chapman. Vertical section showing saddle shape structure. X10.
(*b*) *Neoalveolina pygmaea* Hanzawa. Horizontal section. X10.
(*c*) *Trillina howchini* Schlumberger. Vertical section. X10.

Fig. 4.—*L.* (*E*) *murrayana* Jones and Chapman. Vertical section through saddle shaped specimen, showing large Eulepidine proloculum, also fragmentary sections of *Heterostegina borneënsis*. X12.

Fig. 5.—*Neoalveolina pygmaea* (Hanzawa). Horizontal section. X12.

Fig. 6.—*Heterostegina borneënsis* Van der Vlerk. Horizontal and vertical sections. X10.

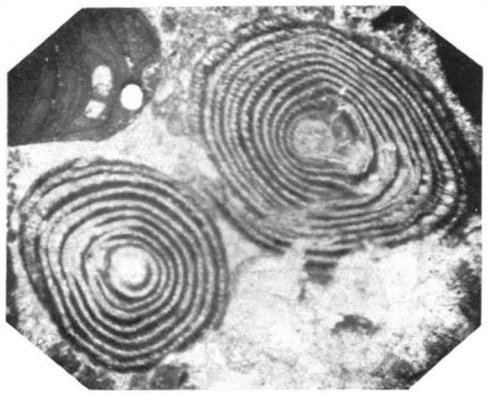
Fig. 7.—*H. borneënsis* Van der Vlerk. Vertical sections. X10.

Fig. 8.—*H. borneënsis Van der Vlerk.* Vertical section, with fragments in horizontal direction. X10.

Fig. 9.—*Lepidocyclina* (*Eulepidina*) *murrayana* Jones and Chapman. Lower left, transverse section. *Heterostegina borneënsis* Van der Vlerk. Top right. X10.

NOTE.—All specimens figured are in the Commonwealth Palaeontological Collection, at Canberra.

PLATE I.



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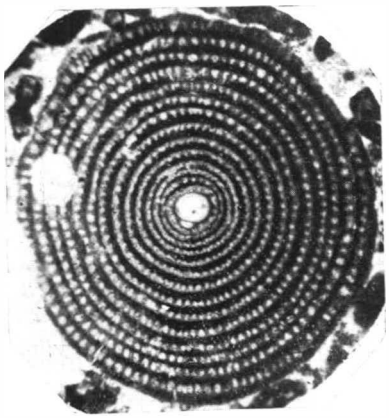

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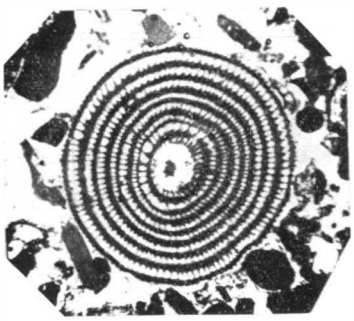

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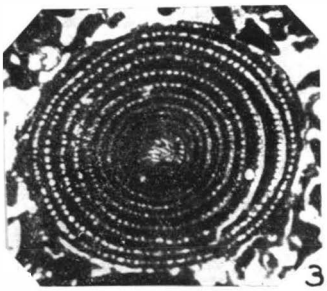

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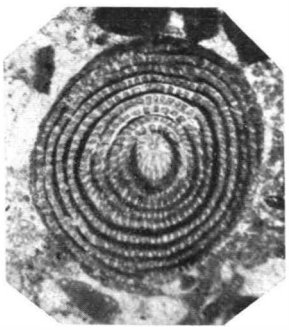

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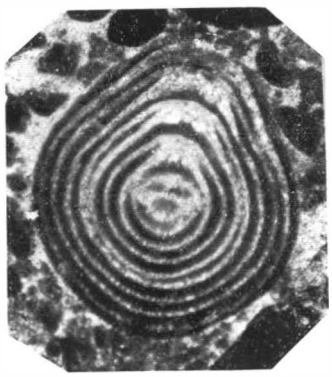

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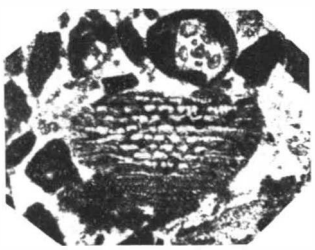

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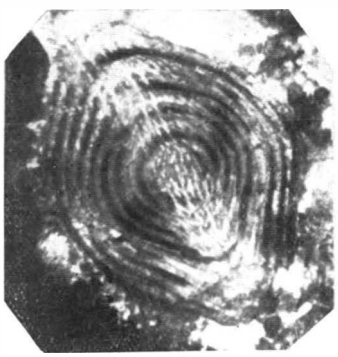

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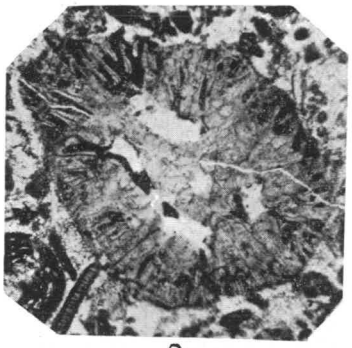
Photo H B Hawkins

LACAZINA AND COSKINOLINA FROM NEW GUINEA

PLATE 2.



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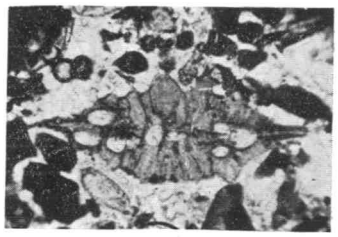

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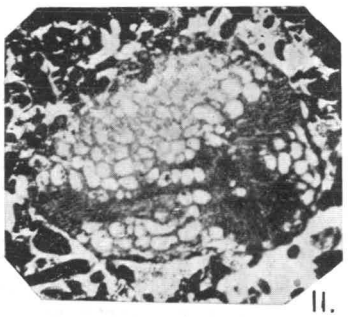

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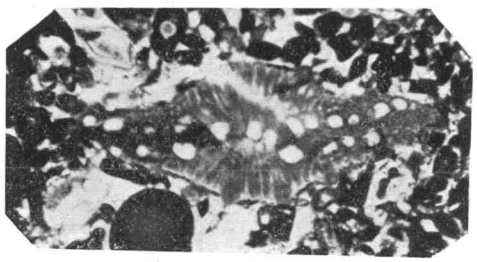

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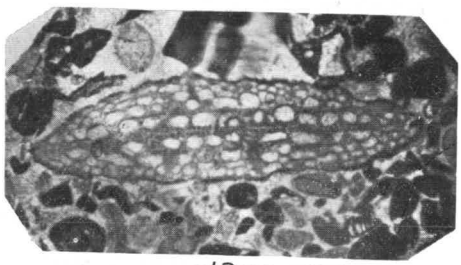

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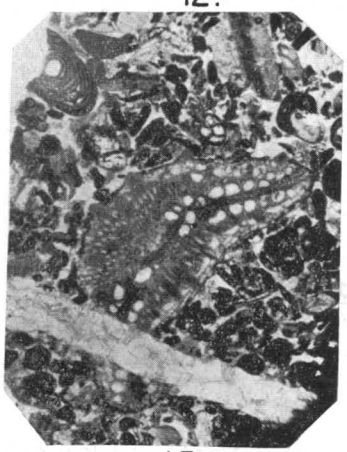

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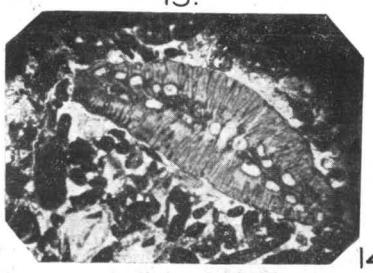

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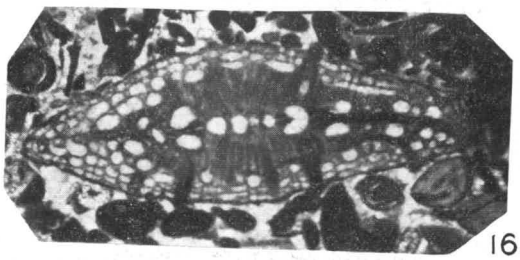

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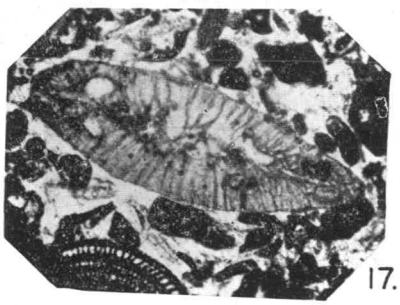

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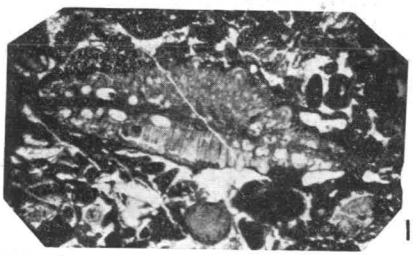

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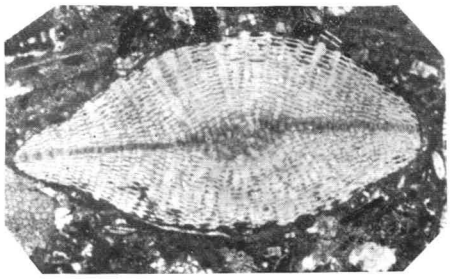
Photo. H. B. Hawkins

BIPLANISPIRA FROM NEW GUINEA

PLATE 3.



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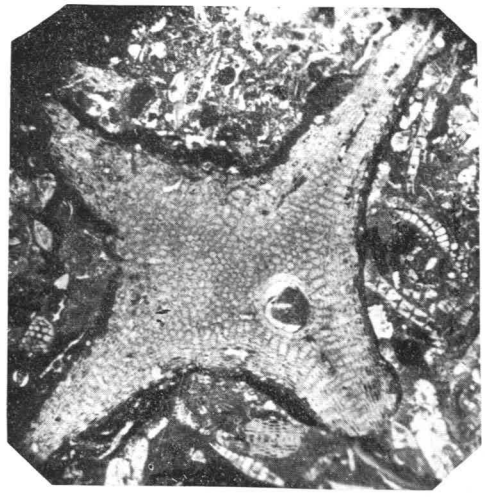

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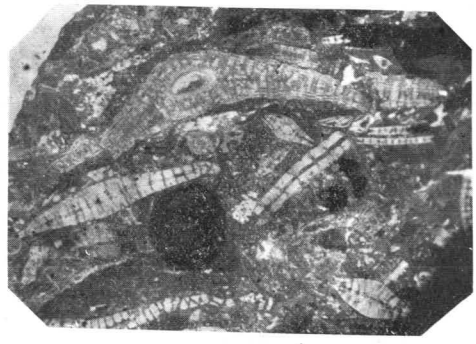

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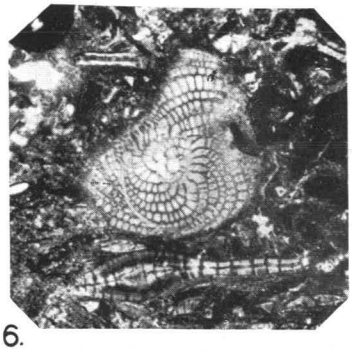

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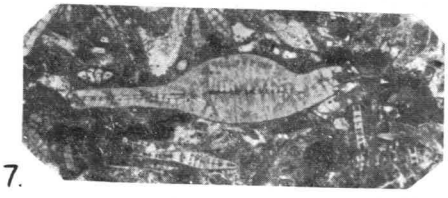

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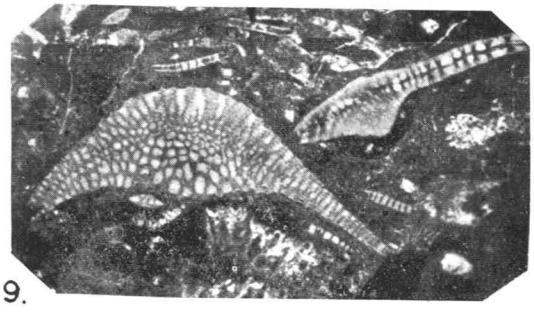

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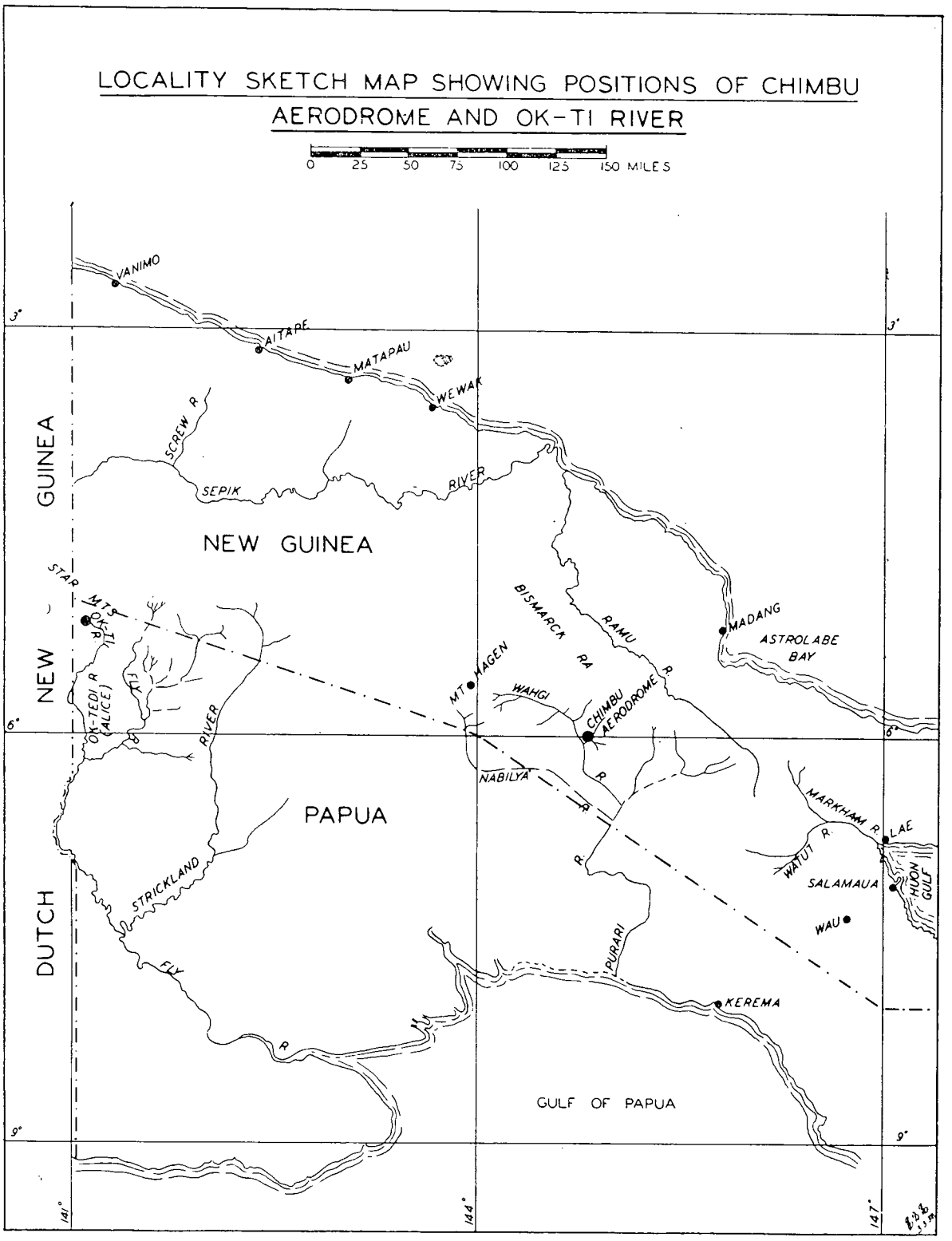
Photo. H.B.Hawkins.

LEPIDOCYCLINA NEOALVEOLINA & HETEROSTEGINA FROM PAPUA.



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