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1961/73

THE GEOLOGY OF THE SAU RIVER AND ENVIRONS NEW GUINEA.

by

D.B. Dow.

The information contained in this report has been obtained by the Department of National Development, as part of the policy of the Commonwealth Government, to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus without the permission in writing of the Director, Bureau of Mineral Resources, Geology and Geophysics.

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NEW GUINEA

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ILLUSTRATIONS

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THE GEOLOGY OF THE SAU RIVER AND ENVIRONS NEW GUINEA

SUMMARY

An area of approximately 800 square miles in the Western Highlands of New Guinea was mapped during a reconnaissance geological survey in 1959.

Non-metamorphic Jurassic fine-grained marine sediments and Lower Cretaceous volcanics are faulted against an Eocene to Pliocene sequence of marine sediments and volcanics; these rocks are openly folded along north-west trending axes and dislocated by two major north-west trending faults. Pleistocene basic volcanics and alluvial deposits are the youngest rocks.

A large basic pluton which intrudes Miocene and older rocks is the source of gold, platinum, and minor copper mineralisation.

INTRODUCTION

The writer spent four weeks in November and December 1959 mapping the Magare and part of the Gurap one-mile areas, New Guinea. Vertical aerial photographs were used for the mapping which was of a reconnaissance nature. The accompanying geological map (see Plate 1.), on a scale of two miles to one inch, was made by tracing an uncontrolled assembly of the aerial photographs and reducing by means of a pantograph.

COMMUNICATIONS

The Lae - Mt. Hagen Road extends to Yaramanda where a bridge is being built across the Lai River (1960). From Wapenamanda a well-surfaced road follows the Upper Lai Valley to Wabag and beyond to Laiagam; Kompiam Patrol Post is connected to Wabag by a well-graded, but poorly surfaced road, which is negotiable in wet weather only by four-wheel-drive vehicles.

While this road network is suitable for local communication in the Western Highlands, it is unsuitable for heavy transport, hence most supplies are air-freighted from Madang to the various centres, all of which have airstrips.

Access to the southern part of the area mapped is by good Government tracks, but in the northern part the local tracks are very rough and often ill-defined.

TOPOGRAPHY AND DRAINAGE

Most of the area is drained by the Lai River (locally called the Gai River in its lower reaches), and its large tributaries, the Baiyer and Sau Rivers. In its upper reaches the Lai River follows the regional south-east strike of the bedding to near Wapenamanda where it turns sharply north across the regional strike, and flows through a deep gorge to join the Baiyer and Sau Rivers. The river is named the Lai River for a further 15 miles to its junction with the Jimi River but for the remainder of its course to the Sepik River it is known as the Yuat River. The north-western part of the map area is drained by the Wale and Tarua Rivers which are tributaries of the Yuat.

With the exception of the middle reaches of the Baiyer River and the lower reaches of the Lai River, the country is rugged, with deeply incised rivers and tributaries. It ranges in elevation from about 1000 feet in the lower Lai Valley to over 9000 feet between Kompiam and Wabag. The area is dominated by the volcanic massif of Mount Hagen which rises to over 13000 feet above sea level south of the area mapped.

POPULATION AND INDUSTRY

The region supports a large native population which is administered from the Wabag Sub-District Office and Kompiam and Wapenamanda Patrol Posts, of the Western Highlands District. An Administration Agricultural Research Station is established at Baiyer River and there are mission stations at Baiyer River (Baptist), Wabag (Roman Catholic, Lutheran, and Seven Day Adventist), Pawari (Lutheran) and Yaramanda (Lutheran).

Messrs. L. and M. Wilson have been mining gold and platinum at Timun River since 1949 for small returns.

PREVIOUS INVESTIGATIONS

In 1952 and 1953, F.K. Rickwood (1955) mapped the Wahgi Valley and the Lai River from Wapenamanda nearly to Pawari.

GEOMORPHOLOGY

Faulting and folding determined the main topographical features of the Western Highlands during Pliocene time. The core of the Lai Syncline is occupied by resistant conglomerate of the Birip Beds which forms a dissected, steep-flanked plateau rising to over 9,000 feet above sea level.

Dissection of this plateau was well advanced and the major valley systems were in existence before the onset of the Pleistocene volcanism during which the large basalt volcano of Mount Hagen gradually accumulated to form the dominant landform of the region. This vulcanism isolated the former reaches of the Wahgi River to form the Lai River which is now deeply entrenched in a northerly course across the regional strike of the Tertiary rocks. Volcanic debris filled the valley of the Lower Lai River forming the extensive Lai - Jimi Plain.

Since the cessation of volcanic activity at Mount Hagen, the volcano and the piedmont aprons have undergone considerable dissection, and the flanks of the volcano are scored by deep ravines. The Lai River now flows through a steep-sided gorge about 800 feet below the Lai - Jimi Plain.

STRATIGRAPHY

GENERAL:

The oldest rocks in the area are the Jurassic Labalam Beds which consist of sandstone, grit, fine-grained conglomerate and shale. Ancient basaltic volcanic rocks overlie the Labalam Beds and are probably correlatives of the Kondaku Tuff of Lower Cretaceous age (Rickwood 1955).

Most of the area consists of a conformable sequence of Eocene to Upper Miocene rocks which the writer has divided into three formations viz. : Linganas Beds (probable Eocene) Kompiam Beds (Oligocene to Miocene), and the Birip Beds (Miocene f_{1-2}stage).

All these rocks, with the possible exception of the Birip Beds, have been intruded by igneous rocks ranging in composition from gabbro to granodiorite which the writer has called the Timun Intrusives.

The Mount Hagen Range is a large complex Pleistocene volcano, predominantly basaltic in composition. Around its flanks are spectacular dissected piedmont apron deposits which grade into the extensive alluvium of the Lai - Jimi Plain.

The youngest are small alluvial deposits such as the auriferous gravels at Timun River, and the small dissected basaltic volcanoes at Linganas and Kompiam Patrol Post.

The Tertiary rocks are folded into a broad syncline called the Lai Syncline, (Rickwood ibid.) which trends north-west and has been faulted along its south-west flank. The Mesozoic rocks have been folded into a broad north-west trending anticline which has been down-faulted on the its south-western flank by the Bismarck Fault.

LABALAM BEDS:

Labalam Beds is the formation name proposed for the oldest rocks in the area which are Jurassic sandstone and shale. They occur in the north-eastern corner of the area where they are overlain by Cretaceous Kondaku Tuff to the north-east and are faulted against Eocene sediments to the south-west.

Exposures are poor and only a general idea of the succession was obtained. The lower part is composed predominantly of arenaceous sediments, the most common of which is a laminated and thin-bedded quartz sandstone. The rock is indurated and consists predominantly of well-rounded and well-sorted quartz grains with minor chert grains. It is interbedded with a massive medium-grained sandstone which is not as well sorted and consists of sub-rounded grains of quartz, chert, and fine-grained silicified siltstone. This sandstone grades into a distinctive fine-grained intraformational conglomerate which consists of elongated and sub-rounded siltstone and shale pebbles in a fine sandy matrix. Grey and dark blue shale and siltstone are prominent in this section; they are micaceous, usually phyllitic, and have and incipient slaty cleavage parallel to the bedding. Fossils were found in the shale in one locality.

Higher in the sequence, shale, siltstone, and calcareous siltstone predominate. They are dark grey to dark blue, are indurated and generally phyllitic, and are indistinguishable from the Eocene Linganas Beds to the south-west.

Fossils were found 1½ miles north-east of Labalam Village, and the following were recognised by the writer :

Buchia malayomaorica
Inoceramus sp.

The sediments are therefore Jurassic and a correlative of the *Buchia malayomaorica* horizon (recorded by Rickwood 1955) in the head of Wahgi Valley about 30 miles to the south-east. However, the Jurassic rocks of the Wahgi Valley are predominantly shale with prominent masses of reef limestone, and hence a new formation name has been proposed for the beds in the map area.

KONDAKU TUFF:

The name Kondaku Tuff was first proposed by Edwards and Glaessner (1953) for Lower Cretaceous volcanic breccia and tuff with interbedded marine sediments which are found in the Wahgi Valley 18 miles to the south-east of the map area. The basaltic volcanic rocks which overlie the Labalam Beds in the north-eastern corner of the area are tentatively correlated with the Kondaku Tuff.

These volcanics were examined only near the junction of the Sau River and the Lai River (see figure I). In this locality they consist of green altered basalt lava and agglomerate with minor interbedded fine grained tuff. Contorted and partly assimilated lenses of coarsely crystalline calcite up to two feet wide are a feature of the lava and agglomerate. In this locality the volcanics were deposited sub-aerially.

FIGURE I

Agglomerate, tuff and lava flows of the Kondaku Tuff at a native suspension bridge across the Sau River near its junction with the Lai River. Boulder shows calcite (white) nearly assimilated by basalt.

LINGANAS BEDS:

The name Linganas Beds is proposed for an Eocene sequence of predominantly fine-grained marine sediments. They crop out as a narrow north-west trending belt across the middle of the area. They are faulted against Jurassic rocks to the north-east and are overlain conformably by the Kompiam Beds to the south-west.

The following section was measured near Linganas:

350 ft.	Shale, siltstone, calcareous siltstone fine-grained greywacke.
700 ft.	Foraminiferal calcarenite
4,500 ft.	Siltstone, shale, fine-grained calcareous greywacke, calcareous siltstone.

The beds below the calcarenite are mainly blue to dark grey micaceous siltstone and shale. They are indurated, have incipient slaty cleavage and grade into phyllitic siltstone. Red and light grey, less indurated, siltstone was seen as pebbles and boulders in the streams to the north of Linganas but the rocks were not found in situ. Calcareous sediments are not common, but dark-coloured calcareous siltstone and fine-grained calcareous greywacke were seen. The beds are generally massive but thin-bedding and laminations are not rare.

In the Lamant River the beds below the calcarenite differ slightly from those near Linganas. Regular bedding, both laminated and thin-bedded, is more common and in addition colour-banding up to ½ inch wide in alternating light and dark grey bands is common. In this area quartz veins and pyrite mineralisation occurs as joint linings and disseminated crystals near the porphyry intrusion.

The foraminiferal calcarenite is invariably fine-grained and massive and consists of rounded grains of calcite with abundant small pelagic foraminifera and sub-rounded shell fragments cemented by interstitial calcite. The bed is resistant to erosion and forms a prominent scarp throughout the area from south of Pawari to near Lamant River where it lenses out.

Above the calcarenite, the shale and siltstone are similar to the underlying beds, but contain bands of fine-grained dark-coloured greywacke up to four feet thick.

The calcarenite was mapped by Rickwood, in the Lai Gorge four miles south of Pawari, as a correlative of the Eocene Mebilyer Limestone. No diagnostic fossils were found in the Linganas Beds during the present survey and following Rickwood the beds are tentatively regarded as Eocene.

KOMPIAM BEDS:

Kompiam Beds is the name proposed for a sequence of arenaceous marine sediments and basaltic volcanic rocks which conformably overlies the Linganas Beds and crops out as a north-west trending belt across the middle of the map area.

The section between Linganas and the overlying Birip Beds, with approximate thicknesses estimated from aerial photographs, is given below :

----TOP----

Thickness	Description
3,000 feet	Mainly basaltic lava, tuff, and agglomerate. The agglomerate contains angular fragments of basalt and andesite up to 2 feet across in a tuff matrix; it grades into a coarse-grained boulder conglomerate with sub-rounded basalt boulders and cobbles in a tuffaceous matrix.
1,500 feet	Mainly dark-coloured indurated conglomerate with sub-rounded to rounded basalt cobbles and boulders in a tuffaceous matrix. The conglomerate grades into subordinate fine-grained basalt agglomerate.
3,500 feet	Dark grey and blue, highly indurated, greywacke and tuffaceous sandstone which grades into water-laid tuff near the top. The most common rock type consists of sub-angular fragments of basic igneous rocks, feldspar, and ferromagnesian minerals chaotically dispersed in a fine-grained tuffaceous matrix. These beds range in grain-size from thin-bedded to massive and are interbedded with laminated and thin-bedded siltstone which comprises about one third of the sequence. Small lenses of argillaceous limestone up to 30 feet thick containing gastropods, bryozoa, and foraminifera are common in this member near Kompiam.
2,000 feet	This interval is poorly exposed on the line of traverse. It consists mainly of arenaceous sediments similar to the above, intruded by many gabbro and dolerite dykes.
3,000 feet	Mainly conglomerate, with well-rounded pebbles of greywacke, siltstone, and quartz, in a sandstone matrix. Claystone and peaty siltstone containing wood fragments and other carbonised vegetable matter, which comprise nearly half this interval are regarded as terrestrial beds.
5,000 feet	Mainly thick-bedded, coarse to medium-grained greywacke with thin interbeds of shale and siltstone. The greywacke is dark coloured and consists of sub-rounded fragments of greywacke siltstone, chert, and quartz in a fine-grained siltstone matrix. Thick conglomerate lenses are common and consist of schist, quartz, greywacke, and siltstone in a sandstone matrix.

The above section is approximately 18,000 feet thick. Rickwood states that the section along the Lai River from the base of the coarse facies to the top of the volcanics, which is approximately the same stratigraphic interval, is 10,600 feet thick. This shows that the basin of deposition deepened to the north-west.

No diagnostic fossils were found in the Kompiam Beds but they are conformably overlain by Miocene f1-2 stage Birip Beds described below -- it is suggested that the Kompiam Beds range in age from Lower Miocene through Oligocene and into the Eocene.

To the east of Wabag, a north-west trending belt of thick-bedded to medium-bedded greywacke is faulted against Lower Miocene Birip Beds on the south-western limb of the Lai Syncline. This sequence dips regularly to the south-west between 50° and 65°, and can be seen on the aerial photos to extend as far as the Maramuni River to the north-west. Its age is unknown, but it is lithologically comparable with the greywacke sequence in the upper half of the Kompiam Beds.

BIRIP BEDS:

Birip Beds is the name given to shallow-water, off-shore sediments which overlie the Kompiam Beds. They are exposed in the core of the Lai Syncline as a north-west trending belt across the south-western part of the mapped area.

The lower part of the formation includes argillaceous sandstone, argillaceous calcarenite, and minor conglomerate. The sandstone is generally light-coloured, friable, and consists of well-rounded quartz grains in an argillaceous matrix, but it varies considerably from a black, calcareous, argillaceous sandstone, to a cleaner and better-sorted sandstone. The calcarenite is coloured light cream and is composed of shell fragments in a marly matrix. Large diagnostic foraminifera identified by D.J. Belford (Appendix I this report) were found in a lense of this calcarenite. The conglomerate consists of well-rounded pebbles and cobbles of andesite in a sandstone matrix. Fine-grained basic igneous rock which could be basalt lava flows, or more likely dolerite sills occur throughout this section. Gypsum nodules and patches are fairly common in the fine-grained sediments.

In the upper part of the formation, conglomerate which is predominant, is interbedded with thin shale and siltstone. The conglomerate is indurated, and consists of well-rounded cobbles and boulders of andesite and basalt in a dark sandy matrix. Some clay beds with silicified wood, and limonitic horizons which could be old lateritic profiles, were seen in the uppermost beds. These suggest terrestrial conditions during deposition. However, exposures in this section are very poor and more detailed mapping is needed.

The formation is at least 2,500 feet thick. An argillaceous calcarenite about 800 feet above the base of the Birip Beds contains the following foraminifera (Belford 1960 see appendix) :

Lepidocyclina (N.) ferreroi
L. (N.) sp.
Miogypsina sp.
Elphidium sp.

The sample is regarded as Lower Miocene f1-2 stage.

TIMUN INTRUSIVES

Predominantly basic igneous rocks which intrude Miocene and older sediments in the map area have been here named the Timun Intrusives.

The name is derived from the Timun River where an igneous body, 14 miles long by 6 miles wide, intrudes Miocene sediments. The intrusion consists mainly of basic rocks and ranges in composition from olivine dolerite and gabbro with minor serpentinite, to granodiorite. The granodiorite grades to medium-grained diorite and constitutes about one third of the intrusion. Some rare andesite porphyry also occurs.

A small stock of andesite porphyry about three miles long by one mile wide, which grades to fine-grained diorite, was seen in the headwater tributaries of the Lamant River. This porphyry contains about 50% angular shale fragments in a marginal zone for about 20 feet from its intrusive contact. A roughly banded volcanic rock with rounded and angular pumiceous fragments up to half an inch across is associated with this porphyry.

A large body of medium to coarse-grained granodiorite with dolerite and gabbro differentiates, occurs between the head of the Lamant River and the lower Sau River. Another intrusion composed of dolerite and granodiorite occurs north of the Baiyer River. These are tentatively referred to the Timun Intrusives, though they are predominantly granodiorite and nowhere are they known to intrude sediments younger than Cretaceous.

The Timun Intrusives intrude the Kompiam Beds and probably the Birip Beds and thus are younger than Miocene f1-2 stage.

HAGEN VOLCANICS:

The name Hagen Volcanics is proposed for the basalt lava and agglomerate derived from Mount Hagen, a large volcano near the southern margin of the map area. The north-western slopes of Mount Hagen, are dissected piedmont aprons composed mainly of angular volcanic detritus forming chaotically deposited agglomerates. They grade into true agglomerate, but most were probably redistributed volcanic deposits, laid down by rivers and lahars. Basalt lava flows, conformable with the slope of the piedmont aprons have been exposed by the dissecting streams, and show that the volcano was still active during the deposition of the aprons.

The small dissected basalt volcanoes at Linganas and Kompiam (see Figures 2 and 3) are included with the Hagen Volcanics, though they are probably somewhat younger. The volcanics are regarded as Pleistocene since Mount Hagen has undergone considerable erosion since the formation of the volcanic aprons.

FIGURE 2

Kompiam Patrol Post looking north-east. Airstrip and Patrol Post are on the surface of a Pleistocene basalt flow.

FIGURE 3

Kompiam Patrol Post looking west, up the Sau Valley.

ALLUVIA

(1). THE LAI-JIMI PLAIN:

The extensive alluvial plain of the Lower Lai and Jimi Rivers is most striking and has resulted from the accumulation of volcanic detritus from Mount Hagen in Late Pleistocene time. Near the junction of the Sau and Baiyer Rivers the alluvium consists mainly of boulders of basalt in a matrix of redistributed tuff. Rare boulders of limestone and other sedimentary rocks occur. Towards the Jimi River the proportion of rocks other than basalt increases. The formation ranges considerably in thickness but seems to have a maximum of about 1,000 feet.

(2). THE BAIYER PLAIN: (See Figure 4.)

The Baiyer Plain is a chaotic alluvial deposit containing predominant sub-angular basalt components overlain by patches of recent alluvium and a thin veneer of soil. It is thought that the plain was formed by the filling of the Baiyer Valley, firstly with lavas, then with lahar deposits from Mount Hagen.

FIGURE 4

The Baiyer Plain looking south-east from near the junction of the Baiyer and Lai Rivers. The lower slopes of Mount Hagen are on the right.

STRUCTURE

The rocks of the map area are broadly folded along north-west trending axes and are dislocated by two north-west trending faults.

The structure of the Mesozoic rocks is not well known but they appear to be folded into a broad north-west trending anticline. The Tertiary succession is folded into a broad north-west trending syncline, named the Lai Syncline by Rickwood. The dip of the lowermost beds is between 45° and 50° ; this gradually becomes less steep towards the top of the succession where the Birip Beds dip at about 8° .

On the north-western flank of the Mesozoic anticline, a broad area of Cretaceous Kondaku Tuff is exposed, but the south-eastern flank has been downfaulted and Eocene Linganas Beds abut against the Jurassic Labalam Beds. The fault is a north-western extension of the Bismarck Fault Zone of Rickwood. The south-western limb of the Lai Syncline has been up-faulted so that steeply dipping Kompiam Beds abut against the Birip Beds.

The steeper dips in the lowermost Tertiary rocks of the Lai Syncline indicate that folding possibly continued throughout the Tertiary deposition, culminating in the uplift accompanied by folding and faulting in the Upper Miocene or Pliocene.

The Bismarck Fault was inferred from the juxtaposition of Jurassic and Eocene rocks and a vague linear feature seen on the aerial photographs coinciding with the contact. The fault was crossed by the writer in two places and only in the Lamant River, were exposures reasonable; here the rocks are considerably sheared and contorted, but no clearly defined fault was seen.

Rickwood states that the faults in the Bismarck Fault Zone are "obviously high-angle overthrust faults" though he cites no evidence to support this conclusion. Despite the rugged terrain crossed the fault trace is remarkably straight and the fault plane is probably vertical. It is therefore possible that the fault has a large transcurrent component.

GEOLOGICAL HISTORY

In Jurassic time a basin of marine deposition existed along the site of the present Bismarck Range, with a shoreline along the foothills of the Kubor Range which is on the south side of the Wahgi Valley (Rickwood ibid.). This basin extended north-west to the map area, where the shoreline was probably near the Lai Valley between Wapenamanda and Wabag (see figure 5).

An influx of basic volcanic material marks the Lower Cretaceous. Along the Wahgi Valley, these volcanics were laid down under water and Edwards and Glaessner (1953) suggested that the vulcanism originated in island arcs to the north. This is supported by the fact that the Lower Cretaceous volcanics in the lower Lai and Jimi Rivers were laid down sub-aerially; a line parallel to and south of the Jimi River probably marks the zone of island arcs.

Upper Cretaceous basaltic cobble and boulder conglomerate with pillow lavas and interbedded shale recently recorded by the writer (Dow 1961), from north of the Jimi River and from the Simbai River suggest a

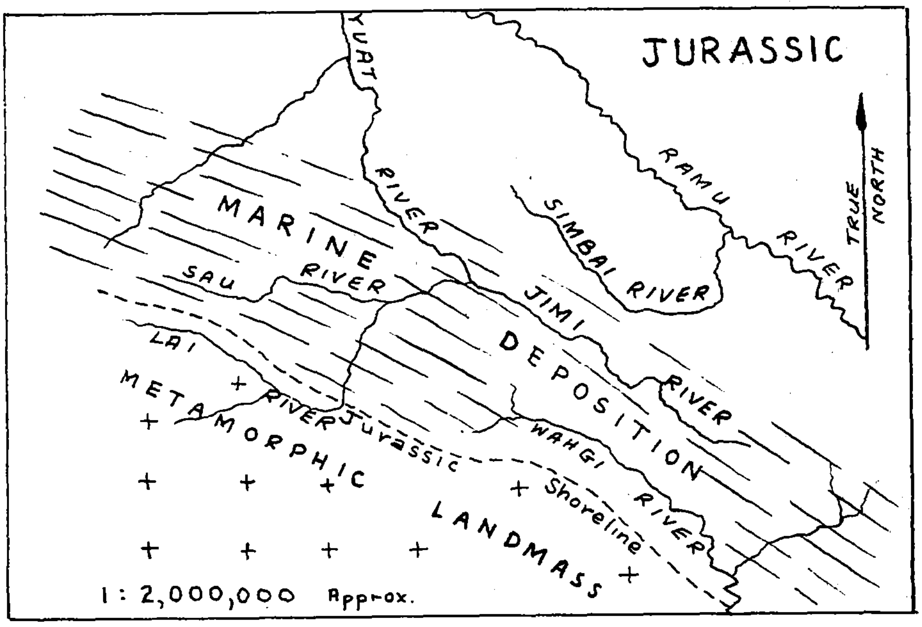

FIGURE 5

Palaegeographic map of the Sau River-Jimi River area during the Jurassic.

northerly limit to the Upper Cretaceous sub-aerial volcanic deposition along the Jimi River (figure 6).

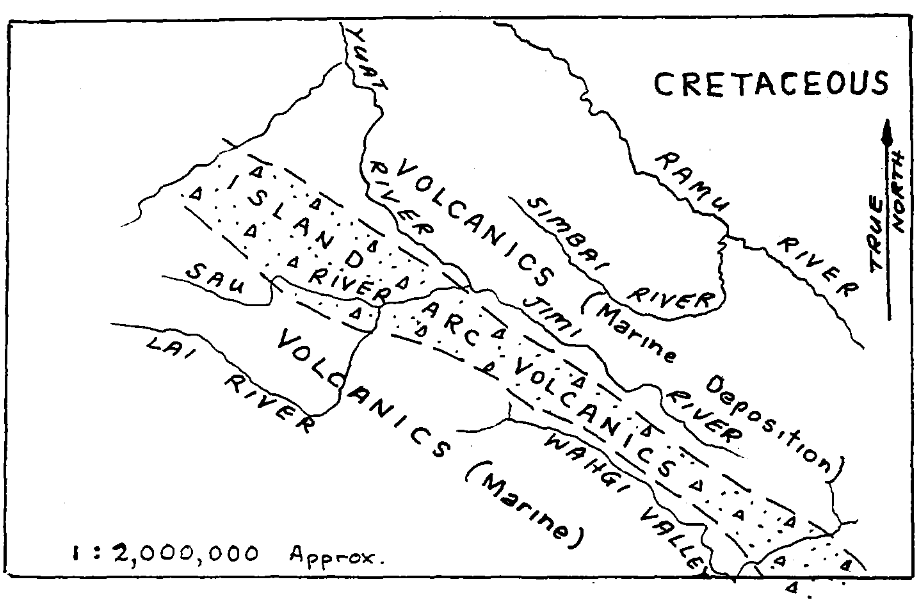

FIGURE 6

Palaegeographic map of the Sau River-Jimi River area during the Upper Cretaceous.

The Eocene rocks exposed are mainly fine-grained marine sediments which may indicate either deep water deposition and a remote shoreline, or more likely, that stable tectonic conditions prevailed and a low-lying landmass supplies the fine detritus.

Increased tectonic activity in Oligocene time is indicated by the coarser sediments of the Kompiam Beds.

The conglomerate components suggest provenance from a metamorphic landmass to the south. In Miocene time volcanic activity contributed tuff and agglomerate, mostly laid down in water.

This increased tectonic activity culminated in the orogeny which ended marine sedimentation by uplift accompanied by moderate folding and faulting in the Pliocene. At a late stage of this orogeny, the Mount Hagen Volcano started erupting and continued intermittently into Pleistocene time. The small volcanoes of Linganas and Kompiar were the last manifestation of this activity.

ECONOMIC GEOLOGY

The Timun Intrusives have been a source of gold and platinum. Gold is almost invariably found in streams draining the dioritic phases of the intrusions, though most of the stream gradients are too steep for economic concentrations to form.

Messrs. L. and M. Wilson are working alluvium of the Timun River for poor returns of gold and platinum, which have been derived from the Timun Intrusives. Near the head of the Timun River are fairly extensive lake beds composed mainly of gravels and conglomerate containing poor gold and platinum which have been reconcentrated in the flat bed of the Timun River below the lake beds.

The Lamant River has several small alluvial flats in the upper reaches, from which the writer washed fair gold prospects, but the amount of auriferous gravel is small and is not likely to be worked, except by local natives. The gold in this case originated in an andesite porphyry intrusion, the margins of which warrant further prospecting for gold lodes.

Diorite near the margin of a large intrusion, seven miles to the east of Labalam village, in a tributary of the Sau River, contains scattered chalcopyrite. Further investigation for economic copper mineralisation near the margin of this intrusion may be warranted. Access to the area is very difficult.

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APPENDIX I

FORAMINIFERA FROM THE KOMPIAM AREA, EASTERN END OF THE CENTRAL RANGE, NEW GUINEA

(B.M.R. RECORDS 1960/15)

by

D.J. Belford

Nine samples of limestone from the Kompiam area were forwarded for micropalaeontological examination by D.B. Dow. Results of the examination are as follows :-

Sample G.8.

Grey fine-grained limestone from the lower Lai River. This sample contains abundant planktonic foraminifera, and other indeterminate smaller foraminifera. No diagnostic larger foraminifera were observed.

Sample G.37.

Grey crystalline limestone from the Lower Sau River containing algae and echinoid spines: no foraminifera were observed and no age can be given to the sample.

Sample G.49.

Grey, coarse-grained limestone from the Upper Sau River containing foraminifera, algae, molluscan fragments, echinoid spines and corals.

Foraminifera: Lepidocyclina (N.) ferreroi
L. (N) sp.
Miogypsina sp.
Elphidium sp.

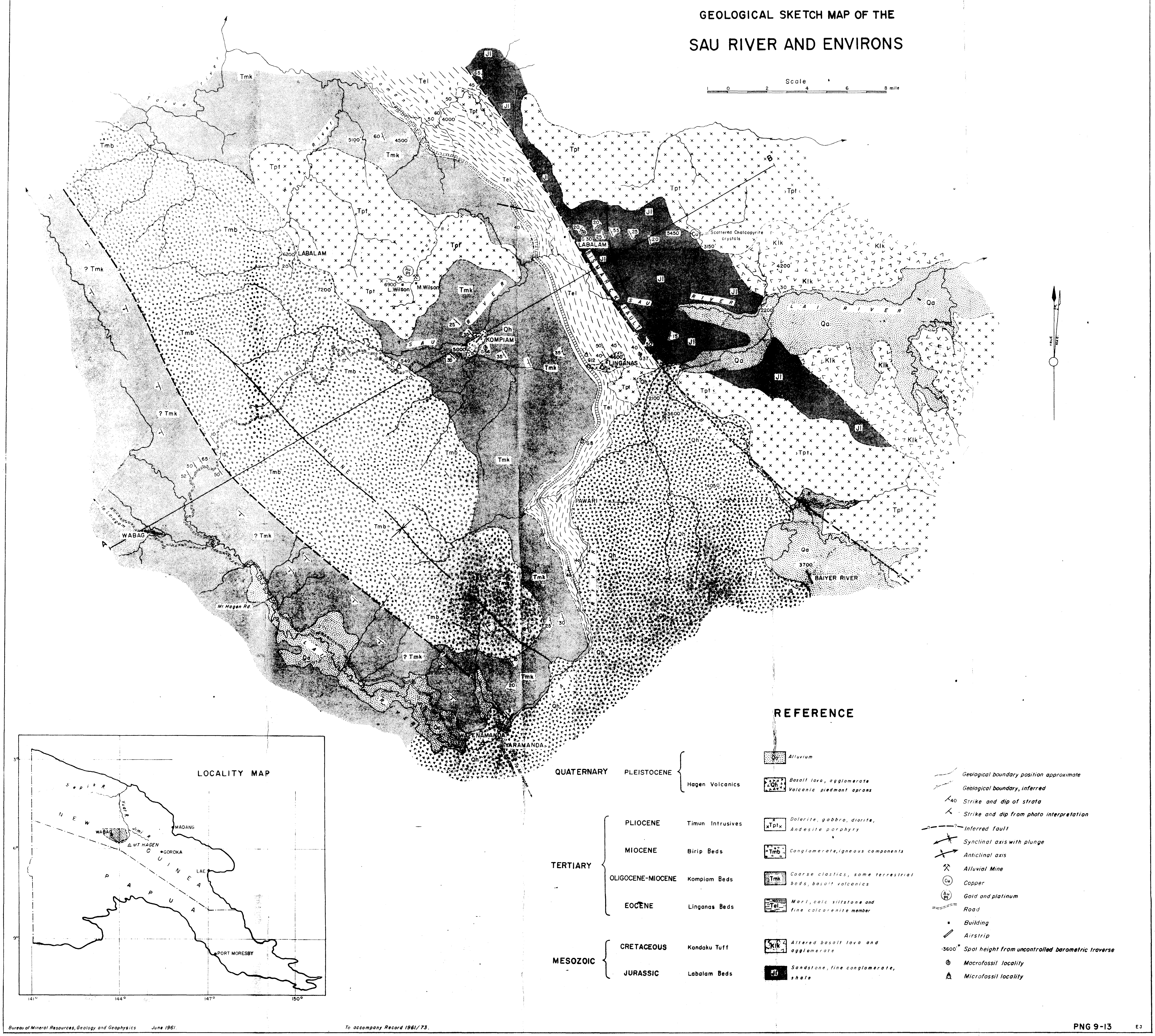
Rare indeterminate smaller foraminifera.

The sample is regarded as Lower Miocene in age ("f"1-2" stage). It contains a new, strongly pillared species of Miogypsina which has previously been recorded from the Matapau area and from Manus Island.

Sample G.56.

Grey coralline limestone from the Kompiam Patrol Post containing corals, mollusca (gastropoda), bryozoa and rare indeterminate smaller foraminifera. It is not possible to give an age to this sample.

PLATE I.


GEOLOGICAL SKETCH MAP OF THE
SAU RIVER AND ENVIRONS
Scale
0 2 4 6 8 mile
LABALAM
KOMPIAM
LINGANAS
PAWARI
WABAG
BAIYER RIVER
NAMAI
YARAMANDA
L. Wilson
M. Wilson
Scattered Chalcopyrite crystals
SAU RIVER
LAI RIVER
BISMARCK FAULT
LAI SYNCLINE
Mt Hagen Rd
Tmk
Tmb
Tpt
Tel
Jl
Klk
Qa
Qh
? Tmk
REFERENCE
QUATERNARY
PLEISTOCENE
Alluvium
Hagen Volcanics
Basalt lava, agglomerate
Volcanic piedmont aprons
TERTIARY
PLIOCENE
Timun Intrusives
Dolerite, gabbro, diorite, Andesite porphyry
MIOCENE
Birip Beds
Conglomerate, igneous components
OLIGOCENE-MIOCENE
Kompiam Beds
Coarse clastics, some terrestrial beds, basalt volcanics
EOCENE
Linganas Beds
Marl, calc siltstone and fine calcarenite member
MESOZOIC
CRETACEOUS
Kondaku Tuff
Altered basalt lava and agglomerate
JURASSIC
Labalam Beds
Sandstone, fine conglomerate, shale
Geological boundary position approximate
Geological boundary, inferred
Strike and dip of strata
Strike and dip from photo interpretation
Inferred fault
Synclinal axis with plunge
Anticlinal axis
Alluvial Mine
Copper
Gold and platinum
Road
Building
Airstrip
Spot height from uncontrolled barometric traverse
Macrofossil locality
Microfossil locality
LOCALITY MAP
Sepik R
Yuat R
Jimi R
NEW GUINEA
PAPUA
WABAG
MT HAGEN
GOROKA
MADANG
LAE
PORT MORESBY
141°
144°
147°
150°
Bureau of Mineral Resources, Geology and Geophysics June 1961
To accompany Record 1961/73
PNG 9-13

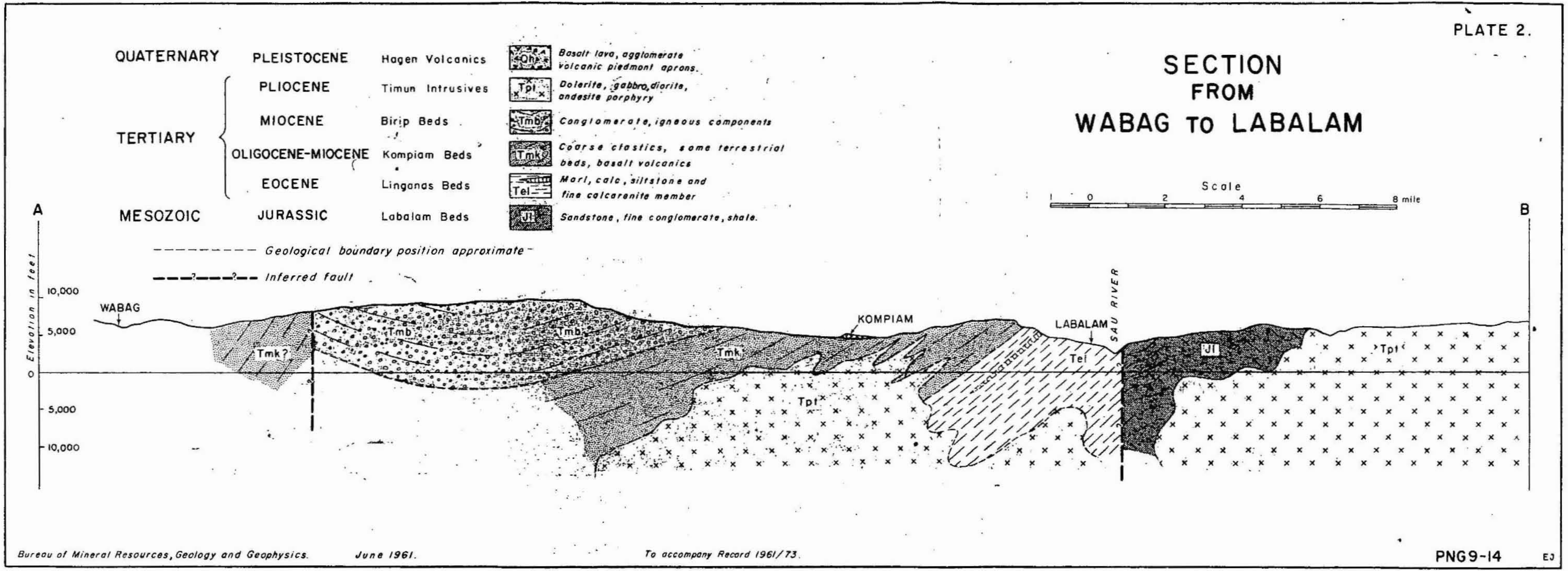


PLATE 2.
SECTION FROM WABAG TO LABALAM
QUATERNARY
PLEISTOCENE
Hagen Volcanics
Qh
Basalt lava, agglomerate volcanic piedmont aprons.
TERTIARY
PLIOCENE
Timun Intrusives
Tpt
Dolerite, gabbro, diorite, andesite porphyry
MIOCENE
Birip Beds
Tmb
Conglomerate, igneous components
OLIGOCENE-MIOCENE
Kompiam Beds
Tmk
Coarse clastics, some terrestrial beds, basalt volcanics
EOCENE
Linganas Beds
Tel
Marl, calc, siltstone and fine calcarenite member
MESOZOIC
JURASSIC
Labalam Beds
Jl
Sandstone, fine conglomerate, shale.
Geological boundary position approximate
Inferred fault
Scale
0
2
4
6
8 mile
A
B
Elevation in feet
10,000
5,000
0
5,000
10,000
WABAG
KOMPIAM
LABALAM
SAU RIVER
Tmk?
Tmb
Tmb
Tmk
Tpt
Tel
Jl
Tpt
Bureau of Mineral Resources, Geology and Geophysics.
June 1961.
To accompany Record 1961/73.
PNG9-14
EJ