PALYNOLOGICAL REPORT ON ESSO PERCH A-1 WELL

Sidewall cores from between 4074 feet and 8245 feet and chips of core 6 from 8739-53 feet in Esso Perch A-1 well were submitted for palynological dating by Esso Standard Oil (Australia) ltd. The majority of samples examined yielded plant material including spores, pollen grains, and fragments of wood and cuticular tissue; microplankton were not encountered in the palynological residues. Samples between 4074 feet and 4825 feet contain, in concentrations ranging from abundant to sparse, reasonably well preserved spores and pollen grains. The microfloras extracted from horizons between 5683 feet and 8753 feet are less well preserved, exhibiting a decrease in preservation quality with increasing depth.

Analyses of microfloras contained in sediments between 4074 feet and 4825 feet indicates that the section ranges in age from uppermost Cretaceous to Eocene. Sediments at and below 5683 feet areof Lower Cretaceous age, ranging from Neocomian or Aptian to Albian.

MICROFLORAL ASSEMBLAGES AND AGE DETERMINATIONS

A. 4074 feet - 4825 feet

4074 feet

Fair concentrations of reasonably well preserved spores and pollen grains together with abundant cuticular tissue were extracted from the sample. Species identified include:

Spores: *Baculatisporites comaumensis* (Cookson)
Cyathidites splendens Harris
Gleicheniidites circinidites (Cookson)
Laevigatosporites ovatus Wilson & Webster
Lycopodiumsporites austroclavatidites (Cookson)
Stereisporites antiquasporites (Wilson & Webster)

Pollen: *Anacolosidites acutullus* Cookson & Pike
Duplopollis orthoteichus (Cookson & Pike)
Nothofagidites emarcidus (Cookson)
N. cinctus (Cookson)
N. heterus (Cookson)

N. goniatus (Cookson)
Phyllocladidites mawsonii Cookson
Podocarpidites ellipticus Cookson
Proteacidites crassus Cookson
P. subscabratus Couper
P. spp.
Tricolpites sp.
Triorites harrisii Couper

4382 feet

The carbonaceous residue consists chiefly of wood fragments. Spores and pollen grains are of rare occurrence and are reasonably well preserved. Specimens attributable to the following types were observed:

Spores: Gleicheniidites circinidites (Cookson)
Pollen: Phyllocladidites mawsonii Cookson
Podocarpidites ellipticus Cookson
Proteacidites subscabratus Couper
Triorites edwardsii Cookson & Pike f. tenuis Stover & Jones (one broken specimen)

4555 feet

Reasonably well preserved spores and pollen grains are of common occurrence in the residue which also contains some wood and cuticular material. The following species were observed:

Spores: Camarozonosporites amplus (Stanley)
Cyathidites australis Couper
Stereisporites antiquasporites (Wilson & Webster)
Pollen: Dacrydiumites balmei Cookson
D. ellipticus Harris
D. florinii Cookson & Pike
Microcachryidites antarcticus Cookson
Nothofagidites emarcidus (Cookson)
Polyporina fragilis Harris
Phyllocladidites mawsonii Cookson
P. reticul osaccatus Harris
Proteacidites crassus Cookson
P. subscabratus Couper
Triorites edwardsii Cookson & Pike f. rudatus Stover & Jones

4640 feet

Low concentrations of spores and pollen grains occur with abundant wood and cuticular tissue in the residue. The following reasonably well preserved species were identified:

Spores: Laevigatosporites ovatus Wilson & Webster
Pollen: Cycadopites sp.
Microcachryidites antarcticus Cookson
Phyllocladidites mawsonii Cookson
P. reticulosaccatus Harris
Podocarpidites ellipticus Cookson

4720 feet

A reasonably well preserved assemblage of spores and pollen grains was extracted from the sample together with infrequent wood and cuticular material. The following species were observed:

Spores: Camarozonosporites amplus (Stanley)
Cyathidites australis Couper
C. splendens Harris
Gleicheniidites circinidites (Cookson)
Laevigatosporites ovatus Wilson & Webster
L. major (Cookson)
Microfoveolatosporis sp.
Stereisporites antiquasporites (Wilson & Webster)
Pollen: Dacrydiumites balmei Cookson
D. florinii Cookson & Pike
Microcachryidites antarcticus Cookson
Nothofagidites emarcidus (Cookson)
Phyllocladidites mawsonii Cookson
P. reticulosaccatus Harris
Proteacidites cf. crassus Cookson
P. subscabratus Couper
Tricolpites pachyexinus Couper
T. sp.
Triorites edwardsii Cookson & Pike f. tenuis Stover & Jones
Triorites harrisii Couper

4790 feet

Plant material extracted from the sample includes fairly preserved spores and pollen grains with less common wood and cuticular material. The following spore and pollen species were identified:

Spores: Baculatisporites comaumensis (Cookson)
Camarozonosporites amplus (Stanley)
Cyathidites australis Couper
C. minor Couper
C. splendens Harris
Gleicheniidites circinidites (Cookson)
Kraeuselisporites papillatus Harris
Laevigatosporites major (Cookson)
L. ovatus Wilson & Webster
Stereisporites antiquasporites (Wilson & Webster)
S. sp.

Pollen: Araucariacites australis Cookson
Dacrydiumites balmei Cookson
Microcachryidites antarcticus Cookson
Phyllocladidites mawsonii Cookson
Podosporites microsaccatus (Couper)
Podocarpidites ellipticus Cookson
Proteacidites subscabratus Couper
Stephanoporopollenites obscurus Harris
Tricolpites gillii Cookson
T. pachyexinus Couper
Tetracol(?por) ites sp.

4825 feet

Reasonable concentrations of fairly preserved spores and pollen grains occur in the residue. Abundant, fragmented woody tissue was also recovered. The following spore-pollen forms were identified:

Spores: Baculatisporites comaumensis (Cookson)
Cyathidites australis Cookson
Gleicheniidites circinidites (Cookson)
Pollen: Araucariacites australis Cookson
Dacrydiumites florinii Cookson & Pike
Microcachryidites antarcticus Cookson
Phyllocladidites mawsonii Cookson
Podocarpidites ellipticus Cookson
Polyporina fragilis Harris
Proteacidites amolosexinus Dettmann & Playford
P. scaboratus Couper
P. subscabratus Couper
Stephanoporopollenites obscurus Harris
Tricolpites gillii Cookson
T. lillei Couper
T. pachyexinus Couper
T. sabulosus Dettmann & Playford
Triorites edwardsii Cookson & Pike f. rudatus Stover & Jones
T. edwardsii f. tenuis Stover & Jones

The sample at 4074 feet yielded Duplopollis orthoteichus and common Nothofagidites, including a single specimen of N. goniatus. The latter species would suggest assignment of the microflora to the Nothofagidites asperus (Eocene) Assemblage, but it is possible that the species' single representative could have been derived from higher horizons. In any case, the presence of Duplopollis orthoteichus indicates that the microflora belongs to the D. orthoteichus Eocene Assemblage or to younger Eocene assemblages.

A sparse microflora was obtained from the sample at 4382 feet; a broken example of Triorites edwardsii was identified and on this basis the microflora is tentatively assigned to the Paleocene Triorites edwardsii Assemblage. This assemblage is represented in the sample from 4555 feet which yielded Triorites edwardsii, Camarozonosporites amplus, Dacrydiumites balmei, and Phyllocladidites reticulosaccatus. P. reticulosaccatus was also recovered from the sample at 4640 feet but no other stratigraphically significant species were observed in the sparse microflora.

The association of P. reticulosaccatus, Dacrydiumites balmei, and Tricolpites pachyexinus at 4720 feet and of the two last-named species at 4790 feet appears to be anomalous with the known distribution of the individual species. D. balmei has been recorded only from the Triorites edwardsii and Transition Assemblages. P. reticulosaccatus exhibits similar stratigraphical restriction, but with few documented occurrences in the Transition Assemblage (see Dettmann 1963). Tricolpites pachyexinus, however, has hitherto been reported only from the Tricolpites lillei Assemblage. Thus, on present knowledge, the horizons at 4720 feet and 4790 feet may be attributable to either the early Tertiary- late Cretaceous Transition Zone or the the uppermost Cretaceous Tricolpites lillei Zone.

The T. lillei Assemblage was identified in the sample at 4825 feet which includes T. lillei, T. pachyexinus, T. sabulosus, and Proteacidites amolosexinus.

B. 5683 feet - 8753 feet

5683 feet

Reasonable concentrations of poorly preserved spores and pollen grains were recovered from the sample. The following types were identified:

Spores: Baculatisporites comaumensis (Cookson)
Cicatricosisporites australiensis (Cookson)
Coptospora paradoxa (Cookson & Dettmann)
Crybelosporites striatus (Cookson & Dettmann)
Cyathidites australis Couper
Foraminisporis wonthaggiensis (Cookson & Dettmann)
Klukisporites scaberis (Cookson & Dettmann)
Leptolepidites verrucatus Couper
Lycopodiumsporites austroclavatidites (Cookson)
Stereisporites antiquasporites (Wilson & Webster)
Trilobosporites trioreticulosus Cookson & Dettmann
Pollen: Alisporites grandis (Cookson)
A. similis (Balme)
Araucariacites australis Cookson
Microcachryidites antarcticus Cookson
Podocarpidites cf. ellipticus Cookson

5925 feet

An abundant microflora containing the following fair to poorly preserved spores and pollen grains was extracted from the sample:

Spores: Aequitriradites spinulosus (Cookson & Dettmann)
Cicatricosisporites australiensis (Cookson)
Coptospora paradoxa (Cookson & Dettmann)
Crybelosporites striatus (Cookson & Dettmann)
Cyathidites australis Couper
C. minor Couper
C. punctatus (Delcourt & Sprumont)
Foraminisporis wonthaggiensis (Cookson & Dettmann)
Rouseisporites reticulatus Pocock
R. simplex Dettmann
Stereisporites antiquasporites (Wilson & Webster)
Pollen: Alisporites grandis (Cookson)
Classopollis cf. classoides Pflug
Araucariacites australis Cookson
Microcachryidites antarcticus Cookson
Podosporites microsaccatus (Couper)
Podocarpidites cf. ellipticus Cookson
Incertae Sedis: Schizosporis reticulatus Cookson & Dettmann

6054 feet

Poor concentrations of the following species of fairly to poorly preserved spores and pollen grains were recovered from the sample:

Spores: Baculatisporites comaumensis (Cookson)
Cyathidites australis Couper
C. minor Couper
Foraminisporis asymmetricus (Cookson & Dettmann)
F. wonthaggiensis (Cookson & Dettmann)

Gleicheniidites circinidites (Cookson)
Rouseisporites simplex (Cookson & Dettmann)
Stereisporites antiquasporites (Wilson & Webster)
Pollen: Cycadopites nitidus (Balme)
Microcachryidites antarcticus Cookson
Podocarpidites cf. ellipticus Cookson

6110 feet

The sample yielded a sparse, poorly preserved microflora in which the following species were identified:

Spores: Baculatisporites comaumensis (Cookson)
Cyathidites australis Couper
C. minor Couper
Lycopodiumsporites austroclavatidites (Cookson)
Stereisporites antiquasporites (Wilson & Webster)
Pollen: Podocarpidites cf. ellipticus Cookson

6332 feet

Abundant, fairly to poorly preserved spores and pollen grains and less frequent wood and cuticular fragments were obtained from the sample. Species identified include:

Spores: Aequitriradites spinulosus (Cookson & Dettmann)
A. verrucosus (Cookson & Dettmann)
Arcellites reticulatus (Cookson & Dettmann)
Balmeisporites holodictyus Cookson & Dettmann
Cicatricosisporites australiensis (Cookson)
Coptospora paradoxa (Cookson & Dettmann)
Crybelosporites striatus (Cookson & Dettmann)
Cyathidites australis Couper
C. minor Couper
C. punctatus (Delcourt & Sprumont)
Foraminisporis asymmetricus (Cookson & Dettmann)
Lycopodiacidites asperatus Dettmann
Rouseisporites reticulatus Pocock
R. radiatus Dettmann
R. simplex (Cookson & Dettmann)
Stereisporites antiquasporites (Wilson & Webster)
Pollen: Microcachryidites antarcticus Cookson
Podocarpidites cf. ellipticus Cookson

6522 feet

Poorly preserved spores, pollen grains, wood, and cuticular material were extracted from the sample. The following spore-pollen types were identified:

Spores: Cicatricosisporites australiensis (Cookson)
Crybelosporites striatus (Cookson & Dettmann)
Cyathidites australis Couper
C. minor Couper
C. punctatus (Delcourt & Sprumont)
Foraminisporis wonthaggiensis (Cookson & Dettmann)
Lycopodiumsporites eminulus Dettmann
Rouseisporites reticulatus Pocock
Stereisporites antiquasporites (Wilson & Webster)
Pollen: Alisporites grandis (Cookson)
Microcachryidites antarcticus Cookson
Podocarpidites cf. ellipticus Cookson

6740 feet

Plant material observed in the residue includes poorly preserved spores and pollen grains intermixed with abundant wood and cuticle. The following species of spores and pollen grains were identified:

Spores: Ceratosporites equalis Cookson & Dettmann
Coptospora paradoxa (Cookson & Dettmann)
Crybelosporites striatus (Cookson & Dettmann)
Cyathidites australis Couper
C. minor Couper
Foraminisporis wonthaggiensis (Cookson & Dettmann)
Leptolepidites verrucatus Couper
Lycopodiumsporites austroclavatidites (Cookson)
L. nodosus Dettmann
Klukisporites scaberis (Cookson & Dettmann)
Rouseisporites reticulatus Pocock
Stereisporites antiquasporites (Wilson & Webster)
Pollen: Araucariacites australis Cookson
Microcachryidites antarcticus Cookson
Podocarpidites cf. ellipticus Cookson
Tsugaepollenites dampieri (Balme)

6985 feet

Poorly preserved, fragmented plant material extracted from the sample includes common spores and pollen grains and abundant wood and cuticular tissue. The following forms were identified:

Spores: Baculatisporites comaumensis (Cookson)
Cicatricosisporites australiensis (Cookson)
Cyathidites australis Couper
C. minor Couper
Dictyotosporites speciosus Cookson & Dettmann (1 doubtful specimen)
Foraminisporis asymmetricus (Cookson & Dettmann)
F. wonthaggiensis (Cookson & Dettmann)
Lycopodiumsporites austroclavatidites (Cookson)

Stereisporites antiquasporites (Wilson & Webster)
Pollen: Alisporites grandis (Cookson)
Microcachryidites antarcticus Cookson

7170 feet

A small residue containing poorly preserved, fragmented spores and pollen grains was extracted from the sample. Species identified include:

Spores: Baculatisporites comaumensis (Cookson)
Cicatricosisporites australiensis (Cookson)
Lycopodiumsporites sp.
Pollen: Araucariacites australis Cookson
Podocarpidites cf. ellipticus Cookson

7430 feet

Abundant, poorly preserved and fragmented spores and pollen grains occur in the sample and include representatives of the following species:

Spores: Baculatisporites comaumensis (Cookson)
Ceratosporites sp.
Cicatricosisporites australiensis (Cookson)
Cingutriletes clavus (Balme)
Crybelosporites striatus (Cookson & Dettmann)
Cyathidites australis Couper
C. minor Couper
Klukisporites scaberis (Cookson & Dettmann)
Lycopodiumsporites austroclavatidites (Cookson)
L. facetus Dettmann
Stereisporites antiquasporites (Wilson & Webster)
Pollen: Alisporites similis (Balme)
Araucariacites australis Cookson
Microcachryidites antarcticus Cookson

7625 feet

Good concentrations of fragmented and poorly preserved spores and pollen grains occur in the sample. The following types were identified:

Spores: Aequitriradites spinulosus (Cookson & Dettmann)
Cicatricosisporites australiensis (Cookson)
Contignisporites sp.
Crybelosporites striatus (Cookson & Dettmann)
Cyathidites australis Couper
C. minor Couper
C. punctatus (Delcourt & Sprumont)
Januasporites spinulosus Dettmann

Leptolepidites major Couper
Lycopodiumsporites austroclavatidites (Cookson)
Foraminisporis wonthaggiensis (Cookson & Dettmann)
Reticulatisporites pudens Balme
Rouseisporites sp.
Stereisporites antiquasporites (Wilson & Webster)

Pollen: Araucariacites australis Cookson
Microcachryidites antarcticus Cookson
Podocarpidites cf. ellipticus Cookson

7897 feet

The following species of poorly preserved spores and pollen grains occur commonly in the residue which also contains infrequent wood and cuticle.

Spores: Baculatisporites comaumensis (Cookson)
Ceratosporites sp.
Cicatricosisporites australiensis (Cookson)
Crybelosporites striatus (Cookson & Dettmann)
Cyathidites australis Couper
C. punctatus (Delcourt & Sprumont)
Gleicheniidites cf. circinidites (Cookson)
Leptolepidites verrucatus Couper
Lycopodiumsporites austroclavatidites (Cookson)
L. facetus Dettmann
L. nodosus Dettmann

Pollen: Alisporites grandis (Cookson)
Microcachryidites antarcticus Cookson
Podocarpidites cf. ellipticus Cookson

8092 feet

The poorly preserved microflora extracted from the sample includes the following forms of spores and pollen grains:

Spores: Aequitriradites spinulosus (Cookson & Dettmann)
Baculatisporites comaumensis (Cookson)
Ceratosporites sp.
Cicatricosisporites australiensis (Cookson)
Crybelosporites striatus (Cookson & Dettmann)
Cyathidites australis Couper
C. minor Couper
C. punctatus (Delcourt & Sprumont)
Foraminisporis asymmetricus (Cookson & Dettmann)
F. wonthaggiensis (Cookson & Dettmann)
Gleicheniidites cf. circinidites (Cookson)
Klukisporites scaberis (Cookson & Dettmann)
Lycopodiumsporites austroclavatidites (Cookson)
Pilosisporites notensis Cookson & Dettmann
Rouseisporites reticulatus Pocock

Stereisporites antiquasporites (Wilson & Webster)
Pollen: Araucariacites australis Cookson
Microcachryidites antarcticus Cookson
Podocarpidites cf. ellipticus Cookson

8245 feet

Good concentrations of poorly preserved spores and pollen were extracted from the sample which also contains abundant fragments of wood and cuticle. The following spore-pollen types were identified:

Spores: Baculatisporites comaumensis (Cookson)
Ceratosporites sp.
Cicatricosisporites australiensis (Cookson)
Crybelosporites striatus (Cookson & Dettmann) (1 doubtful specimen)
Cyclosporites hughesi (Cookson & Dettmann)
Cyathidites australis Couper
C. minor Couper
Leptolepidites verrucatus Couper
Lycopodiumsporites austroclavatidites (Cookson)
L. facetus Dettmann
Neoraistrickia truncata (Cookson)
Rouseisporites reticulatus Pocock
Stereisporites antiquasporites (Wilson & Webster)
Pollen: Araucariacites australis Cookson
Classopollis cf. classoides Pflug
Microcachryidites antarcticus Cookson
Podocarpidites cf. ellipticus Cookson

8739 feet (core 6)

Poorly preserved, fragmented plant microfossils identified in the residue include the following forms:

Spores: Aequitriradites verrucosus (Cookson & Dettmann)
Baculatisporites comaumensis (Cookson)
Cicatricosisporites australiensis (Cookson)
Cyathidites australis Couper
Foraminisporis wonthaggiensis (Cookson & Dettmann)
Leptolepidites verrucatus Couper
Lycopodiumsporites austroclavatidites (Cookson)
Rouseisporites reticulatus Pocock
Stereisporites antiquasporites (Wilson & Webster)
Pollen: Araucariacites australis Cookson
Alisporites grandis (Cookson)
Microcachryidites antarcticus Cookson
Incerate Sedis : Schizosporis ?spriggi Cookson & Dettmann

8753 feet (core 6)

Spores and pollen grains occur rarely in the sample and are poorly

preserved. The following types were identified:

Spores: Aequitriradites spinulosus (Cookson & Dettmann)
Baculatisporites comaumensis (Cookson)
Cicatricosisporites australiensis (Cookson)
Cyathidites australis Couper
Rouseisporites reticulatus Pocock
Stereisporites antiquasporites (Wilson & Webster)

Pollen: Classopollis cf. classoides Pflug
Microcachryidites antarcticus Cookson
Podocarpidites sp.

Samples at and below 5685 feet are clearly of Lower Cretaceous age on the basis of their spore-pollen content. The highest sample at 5683 feet yielded Coptospora paradoxa in association with Trilobosporites trioreticulosus and Crybelosporites striatus and apparently lacks angiospermous grains. This evidence indicates the presence of the Coptospora paradoxa Zone which is now regarded to be of Middle-Upper Albian age (see Dettmann and Playford 1968, Evans and Hawkins 1967, Burger 1968). Coptospora paradoxa continues as a component of microfloras down to 6740 feet; thus, the section between 5683 feet and 6740 feet is referred to the C. paradoxa Zone.

Stratigraphically significant species observed in successively lower horizons include Crybelosporites striatus which occurs down to 8092 feet. Thus, the section between 6740 feet and 8092 feet is also of Albian age. Moreover, the possible representation of Dictyotosporites speciosus at 6985 feet could indicate that sediments in the interval 6985 - 8092 feet are referable to the Crybelosporites striatus Subzone of the Dictyotosporites speciosus Zone and are of Lower Albian age (Evans and Hawkins 1967).

The sample at 8245 feet yielded Cyclosporites hughesi with doubtful Crybelosporites striatus. The concurrence of these species would suggest that the horizon is of Aptian/Lower Albian age and on the boundary between the C. striatus and C. hughesi Subzones of the D. speciosus

Zone.

The remainder of the section examined (between 8739 feet and 8753 feet) is probably referable to the Cyclosporites hughesi Subzone of Neocomian - Aptian age on the basis of the content of Rouseisporites reticulatus.

CONCLUSIONS

Sediments in Perch A-1 well between 4074 feet and 8753 feet range in age from Neocomian or Aptian to Eocene. The section between 4074 feet and 4825 feet yielded microfloras referable to the following late Cretaceous - early Tertiary spore-pollen assembalges:

1) the Duplopollis orthoteichus Assemblage or/a younger assemblage of Eocene age at 4074 feet.
2) the Paleocene Triorites edwardsii Assemblage at 4555 feet, and possibly at 4382 feet and 4640 feet.
3) possible representation of the latest Cretaceous-earliest Tertiary Transition Assemblage at 4720 feet and 4790 feet.
4) the late Cretaceous Tricolpites lillei Assemblage at 4825 feet.

The section between 5683 feet and 8753 feet is of Lower Cretaceous age and includes the following spore-pollen Zones.

1) the Coptospora paradoxa Zone of Middle-Upper Albian age between 5683 feet and 6740 feet.
2) possible representation of the Lower Albian Crybelosporites striatus Subzone of the Dictyotosporites speciosus Zone between 6985 feet and 8092 feet (to ?8245 feet).
3) the Neocomian-Aptian Cyclosporites hughesi Subzone of the D. speciosus Zone between 8245 feet and 8753 feet.

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