PALYNOLOGY OF THE TUNA FIELD

GIPPSLAND BASIN

by

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INTRODUCTION

Three wells have been drilled into the Tuna field. A full palynological report was written only for Tuna -1 (Palyn. Rept. 1969/2). Preliminary reports of data from Tuna -2 and -3 have been issued and the relationships between Tuna -1 and -2 were considered in discussions on the Flounder field (Palyn. Rept. 1969/9). Dinoflagellates from the Early Eocene upper M. diversus zone in Tuna -1 were described in Palyn. Rept. 1970/2 and from the Early-Late Eocene of Tuna -3 in Palyn. Rept. 1970/23.

The present report includes a revised view of all palynological data from the three Tuna wells.

Interest in Tuna has centred around two main problems: 1) The size, age and characteristics of the Eocene "channel fill". 2) The position of the top of the Cretaceous. Both problems have had a direct bearing on regional interpretations of the Gippsland Basin.

Other palynological features about Tuna have received less attention, but are at least recorded below for possible future study as need arises.

SUMMARY

	Tuna -2	Tuna -1	Tuna -3
N. goniatus Zone			
O. dictyoplokus *			S.4450 S.4460 S.4470 S.4480
D. extensa *			S.4490 S.4500
Undiff.		C.4430 C.4439	
Upper *M. diversus* Zone	C.4535 C.4565 C.4578 C.4590		
W. thompsonae *		C.4507 4549 4565 4574 4588 4592 4597 4607 4621	C.4586 ?S.4606
Undiff.	S.4726 S.4750 S.4800 S.4820 S.5098		
Lower *M. diversus* Zone			S.4623 S.4654 S.4692 S.4719 ?S.4758

* = dinoflagellate zone. C. = core; S. = sidewall core.

Depths are in feet.

	Tuna -2	Tuna -1	Tuna -3
L. balmei Zone	S.5494	C.5390	S.4994
	S.5684	S.5618	S.5024
	S.6196	S.5708	S.5142
	C.6508	S.5927	S.5520
	S.6580	S.6118	S.5619
	C.6615	C.6190	S.5902
		C.6205	S.6015
		C.6220	S.6181
			S.6409
			S.6414
			C.6523
			S.6530
T. lilliei Zone	S.6968	C.6462	
	S.7150	C.6478	S.6579
	C.7246	C.6493	S.6594
		C.6510	S.6602
		C.6578	S.6646
			S.6652
			S.6674
N. senectus Zone	? S.7548	C.7409	S.7067
	? S 8200	C.7436	S.7824
		C.7439	S.8027
		C.8070	S.8044
		C.8074	
T. pachyexinus - *C. triplex*		C.9349	S.8382
		C.9358	8478
		C.10128	8770
			9067
			9192
A. distocarinatus		C.10280	
T. pannosus		C.11621	
		S.11921	
		S.11940	

COMMENT

Lower Cretaceous - Upper Cretaceous

There is no good evidence that Tuna -1, the deepest well, entered the Lower Cretaceous although it probably ended in sediments of the T. pannosus Zone. The T. pannosus Zone is thought to straddle the L-U. Cretaceous boundary, but at the time of drilling, evidence for the C. paradoxa Zone as a mark of distinct Lower Cretaceous was sought.

The deepest sample in Tuna -1. 11940 feet did not yield T. pannosus, but several of the spores present were atypical of the paradoxa Zone and hence even the bottom of the hole is tentatively referred to the pannosus Zone.

T. pannosus was positively identified at 11,621 feet.

The Lower Cretaceous is generally equated with the Strzlecki Group in most discussions about the Gippsland Basin. Basal section in Tuna -1 did not resemble the Strzlecki Group.

However, the T. pannosus Zone in the Otway Basin extends into the Otway Group, a lithological equivalent to the Strzelecki Group. Furthermore, a sequence in Golden Beach West -1 below a drill depth of about 5900 feet which represents in part the T. pannosus Zone has been regarded as either Strzlecki Group or an "intermediate" unit, the "Barracouta Sandstone".

It is possible, therefore, that a lower portion of the Tuna sequence, perhaps that below the lithological change at about 9800 in Tuna -1, is related to the intermediate type of lithology between the typical Strzlecki below (not encountered at Tuna) and the Latrobe Group above.

UPPER CRETACEOUS

T. pachyexinus - C. triplex Zones

Studies in the Otway Basin have shown it is difficult to support the pachyexinus and triplex Zones as distinct units and insufficient data are available from Tuna by which separation might be attempted.

Representative samples of the interval are very poor in Tuna -1, but good in Tuna -3. The sidewall core from Tuna -3, 8770 feet is remarkable for its content of dinoflagellates. They have not been studied in detail, but are notable for the absence among their numbers of Deflandreid species by which equivalent levels in the Otway Basin are zoned. Nevertheless, this horizon in Tuna -3 is the only one in the Upper Cretaceous of the Gippsland Basin to yield this type of microfossil.

N. senectus - T. lilliei Zones

The limits and content of the senectus Zone are best demonstrated in Tuna -3,

Tuna -1 at 6462 feet has provided a "standard" for the lilliei zone in the eastern part of the basin. Revised determinations of the extent of the lilliei Zone undertaken during the first part of 1970 were largely based on Tuna.

The top of the zone, based on the decline in Nothofagidites spp. and the first stratigraphic appearance of Tripunctisporis sp. is documented to within an interval of about 50 feet. Main core no. 6 from within this interval could provide additional data about the top of the zone.

TERTIARY

Numerous samples are available from the balmei Zone and subdivision of the zone should be possible after further study. The uppermost section of the zone (previously referred to as Pla) is recognizable in Tuna -1 at 5390 feet and Tuna -2 at 5494 feet. Presumably it continues in younger horizons in Tuna - but has not been specifically identified there as a subdivision of the zone. The lower M. diversus Zone above the balmei Zone in Tuna -3 is, therefore, likely to be the result of continuous deposition from balmei to diversus times.

In contrast the presence of late M. diversus Zone above the balmei Zone in Tuna -2 is an indication of the break at the base of the "channel fill" (recogniz in Palyn. Rept. 1969/9 in discussion of the Flounder wells).

The upper M. diversus Zone in Tuna -1 has long been noted for its content of dinoflagellates including Wetzeliella thompsonae, at least over a short interval. No dinoflagellates were identified in Tuna -2, but their "absence" is explicable in terms of sample position.

The thompsonae Zone is represented in Tuna -3 only in core at 4596 feet, but relatively abundant dinoflagellates of uncertain zonal position occur immediately below, at 4606 feet, and are provisionally assigned to the same zone.

If the "channel" was filled only with upper M. diversus sediments (as at Flounder) the base of the "channel" could lie as traced on the accompanying diagram. The "channel" has thus cut out the lower M. diversus and a portion of the L. balmei Zone at the locations of Tuna -1 and Tuna -2.

Unlike the "channel" at Flounder, a greater portion of sandstone comprises the fill at Tuna, fewer dinoflagellates are present and the cut was not so deep.

The upper M. diversus Zone appears to continue above horizons which could bear W. thompsonae in Tuna -2. However, its relationship to the N. goniatus Zone is less clear. Core at 4439 feet in Tuna -1 is assigned to the goniatus Zone mainly because of its much higher Nothofagidites content. The numerous samples from the upper N. goniatus (=N. asperus) Zone in Tuna -3 are yet stratigraphically higher and are marked by the presence of dinoflagellates of both the extensa and dictyoplokus Zones. Thus the pay section at the top of the Tuna Eocene sequence appears to be referrable to the N. goniatus Zone. Whether or not one or more breaks occur below or within the goniatus Zone cannot be determined, although they remain a possibility in view of the brevity of the sequence.

Taylor reports Miocene unit G at 4350 feet in Tuna -2, immediately above the "Latrobe". The extensa and dictyoplokus Zones appear to correlate with Eocene foraminiferal zonules L or K. An hiatus at the top of the "Latrobe" therefore represents the interval Oligocene unit J to Miocene unit H.