

FURTHER EXAMINATION OF PLANT REMAINS F.B.H. FORT CAMPBELL NO. 4 BORE

Further examination of plant remains from Port Campbell No. 4 bore at 4,985-5,005 feet has yielded the following additional information.

The strap-like compressions described anatomically and physically in Unpublished Report 75/64 have been redescribed because it appears that two Agathis-like forms exist in the core, or different organs from one Agathis-like form are present. After any necessary revision and addenda complete diagnoses will be formally published on completion of the current work on Victorian Mesozoic plant compressions.

A. Compressions comparable with Agathis sp.

Description

Megascopeic. leaves, isolated fragmentary, strap-like, linear spatulate, margins parallel, apex rounded, surface with longitudinal ridges. Lamina length (fragments only), maximum 65 mm. Lamina width (maximum) 12 mm.

Microscopic. Stem unknown
Leaf (hypostomatic) Cuticle regarded as derived from upper surface.

Cells rectangular sub rectangular, the former more confined to areas covering vein cells which form parallel but inconspicuous rows. Anticlinal walls heavily thickened, pitting prominent cells very seldom longer than 80 microns, average width about 28 microns.

Cuticle regarded as derived from lower surface

Cells divided into stomatal and non stomatal areas, stomata confined to bands parallel to the longitudinal veins, bands usually consisting of four rows of stomata, interior rows often tenuous, intermittent.

Vein cells strongly thickened, pitting prominent. Shape rectangular size comparable to rectangular cells of upper surface cuticle.

Stomata usually arranged with polar axis transverse vein direction, chamber about 50 microns in diameter. Inside walls of subsidiary cells, or outer walls of guard cells heavily thickened. Chamber generally oval, or oval rectangular in shape. Subsidiary cells usually 5 encircling cells present.

Remarks

This species differs from all other Victorian Mesozoic Agathis-like forms in possessing hypostomatic leaf surfaces. It also differs in stomatal arrangement on the lower surface of the leaf. It is thus more comparable with the Tertiary forms described by Cookson and Duigan (1951) but differs slightly in vein cell elongation and stomatal arrangement. It is the only species so far obtained from this core with recognizable megastructure and well preserved microstructure.

B. Maceration cuticular material comparable with Agathis sp.

Description

Microscopic. Adhering cuticles, one (lower and upper not distinguishable in fragments examined) slightly thicker than the other. Both divided into stomatal and non stomatal areas. Stomata in rows of single stomata, separated by up to 12 vein or intervening cells. Intervening cells rectangular, pitting not prominent. Stomata orientation with polar axis transverse vein direction; chamber diameter about 50 microns. Subsidiary cells 4-6, encircling cells present.

Remarks

This cuticle has been previously discussed in my first report on the plant remains from Port Campbell bore No. 4 4,985-5,003 feet, but was wrongly attributed to the megascopic compressions common in this core. It appears at this juncture to be from a different species of Agathis-like conifer than the cuticle obtained from the compressions described above.

C. Maceration cuticular material comparable with:

1. Pagiophyllum sp.

Description

Conifer leaves, up to 5 m.m. long, narrow triangular, lower surface planar, upper with projecting longitudinal ridge (convex), margins entire.

Stomata not present on upper surface, which consists of longitudinal rows of rectangular-rounded cells arranged longitudinally, and much thickened in on outer surface. Lower surface of thinner walled cells with stomatal region commencing some distance from margin, but possibly absent over central strip running longitudinally. Stomata closely juxtaposed subsidiary cells 4-6, encircling cells present. Neighbouring stomata encircling cells often with a common anticlinal wall. Stomatal pit rectangular-oval stomatal complex including encircling cells averaging about 55 microns in diameter.

Remarks

Pagiophyllum type leaves, probably derived from Arancarian precursors have been found from a number of localities in Western Victoria, including F.B.H. Pretty Hill No. 1 bore at 2,736-2,738 feet, and Moonlight Head (outcrop samples). Although more than one form is probably present, the leaf described above does not appear to be present in older Victorian Mesozoic floras, and as far as is known is a good indicator of beds near the top of the Victorian non-marine Mesozoic section (Otway Group).

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2. Elatocladus sp.

Description

Leaves narrow flat portions 5-6 long macerated, averaging 1 m.m. wide, margins sub parallel, apex pointed.

Cuticle regarded as upper consisting of sub-rectangular cells, anticlinal walls pitted, not obviously thickened, medium zone of longer, narrower cells probably representing position of main vein. Cuticle regarded as lower thinner, walls pitted, shape sub-rectangular, with stomata in two rows on either side of position of central main vein, stomata rows 2 stomata wide on each side.

Stomatal apertures invariably aligned parallel main vein (and leaf margins) stomata consisting of 4-6 subsidiary cells and encircling cells. Stomatal complex 35-50 microns in diameter to outer margins of subsidiary cells.

Remarks

The name Elatocladus, applied to sterile Podocarpaceae-like conifer leaves is temporarily applied here until further comparison is made.

- D. Maceration cuticular material considered to belong to dicotyledonous angiosperms.

Type 1. Provisional description

Adhering hypostomatic cuticles, cuticle regarded as derived from upper surface of leaf showing irregular-rectangular shaped cells surface area about 300 sq. microns. Anticlinal walls irregular with slight undulations, but in low power magnification appearing more or less straight. Walls (anticlinal) about 2 microns thick. Cuticle regarded as derived from lower surface ordinary cells similar to above, with exception of stomata (see below) and vein cells which are more elongated, and form an interlocking network. Stomata are apparently of paracytic type, with large subsidiary cells flanking thickened guard cells. Guard cells are kidney shaped, 19-25 microns long, and in expanded condition the distance from outer wall of guard cell to corresponding outer wall often reaches 20 microns. Stomatal frequency taken over an area with no major veins, averages 90 per sq. m.m. Orientation apparently irregular, but possibly with some relationship to vein arrangement.

Remarks

This and the following form provisionally described are the first angiosperm-like cuticles to be derived from the Victorian Mesozoic. Evans 1961 (Bureau of Min. Res. Records 1961/63) records Angiosperm pollen from the Port Campbell No. 1 bore in core 23 (5,700-5,708') which has been correlated with this PC4 material in my preliminary report. Further examination of the PCL core 23 has revealed angiosperm-like remains from the 5,700-5,708' core, thus providing further evidence for correlation.

Type 2. Provisional description

Single cuticle, regarded as probably derived from lower surface of leaf. Cell shape irregular, except in vein areas where they are rectangular-spindle shaped. Veins arranged in network. Ordinary epidermal cell anticlinal walls irregularly sinuous, about 1 micron thick, surface area from 250-350 sq. microns. Stomata present, apparently irregularly orientated but possibly with some relationship to vein arrangement. Frequency over an area with no major veins, 170 per sq. mm. Guard cells kidney shaped, average size 24 x 15 microns. Subsidiary cells in paracytic arrangement.

Remarks

This form may readily be distinguished from the cuticle regarded as derived from the lower surface of leaf, Type 1 above in:

1. Ordinary epidermal cell anticlinal wall form.

These walls are much more sinuous in Type 2.

2. Stomatal frequency.

In Type 2 the stomata are almost twice as frequent. Numerous undescribed cuticle fragments have been isolated from this Port Campbell No. 4 bore core including some from conifer reproductive tissues, and other angiosperms apart from those briefly described above.

Correlation of Beds

This Conifer-Angiosperm flora may be an important unknown element in the evolutionary history of the Victorian flora, and is known elsewhere only from the Port Campbell No. 1 bore at 5,705 feet and Mepunga No. 7 bore at 3,227-3,239 feet (Core AS). Certain elements of the flora also occur in the Pretty Hill No. 1 bore at 2,736-2,738 feet, and in outcrop at Moonlight Head (see above).

John Douglas,
Geologist

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