COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS

SEDIMENTARY BASINS OF THE TERRITORY OF PAPUA AND NEW GUINEA AND THE STRATIGRAPHIC OCCURRENCE OF HYDROCARBONS

J E THOMPSON

ECONOMIC COMMISSION FOR ASIA AND THE FAR EAST
COMMITTEE ON INDUSTRY AND NATURAL RESOURCES

Symposium on the Development of Petroleum Resources of Asia and the Far East

Third Session: 10th—20th November 1965

TOKYO, JAPAN

SEDIMENTARY BASINS OF THE TERRITORY OF PAPUA AND NEW GUINEA AND THE STRATIGRAPHIC OCCURRENCE OF HYDROCARBONS

by

J.E. Thompson

CONTENTS

SEDIMENTARY BASINS OF THE TERRITORY OF PAPUA AND NEW GUINEA AND THE STRATIGRAPHIC OCCURRENCE OF HYDROCARBONS

by

J.E. Thompson

INTRODUCTION

In the Territory of Papua and New Guinea, thick sequences of marine sediments ranging in age from Jurassic to Pliocene are prospective for oil and gas. Unmetamorphosed Triassic (Dow, 1962) and Permian (Rickwood, 1955) sediments are exposed in the central highlands; these sediments have not been recognised either at outcrop, or in the subsurface, in the flanking sedimentary basins. Low-grade metasediments within the median orogenic belt are probably of Palaeozoic or older age. Some Mesozoic sediments are regionally metamorphosed, particularly on the flanks of the Owen Stanley Range. The original form of the pre-Tertiary basins has been severely disfigured by Cainozoic orogenies which have produced the main present-day cordillera of New Guinea. The principal basins of Tertiary marine sedimentation, namely the Papuan Basin (Osborne, 1956) south of the highlands, and the Northern New Guinea Basin, north of the highlands, received floods of clastic sediments derived from recurring orogenic movements and associated vulcanism along a zone now occupied by the highlands and mountain chains of New Guinea. The basin outlines shown on Plate 1 delimit the present distribution of unmetamorphosed Mesozoic and Tertiary sediments; these outlines do not necessarily conform with the original basin margins before folding, emergence and erosion. Only in the Papuan Basin can opposing basin flanks be confidently recognized. The Northern New Guinea Basin and the Cape Vogel Basin which are both truncated by the coastline are probably of the open marginal type (Weeks, 1959). Undoubtedly, thick Tertiary to Recent sediments have accumulated in the offshore areas around the coastline of Papua and New Guinea and adjoining islands but, except off the coast of western Papua, deep water has precluded offshore oil exploration.

The information contained in this summary has been compiled mainly from published and unpublished reports by the staff of oil exploration companies and the Bureau of Mineral Resources. The principal source of geological information on western Papua is the review by Australasian Petroleum Company (1961a). All sources of information cannot be acknowledged specifically in a review paper such as this, but the main published references are listed.

THE PAPUAN BASIN, (Jurassic - Recent).

The Papuan Basin (see Plate I) is a composite basin covering about 80,000 square miles and containing a thick Tertiary succession of marine and paralic sediments overlying, with degrees of unconformity, a Cretaceous and Jurassic succession. A major depositional or erosional break between Lower Cretaceous and Lower

Miocene is widespread over most of the basin. However, Eocene limestone, rarely more than a few hundred feet thick, has been recorded from several localities and in some wells in western Papua. This limestone probably represents a relatively short period of marine transgression during the major period of widespread emergence between Cretaceous and Miocene deposition. This major break is not present in the Port Moresby area where Upper Cretaceous, Eocene and Oligocene limestone, chert and tuffaceous sediments have been recorded (Glaessner, 1952); the relationship of this sequence to Lower Cretaceous sediments is not known. The stratigraphic succession in various provinces of the basin is shown in Table I.

The Pliocene sediments of the Papuan Basin are generally not as tightly folded as the Miocene sediments. Folding, erosion and deposition progressed concomitantly during the Pliocene and clastic sediments with some coal interbeds, accumulated in paralic and deltaic environments in structurally and topographically depressed areas. In the Aure Trough, this concomitant folding and deposition has produced an effect of catenary folding with broad synclines containing thick Pliocene successions separated by sharp anticlinal crests on which the Pliocene sections are reduced or absent. In the south-eastern part of the Aure Trough, the trangression of Pliocene clastic sediments over folded Upper Miocene sediments can be interpreted from aerial photographs.

The broad morphology of the Papuan Basin throughout Miocene time is fairly characteristic of a miogeosyncline, having:-

TABLE I

GENERALIZED STRATIGRAPHY OF THE* PAPUAN BASIN

AGE	S.W. FLANK (Wide, shallow shelf)	TROUGH (Miogeosynclinal, from Lower Miocene to Recent; Jurassic to Aptian environment not known).	N.E. FLANK (Narrow, steep, local and intermittent shelves during Tertiary; Mesozoic sediments slightly metamorphosed)
RECENT	100 ft; flood plain and delta unconsol. clastics.	200 ft; flood plain and delta unconsol clastics.	50 ft; alluvium.
PLEISTOCENE	300 ft; Fly River delta and flood plain deposits. Basaltic volcanics and piedmont fans.	800 ft; Kikori-Purari delta and flood plain. Local reefs raised to 500 ft a.s.l. Basalt plugs, cones and apron deposits.	Sub-basaltic agglomerate sheets up to 2000 ft thick; raised limestone to 50 ft thick; dissected piedmont deposits 300 ft.
PLIOCENE	0-1000 ft; deltaic clastics	8000 - 10000 ft. Trough divided into two subsiding depositional basins by transverse emergent area. Deltaic deposits - greywacke and mudstone with coal measures in lower half of sequence.	1000 - 5000 ft medium to coarse clastics: greywacke, with notable tuffaceous content; local raised reef limestone to 300 ft thick. Basaltic volcanic plugs, flows, apron deposits to 3000 ft thick.
	SLIGHT REGIONAL UNCONFORMITY		ANGULAR UNCONFORMITY
NEOGENE Miocene "g", "f" "e" stages	500 - 3,500 ft: algal-bryozoal reef and shoal limestone. 11,000 ft locally in Omati Trough, including 6000 ft Miocene "e-stage" basinal limestone.	30,000 - 35,000 ft marine and deltaic deep-water muddy clastics; mudstone and greywacke. Interbeds of basinal ('puri-type') limestone.	Up to 10,000 ft medium to coarse tuffaceous clastics; including localized reefs to 500 ft thick. Basaltic volcanics.
	MAJOR REGIONAL LOW ANGLED UNCONFORMITY		
PALAEOGENE (Eocene, Oligocene)	Reef and shoal limestone, local erosional remnants of Eocene to 200 ft thick. Oligocene missing	Eocene shoal and basinal limestone and coarse clastics to 2000 ft. Oligocene missing	Up to 5000 ft limestone, chert, submarine volcanics complexly folded.
UPPER CRETACEOUS (Cenomanian) (Turonian) (Senonian)	REGIONAL LOW ANGLED UNCONFORMITY	10,000 ft; Greywacke and mudstone, some local limestone. Exposed only in central highlands.	+4000 ft clastics and some limestone, complexly folded and partly metamorphosed; true thickness indeterminate.
LOWER CRETACEOUS	0-3000 ft; fine clastics, some quartz sand in west.	+6000 ft fine clastics; mudstone, glauconitic greywacke and red shale.	Not recognised, possibly because of metamorphism.
JURASSIC	0-6000 ft; clastics, mudstone and greywacke, some coal measures, quartzose and arkosic sandstone and conglomerate near base.	10,000 ft black mudstone, in trough in Western Highlands. (Not exposed in Aure Trough).	Not recognised, probably metamorphosed.
TRIASSIC	Possible 650 ft arkosic sandstone at Barikewa.	Possible 2000 - 3000 ft coarse to fine arkosic clastic sediments in central highlands.	Not recognised (?metamorphosed).
PERMIAN	800 ft; arkosic limestone, limestone and submarine volcanics in central highlands.	Not recognised.	Not recognised.
BASEMENT	(?) Permo-Carb. granite.	Probable Palaeozoic metamorphics	Cretaceous and older metamorphics.

* (The Papuan Basin is strictly a late Tertiary basin - the extent and pattern of early Tertiary and Mesozoic sedimentation in Papua has not yet been unravelled).

(1) a broad, slowly subsiding south-western shelf zone on which about 3,000 feet of limestone, with complex interplays of shoal and reef facies, accumulated,

(2) a deep asymmetrical trough (The Aure Trough) in which about 35,000 feet of alternating greywacke and mudstone were deposited rapidly, and

(3) a narrow north-eastern shelf zone containing localized reef and shoal limestone lenses, and coarse clastic sediments derived mainly from basic to andesitic vulcanism to the north and north-east.

Each of these three provinces has subsequently been deformed in a characteristic tectonic style which reflects both the competency of the sedimentary pile and the rigidity of the basement:

(1) In the extreme south-west, where a total Tertiary and Mesozoic sedimentary section, generally less than 10,000 feet thick, overlies granitic basement, folding is very broad and the Mesozoic section and basement have been dislocated by normal faulting. Farther north-east, but still in the province of Tertiary shelf limestone deposition, folding grades from broad and symmetrical to tight and asymmetric as the Miocene reef front, approximating to the Erave-Wana Swell (Plate I), is approached. At Iehi and

Puri near this hinge line, steep and low-angled thrust faulting of both the Tertiary and Mesozoic sections has been recorded (A.P.C., 1961a).

(2) Beyond the carbonate front, the thick (35,000 feet approximately) Lower Miocene to Pliocene fine-grained clastic succession of the Aure Trough is tightly folded; many folds are crestally thrust-faulted and incompetent mudstones and siltstones have diapirically ruptured the cores of some folds. Major strike faults in this zone, such as Aure and Ekiere Faults, probably have considerable horizontal, as well as vertical, displacements.

(3) On the narrow north-eastern flank, where conglomerate, limestone and volcanics are present within the sedimentary sequence, folding is more robust and crestal faulting less prevalent than in the thicker, less competent, sedimentary pile of the Aure Trough.

The pattern of Cretaceous and Jurassic deposition is less clear. The thick marine Mesozoic clastic sections (9,000 feet to 22,000 feet) in the Western and Eastern Highlands Districts of New Guinea (A.P.C., 1961a; McMillan and Malone, 1960; Noakes, 1939; Rickwood, 1955; Dow, 1962) suggest marine trough deposition but the axis of the trough cannot be traced. In this same region Permian and Triassic sediments were deposited on or associated with intermediate to acid plutonic and volcanic rocks. It is possible that the belt of basic and ultramafic intrusive and volcanic rocks north of both the central highlands and the Morobe Arc represents a zone of late Cretaceous orogeny in the trough of an orthogeosyncline. Superimposed Cainozoic orogeny and probably transcurrent fault displacements make reconstruction of the pre-Tertiary continental margin virtually impossible. There is no evidence to suggest that the principal axes of Mesozoic and Tertiary deposition in the Papuan Basin are coincident. It has not been possible to detect with certainty any angular discordance between the Cretaceous and Tertiary either in outcrop or in wells in the Papuan Basin. However, the drilling by Australasian Petroleum Company of the Komewu No.1 and No.2 wells on either side of the Komewu Fault has indicated about 3,000 feet of vertical displacement of the Mesozoic succession before erosion and transgression by Lower Miocene limestone (A.P.C., 1961(a).The Cretaceous sediments encountered in the Papuan Basin are dominantly fine to medium grained, grey to green, marine sandstone, silt and mudstone; glauconite is a common constituent. These clastic sediments differ mineralogically from the Tertiary greywackes (Edwards, 1950 (a), 1950 (b)) though, in hand specimen they may appear similar. The Jurassic sediments encountered in drilling in the Papuan Basin are dark grey to red-brown sandstones and mudstones. The sandstones are both quartzose and feldspathic. They contain an Upper Jurassic marine fauna at Omati, Barikewa and Iehi but, at Komewu, Aramia and Morehead, the lack of marine fauna and the presence of coals suggest a terrestrial depositional environment.

Surface showings of oil or gas are known in sediments ranging from Jurassic to Pliocene age. Most of the oil showings are impregnations in sediments which will either produce an oil film when freshly broken under water or which have a distinct petroliferous odour when broken. No large free-flowing oil seepages are known but oil can be collected from many small seepages by skimming the surface of the water in freshly dug collecting pits. Oil films and odours are also frequently associated with gas blows even though in most cases the gas is "dry". The oil and gas seepage areas in the Papuan Basin can be conveniently grouped into three provinces, thus -

(i) The central Aure Trough: This is the zone of tighest folding in the Papuan Basin and is characterized by crestally faulted anticlines with steep flanks and, in some places, with diapiric mudstone cores. Gas blows and associated oil showings at Hohoro, Upoia, Iavokia, Beleppa Hills, Ivori Junction, Nakoro, Aipa Hills and the Opau area can be included in this category.

(ii) The south-western hinge: A small but important group of gas blows and oil showings in the exposed crestal zone of the Puri anticline belong to this province. The oil and gas emanates from fractured, dense, Lower Miocene limestone. The gas in this area contains a significant proportion of higher hydrocarbons.

(iii) <u>The South Highlands zone of thrust faulting</u>: The most prolific oil seepages in Papua come from Cretaceous glauconitic sandstones and basal Miocene limestones near major strike faults which dominate the tectonic pattern of this area. Oil has been used and traded by natives of this area for a long time. Geologists of Australasian Petroleum Company have described most of the known oil and gas seepages of this province in unpublished reports.

After almost 30 years of geological investigation followed by extensive geophysical surveys and drilling some encouragement was received in 1958 from the short-lived production of oil and "wet" gas during the testing of a sub-thrust wedge of fractured Lower Miocene limestone in the Puri Anticline (A.P.C., 1961 (b)) on the south-western hinge of the basin. A well on the Bwata Anticline 15 miles north-west of Puri was designed to test the top of the Lower Miocene limestone within anticlinal closure. The well spudded in Upper Miocene mudstone and intersected the target limestone at 4750 feet. On test the interval 4750-5266 feet produced "lean gas" in excess of 25,000,000 cubic feet per day; this gas yielded condensate at the rate of 0.23 galls per 1000 cubic feet. No liquid petroleum was produced and the well was plugged and abandoned.

Large quantities of "dry" gas were indicated in tests of Cretaceous sandstones at Barikewa and Iehi and gas under high-pressure was encountered at the top of a thick Miocene limestone succession at Kuru.

Exploration in the Papuan Basin is now directed towards marine and delta seismic surveys in the Gulf of Papua and the adjoining Kikori-Purari Delta.

THE NORTHERN NEW GUINEA BASIN, (Miocene - Pliocene)

The name Northern New Guinea Basin (Osborne, 1956) is applied loosely to a zone of thick Miocene and Pliocene clastic sedimentation north of the central highlands of New Guinea. The present-day southern limit of the basin is topographically expressed by the front of the main cordillera which, in the region of the Markham and Ramu Valleys, is fault-controlled. The basin is elongate, extending north-west into West Irian and south-east at least to the Huon Peninsula. The offshore limits of the basin are not known but it is probable that the principal axis of deposition lies offshore, so that only the southern flank is represented onshore. The onshore part of this basin covers about 32,000 square miles.

The aggregate thickness of Miocene and Pliocene clastic sediments in the region of the Bewani-Torricelli Mountains is about 35,000 feet. The Pliocene part of this succession comprises dominantly non-marine coarse to fine grained clastics with some coal interbeds;

the Miocene part is essentially marine greywacke and mudstone with globigerinal marl interbeds. In the Sepik Valley the total section is thinner and the facies suggest shelf deposition. A late Tertiary orogeny has produced the Bewani, Torricelli and Prince Alexander Mountains which have cores of granitic, dioritic and metamorphic upfaulted basement. The Tertiary sediments on the northern flanks of these mountains are very complexly folded and faulted. Oil seepages and gas flows occur in shear zones in diorite at Matapau near the coast between Wewak and Aitape and near Cape Terebu, about 8 miles south-east of Wewak (G.A.V. Stanley, pers.comm.). Slight oil impregnations in Miocene and Pliocene sediments have been recorded from many localities in this part of the basin. Complicated tectonics and the predominance of sediments with low permeability have discouraged intensive oil exploration in this area.

At the south-eastern end of this basin, inland from Madang and north of the Ramu River, a thick coarsely clastic and partly volcanic Upper Miocene and Pliocene succession is broadly folded. Some gas seepages from folded Tertiary sediments on the northern flank of the Ramu valley are known.

At the extreme south-eastern end of the basin, in the rugged Finisterre, Saruwaged and Cromwell Mountains of the Huon Peninsula, a very thick, dominantly volcanic, Miocene section has been uplifted, folded and faulted in Pleistocene to Recent time. This part of the basin has very poor oil prospects.

The stratigraphy of the basin is summarized in Table II.

TABLE II

GENERALIZED STRATIGRAPHY OF THE NORTHERN NEW GUINEA BASIN

AGE	North-western Part (North of Bewani and Torricelli Mountains)	Central Part (Lower Sepik R.)	South-eastern Part (Madang Basin)
Pliocene:	Basal marine mudstone and sandstone to upper non-marine conglomerate and mudstone with coal 12,000-17,000 feet	Section thins, volcanic component decreases and shelf facies developed	Section similar to that in north-western part but Pliocene thinner and volcanic component increases eastward throughout section. Section in Finisterre and Saruwaged Ranges is dominantly volcanic.
Miocene:	Interbedded volcanics, limestone, greywacke and mudstone 16,00-29,000 feet, uppermost 1,000-4,000 feet mainly globigerinal marl with volcanics		
Palaeogene:	Scattered erosional remnants of Eocene limestone		
Pre-Tertiary: Crystalline rocks	Metasediments, granite-granodiorite, diorite, gabbro, peridotite of unknown ages		

During the period 1930 to 1940 reconnaissance geological mapping related to the search for oil was carried out over most of the basin. In the post-war period oil exploration companies have shown little interest in this area and no deep test wells have been drilled. Some shallow drilling was done in the period 1924 to 1926 near the Matapau oil seepages;; and some shallow core drilling for geological information near Waniwa and Napsiei in the Upper Sepik valley was completed in 1957. In 1926, a well was drilled to 2,705 feet at Marienburg near the mouth of the Sepik River but the results were not encouraging.

In 1964 American and French oil companies were granted Petroleum Prospecting Permits in this basin and geological investigations are continuing.

<u>CAPE VOGEL BASIN</u>, (Middle Miocene to Recent)

The Cape Vogel Basin includes the thick folded sedimentary sequence which forms Cape Vogel. It is exposed over an area of about 5,000 square miles and may extend to the north-west beneath Recent coastal plain alluvium and volcanics. Deeply eroded sediments on the southern shore of Goodenough Bay and along the coast farther to the south-east may also be included in the basin. The offshore limits of the basin are not known.

The principal fold on Cape Vogel has an exposed core of basic submarine lava of probable early Tertiary age which has been intruded by Pliocene or younger basalt. The older submarine volcanics include a rare clino-enstatite-bearing tholeiitic basalt. A veneer of Palaeogene limestone, marl and conglomerate overlies the submarine volcanic basement in the Castle Hill area.

TABLE III

GENERALIZED STRATIGRAPHY - CAPE VOGEL BASIN

	AGE	APPROX. THICKNESS	SEDIMENTS	IGNEOUS ROCKS
CAPE VOGEL BASIN SEDIMENTS	Pleistocene and Recent	300 feet	Alluvium and coral reef at or near sea level; raised reef up to 400 feet a.s.l., tilted but not noticeably folded.	Extrusive and shallow intrusive igneous rocks of andesitic to basic composition. Includes (1) Pleistocene to Recent volcanics of Cape Nelson and their apron deposits; (2) basic tuffs, lapilli beds and explosion breccias within the sedimentary succession exposed on Cape Vogel, and (3) basic intrusive rocks which have intruded and domed the Neogene sediments at Cape Vogel.
		SLIGHT	UNCONFORMITY	
	Plio-Pleistocene	1,000 feet	Interbedded poorly sorted conglomerate and greywacke, tuff and white marl, mainly non-marine. Gently folded.	
		SLIGHT	UNCONFORMITY	
	Pliocene ("h" stage)	1,200 feet	Light grey and buff coloured marine marl with "h" stage foraminifera. Medium dips. Exposed on both north and south flank of Cape Vogel.	
		SLIGHT	UNCONFORMITY	
	Mio-Pliocene	10,000 feet	Interbedded brown greywacke and carbonaceous mudstone containing foraminifera. Moderately folded. Dips steep and sediments indurated adjoining volcanics and shallow intrusives on Cape Vogel.	
	Middle Miocene	400 feet	Reef limestone and calcarenite at Castle Hill	
			MAJOR UNCONFORMITY	
	Palaeogene	+200 feet	Limestone, marl, conglomerate	Basic submarine lavas including a rare clino-enstatite-bearing tholeiitic basalt. Ultramafic and basic plutonic rocks.
			MAJOR UNCONFORMITY	
BASEMENT	?Mesozoic	?	Recrystallized limestone and calc-silicate metamorphics on the northern flank of the Owen Stanley Range east of the Musa Valley.	
			UNCONFORMITY	
	?Mesozoic-Palaeozoic	+10,000 ft. (?)	Phyllite, schist, and metavolcanics of Mount Dayman and the Goropu Mountains.	

The main sedimentary sequence exposed on Cape Vogel comprises about 13,000 feet of Upper Miocene and Pliocene sandstone, conglomerate and marl deposited rapidly in the paralic environment of a coastal plain bounding an active fault block of low-grade metasediments and basic to ultrabasic intrusives. Grey foraminiferal Pliocene marl, about 1,000 feet thick, on the northern part of Cape Vogel may have oil-source potential but conditions for the entrapment of oil from this source do not appear to be present.

The tabulated summary of the generalized stratigraphy (Table III) is based on unpublished observations by the writer and palaeontological determinations by Dr. I. Crespin and Dr. D.J. Belford of the Bureau of Mineral Resources.

The principal fold on Cape Vogel has an exposed core of basic submarine volcanics. Basic tuffs, lapilli beds and agglomerate occur throughout and unconformably on the thick clastic sequence.

Carbon dioxide seepages and hot springs in the Cape Vogel area are probably related to decadent volcanism.

There has been no active oil exploration in this basin since 1928 when the area was examined by geologists of the Anglo-Persian Oil Company (A.P.O.C., 1930). Two shallow wells drilled by the Cape Vogel Petroleum in 1927 and 1928 near the former village of Kukuia on the southern flank of the Cape Vogel Anticline did not yield any confirmed evidence of either oil or gas.

REFERENCES

A.P.C., 1961a - Geological results of petroleum exploration in western Papua 1937-1961. J.geol.Soc.Aust., 8 (1), 133.

A.P.C., 1961b - Puri No.1 Well, Papua. Bur.Min.Resour.Aust. Petrol.Search Subs.Act Publ. 6.

A.P.O.C., 1930 - The oil exploration work in Papua and New Guinea conducted by the Anglo-Persian Oil Company on behalf of the Government of the Commonwealth of Australia, 1920-1929. Harrison and Sons Ltd, London.

DOW, D.B., 1962 - A geological reconnaissance of the Jimi and Simbai Rivers. Bur.Min.Resour.Aust.Rec. 1962/110, (unpubl.).

EDWARDS, A.B., 1950a - The petrology of the Miocene sediments of the Aure Trough, Papua. Proc.Roy.Soc.Vic., 60, 123-148.

EDWARDS, A.B., 1950b - The petrology of the Cretaceous greywackes of the Purari Valley, Papua. Ibid, 60, 163-171.

GLAESSNER, M.F., 1952 - Geology of Port Moresby, Papua. Sir Douglas Mawson Anniversary Volume, Univ. of Adelaide, 63-86.

McMILLAN, N.J., and MALONE, E.J., 1960 - The geology of the eastern Central Highlands of New Guinea. Bur.Min. Resour.Aust.Rep. 48.

NOAKES, L.C., 1939 - Geological report on the Chimbu-Hagen area, Territory of New Guinea. (unpubl.).

OSBORNE, N., 1956 - The sedimentary basins of the Australian Territory of Papua and New Guinea. Symposium sobre yacimientos de petroles y gas. Int.geol. Cong. 20th Sess., Mexico, 227-235.

RICKWOOD, F.K., 1955 - The geology of the western highlands of New Guinea. J.geol.Soc.Aust., 2, 63-82.

WEEKS, L.G., 1959 - Geologic architecture of Circum-Pacific. Bull.Amer.Ass.Petrol.Geol. 43 (2), 350-380.

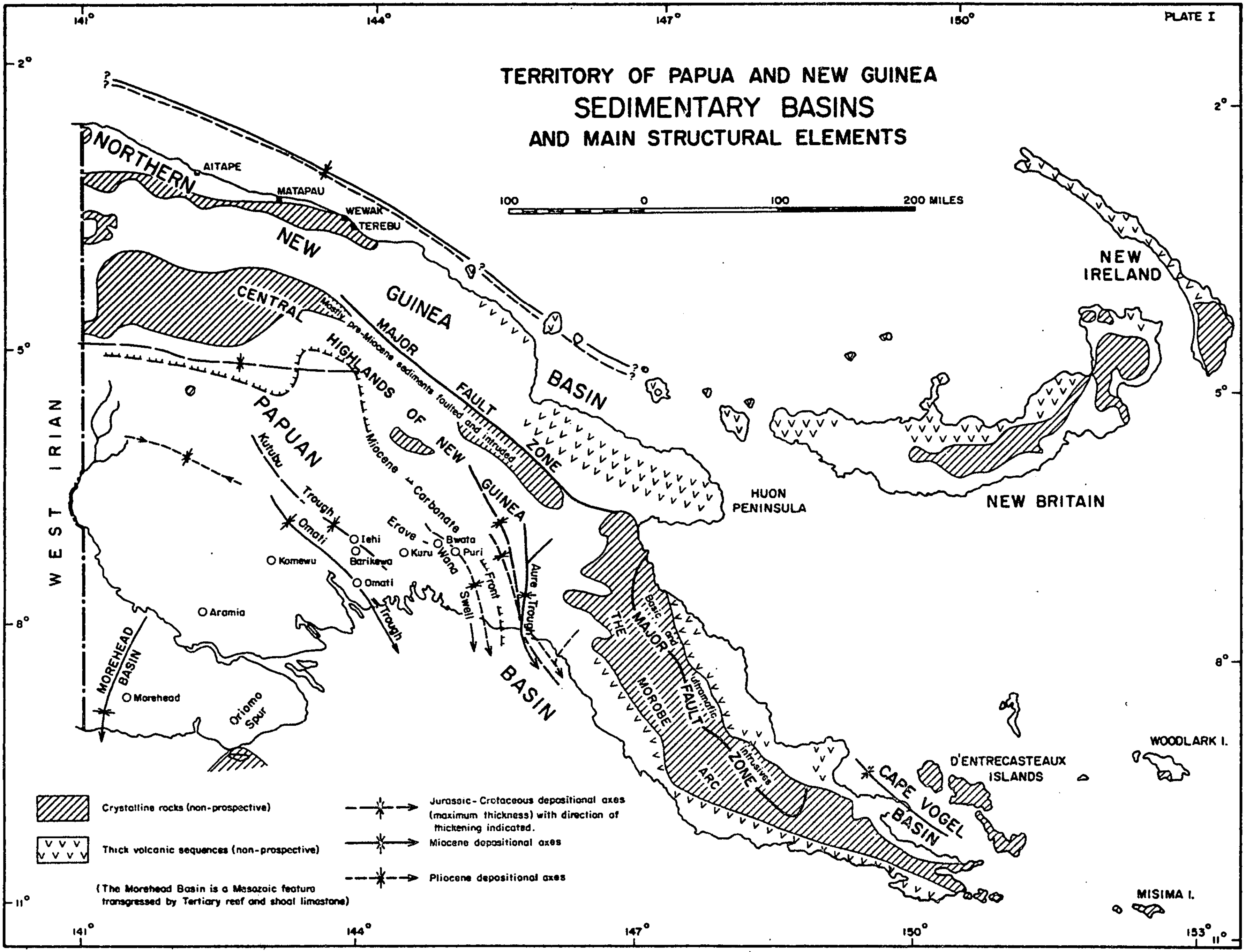
PLATE I
TERRITORY OF PAPUA AND NEW GUINEA
SEDIMENTARY BASINS
AND MAIN STRUCTURAL ELEMENTS
100 0 100 200 MILES
141°
144°
147°
150°
153°
2°
5°
8°
11°
NORTHERN NEW GUINEA BASIN
AITAPE
MATAPAU
WEWAK
TEREBU
CENTRAL HIGHLANDS OF NEW GUINEA
Mostly pre-Miocene sediments faulted and intruded
MAJOR FAULT ZONE
PAPUAN BASIN
Kutubu Trough
Omati Trough
Miocene Carbonate Front
Erave Wana Swell
Aure Trough
Iehi
Barikewa
Kuru
Bwata
Puri
Omati
Komewu
Aramia
WEST IRIAN
MOREHEAD BASIN
Morehead
Oriomo Spur
HUON PENINSULA
NEW BRITAIN
NEW IRELAND
THE MAJOR FAULT ZONE
Basic and ultramafic intrusives
MOROBE ARC
CAPE VOGEL BASIN
D'ENTRECASTEAUX ISLANDS
WOODLARK I.
MISIMA I.
Crystalline rocks (non-prospective)
Thick volcanic sequences (non-prospective)
(The Morehead Basin is a Mesozoic feature transgressed by Tertiary reef and shoal limestone)
Jurassic-Cretaceous depositional axes (maximum thickness) with direction of thickening indicated.
Miocene depositional axes
Pliocene depositional axes