

**Palynological analysis of bottom hole cuttings  
in Wombat-3, onshore Gippsland Basin.**

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### Summary

Palynological analysis of a composite cuttings sample between 2166 and 2169m in Wombat-1 has confirmed an age for the Strzelecki Group of not older than the early Albian *Crybelosporites striatus* Zone at the bottom of the well. The recorded assemblage may however be younger, equivalent to the middle to late Albian *Coptospora paradoxa* Zone, based on the very rare presence of *Perotrilites majus*. This latter zone assignment is problematic as it implies a thickness of >800 metres for the *C. paradoxa* Zone, which is inconsistent with other wells in the Seaspray Depression. A more plausible explanation is that the index species *Perotrilites majus* has a longer range than currently documented.

### Introduction

The composite cuttings sample from two bags at 2166 and 2169m, and located just above the TD of the well at 2178m, was analysed to determine the age of the deepest part of the Strzelecki Group penetrated in Wombat-3. This analysis also compliments the previous palynological study by Partridge (2004b) in which the deepest sample analysed was at 1452m. The new sample was collected from the Werribee Core Library on 12<sup>th</sup> January and sent to Core Laboratories Australia Pty Ltd in Perth for processing on 14<sup>th</sup> January. The prepared palynological slides were received back from the laboratory on 31<sup>st</sup> January, and a Provisional Report on the initial microscope examination was submitted on 8<sup>th</sup> February 2005.

The 19 grams of sample processed gave a moderate to high organic residue yield, containing a high concentration of palynomorphs whose preservation varied from poor to fair. The moderate diversity assemblage, comprising 29 spore-pollen species and a single algal species, is recorded in Table 1. Author citations for the species recorded can be sourced from the papers by Dettmann (1963, 1986) and Helby *et al.* (1987).

### Discussion

The sample gave a high yield and concentration of poorly preserved spores (62%) and gymnosperm pollen (38%). Angiosperm pollen are rare (<1%), and all are caved from the Tertiary. Overall, the assemblage has relatively low diversity, being equally dominated by bisaccate pollen referred to *Podocarpidites* (25%), and laevigate trilete spores referred to *Cyathidites* (26%), with the third most abundant group being the granulate and baculate trilete spores assigned to the *Baculatisporites*–*Osmundacidites* complex (22%). The most frequent index species are the spores of *Ruffordiaspora* (al *Cicatricosisporites*) *australiensis* representing 3.7% of the count.

The other key index species in the recorded assemblage are the rare presence of *Crybelosporites striatus* which indicates the assemblage is not older than the *Crybelosporites striatus* Zone, and *Perotrilites* (al. *Kraeuselisporites*) *majus* which is not considered to range below the *C. paradoxa* Zone and therefore is a secondary marker species for the base of that younger zone (see Dettmann & Playford, 1989; Table 9.4). The assemblage is no younger than Albian based on the youngest frequent occurrence of *Ruffordiaspora australiensis* which is considered to be a marker for both the top of the *C. paradoxa* Zone and top of Strzelecki Group in the Gippsland Basin.

Although the presence of *Perotrilites majus* clearly favours assigning the sample to the *C. paradoxa* Zone, this would place the 805 metres of Strzelecki Group penetrated in Wombat-3 into this zone making it the thickest known section of the *C. paradoxa* Zone in the Seaspray Depression. This problem with the surprising thickness of the *C. paradoxa* Zone has been encountered and discussed before. In the analysis of the Trifon-1 well Partridge (2001) recorded good assemblages belonging to the zone in sidewall cores between 1241 and 1778m (thickness >537 metres), and compared these results with the available age dating from other deep wells in the onshore basin. That review concluded that relatively few wells actually fully penetrated the *C. paradoxa* Zone before reaching TD, and in those that may have the currently available palynological age dating is often weak.

More recently new analyses of the cores in Lake Reeve-1 by Partridge (2004a) have confirmed the presence of good *C. paradoxa* Zone assemblages in core-2 at 1854.9m and a possible assemblage referable to the zone in core-3 at 2019.6m. The latter assemblage is remarkably similar to the assemblage documented in this report in that it contains rare *Perotrilites majus*, but lacks the more definitive index species *Coptospora paradoxa*. Dependant on verification in other sections there may be case for believing that *Perotrilites majus* has a range extension beyond the oldest occurrence of *Coptospora paradoxa*, and this may eventually prove to be a useful subdivision of the underlying *C. striatus* Zone.

What can confidently be stated in conclusion is that the Strzelecki Group at the bottom of the Wombat-3 well is definitely no older than the *Crybelosporites striatus* Zone, but may be no older than the younger *Coptospora paradoxa* Zone. If the latter is the case the *C. paradoxa* Zone has a thickness in excess of 800 metres in this well.

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**Table 1. Palynomorph assemblage recorded from cuttings at 2166-69m in Wombat-3.****Spores**

<i>Aequitriradites spinulosus</i>	X
<i>Annulispora folliculosa</i>	X
<i>Baculatisporites</i> spp.	8.0%
<i>Ceratosporites equalis</i>	X
<i>Cingutritiles congruens</i>	X
<i>Crybelosporites striatus</i>	X
<i>Cyathidites australis</i>	5.5%
<i>Cyathidites minor</i>	20.9%
<i>Dictyophyllidites</i> spp.	1.2%
<i>Dictyophyllidites crenulatus</i>	X
<i>Foveosporites canalis</i>	X
<i>Foveosporites moretonensis</i>	X
<i>Gleicheniidites circinidites</i>	0.6%
<i>Horriditritiles ramosus</i>	X
<i>Leptolepidites verrucatus</i>	X
<i>Marattisporites scabratus</i>	X
<i>Osmundacidites wellmanii</i>	14.1%
<i>Perotritiles majus</i>	X
<i>Retritritiles</i> spp.	1.2%
<i>Retritritiles austroclavatidites</i>	X
<i>Ruffordiaspora australiensis</i>	3.7%
<i>Stereisporites antiquasporites</i>	1.8%
Trilete spores undiff.	4.9%
<i>Triporoletes reticulatus</i>	X

**Total Spores: 62%****Gymnosperm Pollen**

<i>Alisporites grandis</i>	X
<i>Araucariacites australis</i>	3.1%
<i>Microcachryidites antarcticus</i>	4.9%
<i>Podocarpidites</i> spp.	24.5%
<i>Trichotomosulcites subgranulatus</i>	5.5%

**Total Gymnosperms: 38%****Total Spore-Pollen: 163****Microplankton**

<i>Sigmopollis carbonis</i>	0.6%
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**Total Microplankton in SP + MP count: 0.6%****Combined SP + MP count: 164****Other Palynomorphs**

Fungal fruiting bodies	X
Caved Tertiary palynomorphs in count	0.5%
Indeterminate palynomorphs in count	12.3%

**Other Palynomorphs in Count: 23****TOTAL Cretaceous COUNT: 187**

X = Species recorded outside of count.