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REPORT ON AN OFFICIAL VISIT TO PORTUGUESE TIMOR, FROM 25TH APRIL TO 9TH MAY, 1967

by

J.J. Veevers

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INTRODUCTION

From 25th April to 9th May, 1967, I took part, officially, in a geological excursion to Portuguese Timor. The excursion was led by Dr. R.O. Brunnschweiler, consulting geologist, of Canberra, and formerly Chief Geologist of Timor Oil Limited, and was sponsored by the Atlantic Richfield Company (ARCO), of Sydney, and Australian Aquitaine Petroleum Pty. Ltd. (AAP), of Brisbane. These companies are associated in exploring for petroleum in a broad area of the Sahul Shelf (Timor Sea), and the aim of the excursion was to introduce geologists from the companies to the geology of Portuguese Timor so that comparisons could be made with the geology of north-west Australia, in particular with that of the Sahul Shelf. Approval to carry out the excursion was granted by the Portuguese authorities and by the holder of petroleum tenements in Timor, Timor Oil Limited, of Sydney. I took part in the excursion with the permission, in turn, of Dr. Brunnschweiler, and as a guest of the sponsoring companies, to all of whom I gratefully express my thanks.

The Atlantic Richfield Company was represented by Mr. B.J. Damon, and Australian Aquitaine Petroleum Pty. Ltd. by Mr. J.P. Caye. The party was helped in local matters of supplies, accommodation, languages, etc. by Mr. John Martires, of Dili. Travel was by a longwheel-base Landrover driven by Mr. P. Costa, of Dili.

We were invited to meet the Governor of Portuguese Timor, Coronel Jose Alberty Correia, at the start of the visit, on 26th April, 1967, and enjoyed the friendly co-operation and openhanded hospitality of government officials wherever we went. We also enjoyed the help and hospitality of Mr. J. Colquhoun Denvers, Australian Consul in Dili, who took a lively interest in the work of the excursion. In turn, the sponsoring oil companies were hosts to a gathering of government officials, civic leaders, and the Australian Consul at a banquet held at the Hotel Miramar on 1st May. Without the help given us by the Portuguese authorities and by the Australian Consul, our excursion would have been seriously handicapped.

Summary of the geology of Portuguese Timor

Timor is renowned geologically for its Alpine-style tectonics and consequently well-exposed varied formations (see Stratigraphical Table).

Timor lies on the orogenic Banda Arc and is bounded northward by a volcanic arc (Fig. 1, locality map). Morphologically, Portuguese Timor consists of a number of narrow depositional coastal plains and recently elevated coral plateaus on the north backed by a mountain range reaching 2920 metres along the backbone of the island, and an area of foothills and depositional coastal plains of variable width in the south. The plains of the north and south coasts are modern; the plateaus are Pleistocene to sub-Recent, and are capped by extensive coral reefs; the range is a complex of thrust sheets of Permian to Miocene sedimentary, metamorphic, and eruptive rocks; and the southern foothills a complex of lower thrust sheets, and Tertiary block clays (synorogenic) and molasse (post-orogenic) deposits. The salient features of this complex geology were seen in four north-south traverses (Figure 1).

I Dili - Betano

Dili-Aileu: Dili Series, of allochthonous (i.e. tectonically displaced) plicated low-grade metamorphics (phyllite or schistes lustrees, with quartz veins, ophiolites).

Aileu - Maubisse: Aileu and Maubisse Series, of allochthonous plicated unmetamorphosed shale, mudstone, and thin-bedded red Permian crinoidal limestone.

Maubisse - Same: Central range of allochthonous Permian limestone, ?autochthonous (i.e. tectonically in situ) Triassic shale and limestone, Jurassic radiolarite, limestone, and shale; allochthonous Miocene limestone (Cablac Limestone), and metamorphics (Lolotoi Complex). The most conspicuous structure is the Aituto Anticline in Triassic limestone, capped by overthrusted Permian limestones and igneous rocks.

Same - Betano: late Cretaceous-Eocene Bibileu block clay, Miocene-Pliocene molasse sandstone and shale (Viqueque Formation), and autochthonous radiolitic limestone (?Upper Cretaceous) east of Betano.

Same - Hato Udo - Suro Craik: Biblieu block clay, conglomeratic Viqueque Formation near Ramelau Range, Suro Lau thrust sheets of Lolotoi Complex, Triassic limestone, Triassic shale, Miocene limestone. Bibileu block clay intruded by trachyte plugs; Pleistocene coral reefs at 426 metres at Hato Udo.

II Dili - Bobanaro

Dili - Lete Foho: Dili and Aileu Series.

Late Foho - Bobonaro: overthrust sheets of Permian limestone, autochthonous Triassic limestone and shale, Upper Jurassic calcareous shale and sphiolite, allochthonous Eocene and Miocene limestone.

Bobonaro: late Miocene Bobonaro block clay, a massive bentonitic clay with blocks up to ½ kilometre long of all older formations.

III Dili - Laclubar

Dili - Manatuto: low-to medium-grade metamorphics (up to actinolite schist), and autochthonous Triassic shale and sandstone.

Manatuto-Cribas: autochthonous Triassic shale and sandstone, autochthonous Permian shale and quartzite (Cribas Series).

Cribas-Laclubar: autochthonous Triassic shale, allochthonous Lolotoi (metamorphic) complex, allochthonous Upper Cretaceous to Eocene limestones, river terraces to 1000 metres.

IV Baucau to Aliambata

Baucau to Venilale: Pleistocene coral reef terrace.

Venilale to Viqueque: Bibileu block clay, overthrusted Permian, Triassic, Eocene, and Miocene limestone; Pleistocene coral reefs at 920 metres (Lari Guto pass) and higher (1300 metres) in surrounding range.

Viqueque - Aliambata: Viqueque Formation (molasse), Bibileu block clay, Triassic shale.

Aliambata: allochthonous Borololo limestone (Upper Cretaceous), thrusted with Eocene limestone.

V Atauro Island

The afternoon of 5th May was spent on Atauro Island, 16 miles north of Dili. Atauro is part of the inner volcanic arc, and consists of late Tertiary to sub-Recent basalt flows, tuff, and agglomerates. The island is fringed with coral reefs, and the southern slope of the island is marked by seven coral terraces, the highest being at 700 metres.

Samples were collected from 61 localities, and photographs taken of the more notable features encountered.

Comparisons with Australian geology

(a) The autochthonous Permian Cribas Series consists of shale and quartzite which are similar to contemporaneous deposits in north-west Australia; moreover, the Cribas Series contains pelecypods conspecific with Australian forms.

The widespread allochthonous Permian limestone (Fatus) has come from the north, and has no obvious equivalent in north-west Australia.

(b) The autochthonous Triassic shale, with Isaura, Halobia, Daonella, and Lingula, is similar to the widespread Triassic estuarine Triassic shale of north-west Australia (Blina Shale, unnamed Isaura-shale of Port Keats).

(c) The Upper Jurassic (Oxfordian) red siltstone south of Atsabe resembles the equivalent Jarlemai Siltstone of the Canning Basin.

(d) Parts of the late Mesozoic and Tertiary sequences may be compared with contemporaneous deposits in the Carnarvon Basin.

The reef limestones of the allochthonous Permian, Triassic, and Miocene have no obvious counterparts in Australia; nor do the parautochthonous synorogenic Tertiary block clays and autochthonous molasse deposits. The parautochthonous and autochthonous Tertiary deposits of Timor may, however, extend some distance southward beneath the Timor Sea, and this possibility should be taken into account in interpreting the geology of the outer part of the Sahul Shelf.

It is a tribute to the pioneer geologists of Portuguese Timor - Escher, Grunau, Gageonnet, Lemoine, Audley-Charles, and, in particular, Brunnschweiler - that the outlines of the geology are so well known, and that so much may be learned during a brief excursion of this kind. More information on the geology of Timor is desirable for the light it may shed on the geology of north-west Australia and offshore areas, and it is to be hoped that detailed surveys of Portuguese Timor will keep pace with exploration offshore.

Reference:

LEMOINE, M., 1959 - Un example de tectonique chaotique : Timor. Rev. geogr. phys. geol. dynam., (2), II (4), 205-230.

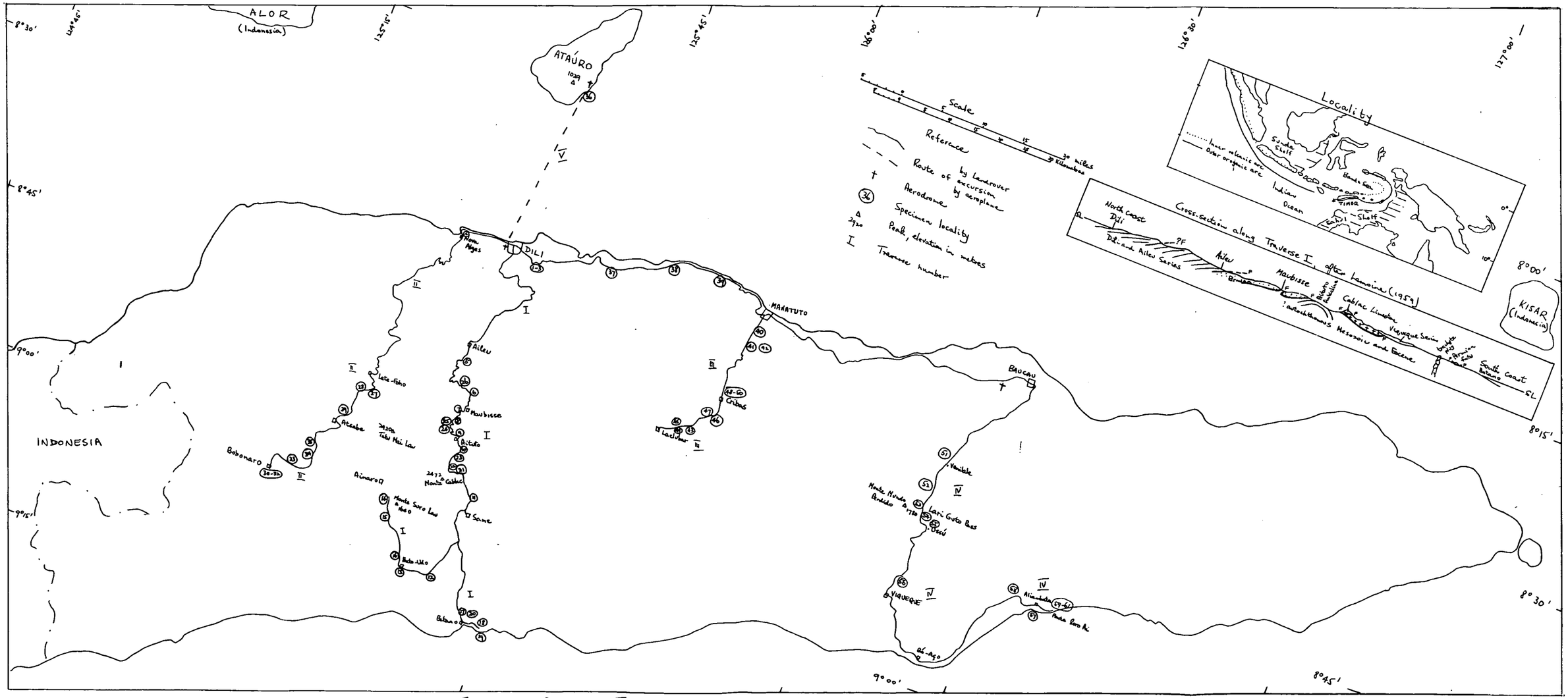

Figure 1 — Portuguese Timor, showing route of excursion, and specimen localities.

(Record 1967/74)

STRATIGRAPHICAL TABLE, PORTUGUESE TIMOR (after LEMOINE, 1959)

I Neo-autochthonous (formations following the major tectonic phase) : upper Miocene to Pleistocene

Terrace alluvium

Uplifted coral reefs and associated sediments : Pleistocene

Viqueque Series (molasse) (limestone, marl, sand, conglomerate), folded and faulted : upper Miocene or lower Pliocene to Pleistocene
(2,000 feet)

II Synorogenic (formations accompanying the major tectonic phase) : middle Miocene-Pliocene

Bobonaro Block Clay : middle Miocene-Pliocene
(3,000 feet)

III Autochthonous and allochthonous

STRATIGRAPHICAL SUBDIVISION	AUTOCHTHONOUS	ALLOCHTHONOUS		
		METAMORPHIC AND ERUPTIVE	PERMIAN	LIMESTONES CALLED FATU (isolated klippen)
Tertiary e				Coblac Limestone
Tertiary c & d	Hiatus and erosion			
Tertiary a & b	Bibileu Series : radiolarite and other pelagic sediments, block clays, intruded by trachyte	Same Series : limestone, marl, volc. tuff.		Limestone with pelagic microfossils
Upper Cretaceous	Bibileu Series ? at Betano			Borolalo Limestone
Lower Cretaceous	Hiatus			
Middle and Upper Jurassic	Flysch, calcareous, red siltstone	Dili and Aileu Series of phyllites and ophiolites, Lolotoi complex		
Lias	Flysch, marly limestone with ammonites			
Upper Triassic	Limestone and marly limestone with Halobia; flysch; shale			Grey limestone, coralline
Permian	Cribas Series : shale, quartzite, limestone (6,000 feet)		Maubisse Series : phyllite, limestone, and marl; lenses of crinoidal limestone; volcanics.	Red crinoidal limestone, grey limestone, diabase

Note: approximate thicknesses are available for only a few formations.