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RECORDS:

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THE PALYNOLOGY OF AMERADA NEWLANDS No.1 WELL. QUEENSLAND.

by

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CONTENTS

ABSTRACT

Examination of spore, pollen grains and microplankton in sidewall cores from Amerada Newlands No.1 Well, Eromanga Basin, Queensland, and cores from the older W.O.L. Nos 1 - 3 (Warbreccan) Wells, 26 miles to the south of Newlands, has confirmed the stratigraphy of Newlands No.1 deduced by Amerada from the lithological section and electric logs. The stratigraphy of A.A.P.Mayneside No.1, 34 miles to the north of Newlands, and the Warbreccan wells, has been revised. Early Jurassic (J2? - J3) sediments overlie palaeontologically undated, steeply dipping sediments. The succession from the Birkhead Formation to Hooray Sandstone (J4 - Kla) is similar to that further north in the Eromanga Basin. The "Hooray Sandstone" is divisible into five units. A finer grained member in a homotaxial position to the Orallo Formation of the Surat Basin is developed in the formation and yielded spores of possible Cretaceous Kla age. The higher, fine grained member of the "Hooray Sandstone" is normally regarded as transitional into the overlying marine Wilgunya Formation, but there is no palynological evidence of its marine character. Instead it has yielded in abundance the acritarch "Gen. et sp. nov. Form A" Eisenack & Cookson of possible algal origin and uncertain environmental significance, but of now proven stratigraphic value. The microflora of the pre-marine formations is recorded in detail, but only general comments are made on the content of samples from the Wilgunya and younger formations.

INTRODUCTION

Amerada Petroleum Corporation drilled Newlands No.1 during May and June, 1966, in their exploration licence area 75P, which covers a portion of the northern Eromanga Basin (figure 1). Thirty sidewall cores were taken for palynological study, particularly of the pre-marine Cretaceous section. Newlands No.1 is sited between the previously drilled wells W.O.L. Nos. 1 - 3 (Warbreccan) 26 miles to the south and A.A.P. Mayneside No.1 34 miles to the north. The stratigraphy of the Warbreccan wells was initially outlined by (G.S.Q., 1960)*, but core samples supplied by the Geological Survey of Queensland to the B.M.R. some years ago provided evidence that these interpretations should be modified. The significance of the previous observations could not be readily understood until Newlands No.1 was drilled. Cores and cuttings from Mayneside No.1 were examined for their microfloral content by Mr. Poumot (Australian Aquitaine Petroleum Pty Ltd., 1965b) and the stratigraphy of that well was recently interpreted in terms of the outcrop sequence around the northern margin of the Eromanga Basin by Vine (1966). Hence it is opportune to consider the palynology of Newlands No.1 with that of the Warbreccan and Mayneside wells in order to further understand the distribution of the Mesozoic of the northern Eromanga Basin. Amerada# (1966) have already extended Vine's stratigraphy to Newlands No.1 in a manner which needs little modification after the palynological study. This paper therefore sets out to review the stratigraphic succession in the group of wells in terms of palynological units (Evans, 1966a), rather than confine discussion to Newlands No.1.

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* G.S.Q. = Geological Survey of Queensland.

\# Amerada = Amerada Petroleum Corporation of Australia Ltd.

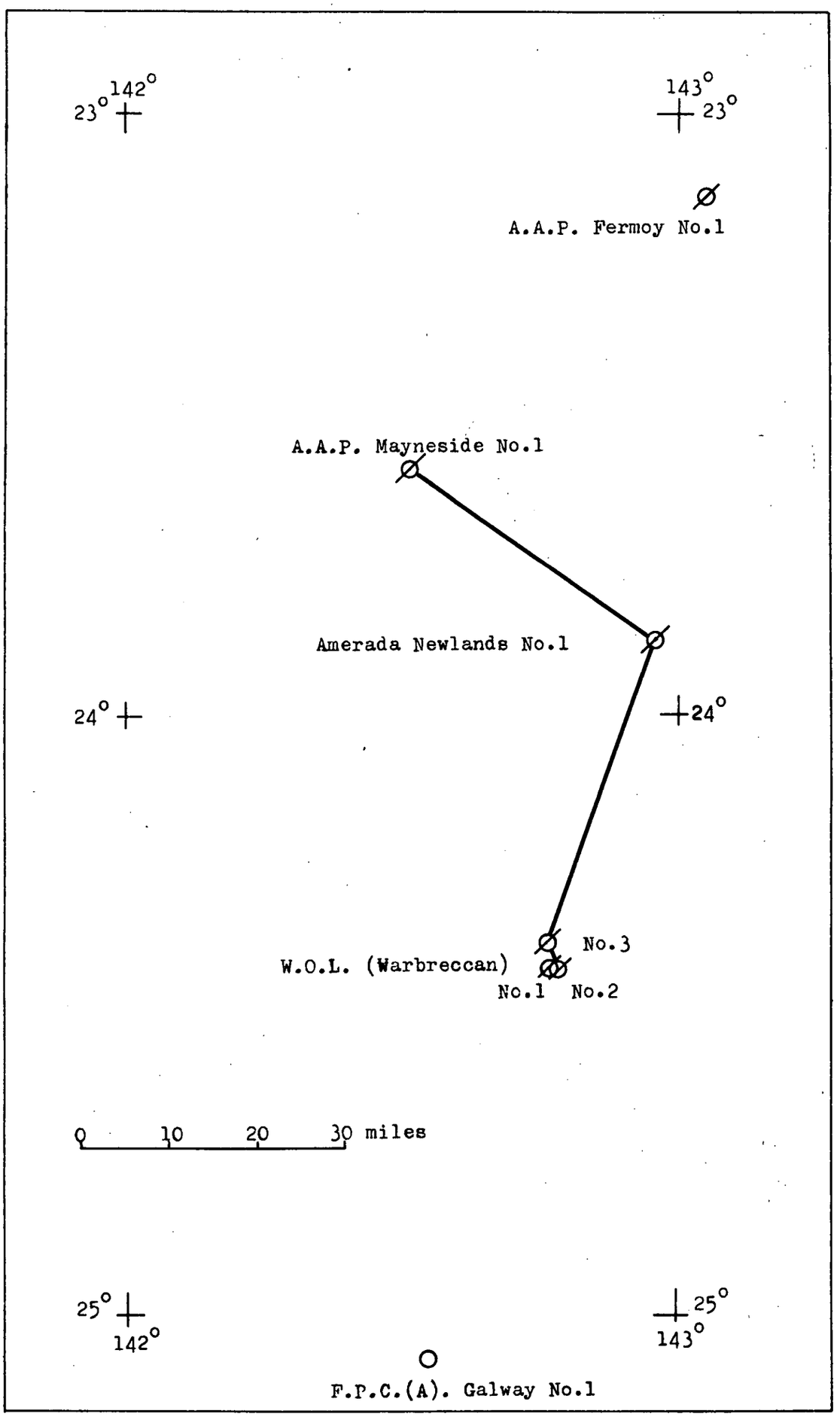

FIGURE 1: LCCATION OF WELLS & LINE OF SECTION

OBSERVATIONS

The approximate locations of the wells are plotted in figure 1; their co-ordinates are listed in Table 1. Co-ordinates for the Warbreccan wells are those reported by Morley (1955). G.S.Q. (1960) gave alternative elevations which are accepted here.

The depths of the thirty sidewall cores and samples of main cores 1 and 2 from Newlands No.1 are listed in Table 2. Only thirteen sidewall cores were suitable for palynological study: the remainder had either collapsed and been impregnated with drilling mud which could not be removed, or were not recovered. Observations on the three sidewall cores marked (*) in Table 2 could be doubted as they were not cleaned satisfactorily.

Core samples available from the Warbreccan wells are listed in Table 3. They include a number from the Cretaceous Wilgunya, Mackunda and Winton Formations which have not been examined in detail.

Fossils observed in the Newlands and remaining Warbreccan material are listed in Tables 4 and 5 respectively.

Australian Aquitaine Petroleum Pty. Ltd. (1965b) listed forms from Mayneside No.1 by Poumot; the depths of relevant core samples are marked in figure 2.

STRATIGRAPHY

The formations and palynological units discussed below, as recognized in the Warbreccan, Newlands and Mayneside wells are depicted in figure 2. Abbreviations of formation names in this diagram are those used by Exon et al. (1966a).

Formation nomenclatures which have been applied to the rock sequence of the region by other authors are compared in Table 6.

W.O.L. No.1 (Warbreccan) entered granite of undetermined age at 5400 feet. The granite presumably intrudes the multicoloured, steeply dipping (about 60°) shales and sandstones entered by both the Nos. 1 and 3 wells and referred to the Devonian or Carboniferous by G.S.Q. (1960). Core 8, 5292-5312 feet from this section in the No.3 well was barren of spores and its age remains undetermined.

WELL	LATITUDE	LONGITUDE	GL	KB
W.O.L.No.1 (Warbreccan)	24°25'30"S	142°46'10"E	761'	770'
W.O.L.No.2 (Warbreccan)	24°25'30"S	142°47'00"E	773'	782'
W.O.L.No.3 (Warbreccan)	24°22'45"S	142°46'20"E	665'	673'
Amerada Newlands No.1	23°52'30"S	142°57'45"E	704.5'	718.5'
A.A.P. Mayneside No.1	23°35'23"S	142°31'11"E	661'	673.6'

TABLE 1: WELL CO-ORDINATES

CORE NO.	DEPTH	MFP	CORE NO.	DEPTH	MFP
30	3804'	4101	15	5430'	US
29	3852'	4102	14	5510'	4111
28	3894'	US	13	5512'	4112
27	3934'	4103*	12	5548'	US
26	4156'	4104	11	5573'	NR
25	4244'	4105	10	5594'	US
24	4486'	US	9	5608'	US
23	4584'	4106*	8	5612'	NR
22	4670'	4107	7	5634'	NR
21	4790'	NR	6	5638'	NR
20	4964'	NR	5	5644'	4113
19	5020'	4108*	4	5650'	NR
18	5266'	NR	3	5655'	NR
17	5399'	4109	2	5660'	US
16	5424'	4110	1	5665'	US

US = unsuitable; NR = no recovery; * = unreliable

TABLE 2: SIDEWALL CORES FROM NEWLANDS NO.1

WELL	CORE	DEPTH	MFP
W.O.L. No.1	1	500- 520'	518
	3	1489-1509'	519
	4	1968-1983'	520
	5	2568-2587'	521
	6	2983-3003'	522
	9	4047-4052'	1327
	10	4381-4400'	1328
W.O.L.No.2	1	400 - 420'	553
	2	1502-1528'	554
	3	2801-2821'	555
	4	3542-3544'	556
	5	4069-4071'	557
W.O.L.No.3	1	1870-1878'	558
	2	2270-2290'	559
	3	3040-3060'	560
	7	5206-5213'	1051
	8	5292-5312'	561

TABLE 3: SAMPLES FROM W.O.L.Nos 1-3 (WARBRECCAN)

	UNIT	J2-3		J4		J5-6			Kla				
	DEPTH	5510'	5399'	5020'	4884'	4670'	4584'	4244'	4156'	3852'	3828'	3818'	3804'
	CORE	14	17	19	c2	22	23	25	26	29	c1	c1	30
	MFP	4111	4109	4108	4116	4107	4106	4105	4104	4102	4115	4114	4101
SPECIES	NO.												
Applanopsis dampieri	335	?		+	+			+		+		+	+
Cyathidites cf. C. minor	313	+	+	+	+	+				+	+	+	
Araucariacites australis	345	?		?									
Granulatisporites sp.	440	+		+									
Striatoabietites sp.	209	+											
?Stereisporites sp.	328		+	+		+							+
Classopollis cf. C. classoides	336		?				+		+	+		+	
Monosaccites sp.	175		+										
Baculatisporites comaumensis	315			+	+	+	+		+	+	+		+
Alisporites grandis	330			+		+	+	+	+	+	+	+	+
"Inaperturopollenites" turbatus	333			+	+	+							
Ischyosporites marburgensis	323			+									
Laricoidites sp.	332			+									
Murornati sp.	337			+									
Disaccites sp.	343			+									
Apiculati sp.	446			+									
Lycopodiumsporites sp.	457			+									
Stereisporites sp.	665			+									
Laevigati sp.	666			+									
Laricoidites sp.	331				+	+		+	+	+		+	+
Cycadopites nitidus	402				+				+			+	
Lycopodiumsporites sp.	459				?	+				+		+	
Disaccites sp.	545				+					+		+	
Lycopodiumsporites sp.	321				+				+				
Tsugaepollenites segmentatus	334				+			+	+				
Klukisporites scaberis	417				?				+				
Staplinisporites caminus	324				+								
Laevigati sp.	502				?								
Januasporites sp.	547				+					?			
Neoraistrickia truncata	413					+						+	+
Leptolepidites major	416					+				+			+
Lycopodiumsporites circolumenus	418					+			+	+		+	+
Osmundacites wellmannii	438					+	+						+
Cycadopites sp.	480					+	+						+
Cyathidites australis rimalis	312					+	+		+	+		+	
Lycopodiumsporites sp.	462					+	+					+	
Vitreisporites pallidus	344					+			+				
Leptolepidites verrucatus	414					+	+						
Apiculatisporis sp.	443					+	+						
Concentrisporites hallei	329					+							
Contignisporites sp.	471					+							
Concavissimisporites sp.	487					+							
Apiculati sp.	708					+							
Cyathidites cf. C. punctatus	373						+		+	+		+	+
Podocarpidites cf. P. multesimus	400						+						+
Microcachryidites antarcticus	404						+	+		+		+	+
Disaccites sp.	481						+		?			+	
Murospora florida	472						+			+			
Murornati sp.	531						+						
Granulatisporites sp.	439						+						
Rugulatisporites ramosus	450						+						
Lycopodiumsporites sp.	456						+						
Lycopodiumsporites rosewoodensis	461						+						
Murornati sp.	464						+						
Laevigati sp.	704						+						
Laevigati sp.	436							+					
Contignisporites cooksonii	396								+	+		+	
Nevesisporites vallatus	327								?	?			
Cicatricosisporites ludbrooki	394								+	+			
Ischyosporites punctatus	420								+	+			
Apiculatisporis sp.	449								?				
Ischyosporites sp.	521								+				
Apiculati sp.	705								+				
Ceratosporites equalis	376									+			+
Baculatisporites sp.	706									+	+		+
Monosaccites sp.	157									+			
Stereisporites antiquasporites	378									+			
Trilobosporites parverulentus	383									+			
Dictyotosporites complex	493									+			
Aequitriradites spinulosus	651									+			
Aequitriradites sp. A Dettmann	710									+			
Rugulatisporites sp.	709										+		
Cyathidites australis	374											+	+
"Gen et sp.nov. Forma A"	405											+	+
Granulatisporites trisinus	372											+	
Dictyotosporites speciosus	424											+	
Coronatispora perforata	468											+	
Murornati sp.	470											?	
Cyclosporites hughesi	489											+	
Perinotriliti sp.	492											+	
Laevigati sp.	537											+	
Cingutriletes sp.	601											+	
Megaspore	712											+	
Crybelosporites stylosus	714											+	
"Inaperturopollenites" limbatus	715											+	
Murornati sp.	338												+
Cicatricosisporites australiensis	403												+
Punctatosporites sp.	477												+
Neoraistrickia sp.	707												+
Sestrosporites pseudoalveolatus	711												+

TABLE 4: MICROFLORAL DISTRIBUTION CHART - AMERADA NEWLANDS NO.1

	UNIT	J2-3	J5-6			Kla	
	DEPTH	5206-5213'	4381-4400'	4047-4052'	3542-3544'	3040-3060'	2983-3003'
	CORE	7	10	9	4	3	6
	WELL	3	1	1	2	3	1
	MFP	1051	1328	1327	556	560	522
SPECIES	NO.						
Baculatisporites comaumensis	315	+	+	+	+	+	
Classopollis cf C. classoides	336	+	+		+	+	
Alisporites australis	277	+					
Disaccites sp.	342	+					
Cyathidites aff. C. minor	313		+	+		+	+
Klukisporites scaberis	417		+				+
Podocarpidites cf P. multesimus	400		+		+	+	
Cycadopites nitidus	402		+		+	+	
Apiculatisporis sp.	317		+		+		
Araucariacites australis	345		+	+	+		
Apiculati sp.	450		+	+	+		
Lycopodiumsporites sp.	321		+	+			
Tsugaepollenites segmentatus	334		+	+			
Applanopsis dampieri	335		+	+			
Gleicheniidites senonicus	434		+	+			
Disaccites sp.	545		+	+			
Rogalskaisporites cicatricosus	326		+				
Concentrisporites hallei	329		+				
Murornati sp.	337		+				
Osmundacites wellmanii	438		+				
Apiculati sp.	444		+				
Lycopodiumsporites rosewoodensis	461		+				
Cycadopites sp.	480		+				
Biretisporites spectabilis	501		+				
Laevigati sp.	502		+				
Apiculati sp.	505		+				
Verrucosisporites sp.	513		+				
Apiculati sp.	518		+				
Rugulatisporites ramosus	527		+				
Monosacciti sp.	546		+				
Stereisporites sp.	665		+				
Laevigati sp.	716		+				
Murospora florida	472		?	+			
Contignisporites cooksonii	396			+	+	+	
Lycopodiumsporites circolumenus	418			+	+	+	
Cyathidites australis rimalis	312			+	+		
Laevigati sp.	436			+	+		
Ischyosporites sp.	521			+	+		
Microcachryidites antarcticus	404			+			
Neoraistrickia truncata	413			+			
Lycopodiumsporites sp.	422			+			
Lycopodiumsporites sp.	462			+			
Murornati sp.	464			+			
Rugulatisporites sp.	465			+			
Ischyosporites sp.	467			+			
Coronatispora perforata	468			+			
Concavissimisporites sp.	487			+			
Alisporites grandis	330				+	+	
Nevesisporites vallatus	327				+		
"Inaperturopollenites" turbatus	333				+		
Vitreisporites pallidus	344				+		
"Podosporites sp." de Jersey & Paten	557				+		
Granulatisporites trisinus	372				+		
Ceratosporites equalis	376					+	
Foraminisporis wonthaggiensis	381					+	
Reticulatisporites pudens	387					+	
Cicatricosisporites ludbrooki	394					+	
Lycopodiumsporites cf. L. facetus	398					+	
Cicatricosisporites australiensis	403					+	
"Gen. et sp. nov. Forma A"	405					+	
Leptolepidites major	416					+	
Schizosporis reticulatus	428					+	
Schizosporis cf. rugulatus	431					+	
Cyclosporites hughesi	489					+	
Aequitriradites spinulosus	651					+	
Apiculati sp.	705					+	
Baculatisporites sp.	706					+	
Schizocystia sp.	717					+	
Kraeuselisporites aff. K. majus	719					+	
Stereisporites antiquasporites	378						+
Dictyotosporites speciosus	424						+
Rouseisporites reticulatus	644					+	

TABLE 5: MICROFLORAL DISTRIBUTION CHART - W.O.L.NOS 1 - 3 (WARBRECCAN)

AGE		DETTMANN, 1963 (ASSEMBLAGE)	EVANS, 1966a (UNIT)	G.S.Q., 1960 (WARBRECCAN)	A.A.P., 1965b (MAYNESIDE)	VINE, 1966 (MAYNESIDE)	AMERADA, 1966 (NEWLANDS)
CRETACEOUS	UPPER	PARADOXA		WINTON FORMATION	WINTON FORMATION	? ?	WINTON FORMATION
	ALBIAN		K2a-b		MACKUNDA BEDS	MACKUNDA FORMATION	MACKUNDA FORMATION
				TAMBO FORMATION	TAMBO FORMATION	WILGUNYA	TAMBO FORMATION
				ROMA FORMATION	TOOLEBUC MEMBER	TOOLEBUC MEMBER	TOOLEBUC MEMBER
			K1d				
	APTIAN	SPECIOSUS	K1b-c		ROMA FORMATION	FORMATION	ROMA FORMATION
	NEOCOMIAN		K1a	BLYTHESDALE GP. "TRANSITION STAGE"	TRANSITION BEDS		HOORAY SANDSTONE
		STYLOSUS		MOOGA SANDSTONE	FERMOY SERIES UPPER SANDSTONE	HOORAY CORRELATE	
JURASSIC			J5-6	"FOSSIL WOOD STAGE"	MIDDLE SHALY SANDSTONE SEQUENCE		
				GUBBERAMUNDA SANDSTONE			
				WALLOON COAL MEASURES		WESTBOURNE FORMATION	WESTBOURNE SHALE
				BOXVALE SANDSTONE		ADORI CORRELATE	ADORI SANDSTONE
			J4	EVERGREEN SHALE		BIRKHEAD CORRELATE	BIRKHEAD SHALE
			J2-3	PRECIPICE SANDSTONE	LOWER SANDSTONE		HUTTON SANDSTONE
				"PERMO-TRIASSIC"			
PRE-MESOZOIC				?DRUMMOND GROUP	DIAMANTINA FORMATION	METAMORPHIC BASEMENT	PRE-MESOZOIC

TABLE 6: COMPARISON OF STRATIGRAPHIC NOMENCLATURES

Lithologically similar although more indurated sediments encountered at the base of Newlands No.1 were sampled in sidewall core 5644 feet, but also proved to be barren.

Grey epimetamorphic quartz-sericite shales and interbedded siltstones at the base of Mayneside No.1 were compared by A.A.P.* (1965b) to basement beds in A.A.P. Fermoy No.1 to the north of Mayneside ("Diamantina Formation") where they were dated radiometrically as Upper Cambrian (A.A.P., 1965a; Kaplan & Kulbicki, 1966). A.A.P. (1965b) distinguished the "Diamantina Formation" from the Warbreccan sediments. Amerada (1966), on the other hand, compared the basal section at Mayneside with those encountered in Newlands and Warbreccan, although noting variations in metamorphic rank. Poumot (A.A.P., 1965b) was unable to find any microfossils in two cores of "Diamantina Formation" in the Mayneside well.

No Permian or Triassic strata have been detected in the region. G.S.Q. (1960) considered the possibility that upper porous sandstones and lower coaly shales between 5160 feet and 5263 feet in W.O.L. No.3 (Warbreccan) were of "Permo-Triassic" age. Core 7, 5206-5213 feet, yielded Jurassic spores (see below) and G.S.Q.'s proposition is discounted.

Jurassic

Units J2(?) - J4

A basal, dominantly sandstone sequence was penetrated by all four wells at depths between:

WARBRECCAN			NEWLANDS	MAYNESIDE
No.1.	No.2	No.3	No.1	No.1
4000' - 5054'	4616' - 5224+'	4503' - 5263'	5075' - 5640'	5032' - 5105'

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* A.A.P. = Australian Aquitaine Petroleum Pty Ltd

W.O.L. No.3 (Warbreccan), core 7, 5206-5213 feet, from this sequence yielded abundant plant tissue and a small number of spores, among which could be identified the Jurassic species Classopollis cf. C. classoides (sp.336), Baculatisporites comaumensis (sp.315) and the disaccate grains sp. 342 and Alisporites australis (sp.277). These are insufficient to indicate to which Jurassic palynological unit the core should be allocated, but the relatively rare content of Classopollis makes a J1 age unlikely and at the most a J2 age is assumed.

Attempts to sample the basal sandstones in Newlands No.1 were generally unsuccessful, and of those recovered only two sidewall cores yielded spores: 5399 feet and 5510 feet. A possible Applanopsis dampieri (sp. 335) at 5510 feet suggests that beds no older than J2 are present at least 150 feet above basement.

The apparently oldest sample from the group of wells to yield an abundant microfloral assemblage was from Newlands No.1 at 5020 feet, from shales referred to the Birkhead Formation. The assemblage included Ischyosporites marburgensis (sp. 323), "Laricoidites" sp.332, which are typical of units J2-3, but appeared to completely lack Classopollis, which would indicate that the top of J3, if not the beginning of J4 is represented.

The basal sandstone sequence is therefore within the range J2 - ?basal J4, homotaxial to the Hutton Sandstone of the Surat Basin. The thickest section of the sandstones was penetrated in W.O.L. No.3 (Warbreccan), towards the base of which is the previously incorrectly identified "Permo-Triassic" (G.S.Q., 1960). This somewhat more shaly section could perhaps represent a pre-Hutton Sandstone section.

The best representative of unit J4 was cut from Newlands No.1, sidewall core 4884 feet, where a possible Klukisportes scaberis (sp. 417) and Januasporites sp. 547 appeared in the absence of the typical J5 species. This core was cut from about 191 feet above the base of the Birkhead Formation. However, in Mayneside No.1, core 7, 5031-5050 feet, very close to the base of Birkhead Formation, Poumot

observed K.(al. Ischyosporites) scaberis and Murospora (al. Cingulatisporites) florida (a marker fossil of units J5 - Kla). A.A.P. (1965b) concluded on the basis of this observation that the basal Jurassic sandstones of the region (considered above to be equivalent to the Hutton Sandstone) were younger than similar sandstones further to the east. The evidence of the Newlands sidewall cores at 4884 feet and 5020 feet seems to throw doubt on this conclusion and the apparent position of the J4/J5 boundary within the upper half of the Birkhead Formation (compare sample positions in the Newlands and Warbreccan wells on the assumption that the broad lithological units are time-concordant in the immediate region) is in close agreement with its apparent boundary in the Surat Basin and further north in the Eromanga Basin (Evans, 1966b). The problem might be resolved by further examination of cores from Mayneside.

Units J5 - J6

The basis for separation of units J5 and J6 needs further study and the separation of species observed in Newlands No.1, swc 4244 feet to 4670 feet may assist this task, although the problem is not considered here. Newlands No.1, sidewall core 4670 feet, is convincingly of J5 - J6 age with a content of Contignisporites sp. 471, Concavissimisporites sp. 487, Murospora florida (sp.472) and Lycopodiumsporites circolumenus (sp. 418). Rugulatisporites ramosus (sp. 450), which is a normal component of unit J4 and rarely found above that level, is also to be seen.

This particular sample was cut from above the Adori Sandstone, but a somewhat older horizon in the Birkhead Formation, sampled in W.O.L. No.1 (Warbreccan), core 10, 4381-4400 feet, seems referable to unit J5 in that it yielded one specimen similar to Murospora florida (sp. 472), but distinguished by an abnormally narrow cingulum. Mayneside No.1, core 6, 4797-4809 feet, was cut from a comparable level in the Birkhead Formation and yield to Poumot Contignisporites (al. Cicatricosisporites) cooksonii and Murospora (al. Cingulatisporites) florida of J5 - J6 age.

An upper limit to units J5 - J6 appears to occur between 4156 feet and 4244 feet in Newlands No.1, i.e. within the"Hooray Sandstone." This is based on the appearance of Cicatricosisporites (C.ludbrooki) at 4156 feet. Assuming the lithological correlations of figure 2, W.O.L. No.2 (Warbreccan), core 4, 3542 - 3544 feet, and possible Mayneside No.1, core 4, 4235 - 4248 feet, should also be of post J6 age, although there is no positive evidence of this. The lack of corroborating evidence from these other wells might raise the suspicion that the productive sidewall core in Newlands was contaminated. As the core in question (4156 feet) could not be satisfactorily cleaned, it may well have been contaminated but for additional reasons discussed below, its microfloral content is temporarily accepted at face value.

Jurassic(?) - Cretaceous

Unit Kla

Unit Kla is defined by the overlap of the range of Murospora florida and Cicatricosisporites. It has been previously located in the Great Artesian Basin within the Blythesdale Formation (Dettmann, 1963 - as the Stylosus Assemblage and part of the Speciosus Assemblage; Evans, in Exon et al., 1966b); at Newlands it ranges at least between 3852 feet and ?4156 feet. Where detected elsewhere, the top half of the unit is associated with the problematicum "Gen et sp. nov.A" Eisenack & Cookson (sp. 405), at certain points, even in swarming numbers (Evans, 1966c). The presence of sp. 405 as high as 3804 feet in Newlands No.1 therefore suggests that Kla should be taken at least to that horizon. (Sp. 405 is particularly common at 3818 feet).

For similar reasons W.O.L. No.3 (Warbreccan), core 3, 3040-3060 feet, containing sp. 405 is allocated to unit Kla.

Newlands at 3804 feet and W.O.L. No.3 at 3040 feet are both within the same lithological unit, which Amerada (1966) included in the "Hooray Sandstone", which G.S.Q. (1960) described as "Transition Stage" of the Blythesdale Group, and which A.A.P. (1965b) put at the top of the "Fermoy Series", although Vine (1966) included it (in Mayneside No.1) in the Wilgunya Formation. Whatever name is applied to it, sediments

typified at Newlands No.1 between 3605 feet and 3813 feet, are widespread across the Eromanga Basin and are readily identified from electric logs. This formation at Mayneside No.1, between 3713 feet and 3910 feet, was sampled by Poumot in core 2, 3728-3756 feet, where he obtained both Cicatricosisporites and M. florida. Most of this formation in the Warbreccan - Newlands - Mayneside region is therefore of Kla age.

Extension of the term "Hooray Sandstone" to the Newlands area is effectively undertaken by using the term to cover the stratigraphic interval between the easily recognized Westbourne Formation below and the Wilgunya Formation above. It may not be advisable to extend the term so far from the area where the Hooray Sandstone is typically developed in the Tambo area as there are considerable differences to be seen between the Tambo and Newlands areas. Exon et al. (1966a,b) noted that the typical "Hooray Sandstone may be split by an unconformity into two parts. By comparison with the Amoseas Boree and Westbourne wells, the upper "Hooray" is comparable with the Newlands section 3605 feet to 3622 feet. The lower part of the "Hooray Sandstone" in the Tambo area is divisible into an upper silty and lower sandy section, but in the Newlands area at least four divisions are recognizable. The uppermost unit, between 3622 and 3813 feet in Newlands No.1 seems to correspond to the upper silty unit of the Tambo area. Below that, among a generally medium to coarse grained sandy sequence, a middle unit of very fine to medium sandstone with interbeds of dark grey shale, siltstone and lignite streaks a characteristically low resitivity curve and intermittently high gamma-ray and sonic travel time values. An appropriately fine grained unit is recognizable in the Warbreccan wells.
The picks for this middle member are as follows:

WARBRECCAN			NEWLANDS	MAYNESIDE
No.1	No.2	No.3	No.1	No.1
3608' -3686'	3626' - 3720'	3496' - 3602'	4095' - 4270'	4169' - 4321'

At Newlands, 4156 feet, a possible Kla age is ascribed to this unit. Development of such a finer grained member at the base of Kla in the Eromanga Basin is of particular interest because of its stratigraphic position compared with that of the Orallo Formation in the Surat Basin either at the base of or within unit Kla. Available evidence indicates that the overlying Blythesdale Formation in the Surat Basin is in part at least of Kla age (Evans, in Exon et al., 1966b), where the stratigraphically lowest determination of Kla is in probable equivalents of the Mooga Sandstone Member. So far no satisfactory determination of the precise age of the underlying Orallo Formation has yet been made although it must be of very late J5 - J6 or basal Kla age. The Orallo Formation must be close to being a correlate of the middle member of the lower "Hooray Sandstone" of the Newlands area, and both formations could be of basal Kla age, if the recorded microfloral content of Newlands No.1, 4156 feet is uncontaminated. No matter the precise answer to this problem the evidence confirms that the original nomination of the middle member at Warbreccan as the "Fossil Wood Stage", the now disused term once applied to the Orallo Formation, (G.S.Q., 1960) was substantially correct.

Apart from C. ludbrooki, the only other species characteristic of unit Kla and above to be found in Newlands No.1, sidewall core 4156 feet, was Ischyosporites punctatus (sp. 420). The succeeding fossiliferous samples yielded more typical Kla species, including, at 3852 feet, Ceratosporites aequalis (sp. 376), Trilobosporites parverulentus, (sp. 383) Dictyotosporites complex (sp. 493), Aequitriradites spinulosus (sp. 651), and Aequitriradites sp.A Dettmann (sp.710). Yet others appeared slightly higher up at 3818 feet, including Dictyotosporites speciosus (sp. 424), Cyclosporites hughesi (sp. 489) and Crybelosporites stylosus (sp. 714).

The latter species is a rarity, but marks the Stylosus Assemblage of Dettmann (1963). The marker fossil Cicatricosisporites australiensis (sp. 403) was not found until core 1 at 3818 feet. However, it appeared to Poumot at a probably somewhat lower stratigraphic level in Mayneside No.1, core 3, 3984-4005 feet, in association with I. punctatus, M. florida and A. spinulosus.

Additions to this list in perhaps the highest sample from Kla, W.O.L. No.3 (Warbreccan), core 3, 3040-3060 feet, include Foraminisporis wonthaggiensis (sp.381), Schizosporis reticulatus (sp.428), Rouseisporites reticulatus (sp.644) and Schizocystia sp.717.

Neither dinoflagellates nor Acanthomorphitae (Micryhstridium spp.) nor Polygonomorpphitae (Veryhachium) type acritarches could be found in samples of Kla age. Only the forms sp.405 and Schizocystia sp.717 could be regarded as acritarchs, but they are of uncertain facies significance, and it appears that the onset of marine sediment did not commence until later times, presumably with the deposition of the Wilgunya Formation.

Several samples of Kla age followed the usual pattern of this interval in containing reworked Permian spores and pollen grains. None was common. They include Granulatisporites trisinus (sp.372) and Monosaccites sp. 157.

Cretaceous

A detailed study of samples from the Wilgunya Formation and younger formations has not been made for this project. However, the following notes may be of some stratigraphic value.

W.O.L. No.2 (Warbreccan), core 3, 2801-2821 feet, contained very few microplankton. Cyclosporites hughesi (sp. 489) was recognized among the spores, indicating an age no younger than Klb-c.

W.O.L. No.3, core 5, 2568-2587 feet, contained Dingodinium cerviculum and Muderongia tetracantha of the D. cerviculum Zone. This horizon would correlate within the Doncaster Member of the Wilgunya Formation at the northern margin of the basin.

Cores in W.O.L. No.3 at 3040 feet and Mayneside No.1 at 2971 feet, close to the level of the Toolebuc Member were barren.

W.O.L. No.1, core 4, 1968-1983 feet, from above the Toolebuc Member yielded:

Appendicisporites sp.

Crybelospoorites striatus (sp. 423)

Trilobosporites trioreticulatus

and rare microplankton (Hystrichosphaera ramosa) of unit K2b/ Odontochitina operculata Zone age.

Microplankton were still present in the succeeding W.O.L. No.3, core 1, and the same K2b/O. operculata Zone interval was represented in W.O.L. No.1, core 3, 1489-1509 feet, where O. operculata, Diconodinium multispina and relatively abundant Laevigatosporites ovatus were found. One specimen referable to Cadargasporites reticulatus (sp. 634) was also extracted from this sample. On present knowledge, the species is relatively common within the early Jurassic unit J1 and of very rare occurrence as high as J4. Its presence in beds as high as the top of the Albian/ Allaru Member of the Wilgunya Formation is therefore exceptional. Either the genus reappears on the scene at this late stage of the Mesozoic or the specimen might be recycled from older sediments, its presence being of value to any consideration of the source area of these Cretaceous sediments.

The highest available samples, from W.O.L. No.1, core 1, 500-520 feet and W.O.L. No.2, core 1, 400-420 feet, both yielded spores with no microplankton. C.striatus, P. paradoxa and T. trioreticulatus and an abundance of L. ovatus were present with fairly common tricolpate angiospermous pollen grains. These horizons belong to the Paradoxa Assemblage (Dettmann, 1963), but, because of the angiosperms, are of post-K2b age (Evans, 1966c) probably of about Cenomanian age.

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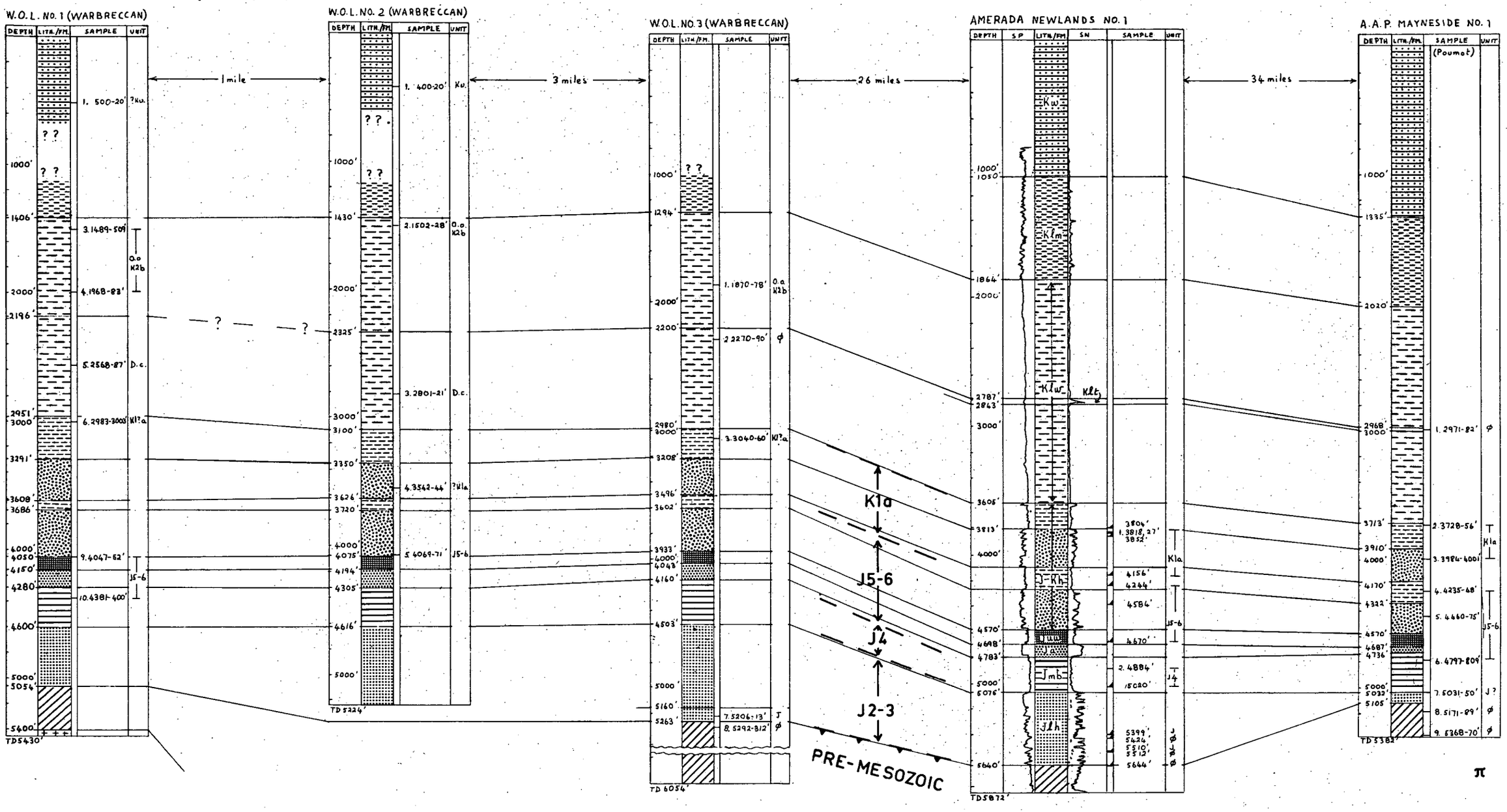

FIGURE 2: CORRELATION OF THE WARBRECCAN-NEWLANDS-MAYNESIDE WELLS