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COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

Record No. 1971/57



Foraminifera and Age of Samples
from New Britain

by

J. G. Binnekamp

**BMR
Record
1971/57
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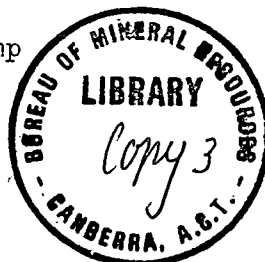
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FORAMINIFERA AND AGE OF SAMPLES FROM
NEW BRITAIN

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SUMMARY

Samples collected during the mapping of New Britain from 1967 to 1969 have been examined for their foraminiferal content to determine the stratigraphical position of the various lithologic units.

The oldest formation is the Baining Volcanics, a volcanogenic unit containing minor limestones with larger forams characteristic of the upper Eocene, Tb stage.

An Oligocene, lower Te stage fauna of larger foraminifera occurs in limestones found in the predominantly volcanogenic Marai Volcanics in Gazelle Peninsula and its equivalents in the Nakanai Mountains and the Whiteman Ranges. Overlying these volcanics is a thick limestone sequence which crops out over large areas of the island. The base of the sequence appears to be upper Te stage, lower Miocene, in its western outcrops in the Whiteman Ranges and becomes gradually younger eastwards; in its most easterly outcrops in the North Baining Mountains the base has been dated as middle Miocene, upper Tf stage. The upper limits of the sequence are insufficiently dated; limestone sedimentation ended late in middle Miocene or upper Miocene times. In the Nakanai Mountains, marly sediments from two areas contain upper Miocene to Pliocene planktonics. Similar assemblages were obtained from volcanic sequences (Sigule and Sinewit Volcanics) in the Gazelle Peninsula.

Pliocene planktonic assemblages occur in a sandstone-siltstone sequence near the mouth of the Aria River on the North Coast, in calcareous sediments near Kandrian on the south coast, and from marly sediments south of Open Bay. A Pleistocene to Recent fauna was found in sediments outcropping along the west coast of Wide Bay. No determinable fauna were obtained from the uplifted coral reefs which occur along the south and east coast of the island.

INTRODUCTION

During 1967, 1968 and 1969 BMR geologists mapped New Britain and collected several hundred samples for foraminiferal age determination. Most samples were hard limestone and were examined on polished surfaces; if Foraminifera were present random sections were prepared. For some samples oriented sections of larger foraminifera were prepared to enable specific identification. Friable samples were washed to free the faunal content.

Only samples with age-diagnostic faunas are discussed here. A description of the locality, faunal content and age is given for each sample. Ages are expressed in the East Indian 'letter' stages and their equivalents in standard ages according to Clarke & Blow (1969). The material on which this study is based is held in the micropalaeontological section, BMR.

Samples examined were:

<u>Number</u>	<u>Collector:</u>
67690200	R.P. Macnab, 1967, Gazelle Peninsula.
67691326	" 1967, mainly from South Baining Mountains, Gazelle Peninsula. These samples were initially examined by D.J. Belford; some have now been studied in detail.
68690551 68690585	" 1968, from Wide Bay - Open Bay area, Gazelle Peninsula. These samples were initially examined by D.J. Belford and the results are given in Record 1968/82. Re-examination and preparation of oriented sections has resulted in different identifications and age determinations in some samples.
68691658 68691711	" 1968, Gazelle Peninsula.
Samples with prefix	
49 NG (Cape Raoult 1:250,000 Sheet area)	
50 NG (Arawe 1:250,000 Sheet area)	
51 NG (Talasea 1:250,000 Sheet area)	
52 NG (Gasmata 1:250,000 Sheet area)	
53 NG (Gazelle Peninsula 1:250,000 Sheet area)	
54 NG (Pomio 1:250,000 Sheet area)	

Collectors: Members of the New Britain Field Party, 1969

Interpretation of the age of the fauna

The primary aim of the present study was to establish the ages of the different lithologic units distinguished in New Britain. The main handicap in doing this has been the lack of continuous exposed sections. Most of the island is covered by thick tropical forest and exposures are poor. In addition, the older rocks are strongly faulted and folded; the younger

formations are mostly flat lying and are only well exposed in inaccessible cliffs, outcrops on less steep slopes being overgrown. Most material consists of spot samples, either from outcrops, the approximate position of which, within the sedimentary succession was sometimes known, or of "float" boulder samples of uncertain stratigraphic position. The problem thus became one of arranging the samples according to their faunal content, thus helping to determine the stratigraphic range of the formations.

For this purpose the Foraminifera were the most suitable fossils as they occur commonly in sediments in New Britain and their succession in the Tertiary of the Indo-Pacific region is relatively well known. The Foraminifera found in New Britain are larger benthonic Foraminifera and planktonic and benthonic smaller Foraminifera. Samples containing larger Foraminifera were initially arranged by using the 'East Indian' letter stages, based on the associations of genera, subgenera and, in some cases, species. Although valuable for generalized correlations, this system is insufficient for detailed correlations and, as has also been pointed out, it does not take into account the fact that some of the genera are facies controlled. Other methods have been developed using the evolutionary changes of some genera and the value of these changes in stratigraphy (e.g. Miogypsina, Cycloclypeus and Lepidocyclina).

Miogypsina is one of the most abundant larger Foraminifera in New Britain, occurring, however, mostly in massive limestones. Drooger's method (1952) of analysis could therefore not be followed, as this requires well-preserved, free specimens.

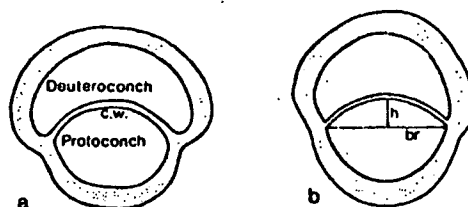
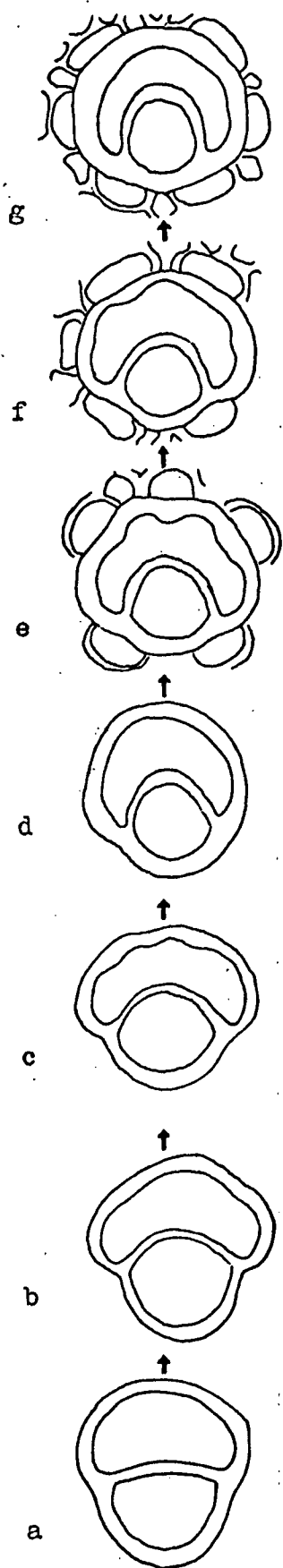
Cycloclypeus is uncommon in New Britain samples and equatorial sections, necessary for identification, hard to prepare. From three samples, only one equatorial section per sample was obtained; a fourth sample yielded several sections, prepared from free specimens. As Tan's method (1932) is based on statistical measurements of a great number of sections, the results from these sections can only be taken as indications of the stratigraphic positions of the samples. However the results seem to accord with other evidence.

Lepidocyclina, subgenus Nephrolepidina (s.l.), occurs quite commonly in the New Britain samples. In various publications van der Vlerk has been able to prove an evolutionary development of the nucleoconch of this subgenus. From older to younger strata the average curvature of the common wall between protoconch and deuterococonch of a number of specimens increases, thus changing the shape of the nucleoconch from an isolepidine- via nephrolepine- to a trybliolepidine form (Fig. 1). These changes can be expressed numerically in the so-called "grade of enclosure" of the protoconch by the deuterococonch or "the degree of curvature" of the common wall between the two. Van der Vlerk has given these values for a number of samples for which the stratigraphical position in terms of the letter stages was also known. From these it appears that the correlation between these values and the letter stages is approximately:

Lower Te : 36%-40% grade of enclosure
Upper Te : 40%-50%
Lower Tf : 50%-59%
Upper Tf : 59% and higher

Fig. 1

EVOLUTION IN LEPIDOCYCLINA



Horizontal sections of the nucleocoenoch of a Lepidocyclina. a, the "grade of enclosure" is defined as that (per cent) proportion of the inner circumference of the protoconch, which is formed by the common wall (c.w.). - b, the "degree of curvature" is defined by the percent ratio $(h/br \times 100)$ between height (h) and breadth (br). (after van der Vlerk & Gloor 1968).

Horizontal sections of the nucleocoenochs of 7 lepidocyclines from E. Java and Madura, showing how the nucleocoenoch changes gradually from a typical isolepidine type (a) via a typical nephrolepidine type (c) to a typical tryblielepidine type (g). (after van der Vlerk & Postuma 1967).

It has been possible to prepare from a number of samples a sufficient number of sections to determine these average values; in other cases preparation of some sections provided indications of the stratigraphical position of the sample.

By combining all evidence it was possible to determine the stratigraphical position of some of the samples from the oldest three formations. Some samples from these formations also yielded smaller Foraminifera, as did a number of friable limestones and mudstones from younger formations; planktonic Foraminifera from these faunas made it possible to date some of these sediments. Figure 2 summarizes the results for those samples for which the biostratigraphical position could be determined. Clarke & Blow's (1969) correlation between letter stages, planktonic zones and ages has been followed. A discussion of the results follows. Descriptions of the lithological units in the Gazelle Peninsula are from Macnab (1970). The ages given by Macnab for the various formations were based on preliminary investigations; further studies have made some corrections necessary; for example the faunas from the Merai Volcanics are now regarded as Lower Tc only, and the Yalam Limestone in the North Baining Mountains is dated as Upper Tf.

Eocene (Baining Volcanics)

The oldest associations of larger Foraminifera occur in the Gazelle Peninsula in the Baining Volcanics. Macnab described these as a thick pile of undifferentiated hard and indurated volcanoclastic marine sedimentary rocks with lava flows; volcanic conglomerate and greywacke are dominant. Small limestone lenses are exposed at several localities and limestone clasts are present in volcanoclastic rocks; the limestone contains much volcanic material.

In the Nakanai region similar limestones have been found as far west as the Melkoi River. Limestones found in association with similar sediments further west were found to be unfossiliferous or contained a fauna which could not be identified with sufficient precision (e.g. Heterostegina sp.) to allow an age determination.

The association found in 22 samples includes the following: Spiroclypeus vermicularis Tan Sin Hok, Nummulites sp. (in some cases referred to cf. pengaronensis Verbeek), Biplanispira hoffmeisteri (Whipple), B. mirabilis Umbgrove, Pellatispira madaraszi (Hantken), including P. fulgeria Whipple, Halkyardia sp., Heterostegina sp. Cyclolypeus sp., Discocyclina (s.l.) sp.

Identical associations have been reported from numerous localities in the Indo-Pacific region assigned to the Tc (upper Eocene).

Hanzawa (1947) recorded a fauna consisting of Pellatispira reticularis n. sp. (put into synonymy with P. provaleae by Cole, 1970), Discocyclina sp. and Heterostegina sp. from an impure limestone from an undescribed locality in the Nakanai region.

Oligocene (Merai Volcanics and equivalents)

A younger fauna is present in limestones occurring in association with less indurated volcanics and volcanogenic sediments, which have been found from the Gazelle Peninsula in the east to the headwaters of the Via River in the west. In the Gazelle Peninsula Macnab has called these sediments Merai Volcanics. The association includes: Lepidocyclus (Eulepidina) ephippioides (Jones & Chapman), Lepidocyclus (Nephrolepidina) isolepidinoides van der Vlerk, L. (N.) augusticamera Cole, Cycloclypeus eidae Tan Sin Hok (very rare), Heterostegina sp., Halkyardia sp.

In terms of letter stages the age of this fauna is Lower Te. Specimens identified as Lepidocyclus (Nephrolepidina) isolepidinoides occur only infrequently in these samples; this and their small size makes the preparation of equatorial sections quite difficult; such sections were made from 5 samples, with a maximum of 3 sections from any one sample. The "grade of enclosure" of these sections (a total number of 10) varies between 29.7% and 37.4%. These values strongly indicate a level close to the base of the lower Te. From one sample (68690569-e) an equatorial section of a specimen of Cycloclypeus was prepared, which showed some 20 nepionic septa; this confirms a position low in the Lower Te.

South of Risbeck Bay samples 49 NG 2605-08-10, taken from a series of unindurated volcanogenic sediments, yielded some poorly preserved planktonics and larger foraminifera. The planktonics of 2605 probably indicate zone N1; in 2608 some younger species (zone N5-N6) were determined in association with older species also found in 2605. The poor preservation, however, makes a definite determination difficult. Larger Foraminifera in 2610 include Eulepidina, a primitive Nephrolepidina and Spiroclypeus and this seems equivalent to the 'Merai' association. The presence of Spiroclypeus in this sample is remarkable, since this is the only sample from New Britain in which this genus is common. On the combined evidence of these three samples it seems best to regard these sediments as lower Te, about planktonic zone N1.

A sample of impure limestone found in association with volcanogenic sediments near Pondo Plantation, west coast, Gazelle Peninsula (sample no. 53 NG 0792), contains Lepidocyclus (Eulepidina) ephippioides together with Lepidocyclus (Nephrolepidina) verbeeki (Newton & Holland). Twenty-four equatorial sections of specimens of verbeeki show an average grade of enclosure 40.3% which puts the position of this sample near the boundary between the lower and upper Te, considerably younger than the L. (E.) ephippioides/ L. (N.) isolepidinoides fauna.

Miocene

Subhorizontal limestones with minor interbedded calcareous sediments overlie these volcanic rocks in many parts of the island. They outcrop extensively in the Whiteman Range, Nakanai Mountains and the North Baining Mountains and south of Ataliklikum Bay, in the Gazelle Peninsula. They are bioclastic limestones, mainly coralline and algal calcarenites containing sparse larger Foraminifera. Small Foraminifera occur also, mainly in finer grained sediments. The larger Foraminifera occur mainly in the lower part of this sequence. Several associations can be distinguished, indicating a range in age of these sediments, with the base

gradually becoming younger from west to east. In the Gazelle Peninsula these limestones have been called Yalam Limestone.

In the Whiteman Range the oldest fauna occurs in sample 49 NG 2638 from the Lamogai area. Larger Foraminifera in this sample are Micgypsina spp., Lepidocyclina (Nephrolepidina) japonica Yabe and Cycloclypeus eidae Tan Sin Hok. The average "grade of enclosure" of 14 specimens of L. japonica is 41.4%; this value corresponds to values found by van der Vlerk (in van der Vlerk & Postuma, 1967) in samples from East-Java, S.W. France and Corfu (Greece), all of which contain planktonic Foraminifera characteristic of the Globorotalia kugleri Zone (as defined by Bolli, 1957), which is approximately equivalent to zone N4 of Blow. Clarke & Blow (1969) correlate this zone with the base of the Upper Te stage. Planktonic Foraminifera from the same sample were identified by D.J. Belford as: Globigerinoides quadrilobatus, G. immaturus, Globorotalia (T.) siakensis, G. (T.) obesa and Globoquadrina altispira. All of these forms are long ranging, but the association cannot be older than zone N4. Other samples from the Whiteman Range to which an age could be assigned are 49 NG 4019 and 4031; the first contains lepidocyclinids belonging to the group of species identified as L. (N.) radiata (Martin) and L. (N.) martini Schlumberger, which are known from the upper part of the Lower Tf and the Upper Tf. Sample 4031 contains Flosculinella borneensis Tan Sin Hok and Austrotrillina howchini Schlumberger. These two species have been reported to occur together near the top of the Lower Tf (see Visser & Hermes, 1962, encl. 7). Unfortunately the position of these samples in relation to the base or top of the sequence is unknown. Samples from near the base collected in the headwaters of the Johanna River did not contain a diagnostic fauna.

Limestones outcropping near Rudiger Point and the lower reaches of the Via River yielded abundant planktonic faunas (samples 49 NG 0010 to 0024 and 2601-2), which range in age from zone N10-N13). These limestones are therefore equivalent to the coralline-algal limestone with larger Foraminifera which form the bulk of the formation further inland.

In the headwaters of the Iglik River just east of the Whiteman Range thin limestones overlie volcanic rocks. In 10 samples an association was found comprising L. (N.) japonica Yabe, Micgypsina spp. and Austrotrillina sp. Measurements of the "grade of enclosure" of japonica gave the following results:

Sample Number	Number of Sections	Variation	Average
51 NG 0539	9	42.1-50.0	44.6
51 NG 2535	5	38.6-47.4	45.0
51 NG 2543a	10	40.0-59.0	47.6
51 NG 2546	10	40.6-50.7	45.8

These values appear to be quite consistent and indicate a position somewhat above the middle of the Upper Te. The representatives of Austrotrillina include specimens that are morphologically intermediate between A. striata and A. howchini as well as true A. howchini, also indicating a horizon in the upper half of the Upper Te.

In this area the limestones are not very thick. All ages as determined fall in a small interval and no distinction in age between the top and the bottom seems possible.

In the western part of the Nakanai Mountains samples collected from the base of the limestone sequence (51NG 2636 and 2640m) contain L. (N.) japonica, A. howchini and Flosculinella globulosa (Rutten). This association occurs near the boundary between the Upper Tf and the Lower Tf or in the lower part of the Lower Tf. Sample 51NG 26401, about 480 metres above 2640m contains representative of the L. radiata/martini group, indicating upper part of the Lower Tf to Upper Tf. Sample 49NG 2630 containing Flosculinella borneensis Tan Sin Hok probably represents a higher level in the sequence as this species is characteristic of the Upper Tf.

In the eastern part of the Nakanai Mountains and the region between Wide Bay and Open Bay no ages from samples from near the base of the sequence are available. The oldest fauna is found in samples 54NG 2000 and 2002, where Flosculinella globulosa occurs with specimens of Austrotrillina which are intermediate between A. howchini and A. striata, indicating a level high in the Upper Tf. Younger faunas were found in sample 54 NG 0005 (L. (N.) radiata/martini group, upper part of Lower Tf to Upper Tf) and in samples 54 NG 1507 j and k and 54NG 2510e, which contain Niogypsina with F. borneensis (Upper Tf). A float specimen sample 68690575b, contains lepidocyclinids belonging to the group of radiata and martini. The "grade of enclosure" of 16 specimens averages 61.7, which indicates Upper Tf.

Near Yalam village in the North Baining Mountains a sequence of some 1000 metres of limestone is exposed in prominent cliffs. A sample from the base (67691340) contains F. borneensis, indicating Upper Tf. In samples from the lower 200 metres L. (N.) radiata-martini group, Cycloclypeus (C.) indopacificus Tan, C. (K.) annulatus Martin, Alveolinella sp. and Marginopora vertehralis Blainville were identified. This association also indicates an Upper Tf age, which is confirmed by the value of the "grade of enclosure" of the lepidocyclinids of two of the samples (68691673a and 68691679) which averages 58.5% and 59.9% respectively. The samples from the other 800 metres of the section did not contain any diagnostic Foraminifera.

Further to the east near the Vudal River a sample from the base of the limestone yielded lepidocyclinids with an average degree of enclosure of 64.5%. Other characteristic faunas from this area include F. borneensis, Austrotrillina, a genus common in the limestones in other parts of New Britain, has not been found in the North Baining area. This genus disappears at the top of the Lower Tf, and its absence confirms the conclusion that the limestone sedimentation in this area did not start until Upper Tf times.

The upper limit of the limestone is difficult to date because of lack of measured and sampled sections. Lower Tf and upper Tf faunas of larger Foraminifera occur in most areas. In the Yalam section, the upper Tf beds are overlain by some 800 metres of coralline limestone from which no Foraminifera were obtained, and its age is therefore unknown. Younger formations of elastic and volcanogenic sediments have been dated as Upper Miocene to basal Pliocene. Large scale limestone sedimentation therefore must have ended in upper middle Miocene and upper Miocene times; since the limestones were largely formed as reefs it seems likely that their formation did not end simultaneously in all areas.

Miocene-Pliocene

Samples 51NG 1516-1526, collected from fine-grained limestone and marl in the Pandi River area, were dated by their planktonic faunas. Although some associations are very long ranging, others indicate an age between zones N17-N19, uppermost Miocene to basal Pliocene. Similar ages were obtained for two samples from the Beg Beg River. Whether or not these sediments form a continuous sequence with the main limestone or form a distinctive lithological unit is uncertain because of poor exposure.

In the Gazelle Peninsula, Macnab distinguished two formations of mainly pyroclastics, the Sigule Volcanics outcropping near the east coast, and the Sinewit Volcanics further west. Three samples from the Sigule Volcanics (67691333-1336 and -1337) were dated as upper Miocene or basal Pliocene. A similar fauna was found in two samples from the Sinewit Volcanics (68690552 and 0569f) from the Bera River, Wide Bay. Several other samples from this formation contain faunas of Pliocene or Pleistocene age.

Pliocene

A sandstone-siltstone sequence called the Lamogai Series, in the lower reaches of the Aria River, contains planktonic Foraminifera characteristic of zones N19-N21. Similar ages were obtained for calcareous sediments near Kandrian on the south coast.

South of the Sai River near Open Bay soft calcareous mudstone, marls and siltstone lenses have been called Sai Beds. Planktonics from these sediments (samples 53 NG0796, 0803) indicate zone N.19 or N.20. Macnab suggests that these sediments are a lateral variation of the Lakit Limestone, a subhorizontal unit more than 200 metres thick of soft, white, reef-shoal bioclastic limestone, which blankets the southern part of the Lakit Range, some 15 kilometres to the north. This limestone yielded only poor faunas of Pliocene to Pleistocene age (samples 68690584, 0585).

Pleistocene-Recent

A sample from the Ip Beds, which occur along the west coast of Wide Bay, yielded a Pleistocene to Recent fauna of planktonic foraminifera (sample 54 NG2524). Samples from the uplifted coral reefs which are common along the south and east coast of the island did not contain any diagnostic faunas.

DESCRIPTION OF SAMPLES

Gazelle Peninsula 1:250,000 Sheet area

67690200

Locality: Headwaters Usavit River

Formation: Baining Volcanics (Recrystallized coralline limestone, occurring as small pods in the formation)

Fauna: Coral, Foraminifera

Pellatispira sp. cf. Biplanispira fulgeria (Whipple)

Pellatispira provaleae Yabe

Sample No.
67690200 (contd)

Discocyclina sp. (incl. Asterocyclina)
Nummulites sp.
Heterostegina sp.
Miliolids

Age: Upper Eocene, Tb.

67691326

Locality: Merai River
Formation: Merai Volcanics
Fauna: Foraminifera, Corals, Algae.

Lepidocyclina (Nephrolepidina) augusticamera Cole, 1954
Heterostegina sp.
Gypsina sp.
"Rotalia" sp.
Miliolids.

Age: Lower Te, Oligocene.

67691327

Locality: Lat River
Formation: float from river bed, probably derived from Baining Volcanics
Fauna: Foraminifera, Corals, Algae

Pellatispira sp. cf. Biplanispira fulgeria (Whipple)
Pellatispira sp. cf. P. madaraszii (Hantken)
Discocyclina sp. (incl. Asterocyclina)
Amphistegina? sp.

Age: Upper Eocene, Tb

67691328

Locality: }
Formation: } as 67691327
Fauna: Foraminifera, Algae, echinoid spines, Bryozoa.

Discocyclina sp.
Spiroclypeus vermicularis Tan
Halkyardia sp. (only one oblique section)
Gypsina sp.
Amphistegina? sp.
"Rotalia" sp.
Miliolids

Age: Upper Eocene, Tb

Sample No.

67691329

Locality: }
Formation: } as 67691327

Fauna: Foraminifera, Corals, Algae

Spiroclypeus vermicularis Tan

Carpentaria sp.

"Rotalia" sp.

Age: Upper Eocene, Tb.

67691330

Locality and Formation: as 67691327

Fauna: Foraminifera, Corals, Algae

Pellatispira sp. cf. Biplanispira fulgeria (Whipple)

Discocyclus (s.l.) sp.

Heterostegina sp.

Spiroclypeus vermicularis Tan

Age: Upper Eocene, Tb

67691331

Locality: Marambu River

Formation: float specimen, probably from Baining Volcanics.

Fauna: Foraminifera, Corals, Algae

Halkyardia sp. cf. H. minima (Liebus)

Gypsina sp.

Amphistegina? sp.

indet. smaller Foraminifera

Age: Eocene

67691332

Locality and Formation: as 67691331

Fauna: Foraminifera, Corals, Algae, Bryozoa

Halkyardia sp. cf. H. minima (Liebus)

Amphistegina? sp.

Carpentaria? sp.

Age: Eocene

67691333

Locality: Kavavas (Warangoi) River above Lemingi Village

Formation: Sigule Volcanics

Fauna: Foraminifera

Globigerinoides quadrilobatus sacculifer (Brady)

G. quadrilobatus quadrilobatus (d'Orbigny)

G. sp. cf. G. bollii Blow

Globoquadrina venezuelana (Hedberg)

Sample No.
67691333 (contd)

Pulleniatina primalis Banner & Blow
Sphaeroidinellopsis seminulina seminulina (Schwager)
Ammonia beccarii (Linne)
Amphistegina sp.
Gyroidina sp.
Elphidium sp.

Age: probably Upper Miocene

67691336

Locality: Marambu Village
Formation: Sigule Volcanics
Fauna: Foraminifera, Mollusca, Ostracods, echinoid spines

Pseudorotalia schroeteriana (Parker & Jones)
Elphidium craticulatum (Fichtel & Moll)
E. sp. cf. E. parri Cushman
E. spp.
Quinqueloculina sp. cf. Q. seminulum (Linne)
Q. bicarinata d'Orbigny
Calcarina spengleri (Gmelin)
Ammonia beccarii (Linne)
Florilus elongatus (d'Orbigny)

Age: Upper Miocene or Pliocene, probably slightly younger than sample
67691333

67691337

Locality: Merai River
Formation: Float specimen, probably derived from Sigule Volcanics
Fauna: Foraminifera

Orbulina universa d'Orbigny
Globigerinoides quadrilobatus immaturus Leroy
Globigerina sp. cf. G. bradyi Wiesner
Sphaeroidinellopsis sp. (decorticated)
Operculina spp.

Age: Probably upper Miocene, similar to 67691333

67691340

Locality: North Baining area NE of Yalam Village
Formation: Yalam Limestone
Fauna: Foraminifera

Flosculinella sp. (fragments of an elongated form)
Sorites sp.

Miliolids
Indet. smaller Foraminifera

Age: Tf, middle Miocene.

Sample No.
67691341

Locality: North Baining area near Ramasaka Village

Formation: Yalam Limestone

Fauna: Foraminifera, Corals, Algae, Bryozoa

Lepidocyclina (Nephrolepidina) sp.

Amphistegina sp.

Carpentaria sp.

Heterostegina sp.

Anomalinella ? sp.

indet. smaller Foraminifera

Age: Te to Tf, lower to middle Miocene.

68690569

Locality: Mumus Creek, southern tributary of Mevlo River

Formation: Float specimens, probably derived from Merai Volcanics.

Fauna:

Fraction a: Lepidocyclina (Nephrolepidina) sp. ~~(Nephrolepidina) sp.~~
L. (N.) sp. cf. L. (N.) isolepidinoides
van der Vlerk (vertical sections only)
L. (Eulepidina) ehippioides (Jones & Chapman)
(micro- and megalospheric)

Age: lower Te, Oligocene

Fraction b: Lepidocyclina (Eulepidina) ehippioides (J. & C.)
L. (N.) sp. cf. L. (N.) isolepidinoides
van der Vlerk
Heterostegina sp.
Carpentaria sp.

Age: lower Te, Oligocene

Fraction c: Lepidocyclina (Eulepidina) ehippioides (J. & C.)
L. (Nephrolepidina) isolepidinoides v.d.V.
Cyclolypeus eidae Tan Sin Hok
Heterostegina borneensis van der Vlerk

Age: lower Te, Oligocene

68690573a

Locality: Sai No.1 River

Formation: probably derived from Yalam Limestone

Fauna: Foraminifera, Coral, Algae

Flosculinella sp. cf. F. bontangensis-borneensis
Sorites sp.
indet. smaller Foraminifera

Age: Middle Miocene, Tf.

Sample No.

68690575b

Locality: Southern tributaries of Sai River.

Formation: Float specimen probably derived from Yalam Limestone .

Fauna: Foraminifera, Algae, Bryozoa

Lepidocyclina (Nephrolepidina) martini group

Heterostegina sp.

Amphistegina sp.

Planorbulinella? sp.

Carpenteria sp. (fragments)

Planktonic Foraminifera (Globigerinidae; Sphaeroidinellopsis)
indet. rotaline specimens

Age: Middle Miocene, probably upper Tf (Tf 2-3).

68690582a.

Locality: Behind Matanakunei Village

Formation: Float specimen, probably derived from Merai Volcanics.

Fauna: Foraminifera, Algae

Lepidocyclina sp. cf. L. (N) augusticamera Cole

indet. smaller Foraminifera

Age: see discussion in chapter III (p. 4).

68690582b

Locality: Behind Matanakunei Village

Formation: Float specimen probably derived from Merai Volcanics.

Fauna: Foraminifera, Algae

Lepidocyclina (Nephrolepidina) augusticamera Cole

Heterostegina sp. cf.

indet. rotaline specimens

Age: probably lower Te, Oligocene.

68690582c

Locality: Behind Matanakunei Village

Formation: Float specimen probably derived from Merai Volcanics.

Fauna: Foraminifera, Algae

Lepidocyclina (Nephrolepidina) augusticamera Cole

Heterostegina sp.

indet. rotaline specimens

Age: probably lower Te, Oligocene.

68690582d

Locality: Behind Matanakunei Village

Formation: Float specimen probably derived from Merai Volcanics.

Fauna: Foraminifera, Coral, Algae

Lepidocyclina (Nephrolepidina) augusticamera Cole

Heterostegina sp.

Carpenteria sp.

Amphistegina sp.

indet. rotaline specimens

Age: probably lower Te, Oligocene.

68690583a

Locality: Behind Matanakunei Village
Formation: Float specimen probably derived from Merai Volcanics
Fauna: Foraminifera, Algae, echinoid spines
Lepidocyclina (Nephrolepidina) augusticamera Cole
Heterostegina sp.
Carpentaria sp.
Halkyardia sp.
indet. rotaline specimens

Age: Probably lower Te, Oligocene.

Discussion: The age of this sample is based on the occurrence of L.(N). augusticamera. Two specimens belonging to the genus Halkyardia were found in random sections in this sample. Until recently this genus was thought to be restricted to the Eocene. Clarke & Blow (1969) have extended this range into the Oligocene (letter stages 'c', 'd' and part of 'e'). To determine whether the specimens in this sample belong to an Eocene or Oligocene representative of this genus more sections of known orientation would be needed. It is noted that the two available sections are very similar to those found in sample 67691331 and 67691332 which are thought to be of Eocene age.

68690583c

Locality: Behind Matanakunei Village
Formation: Float specimen probably derived from Yalam Limestone
Fauna: Foraminifera, Algae, Bryozoa.
Lepidocyclina (Nephrolepidina) sp.cf. L.(N). martini
(Schlumberger)
Heterostegina sp.
Amphistegina sp.
Operculinoides sp.
Elphidium sp.

Age: Middle Miocene, Tf.

68690583e

Locality: Behind Matanakunei Village
Formation: Float specimen probably derived from Merai Volcanics.
Fauna: Foraminifera, Algae
Lepidocyclina (Nephrolepidina) augusticamera Cole
Lepidocyclina (Nephrolepidina) isolepidinoides van der Vlerk
Carpentaria sp.

Age: Lower Te, Oligocene.

68691658 - 68691683

Locality: Section taken from limestone cliffs above Yalam Village, North Baining Mountains area.

Formation: Yalam Limestone

Faunas:

1677a: Coral, Bryozoa, Foraminifera
Lepidocyclina (Nephrolepidina) martini group
Amphistegina sp.

Age: Middle Miocene, Tf.

- 1678a: Foraminifera
Lepidocyclina (Nephrolepidina) martini group
Cycloclypeus (Cycloclypeus) indopacificus Tan Sin Hok
Amphistegina sp.
Age: Middle Miocene, upper Tf
- 1678c: Foraminifera, Coral
Alveolinella sp.
Marginopora vertebralis Blainville
Age: Middle Miocene (Tf) to Recent
- 1679 Foraminifera
Lepidocyclina (Nephrolepidina) martini group
Amphistegina sp.
Age: Middle Miocene, Tf.
- 1682b: Coral, Algae, Bryozoa, Foraminifers
Lepidocyclina (Nephrolepidina) martini group
Amphistegina sp.
Carpentaria sp.
Age: Middle Miocene, Tf.
- 68691686b
Locality: Near Yalam Village
Formation: Yalam Limestone
Fauna: Coral, Bryozoa, rare Foraminifera
Austrotrillina sp.
Alveolinid gen. indet.
Age: Te to lower Tf, based on the occurrence of Austrotrillina
- 68691688 b and c
Locality: Yalam Village near "haus kiap".
Formation: Yalam Limestone.
Fauna: Coral, Bryozoa, Foraminifera
Lepidocyclina (Nephrolepidina) martini group
(megalo- and microspheric specimens)
Planorbulinella? sp.
Cycloclypeus sp.
Carpentaria sp.
Age: Middle Miocene, Tf.
- 68691689a
Locality: N. of Yalam Village
Formation: Yalam Limestone
Fauna: Foraminifera, Bryozoa, Coral, Algae
Lepidocyclina sp. probably belonging to Nephrolepidina
Carpentaria sp.
Amphistegina sp.
Cycloclypeus sp.
Age: Lower to middle Miocene, Te to Tf.

Sample No.

68691692

Locality: E. of Balim Plantation

Formation: Yalam Limestone

Fauna: Coral, Algae, Bryozoa, Foraminifera

Lepidocyclina (Nephrolepidina) sp. cf. martini group

Carpenteria sp.

Amphistegina sp.

planktonic Foraminifera

Age: probably middle Miocene Tf

68691693

Locality: near Puktas Village

Formation: Yalam Limestone.

Fauna: Bryozoa, Coral, Foraminifera

Lepidocyclina (Nephrolepidina) martini group

Lepidocyclina sp. cf. L. perornata Douville
(microspheric)

Planorbulinella? sp.

Amphistegina sp.

planktonic Foraminifera

Age: middle Miocene, Tf

68691694

Locality: SE. of Lassul Bay

Formation: Yalam Limestone.

Fauna: Algae, Foraminifera

Flosculinella bontangensis/borneensis (only 1 specimen
in random section)

Heterostegina sp.

Age: middle Miocene, Tf.

68691695

Locality: South of Lassul Bay.

Formation: Yalam Limestone

Fauna: Algae, rare Foraminifera.

Lepidocyclina sp. subgen. indet.

Miogypsina sp.

Alveolinid gen. indet.

Age: Lower to middle Miocene, upper Te to Tf.

68691696

Locality: Near Litinakaia Plantation

Formation: Yalam Limestone

Fauna: Algae, Foraminifera

Lepidocyclina (Nephrolepidina) sp.

cf. L. (N)martini group

Amphistegina sp.

Carpenteria sp.

Planorbulinella? sp.

Age: probably middle Miocene, Tf.

Sample No.

68691704 b and e

Locality: Upper Vudal River

Formation: Float specimen probably derived from Yalam Limestone.

Fauna: Coral, rare Foraminifera

Flosculinella borneensis (Tan Sin Hok)

Age: Middle Miocene, upper Tf.

68691707 b and c and 68691708

Locality: West of Rangoulit Village.

Formation: Float specimens probably derived from Baining Volcanics.

Fauna:

1707b: Algae, Foraminifera

Pellatispira sp. cf. P. provaleae Yabe

Nummulites sp.

Discocyclina sp. (s.l.)

Heterostegina sp.

Age: Upper Eocene, Tb.

1707c: Coral, Algae, rare Foraminifera

Discocyclina sp. (s.l.)

Age: Eocene, Ta and Tb

1708: Algae, Foraminifera

Spiroclypeus vermicularis Tan Sin Hok

Heterostegina sp.

Discocyclina sp. (s.l.) (fragments)

Age: Upper Eocene, Tb.

68691710 a - f

Locality: Valili Road beyond Vudal Agricultural College.

Formation: Yalam Limestone (base of formation).

Fauna:

Fractions a and c: Coral, Algae, Foraminifera

Lepidocyclina sp. subgen. indet

Amphistegina sp.

Heterostegina sp.

Cycloclypeus sp.

Age: probably middle Miocene, Tf.

Fraction d: Coral, Algae, Foraminifera

Lepidocyclina (N.) sp. cf. L. (N.) martini group

Amphistegina sp.

Heterostegina sp.

Cycloclypeus sp.

Age: Middle Miocene, Tf.

Sample No.

Fraction e: Coral, Algae, Foraminifera, Bryozoa
Lepidocyclina (Nephrolepidina) martini group
Operculinoides sp.
Heterostegina sp.
Amphistegina sp.
Planorbulinella? sp.

Age: Middle Miocene, Tf.

Fraction f: Coral, Algae, Foraminifera
Lepidocyclina sp. subgen. indet.
Operculina sp.
Cycloclypeus sp.

Age: probably middle Miocene, Tf.

53 NG 0792

Locality: South of Pondo Plantation
Formation: Float specimen probably derived from Merai Volcanics.
Fauna: Foraminifera, Mollusca
Lepidocyclina (Eulepidina) ephippioides (Jones & Chapman)
Lepidocyclina (Nephrolepidina) verbeeki (Newton & Holland)
Age: Te, probably about the boundary between lower and upper part
(Oligocene-Miocene)

53 NG 0796

Locality: South of Sai River
Formation: Sai Beds
Fauna: abundant smaller planktonic and some benthonic Foraminifera.
Pulleniatina obliquiloculata obliquiloculata
P. primalis
Globigerinoides quadrilobatus subsp.
G. conglobatus
G. ruber
Globorotalia (T.) acostaensis humerosa
G. (T.) tosaensis
G. (G.) cf. tumida
G. (G.) cultrata cultrata
G. (G.) cultrata menardii
Sphaeroidinella auhisceus dehiscens
Globoquadrina venezuelana
Hastigerina siphonifera involuta
Age: Pliocene, zone N 19 or lower N 20.

53 NG 0801 a and b

Locality: South of Sai River
Formation: Yalam Limestone
Fauna:
Fraction a: free specimens of Lepidocyclina belonging to L. (N.) martini group.
Age: middle Miocene, Tf.

Fraction b: Foraminifera

Amphistegina sp.
Lepidocyclina sp. subgen. indet.
planktonic smaller Foraminifera
(incl. Orbulina)
Planorbulinella? sp.

Age: Oligocene - middle Miocene, Te - Tf.

53 NG 0803

Locality: South of Sai River

Formation: Sai Beds

Fauna: abundant planktonic and benthonic smaller Foraminifera

Globorotalia (T.) acostaensis
G. (G.) cultrata cultrata
Globigerinoides ruber
G. quadrilobatus group
Pulleniatina primalis
Sphaeroidinella dehiscens dehiscens
Hastigerina siphonifera involuta

Age: Pliocene, probably zone N 19

53 NG 0807 - 0809

Locality: Southeast of Baia Village

Formation: Float specimens probably derived from Merai Volcanics.

Fauna:

0807: Coral, Algae, Foraminifera

Lepidocyclina (Nephrolepidina) isolepidinoides van der Vlerk
Heterostegina borneensis van der Vlerk
Carpenteria sp.

Age: Te, Oligocene.

0808: Coral, Algae, rare Foraminifera

Lepidocyclina sp. subgen. indet.
Heterostegina sp.
Carpenteria sp.
indet. smaller Foraminifera

Age: Te to Tf, Oligocene to middle Miocene.

0809: Foraminifera

Lepidocyclina (Eulepidina) ephippioides (Jones & Chapman)
Lepidocyclina (Nephrolepidina) sp. cf. L. (N.)
isolepidinoides van der Vlerk
Heterostegina? sp.

Age: probably lower Te, Oligocene.

Sample No.

49 NG 0010 - 0019

Locality: Rudiger Point area, West of Lingalinga

Formation: Jacquinet Limestone

0010 A: abundant planktonic Foraminifera

Orbulina universa

Globoquadrina venezuelana

Sphaeroidinellopsis subdehiscens subdehiscens

Neogloboquadrina dutertrei

N. subcretacea

Age: not older than middle Miocene, ranging to Pliocene.

0015: abundant planktonic, some smaller benthonic Foraminifera.

Globorotalia cultrata cultrata

Globoquadrina dehiscens dehiscens

G. sp.

Globigerinoides quadrilobatus quadrilobatus

G. quadrilobatus sacculiferus

G. quadrilobatus cf. altiaperturnus

Hastigerina siphonifera involuta

Sphaeroidinellopsis subdehiscens subdehiscens

Orbulina universa

Age: middle Miocene (zone N 10 - N 12?).

0017: abundant planktonic, some smaller benthonic Foraminifera..

Orbulina universa

Globigerinoides quadrilobatus cf. altiapertercus

G. quadrilobatus quadrilobatus

G. quadrilobatus immaturus

G. quadrilobatus trilobus

G. obliquus

Sphaeroidinellopsis subdehiscens subdehiscens

Age: middle Miocene (zone N 10 - N 12?).

0018: planktonic Foraminifera, some smaller benthonics

Globoquadrina dehiscens

G. venezuelana

Globorotalia (G.) cultrata menardii

Sphaeroidinellopsis seminulina

Age: not older than top of middle Miocene to Pliocene.

0019: larger benthonic Foraminifera

Lepidocyclina (Nephrolepidina) sp.

Miogypsina sp.

Cycloclypeus sp.

Planorbulinella? sp.

Carpenteria sp.

Miliolids

planktonic smaller Foraminifera

Age: upper Te to Tf, lower to middle Miocene.

Sample No.

49 NG 0024

Locality: near Mt. Penck

Formation: Jacquinot Limestone

Fauna: Few, poorly preserved planktonics

Orbulina universa

Globigerinoides quadrilobatus group

Globoquadrina venezuelana

Sphaeroidinellopsis seminulina

Globorotalia (G.) cultrata cultrata

G. (G.) fohsi (s.l.) fauna robusta + lobata

Age: probably middle Miocene (zone N 12 - N 13).

Cape Raoult 1:250,000 Sheet area

49 NG 2501b

Locality: Kulu River

Formation: Float specimen, probably derived from Jacquinot Limestone

Fauna: Foraminifera, corals, molluscan, fragments, echinoid spines.

Miogypsina spp.

Austrotrillina sp. cf. A. howchini (Schlumberger)

Lepidocyclina sp. subgen. indet. (only 1 specimen)

Operculina sp.

Gypsina sp.

Soritidae gen. indet.

Age: Lower Tf, middle Miocene.

49 NG 2504c

Locality: Kapulak River

Formation: Float specimen, probably derived from Jacquinot Limestone.

Fauna: Foraminifera, Bryozoa, Coral, molluscan fragments

Austrotrillina howchini (Schlumberger)

Lepidocyclina sp. subgen. indet.

Miogypsina sp.

Marginopora vertebralis Quoy & Gaimard

Flosculinella sp. (rare, 1 section shows quite elongated from)

Miliolids

Age: Lower Tf, middle Miocene.

49 NG 2506b

Locality: Via River

Formation: Sample from a large displaced block of limestone.

Fauna: Algae, Coral, Foraminifera, crinoid stem.

Lepidocyclina (Eulepidina) sp.

Lepidocyclina (Nephrolepidina) sp. cf. L. (N.) isolepidinoides
van der Vlerk

Carpenteria (fragments)

Heterostegina sp.

Age: Lower Te, Oligocene.

Sample No.
49 NG 2522a

Locality: Aria River

Formation: Float specimen, derived from cream compact well bedded
limestone, probably Jacquinot Limestone.

Fauna: Planktonic smaller and larger Foraminifera, Bryozoa.

Lepidocyclina (Nephrolepidina) sp.

Miogypsina sp.

?Planorbulinella sp.

Planktonics include Orbulina and Globoquadrina

Age: middle Miocene, Tf.

49 NG 2601 - 2602

Locality: Lower Via River

Formation: Jacquinot Limestone

Fauna: abundant planktonic Foraminifera, some smaller benthonics.

2601: Orbulina universa
Globorotalia (G.) fohsi (s.l.) probably forma lobata Bermudez
G. acostaensis
G. obesa
Globoquadrina dehiscens dehiscens
Hastigerina siphonifera involuta
Sphaeroidinellopsis seminulina

Age: middle Miocene, zone N 12 - N 13.

2602: Globigerinoides ruber
G. quadrilobatus quadrilobatus
G. quadrilobatus immaturus
Globoquadrina venezuelana
G. dutertrei subcretacea
Globorotalia (T.) peripheroronda
G. (T.) peripheroacuta
G. (G.) cultrata cultrata
Sphaeroidinellopsis subdehiscens subdehiscens
Orbulina universa

Age: middle Miocene, zone N 11.

49 NG 2605 - 2608 - 2610

Locality: Small river east of Utier River, south of Riebeck Bay.

Formation: from volcanogenic sediments, as yet unnamed

Fauna:

2605a: planktonic Foraminifera, small specimens
Globigerinita dissimilis dissimilis
G. unicava primitiva
Globigerina praebulloides (s.l.)

Age: probably Oligocene, zone N 1?

2608: few planktonic Foraminifera
Globigerinoides subquadratus
Globorotalia obesa
Globigerina praebulloides praebulloides
Globoquadrina dehiscens praedehiscens
Globigerinita unicava cf. primitiva

Age: early Miocene? (zone N 5 - N 6); however
G. unicava primitiva is known from late Eocene
to middle Oligocene (P14 - N 1)

2610b: larger benthonic Foraminifera
Lepidocyclina (Eulepidina) sp.
Lepidocyclina (Nephrolepidina) sp. cf. isolepidinoides
Lepidocyclina sp. (microspheric)
Spiroclypeus sp.

Age: probably lower Tc, Oligocene.

49 NG 2635 - 2639

Locality: Lamogai area, track between Mokukli village and new
Bulawatue village.

Formation: Jacquinet Limestone

Fauna:

2635: few planktonic Foraminifera
Orbulina universa
Globoquadrina venezuelana
G. dehiscens dehiscens
Globigerinoides quadrilobatus quadrilobatus
Globorotalia (T.) acostaensis

Age: middle to upper Miocene, zone N 9 - N 19.

2636: some rare, undiagnostic Foraminifera.

Age not known.

2637: abundant planktonic Foraminifera were observed in thin
section; no determination possible.

2638: larger and planktonic Foraminifera, free specimens
obtained by freezing and boiling.

Lepidocyclina (Nephrolepidina) japonica
Lepidocyclina sp. (microspheric)
Cycloclypeus eidae
Miogypsina spp.
Operculina sp.
Carpenteria sp.
Globigerinoides quadrilobatus immaturus
Globorotalia (T.) siakensis
G. (T.) obesa
Globoquadrina altispira

Age: The association of larger Foraminifera indicates upper Te to lower Tf; average grade of enclosure of 14 specimens of Nephrolepidina is 41.4%, which has been reported by van der Vlerk for samples from the base of upper Te (lower Miocene). The planktonic fauna indicates lower to middle Miocene, zone N 4 - N14.

2639: Fine-grained limestone with planktonic Foraminifera visible in thin section, no determination possible.

49 NG 2640 - 2650

Locality: Near New Bulawatue, between New Bulawatue and the Aria River and further downstream along the River.

Formation: Lamogai Series

Fauna: planktonic Foraminifera occur abundantly in a number of these samples. They include:

Orbulina universa
Globigerinoides quadrilobatus quadrilobatus
G. quadrilobatus fistulosus
G. quadrilobatus immaturus
G. ruber
G. conglobatus
Globobulimina (T.) tosaensis
G. (T.) acostaensis
G. (T.) inflata
G. (G.) tumida
G. (G.) cultrata cultrata
G. (G.) cultrata menardii
Globoquadrina sp.
Globoquadrina sp. cf. venezuelana
Neogloboquadrina dutertrei subcretacea
Hastigerina siphonifera involuta
Sphaeroidinella dehiscens
dehiscens forma immatura
Pulleniatina obliquiloculata obliquiloculata

Age: These faunas indicate Pliocene age, zone N 19 - N 21.

49 NG 2653

Locality: Upper Via River, float specimens

Formation: probably derived from Jacquinet Limestone

Fauna: Foraminifera, Molluscs

Miogyxina spp.
Austrotrillina sp.
Soritid gen. indet.
Operculina? sp.

Age: Lower to middle Miocene, upper Te to lower Tf.

Sample No.
49 NG 4006

Locality: West branch Johanna River
Formation: Jacquinet Limestone, near the base.
Fauna: Foraminifera, Algae, Molluscs
 Miogypsina spp.
 Lepidocyclina (Nephrolepidina) sp.
 Amphistegina sp.
 Operculina? sp.
 Gypsina sp.
 Elphidium sp.

Age: Lower to middle Miocene, upper Tertiary to Tertiary.

49 NG 4019 and 4031

Locality: West branch Johanna River
Formation: Jacquinet Limestone
Fauna: Foraminifera in fine-grained debris

4019: Lepidocyclina (Nephrolepidina) cf. martini group
 Cyclocypens sp.
 planktonic smaller Foraminifera

Age: middle Miocene, Tertiary.

4031: Austrotrillina howchini
 Flosculinella sp. cf. F. borneensis
 Miliolids

Age: probably top lower Tertiary, middle Miocene.

49 NG 4032

Locality: near village at mouth of Pua River
Formation:
Fauna: abundant planktonic, some benthonic smaller Foraminifera
 Orbulina universa
 Globoquadrina dehiscens dehiscens
 Globigerinoides quadrilobatus quadrilobatus
 G. quadrilobatus trilobus
 G. quadrilobatus immaturus
 G. obliquus extremus
 Sphaeroidinellopsis subdehiscens
 Globorotalia cultrata cultrata
 cultrata menardii
 Oridorsalis umbonatus
 Laticarinina pauperata
 Globocassidulina subglobosa
 Melonis pompilioides

Age: Upper Miocene - lower Pliocene, zone N 16 - N 19.

Sample No.
49 NG 4043e

Locality: southern tributary of Via River
Formation: Jacquinot Limestone, float specimen
Fauna: Algae, Foraminifera, Bryozoa
 Miogyopsina spp.
 Austrotwillina sp.
 Carpenteria sp.

Age: Lower to middle Miocene, upper Te to lower Tf.

49 NG 4062

Locality: Upper Kube River
Formation: pink recrystallized limestone found in Baining Volcanics;
 large displaced block.
Fauna: Coral, Algae, rare Foraminifera, belonging to Heterostegina
Age: Tertiary, no precise determination possible.

Arawe 1:250,000 sheet area.

50 NG 0005 a and b

Locality: Coastal plain North of Kandrian

Formation: Uplifted coral reefs

0005 a Fauna: Corals, Foraminifera, molluscan fragments

Operculinoides sp. cf. O. rectilata Cole

Planorbulinella? sp.

Amphistegina sp.

Carpenteria sp.

Alveolinid gen. indet.

Scritid gen. indet.

Age: Pliocene-Pleistocene (compare sample 68690551A, record 1968/82, p.1).

0005 b: Foraminifera (planktonics), Ostracoda, Gastropoda

Pulleniatina obliquiloculata obliquiloculata

Globigerinoides ruber

G. quadrilobatus quadrilobatus

G. conglobatus

Globigerina bulloides

Globorotalia obesa

G. (T.) acostaensis humerosa

Globigerinita sp.

Pseudorotalia schroeteriana

Age: not older than zone N19 (Pliocene).

50 NG 0006

Locality: North of Kandrian

Formation: calcareous sediments, as yet unnamed

Fauna: Foraminifera, mainly benthonics, some planktonics, Ostracoda, Mollusca

Hastigerina siphonifera involuta

Globigerinoides quadrilobatus quadrilobatus

G. quadrilobatus trilobus

G. ruber

Globorotalia (T.) acostaensis humerosa

Anomalinaella rostrata

Cellanthus sp.

Age: Probably basal Pliocene, top zone N 18

50 NG 0010

Locality: N of Kandrian

Formation: Jacquinot limestone

Fauna: Abundant planktonic smaller and some benthonic

smaller and larger Foraminifera

Miogyopsina sp.

Heterostegina sp.

Amphistegina ? sp.

Age: Upper T_s-T_f, lower-middle Miocene.

Sample No.
50 NG 2502

Locality: Umbi village, Northeast of Kandrian
Formation: Jacquinet Limestone
Fauna: Foraminifera

Lepidocyclina sp. subgen. indet.
Miogypsina sp.
Heterostegina sp.
Planorbulinella? sp.
Miliolids and other indeterminate smaller Foraminifera

Age: Upper Te-Tf, lower-middle Miocene.

Talasea 1:250,000 sheet area

51 NG 0539

Locality: Tributary of Iglik River between Ziek and Ranguigui village.
Formation: Jacquinet Limestone
Fauna: Foraminifera, Algae

Lepidocyclina (Nephrolepidina) japonica Yabe
Lepidocyclina sp. (microspheric)
Miogypsina sp.
Austrotrillina? sp.
Cycloclypeus eidae Tan Sin Hok
Planorbulinella? sp
Miliolids

Age: Upper Te, lower Miocene

51 NG 1029

Locality: About 2 m Southeast of Au'una
Formation: Jacquinet Limestone
Fauna: Coral, Foraminifera

Flosculinella? sp.
Cellanthus sp.

Age: The presence of Flosculinella would indicate upper Te to Tf, lower to middle Miocene age. The poorly preserved fauna however, does not allow a definite determination.

51 NG 1068

Locality: 2 m North of Gavuvu River
Formation: Jacquinet Limestone
Fauna: Algae, Foraminifera

Lepidocyclina sp., probably L. (Nephrolepidina)
Miogypsina spp.
Carpenteria sp.
Gypsina sp.
Miliolids
Soritid gen. indet.
indet. smaller Foraminifera

Age: Upper Te to lower Tf, lower to middle Miocene

Sample No.
51 NG 1082

Locality: Melkoi River, upstream from Ulutu Village
Formation: Float specimen, probably derived from Baining Volcanics
Fauna: Coral, Foraminifera

Nummulites sp. cf. N. pengaronensis Verbeek
Pellatispira sp. cf. P. provaleae Yabe
Discocyclina sp.

Age: Tb, upper Eocene

51 NG 1091 a

Locality: Som River, tributary of Melkoi River
Formation: Float specimen, probably derived from Jacquinet Limestone
Fauna: Foraminifera

Austrotrillina sp. cf. A. howchini Schlumberger
Cycloclypeus sp.
Lepidocyclina sp.
Miogypsina sp.
Miogypsinoidea? sp.
Heterostegina sp.
Gypsina sp.
Amphistegina sp.
Carpenteria sp. (fragments)
Alveolinid gen. indet.
Miliolids

Age: lower Tf, middle Miocene

51 NG 1091 b

Locality: Som River, tributary of Melkoi River
Formation: This sample is a large fragment of limestone in volcanic rudite,
found as float and probably derived from Baining Volcanics
Fauna: Coral, Bryozoa, Foraminifera

Discocyclina sp.
Biplanispira? cf. B. hoffmeisteri (Whipple)
Heterostegina sp.

Age: Tb, upper Eocene

51 NG 1516

Locality: Outcrop in gorge along track Mili - Mukul
Formation: As yet unnamed series of fine-grained limestones
Fauna: Foraminifera, Ostracods

Orbulina universa
Globoquadrina altispira altispira
G. venezuelana
Globorotalia (G.) cultrata cultrata
G. (G.) merotumida
G. (G.) sp. cf. tumida tumida
Globigerinoides quadrilobatus subsp.
+ primitive fistulose forms

Age: Latest Miocene to basal Pliocene, zone N 18

Sample No.

51 NG 1518 b

Locality: Pandi River, near Leli

Formation: Float specimen, probably derived from Jacquinet Limestone

Fauna: Algae, Coral, Foraminifera

Miogypsina sp.

Lepidocyclina (Nephrolepidina) sp.

Amphistegina sp.

Carpenteria sp.

Age: Upper Te-Tf, lower-middle Miocene

51 NG 1518 e

Locality: Pandi River, near Leli

Formation: Float specimen, as 1516

Fauna: Foraminifera, mainly planktonics

Orbulina universa

Globigerinoides quadrilobatus subsp. + immaturus

Globoquadrina dehiscens dehiscens

Age: Middle to upper Miocene, not younger than N19

51 NG 1521 a

Locality: River near Malavone

Formation: Float specimen, as 1516

Fauna: Foraminifera, mainly planktonics

Orbulina universa

Globigerinoides quadrilobatus quadrilobatus

G. quadrilobatus sacculifer

G. (G.) cultrata cultrata

G. (T.) inflata

Sphaeroidinellopsis subdehiscens subdehiscens

Globoquadrina dehiscens

G. altispira

Age: Middle to upper Miocene, N11 - N19

51 NG 2505

Locality: Bairiman River

Formation: Jacquinet Limestone

Fauna: Algae, Coral, very rare Foraminifera

Lepidocyclina spp. subgen. indet.

Carpenteria sp. (fragments)

Age: Te-Tf, Oligocene to middle Miocene

51 NG 2521

Locality: Evilu River near Salilibu Agricultural Station

Formation: Float specimen of light grey, compact detrital limestone

Fauna: Algae, Foraminifera, Bryozoa

Sample No.

51 NG 2521 (Cont.)

Nummulites sp.
Discocyclina sp.
Miliolids

Age: Ta-Tb, middle to upper Eocene

51 NG 2530

Locality: Iglik River between Iok and Ranguigui

Formation: Jacquinet Limestone

Fauna: Foraminifera

Miogypsina spp.
Miogypsinoidea sp.
Lepidocyclina (Nephrolepidina) sp.
Heterostegina sp.
Amphistegina sp.
Gypsina sp.
Operculina sp.
Planorbulinella? sp.

Age: Upper Te to Tf, lower to middle Miocene

51 NG 2532

Locality: Headwaters Iglik River

Formation: Float, probably derived from Jacquinet Limestone

Fauna: Coral, Foraminifera, Algae

Austrotrillina sp.
Lepidocyclina sp. subgen. indet.
Heterostegina sp.
Miogypsina sp.
Miliolids

Age: Upper Te-lower Tf, lower-middle Miocene

51 NG 2533

Locality: Headwaters Iglik River

Formation: Float, probably derived from Jacquinet Limestone

Fauna: Foraminifera, Mollusca

Austrotrillina sp.
Cellanthus sp.
Heterostegina sp.
Lepidocyclina sp. subgen. indet.
Miogypsina sp.

Age: Upper Te-lower Tf, lower-middle Miocene

Sample No.

51 NG 2534

Locality: Headwaters Iglik River

Formation: Float, probably derived from Jacquinet Limestone

Fauna: Coral, Foraminifera

Austrotrillina sp.

Miogypsina sp.

Cellanthus sp.

Soritid gen. indet.

Age: Upper Te-lower Tf, lower-middle Miocene

51 NG 2535

Locality: Headwaters Iglik River

Formation: Float, probably derived from Jacquinet Limestone

Fauna: Coral, Foraminifera

Lepidocyclina (Nephrolepidina) japonica Yabe

Lepidocyclina sp. (microspheric)

Miogypsina sp.

Age: Upper Te, lower Miocene

51 NG 2543 a, b and c

Locality: Headwaters Awio River

Formation: ~~Float~~, probably derived from Jacquinet Limestone

Fraction a: Fauna: Foraminifera

Lepidocyclina (Nephrolepidina) japonica Yabe

L. sp (microspheric)

Miogypsina spp.

Miliolids

Age: upper Te, lower Miocene

Fraction b: Fauna: Foraminifera

Lepidocyclina (Nephrolepidina) sp.

Miogypsina sp.

Heterostegina sp.

Age: upper Te-Tf, lower-middle Miocene

Fraction c: Fauna: Foraminifera, Mollusca

Austrotrillina striata/howchini

Lepidocyclina (Nephrolepidina) japonica Yabe

Miogypsina sp.

Miliolids

Age: Upper Te, lower Miocene

Sample No.

51 NG 2546

Locality: Iglik River

Formation: Jacquinet Limestone

Fauna: Foraminifera, Algae

Lepidocyclina (Nephrolepidina) japonica Yabe

Lepidocyclina sp. (microspheric)

Miogypsinoides sp. cf. M. dehaarti (van der Vlerk)

Miogypsina spp.

Austrotrillina sp. cf. A. howchini (Schlumberger)

Cellanthus sp.

Textularia sp.

Miliolids

Indet. smaller Foraminifera

Soritid gen. indet.

Age: Upper Te, lower Miocene

51 NG 2549 b

Locality: Eastern branch Gavuvu River

Formation: Jacquinet Limestone; Float specimen

Fauna: Coral, Foraminifera, Bryozoa

Lepidocyclina (Nephrolepidina) sp.

Miogypsina sp.

Flosculinella sp. cf. F. bontangensis (Rutten)

Gypsina sp.

Miliolids

Age: lower Tf, middle Miocene

51 NG 2570 b

Locality: Tavalu River

Formation: Float specimen (sample is a compact pinkish limestone found in association with volcanic rock)

Fauna: Foraminifera

Lepidocyclina (Eulepidina) ephippioides (Jones & Chapman)

Age: Te, Oligocene-lower Miocene

51 NG 2605

Locality: Balima River

Formation: Jacquinet Limestone, near top of the formation

Fauna: Foraminifera (rare)

Lepidocyclina subgen. indet.

Operculinoides sp.

Age: Te-Tf, Oligocene-middle Miocene

Sample No.

51 NG 2608 a

Locality: Balima River

Formation: Jacquinot Limestone, about 500' below top of the formation

Fauna: Foraminifera, molluscan fragments

Austrotrillina sp. cf. A. howchini (Schlumberger), primitive

Miliolids

Soritid gen. indet.

indet. smaller Foraminifera

Age: Upper Te-lower Tf, lower-middle Miocene

51 NG 2611

Locality: Balima River

Formation: Jacquinot Limestone, sample from about 200' from top

Fauna: Foraminifera

Austrotrillina sp.

Miogypsina sp.

Lepidocyclina sp. probably belonging to Nephrolepidina

Miliolids

Indet. smaller Foraminifera

Age: Upper Te-lower Tf, lower-middle Miocene

51 NG 2630

Locality: Ivule River where river emerges from hills

Formation: Jacquinot Limestone

Fauna: Foraminifera

Soritid gen. indet.

Miliolids

Flosculinella borneensis (Tan Sin Hok)

Lepidocyclina sp. subgen. indet. (1 specimen only)

Age: Upper Tf, middle Miocene

51 NG 2636

Locality: Ivule River

Formation: Jacquinot Limestone, from base of the formation

Fauna: Algae, Foraminifera, Echinoid spines

Lepidocyclina sp. subgen. indet.

Miogypsina spp.

Austrotrillina sp. (very rare)

Flosculinella sp. cf. F. globulosa (Rutten) (very rare)

Gypsina sp.

Miliolids

Soritid gen. indet.

Age: Lower Tf, middle Miocene

Sample No.

51 NG 2640 l.

Locality: Headwaters, Ivule River

Formation: Jacquinet limestone, sample from a 1500' section, about 100' from the top

Fauna: Abundant free specimens of benthonic larger Foraminifera

Operculina spp. (common)

Sphaerogypsina globulus (Reuss)

Lepidocyclina (Nephrolepidina) Martini group (rare)

Age: Lower Tf, middle Miocene

51 NG 2640 n.

Locality: Headwaters of Ivule River

Formation: Jacquinet Limestone, from base of a 1500' section

Fauna: Algae, Foraminifera

Austrotrillina howchini (Schlumberger)

Miogypsina sp.

Lepidocyclina (Nephrolepidina) japonica Yabe

Soritidae gen. indet.

Indet. smaller Foraminifera

Age: Near boundary between Te and Tf

51 NG 2653 c.

Locality: Obutabu Creek, 8 m East of Uasilau

Formation: Float, probably derived from Baining Volcanics

Fauna: Algae, rare Foraminifera

Biplanispira sp.

Spiroclypeus sp.

Age: Tb, upper Eocene

Gasmata 1:250,000 sheet area

52 NG 2506

Locality: Awio River

Formation:

Fauna: Foraminifera

Operculina sp.

Gypsina sp.

Heterostegina sp.

Amhistegina sp.

Age: indeterminate

Sample No.

52 NG 2523

Locality: Johanna River

Formation: Jacquinet Limestone

Fauna: Foraminifera

Lepidocyclina sp. probably Nephrolepidina sp. (1 specimen only)
planktonic smaller Foraminifera

Age: probably Miocene, but no definite determination can be made

52 NG 2555

Locality: Small river north of Gasmata

Formation: Jacquinet Limestone, (Float specimen)

Fauna: Algae, rare Foraminifera

Miogypsina sp.

Austrotrillina sp.

indet. smaller Foraminifera

Age: Upper Te to lower Tf, lower to middle Miocene

Pomio 1:250,000 Sheet area

54 NG 0002 c

Locality: Tributary of Ip River

Formation: ?Merai Volcanics. Specimen is a carbonate clast from a
volcanic rudite, found as float

Fauna: Algae, rare Foraminifera

Lepidocyclina sp. subgen. indet.

Age: The age of the limestone cannot be accurately determined. Lepidocyclina
occurs only as broken and worn specimens (derived ?) and the sample
could be Miocene or younger.

54 NG 0003 a

Locality: Tributary of Ip River, float specimen derived from fault bounded ?
wedge of limestone

Formation: ?Jacquinet Limestone

Fauna: Algae, Foraminifera, fragments of macrofossils, Bryozoa

Lepidocyclina (s.l.) sp. incl. Nephrolepidina

Miogypsina? sp.

Gypsina sp.

Carpenteria sp. (fragments)

indet. smaller Foraminifera

Age: Upper Te to Tf, lower to middle Miocene. As the specimens are poorly
preserved, worn and broken, they could be derived.

Sample No.

54 NG 0004 a and b

Locality: From 10 metre high limestone cliff adjoining tributary Ip River

Formation: ?Jacquinot Limestone

Fauna: Fraction a: Algae, rare fragments of Foraminifera

Lepidocyclina sp. subgen. indet.

Cellanthus? sp.

Miliolids

Indet. rotaline specimen

Age: The comments on sample 0003 a also apply to this sample

Fauna: Fraction b: Bryozoa, Algae, Foraminifera

Lepidocyclina sp. subgen. indet.

Miogyopsina sp.

Carpenteria sp.

Age: The comments on sample 0003 a also apply to this sample

54 NG 0005

Locality: Ip River

Formation: Jacquinot Limestone

Fauna: Foraminifera

Lepidocyclina (Nephrolepidina) martini group

Amphistegina sp.

Operculinoides? sp.

Rare planktonic Foraminifera

Age: This fauna indicates a Tf, middle Miocene age

54 NG 0013

Locality: Steep sided gorge Ip river

Formation: Baining Volcanics. This sample is a limestone clast from a volcanic rudite

Fauna: Foraminifera

Discocyclina sp.

Biplanispira sp. cf. B. mirabilis (Umbgrove)

Biplanispira? fulgeria (Whipple)

Spiroclypeus vermicularis Tan Sin Hok

Age: Upper Eocene, Tb

54 NG 0022

Locality: Outcrop of massive limestone on east side of eastern tributary Rak River

Formation: Jacquinot Limestone

Fauna: Foraminifera

Lepidocyclina subgen. indet.

Austrotrillina sp.

Operculinoides? sp.

Age: Te to lower Tf, Oligocene to middle Miocene

Sample No.

Locality: Eastern tributary, Rak River

Formation: ? This sample is a limestone cobble from a volcanic rudite
underlying Jacquinot Limestone

Fauna: Coral, Foraminifera (rare)

Miogypsina sp.

Operculina sp.

Age: Upper Te to Tf, lower to middle Miocene

54 NG 0030 a

Locality: Siblong River

Formation: Ip. Formation. This sample is a limestone clast from bedded
volcanic rudites and arenites

Fauna: Foraminifera (rare)

Lepidocyclina sp. subgen. indet.

Operculina? sp.

Age: Probably Miocene; a more distinctive fauna is needed for a definite
age determination

54 NG 0537 c

Locality: Headwaters, Toki River

Formation: Jacquinot Limestone

Fauna: Foraminifera, Algae

Miogypsina spp.

Carpenteria sp.

Calcarina sp.

Indet. rotaline genus

Age: Upper Te to Tf, lower to middle Miocene

54 NG 1045 a and b

Locality: Headwaters Ikoi River

Formation: Float, derived from pre Jacquinot Limestone volcanics

Fauna: Foraminifera, Coral, Algae

Lepidocyclina (Eulepidina) ephippioides (Jones & Chapman)

Lepidocyclina (Nephrolepidina) isolepidinoides Van der Vlerk

Heterostegina spp.

Indet. smaller Foraminifera

Planorbulinella? sp.

Age: Lower Te, Oligocene

54 NG 1052 f

Locality: Headwaters Ikoi River

Formation: Float specimen of volcanic rudite, derived from pre Jacquinot
Limestone volcanics

Fauna: Foraminifera, Bryozoa

Lepidocyclina (Eulepidina) sp.

L. (Nephrolepidina?) sp.

Age: Te, Oligocene to lower Miocene

Sample No.

54 NG 1056

Locality: Lemkong River

Formation: Float specimen of limestone in volcanic detritus, probably derived from pre-Jacquinet Limestone volcanics

Fauna: Foraminifera, Algae, Coral

Lepidocyclina (Nephrolepidina) augusticamera Cole

L. (N.) isolepidinoides van der Vlerk

Heterostegina sp.

Amphistegina sp.

Rare planktonic Foraminifera

Indet. smaller Foraminifera

Age: Lower Te, Oligocene

54 NG 1063 f

Locality: Lemkong River

Formation: Float specimen of volcanic rudite with fragmental limestone, probably derived from pre-Jacquinet Limestone volcanics

Fauna: Foraminifera

Discocyclina (including Asterocyclina) sp.

Biplanispira? fulgeria (Whipple)

Nummulites sp.

Spiroclypeus vermicularis Tan Sin Hok

Age: Tb, upper Eocene

54 NG 1505

Locality: Beg Beg River

Formation: Float specimen of tuffaceous sandstone, probably derived from pre-Jacquinet Limestone volcanics

Fauna: Foraminifera, Bryozoa

Lepidocyclina (Eulepidina) sp.

Lepidocyclina sp. subgen. indet.

Indet. rotaline genus

Heterostegina sp.

Age: Te, Oligocene to lower Miocene

54 NG 1507 b

Locality: Beg Beg River

Formation: Float specimen of dark limestone, probably derived from pre-Jacquinet Limestone volcanics

Fauna: Foraminifera, Bryozoa

Lepidocyclina (Eulepidina) sp.

Lepidocyclina sp. subgen. indet.

Heterostegina sp.

Age: Te, Oligocene-lower Miocene fauna; the specimens are poorly preserved and broken and could be derived.

Sample No.

54 NG 1507 i

Locality: Beg Beg River

Formation: Float specimen, probably derived from Jacquinot Limestone

Fauna: Coral, Foraminifera, Algae

Flosculinella sp.

Lepidocyclina? sp. (one fragment)

Soritid gen. indet.

Miliolids

Age: Upper Te to Tf, lower to middle Miocene

54 NG 1507 j

Locality: Beg Beg River

Formation: Float specimen, probably derived from Jacquinot Limestone

Fauna: Coral, Algae, Foraminifera

Miogypsina sp.

Flosculinella sp. cf. F. borneensis (Tan Sin Hok)

Operculina sp.

Miliolids

Age: Upper Tf, middle Miocene

54 NG 1507 k

Locality: Beg Beg River

Formation: Float specimen, probably derived from Jacquinot Limestone

Fauna: Coral, Foraminifera

Miogypsina sp.

Flosculinella sp. cf. F. borneensis (Tan Sin Hok)

Cellanthus sp.

Age: Upper Tf, middle Miocene

54 NG 1513

Locality: Emou River

Formation: Float specimen of Jacquinot Limestone type lithology, may be part of conglomerate or possibly fault wedge.

Fauna: Coral, Foraminifera

Lepidocyclina sp. subgen. indet.

Flosculinella? sp.

Heterostegina sp.

Gypsina sp.

Age: Probably middle Miocene; further examination may give a definite determination.

Sample No.

54 NG 1518 a

Locality: Upper Iso River

Formation: Baining Volcanics, in situ

Fauna: Foraminifera

Discocyclina sp.

Pellatispira sp. cf. P. provaleae Yabe

Heterostegina sp.

Miliolids

Carpenteria sp.

Age: Tb, upper Eocene

54 NG 1519 c and f

Locality: Upper Iso River

Formation: Float specimens, probably derived from Jacquinet Limestone
outcropping near point 1520

Fauna: Fraction c: Foraminifera, Algae, Bryozoa

Miogypsina spp.

Lepidocyclina sp. subgen. indet.

Austrotrillina sp.

Cycloclypeus sp.

Miliolids

Age: Upper Te to lower Tf, lower to middle Miocene

Fraction f: Algae, Bryozoa, Foraminifera

Austrotrillina sp.

Miogypsina sp.

Miogypsinoides sp.

Miliolids

Age: Upper Te to lower Tf, lower to middle Miocene

54 NG 2000 a and b

Locality: Western tributary of Rak River

Formation: Jacquinet Limestone

Fauna: Coral, Foraminifera, Bryozoa

Austrotrillina sp. cf. A. striata/howchini

Flosculinella sp. cf. F. globulosa (Rutten)

Age: Top upper Te-lower Tf, lower-middle Miocene

Sample No.

54 NG 2002 a and b

Locality: Western tributary of Rak River

Formation: Jacquinet Limestone

Fauna: Fraction a: Algae, Foraminifera

Miogypsina spp.

Lepidocyclina sp.

Austrotrillina sp.

Gypsina sp.

Operculina sp.

Miliolids

Age: Upper Te to lower Tf, lower to middle Miocene

Fraction b: Algae, Foraminifera

Austrotrillina sp.

Miogypsina sp.

Miliolids

Soritid gen. indet.

Age: Upper To lower Tf, lower to middle Miocene

54 NG 2004 d

Locality: Maipa River

Formation: Ip Formation; this sample is a limestone cobble from a semi-consolidated rudite

Fauna: Bryozoa, Algae, Foraminifera

Lepidocyclina sp. cf. L. (N.) martini group

Amphistegina sp.

Carpenteria sp.

Operculinoides? sp.

Age: Probably lower Tf, middle Miocene age

54 NG 2502 a, b and c

Locality: Ip River

Formation: These samples are limestone pebbles found in indurated volcanic sediments, found as float in the river, probably derived from Baining Volcanics

Fauna: Fraction a: Algae, rare Foraminifera

Spiroclypeus sp. cf. S. vermicularis Tan Sin Hok

Heterostegina sp.

Age: probably upper Eocene, Tb

Fraction b: Foraminifera, Algae, Bryozoa, Molluscs

Biplanispira sp. cf. B. mirabilis (Umbgrove)

Nummulites sp. cf. N. pengaronensis (Verbeek)

Discocylinina sp.

Spiroclypeus sp.

Miliolids

Age: Upper Eocene, Tb

Fraction c: Algae, Foraminifera, Corals, Molluscs

Nummulites sp.

Biplanispira sp.

Spiroclypeus sp.

Age: Upper Eocene, Tb

54 NG 2510 e

Locality: Headwaters Berg Berg River

Formation: Jacquinet Limestone

Fauna: Coral, Algae, Molluscs, Foraminifera

Flosculinella borneensis (Tan Sin Hok)

Miogypsina sp. (rare)

Age: Upper Tf, middle Miocene

54 NG 2511

Locality: Rak River

Formation: Float specimen, probably derived from Jacquinet Limestone

Fauna: Foraminifera, Molluscs

Miogypsina sp. cf. M. kotoi Hanzawa

Lepidocyclina sp. subgen. indet. (only 1 specimen)

Cellanthus sp.

Indet. smaller Foraminifera

Age: Upper Te-lower Tf, lower-middle Miocene

54 NG 2512

Locality: Berg Berg River

Formation: Mainly sediments, as yet unnamed

Fauna: Rare Foraminifera in washing

Globorotalia (G.) tumida tumida

Globorotalia (T.) inflata

Globoquadrina sp.

Globigerinoides quadrilobatus quadrilobatus

Sphaeroidinellopsis subdehiscens subdehiscens

Sphaeroidinella dehiscens immatura

Age: Lower Pliocene, zone N 19

Sample No.

54 NG 2514

Locality: Berg Berg River

Formation: Mainly sediments, as yet unnamed

Fauna: abundant planktonics, some smaller benthonics

Globigerinoides quadrilobatus quadrilobatus
G. quadrilobatus immaturus
G. conglobatus
G. bolli
G. obliquus obliquus
Globorotalia (T.) inflata
G. (G.) tumida
G. (G.) cultrata cultrata
Globocquadrina venezuelana
Sphaeroidinellopsis subdehiscens subdehiscens

Age: Probably basal Pliocene, zone N18-N19

54 NG 2517 i

Locality: Ikoi River

Formation: Float specimen of limestone with pyroclastic fragments.

Fauna: Algae, Foraminifera

Lepidocyclina (Eulepidina) ehippoides (Jones and Chapman)
Lepidocyclina sp. subgen. indet. (2 specimens only)
Heterostegina sp.
Indet. smaller Foraminifera

Age: Te, Oligocene to lower Miocene

54 NG 2518 and 2519

Locality: Near Pomio (2518) and near the mouth of Matali River (2519)

Formation: Jacquinet Limestone

Fauna: Planktonic smaller Foraminifera, observed in thin sections, include
Globocquadrina, Globorotalia, Sphaeroidinellopsis and Globigerina

Age: probably middle to upper Miocene

54 NG 2524

Locality: Small river on west coast of Wide Bay

Formation: Ip Beds

Fauna: Small Mollusca and mainly benthonic smaller, some planktonic
smaller Foraminifera

Orbulina universa
Globorotalia (G.) cultrata
G. (T.) acostaensis humerosa
Pulleniatina obliquiloculata finalis
Globigerinoides quadrilobatus subsp.
G. ruber
G. conglobatus

Age: Pleistocene-Recent, upper zone N22-N23

Sample No.

54 NG 2527

Locality: Lemkong River

Formation: Fault sliver of Limestone

Fauna: Algae, Foraminifera, Coral

Spiroclypeus sp.

Nummulites sp.

Biplanispira sp. (only 1 fragment)

Age: Upper Eocene, Tb

54 NG 2549 c

Locality: East branch Sai River

Formation: Jacquinet Limestone

Fauna: Foraminifera, Bryozoa, Algae

Lepidocyclina (Nephrolepidina) sp.

Lepidocyclina sp. (microspheric form)

Amphistegina sp.

Carpenteria sp.

Rare planktonic smaller Foraminifera

Age: probably Tf, middle Miocene

54 NG 2605 a

Locality: Southeast branch of Sai River

Formation: Jacquinet Limestone, fault bounded block

Fauna: Foraminifera, Bryozoa

Lepidocyclina, (Nephrolepidina) sp.

Planorbulinella? sp.

Amphistegina sp.

Operculina? sp.

Miogypsina sp.

Rare planktonic smaller Foraminifera

Age: Lower to middle Miocene, upper Te to Tf

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MICROFAUNA LOCALITIES : NEW BRITAIN

SCALE 1:500000

