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DEPARTMENT OF MINES AND ENERGY

GEOLOGICAL SURVEY

SOUTH AUSTRALIA



REPORT BOOK 93/34

# PALYNOLOGICAL AND DISPERSED CUTICLE REPORT OF KT-1 PORT BROUGHTON, PIRIE BASIN

A ROWETT

Biostratigraphy

JULY 1993

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# Palynological and Dispersed Cuticle Report of KT-1 Port Broughton Pirie Basin

ANDREW ROWETT

SAMPLE DATA:

| | |
|---|---|
| Branch Nos: | S7261, S7262, S7263, S7264. |
| Depths: | 64-68m, 74-77m, 122-123m, 139-148m. |
| Type of Samples: | Cuttings |
| Lithology: | Carbonaceous sandy clay, with small rock clasts. |
| Submitter: | R. Horn. |

LOCATION:

| | |
|---|---|
| General location: | Beach, above high tide mark, Port Broughton. |
| Mapsheet: | WALLAROO |

STRATIGRAPHIC INFORMATION:

| | |
|---|---|
| Stratigraphic Unit: | Kanaka Beds |
| Geological Province: | St Vincent Basin |
| Rock Sample No. (RS): | 6430RS354, 6430RS355, 6430RS356, 6430RS357 |

ANALYTICAL DATA:

| | |
|---|---|
| Laboratory technique: | Standard with acetolysis and 129um and 10um sieves. |
| Microscope used: | Zeiss Photomicroscope III. |
| Palynomorphs counted: | 300 in each sample. |

RESULTS:

Main components of microfossil assemblages (%, or abundance).

- **Pollen/Spore**

S7261, 64-68m.
*Haloragacidites harrisii* (15), *Nothofagidites* spp. (74), *Lygistepollenites florinii* (4). Present but in very low frequencies are *Lilliacidites bainii, Proteacidites annularis, P.obscurus, P.tenuiexinus, P.tuberculiformis, Dryptopollenites semilunatus.*

S7622, 74-77m.
*Haloragacidites harrisii* (21), *Nothofagidites* spp. (63), *Lygistepollenites florinii* (1) *Podocarpidites ellipticus* (2). Present but in very low frequencies are *Proteacidites annularis, ?P.stipplatus.*

S7623, 122-123m.
*Haloragacidites harrisii* (8.5), *Nothofagidites* spp. (53), *Lygistepollenites florinii* (6), *Phyllocladidites* spp. (12), *Podocarpidites ellipticus* (9). Present but in very low frequencies are *Triorites magnificus, Proteacidites reticulatus, P.tenuiexinus. P.tuberculatus, P.crassus, Beaupreaidites elegansiformis.*

S7264, 139-148m.
*Haloragacidites harrisii* (9.5), *Nothofagidites* spp. (60), *Lygistepollenites florinii* (4), *Phyllocladidites* spp. (10.5), *Podocarpidites ellipticus* (4). Present but in very low frequency is *Proteacidites annularis.*

- **Microplankton**: None

Comments

The greater abundance of *Nothofagidites* pollen to *Haloragacidites harrisii* the presence of *Triorites magnificus* in the older samples, and the overall lack of *Proteacidites* pollen suggests the samples are within the Middle *Nothofagidites asperus* Zone, i.e. of Late Eocene age. The low numbers of *Proteacidites crassus, P.reticulatus P.tenuiexinus, P.tuberculiformis, Lilliacidites bainii* and *Dryptopollenites semilunatus* pollen, all of which become absent by the top of the Zone and low numbers of *Proteacidites rectomarginis* which first appears at the top of the Lower Nothofagidites asperus Zone suggest a Late Eocene age. The presence of *Triorites magnificus* at 122-123m (S7264) provides further support for this age. However, the absence of *T.magnificus* and an overall decrease in the diversity of *Proteacidites* spp. from the younger samples (64-68m, 74-77m) along with a meagre presence of *Proteacidites stipplatus* and *P.tuberculatus*, (Upper *Nothofagacidites asperus* Zone) may suggest a slightly younger, possibly Early Oligocene age for these samples.

Dispersed Cuticle Report of KT-1, Port Broughton, St Vincent Basin.

Submitter R Hom
4 samples
PC 52 (64-68m), 6430RS354
PC 53 (74-77m), 6430RS355
PC 54 (122-123m), 6430RS356
PC 55 (139-148m), 6430RS357

Comments

The method of collecting these samples must be questioned as there was a high level of contamination. All four samples contained large amount of plant material identified as fragments of modern coastal sampphire species and seagrass (*Posidonia* sp.). In addition, there was a lot of cotton fibres contained in the samples, shed from the calico bags they were placed in. It would be preferable in future that any sample for dispersed cuticle analysis be stored in plastic bags. However, with these plants showing cells that still contained cytoplasm and chlorophyll there was little difficulty in distinguishing between them and the fossil cuticles.

PC 52

The dispersed cuticle flora comprises 14 cuticle types with **S1 001** and **ABL 008** the codominants, each representing 20% of the total flora. **S1 001** is the cuticle of *Banksieaephyllum laeve*, an extinct member of the Proteaceae currently recognised as an indicator of Late Eocene floras. Another common (10%) cuticle type **AW 007** (aff. Oleaceae) is also an indicator of the same Late Eocene age. A number of cuticle types known to occur in other Australian localities of differing ages are present. These include **ABL 008** aff. Lauraceae - Anglesea (upper Middle Eocene), Vegetable Creek (Late Eocene), Dean's Marsh (Early Eocene), Golden Grove (upper Middle Eocene); **AWF 001** aff. Araucariaceae - Anglesea (upper Middle Eocene), Maslin Bay (upper Middle Eocene), Dean's Marsh (Early Eocene), Lake Eyre (Late Eocene), Sedan (Late Eocene), Yallourn (Oligocene); **HL 001** aff. Lauraceae - Hale River (upper Middle Eocene), Palankarinna (Early Eocene); **AA 009** aff. Lauraceae - Anglesea (upper Middle Eocene), Lake Eyre (Late Eocene), Maslin Bay (upper Middle Eocene) and **AW 018** aff. Podocarpaceae - Anglesea (upper Middle Eocene), Ooldea Range (Late Eocene), Murray Basin (Late Eocene), Peachawarrina (Early Eocene) Kendenup (upper Middle Eocene).
An unknown monocot is also present as is a number of araucarian wood fragments.

PC 53

The dispersed cuticle flora is represented by five cuticle types with **AW 007** (aff. Oleaceae) the dominant cuticle type (58%). As stated above, **AW 007** is a recognised indicator of Australian Late Eocene floras. Of the three Lauraceae cuticle types present (**ABP 008**, **AG 005** and **HL 001**), only **ABP 008** is a significant contributor (25%) to the overall flora. None of these cuticle types are known to be age-specific, having all been recorded from Early Eocene to Early Oligocene floras. The remaining cuticle type is rare and has no known modern plant affinity.

PC 54

The most cuticle-rich sample, but with only nine cuticle types identified. The dominant cuticle type is **AW 007** (50%), which is slightly more abundant than a morphologically very similar cuticle type **OR3 001** (44%). The latter cuticle type has only been recorded from Late Eocene samples at two localities, Ooldea Range and Traralgon. The remaining cuticle types are minor contributors with no biostratigraphic significance, these include **S5 004** (aff. Proteaceae) from the Sedan locality (Late Eocene-Oligocene), **LC 014** (aff. Myrtaceae), Lochiel (Late Eocene-Oligocene), **GL 006** (aff. Myrtaceae) Golden Grove (upper Middle Eocene), Anglesea, (upper Middle Eocene), Hale River (upper Middle Eocene), Ooldea Range (Late Eocene), Curlew Formation (upper Middle Eocene) and **ALL 011** (aff. Elaeocarpaceae) Anglesea (upper Middle Eocene), Golden Grove (upper Middle Eocene), Nerriga (Middle Eocene), Muloorina (Early Eocene), Peachawarinna (Early Eocene).

PC 55

The most depauperate sample with only three cuticle types present. Cuticle type **AW 007** is again the dominant cuticle type with **OR3 001** and **AW 018** both rare.

SUMMARY

The dispersed cuticle floras of the four samples contain only a small number of cuticle types and only two of these are recognised age indicators. Cuticle type **AW 007**, which is a recognised Late Eocene indicator is present in all four samples. It is well represented in all samples, dominating the floras of three samples (PC 53, PC 54, PC 55) and as a common component in the other (PC 52).

However, in absolute terms the number of AW 007 fragments present decreases steadily from PC 54 (122-123m) to PC 52 (64-68m), i.e. from the second oldest sample to the youngest. Comparing this trend to that observed in samples taken from the Lochiel Kooliata Coal (i.e. where in the older Facies Ia sample AW 007 was a minor component and in the younger Facies IIa sample represented the entire flora) it could be interpreted that the PC 54 peak may correlate with the Facies IIa peak, in which case PC 53 and PC 52 are probably younger than Late Eocene - Oligocene.

Cuticle type S1 001 which only occurs in PC 52 is a recognised Late Eocene indicator which is also known to occur in Oligocene floras of the Latrobe Valley.
The small number of Lauraceae species throughout the sequence tends to be a feature of Late Eocene or younger floras and would therefore support an age of at least Late Eocene.

In conclusion it can be said that the four Port Broughton KT-1 samples are Late Eocene-Oligocene in age.

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