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RECORDS:

A PALYNOLOGICAL REPORT ON A.O.G. WENTWORTH NO. 1, N.S.W. WITH OBSERVATIONS ON THE PERMIAN OF THE OAKLANDS - COORABIN AREA OF THE MURRAY BASIN

by

P.R. Evans

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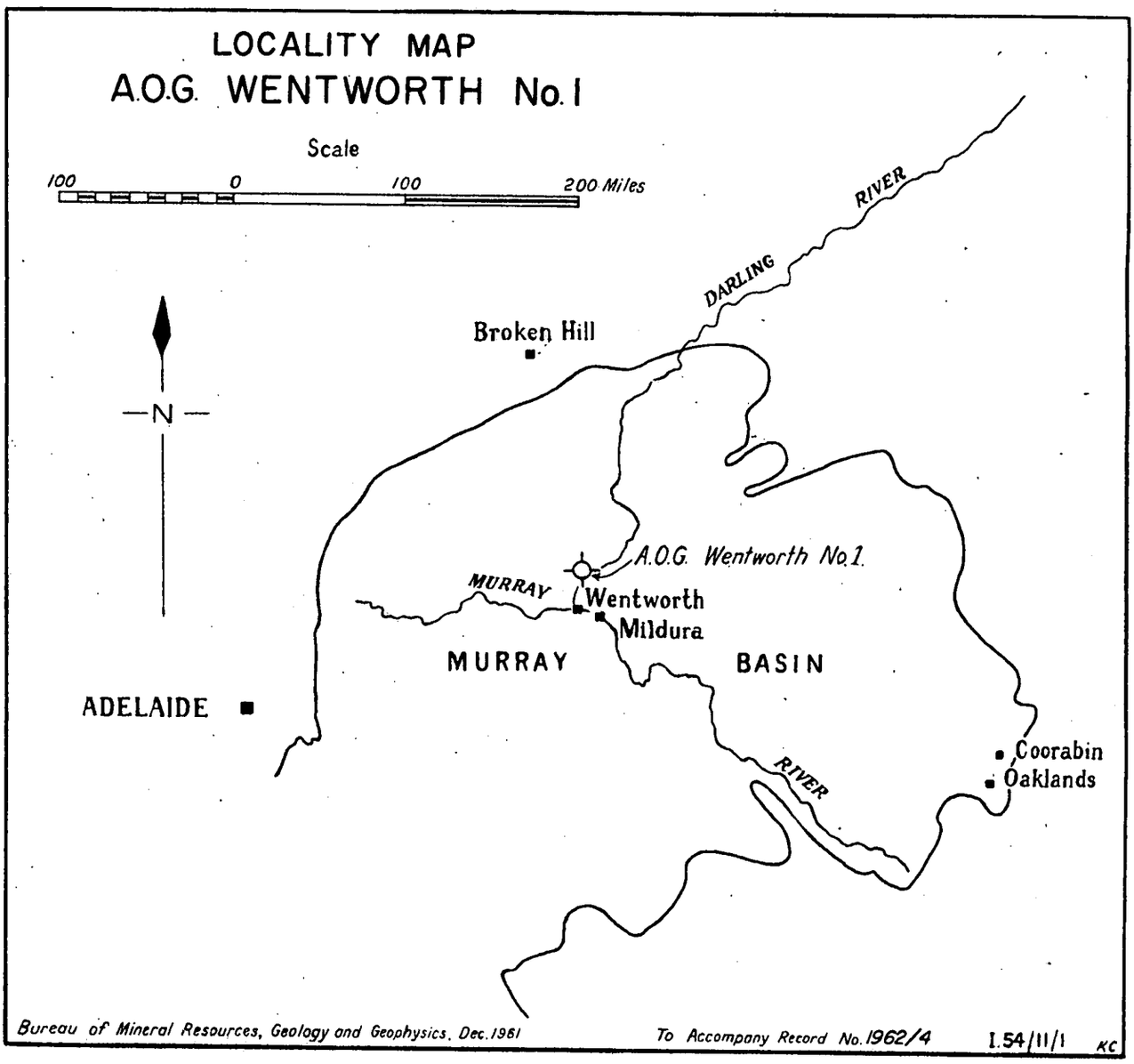
SUMMARY

Palynological examination of cores and cuttings from the subsidised A.O.G. Wentworth No.1 well, Murray Basin, New South Wales, indicates that the well passed from Tertiary into Lower Cretaceous marine sediments at either 1283 - 1335 feet or 1407 - 1455 feet and into probable Lower Permian beds at 1615 - 1645 feet. The well was completed in conglomerates, probably also of Lower Permian age, at a total depth of 2081 feet. Examination of samples from the Oaklands - Coorabin coalfield, to obtain a guide to the age of the pre-Mesozoic section of Wentworth No.1, demonstrated that the coal measures are equivalent in age to the Upper Coal Measures of the Sydney Basin, that they overlie Lower Permian (?)marine beds which, by virtue of their common content of Leiosphaeridae, compare in age with the Wentworth Permian section.

Sketch map of the Murray Basin illustrating the location of A.O.G. Wentworth No.1 well and the Oaklands - Coorabin coalfield



OBSERVATIONS ON WENTWORTH NO.1

Table 1 (p. 5) illustrates the distribution of pollens, spores and microplankton in samples examined from Wentworth No.1 well.

Tertiary

The microfloras of samples containing abundant angiosperm pollens, including common Nothofagus (Cookson, 1946, 1959), have not been logged completely as the presence of such pollens is sufficient to indicate a Tertiary age.

Mesozoic - Lower Cretaceous

The highest undoubted Lower Cretaceous sample examined was from 1455 - 1460 feet which contained Cicatricosisporites australiensis, Granulatisporites dailyi, Apiculatisporis wonthaggiensis (Cookson & Dettmann, 1958). The presence of rare dinoflagellates indicates a marine origin for the section. Odontochitina operculata at 1553 - 1563 feet and Gonyaulax cf. G. edwardsi at 1604 - 1615 feet suggest that beds of approximately Albian age are represented.

The position of the top of this unit is still debatable on palynological evidence. Cuttings at 1335 - 1345 feet and 1397 - 1407 feet contained a low relative abundance of pollens and spores, including Nothofagus, triporate spp., but few angiosperm species were represented and the greater abundance of Cyathidites spp., Podocarpidites spp., associated with Lycopodiumsporites austroclavidites suggests, but does not prove, that the angiosperms may have come from cavings and that Lower Cretaceous beds may have been cut at these horizons. The Lower Cretaceous - Tertiary boundary may therefore lie above 1335 feet and below 1283 feet, the lowest definite Tertiary sample. More satisfactory evidence of the position of the boundary is needed.

Palaeozoic - (?)Lower Permian

Cores 4, 5 and 6 (1760 - 2021 feet) were cut from grey-white to light grey very fine grained shales and siltstones which are well graded in many places. Samples chosen from the finer fractions of such graded beds contained swarms of Leiosphaeridae with virtually no other organic debris. Most specimens were of crumpled spheres with smooth tests, some with a pylom. In a number of specimens punctae passed radially through their relatively thick walls. This is a feature characteristic of Tasmanites Newton, although the average diameter of the tests was smaller than that of described species of the genus.

Alone they are not indicators of the age of the sediment.

It is uncertain whether a marine environment of deposition is represented by the leiosphaerid swarms, although Eisenack (1958) favoured such an association; supporting his attitude is the occurrence of marine fossils in the Tasmanites-bearing shales of Tasmania (Reid, 1924, p.46).

Spores were found only in core 4 (1760 - 1769 ft. 6 in.) and the presence of a specimen of Nuskoisporites triangularis is probably sufficient to indicate a Permian age for that horizon. Evidence from the Oaklands - Coorabin area (below) suggests that a Lower Permian (Sakmarian) section might have been penetrated. A definite age cannot be given to the whole section because of the apparent lack of spores from the lower cores, but the persistence of Leiosphaeridae, the presence in the conglomeratic section sampled by core 7 (2071 - 2081 feet of graded bedding similar to that in higher cores, suggest that the sediments at the bottom of the well were associated with those of core 4 so that they were also or only a little older than Lower Permian in age.

Leiosphaerids were present in cuttings at 1645 - 1656 feet so that, unless they have been reworked, the top of the (?)Permian unit lies between 1615 and 1645 feet.

OBSERVATIONS ON THE OAKLANDS - COORABIN COALFIELD

As so little is known of the pre-Mesozoic of the Murray Basin the only section immediately available in the Bureau of Mineral Resources with which the Palaeozoic section of Wentworth No.1 could be compared was that of the Permian of the Oaklands - Coorabin Coalfield.

Sturmfels (1950) summarized available knowledge of the coalfield where coal seams containing a Permian macroflora (Walkholm ident.) underlie (?)Tertiary beds and overlie an unknown thickness of sediments, at the top of which Permian foraminifera had been found (Crespin, 1943). Only a few samples, some inadequately labelled, from bores in the Oaklands area remain in the B.M.R. museum. However, all those examined contained abundant micro-organisms in which two distinct assemblages were recognized.

The upper assemblage is associated with the coal measures and was recognized in samples from bore D and E (Sturmfels, 1950, P.2; Pl.3, sections A - B, C - D). For example:

Bore E, 345 - 352 feet, contained,
Leiotriletes directus,
Acanthotriletes ericianus,
A. teretoangulatus,
Granulatisporites trisinus,
G. micronodosus,
Nuskoisporites triangularis,
Vesicaspora ovata,
Lunatisporites amplus,
Lunatisporites limpidus,
Striatopodocarpidites fusus,
Marsupipollenites sinuosus,
M. triradiatus.

Bore D, "shale below coal seam", i.e. either 290 - 314 feet 6 in. or 344 - 360 feet included,

Leiotriletes directus,
Calamospora diversiformis,
Granulatisporites trisinus,
Acanthotriletes tereteangulatus,
Microcreticulatisporites bitriangularis,
Cirratriradites splendens,
Nuskoisporites triangularis,
Lunatisporites amplus,
L. limpidus,
Striatopodocarpidites fusus,
Striatites cancellatus,
Protosacculina multistriatus,
Marsupipollenites sinuosus.

Both assemblages suggest similar ages for the samples comparable with that of the Upper Coal Measures (Balme & Hennelly, 1956) rather than the Lower Coal Measures of the Sydney Basin.

The lower assemblage came from Bore J, 384 feet, the horizon at which I. Crespin discovered foraminifera. The spore assemblage consisted of abundant Nuskoisporites triangularis and common Vestigisporites spp. Granulatisporites trisinus and Laevigatosporites sp. were also present. In addition to the spores a number of specimens of Leiosphaeridae were present, identical to those from Wentworth No.1.

A very similar assemblage was found in the light grey silty shale from either bore no.4 or bore no.5 at (?)509 feet where, additional to the bore J species, Cirratriradites sp. and Punctatisporites gretensis were also present. The actual stratigraphic position of this sample cannot be determined on external evidence and it is mentioned only to confirm the persistence of this lower assemblage in the area. (If the sample was stratigraphically lower than the coal seams, it could not have been taken from bore no.5, 509 feet, because the bore was still above the coals at that depth, but it could have come from bore no.4).

The age of the lower assemblage cannot be determined with certainty, but the absence of species such as Marsupipollenites sinuosus, Microreticulatisporites bitriangularis, and of abundant striate bisaccate pollens that together characterise Artinskian and post-Artinskian beds and the recognition of abundant Nuskoisporites comparable with the Lake Phillipson bore South Australia, 430 - 730 feet, (Balme, 1957) strongly suggest that the containing beds are Lower Permian (Sakmarian) in age.

TABLE

Species distribution chart: A.O.G. Wentworth No.1

AGE	Tertiary					Lower Cretaceous					L.(?)Permian				
SPECIES	950 - 940	1033 - 993	1033 - 1023	1137 - 1127	1210 - 1199	1283 - 1273	1345 - 1335	1407 - 1397	1460 - 1455	1511 - 1501	1563 - 1553	1615 - 1604	1656 - 1645	1705 - 1699	1769' 6" - 1760	1812 - 1802	2021 - 2011
MICROSPORES																	
Nothofagus spp.	c	c	c	c	c	c	+	+	+	+	+	+					
Triporate spp.	c	c	c	c	c	c	+	+	+	+	+	+					
Angiosperms undet.	+	+	+	+	+	+											
Lycopodiumsporites austroclavidites							+	+	-	+	+						
Podocarpidites grandis							+	+	-	+	+						
Microcachryidites antarcticus									fc	+	-	+					
Araucariacites australis									+	+							
Classopollis torosus									+								
Cyathidites spp.							+	+	c	+							
C. australis rimalis									+	+							
C. crassiangulatus									+								
Podocarpidites spp.							+	+	c	+	+						
Sphagnumsporites clavus									+								
Granulatisporites dailyi									+								
Neoraistrickia sp.									+								
Cicatricosisporites australiensis									+								
Baculatisporites comaumensis									fc								
Zonati sp.A									+								
Ginkocycadophytus nitidus									+								
Podocarpidites ellipticus									c	-	+						
Zonati sp.B									+								
Pilosisporites sp.									+	-	+						
Microreticulatisporites pudens									+								
Apiculatisporis wonthaggiensis										+	-	+					
Sphagnumsporites australis											+						
Inaperturopollenites spp.												+					
Zonati sp.												+					
Lycopodiumsporites aff. circolumenus												+					
Nuskoisporites triangularis														+			
Marsupipollenites sp.														+			
Rugulatisporites sp.														+			
Laevigati sp.														+			
MICROPLANKTON																	
Hystrichosphaera sp.	+	-	+														
Hystrichosphaeridium spp.								+		+							
Peridinida sp.								+									
Cymatiosphaera sp.									+								
Hystrichosphaera furcata									+								
Odontochitina operculata										+							
aff. Apteodinium maculatum										+	+						
Scriniodinium sp.											+						
Gonyaulax cf.G. edwardsi											+						
Leiosphaera spp.													+	+	c	c	c
Tasmanites sp.															+	+	+

c = common; fc = fairly common; + - present

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