PLEISTOCENE MACRO- AND MICRO-PLANT FOSSILS FROM ROSEBERY, WESTERN TASMANIA

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(with one table and one plate)

COLHOUN, E.A. & VAN DE GEER, G., 1987 (30:vi): Pleistocene macro- and micro-plant fossils from Rosebery, western Tasmania. *Pap. Proc. R. Soc. Tasm.*, 121: 89-92. https://doi.org/10.26749/rstpp.121.89 ISSN 0080-4703. Department of Geography, University of Newcastle, N.S.W. 2083 (E.A.C.); and Department of Geography, University of Tasmania, G.P.O. Box 252C, Tasmania 7001.

Fossils of *Microstrobos niphophilus* and pollen in glacial lake clays that underlie till of the Penultimate Glaciation of western Tasmania indicate that an alpine heathland-herbfield environment occurred at 200 to 240 m altitude, and that the temperature was at least 4.5 to 5° C colder than at present. Charcoal in the deposits indicates that fires occurred adjacent to ice long before Man arrived in Tasmania.
Key Words: Pleistocene, western Tasmania, alpine heathland/herbfield, *Microstrobos*, fire, lower temperature.

INTRODUCTION

During a visit to the Rosebery open cut mine while examining glacial deposits in January 1987 abundant, small wood and charcoal fragments were found in glacial lake clays. The occurrence of such fragments in glacial lake clay deposits is extremely rare in Tasmania. Although transported into the lake the fragments were so well preserved and so numerous that they could not have travelled far. The abundance of wood suggested that the glacial lake clays might contain pollen from which the vegetation and climate that occurred in the area at the time of their deposition might be interpreted. This paper presents and interprets the results.

OCCURRENCE

The Rosebery open cut mine is located between 200 and 240 m a.s.l. on the southwestern slope of Mount Black just north of the Rosebery township (Grid Ref. 787741 on Sophia Sheet 8014, 3rd edition, 1977, 1:100 000 Topographic Survey Map).

A section on the northern wall of the upper level of the mine showed 1-2.5 m of varved-type glacial lake silt and clay resting on an irregular surface of black slates of the Cambrian age Rosebery Group (Corbett *et al.* 1977). The lake deposits extended for about 8 m and were overlain by more than 2 m of compact basal till deposits that were formed during the Boco Glaciation, the Penultimate Glaciation of western Tasmania (Augustinus & Colhoun 1986).

FOSSILS

The macrofossils consisted of many wood fragments 50 to 300 mm in length and 3 to 20 mm in thickness. Most were twisted in a manner which indicated that they were probably derived from a low or reptant shrub. Two branchlets were found which bore the typical leaf form of *Microstrobos niphophilus* Garden and Johnson. The field identification was confirmed under the SEM by R.S. Hill of the Botany Department, University of Tasmania (plate 1). In addition, one broken branchlet that was probably *Diselma archeri* Hook but might have been *Microcachrys tetragona* Hook was found.

The macrofossil evidence suggests that a thicket of low alpine shrubs grew on the southern slopes of Mount Black just before the arrival of the ice which moved from east to west in the Rosebery area. The ice would have destroyed the vegetation and its meltwaters would have washed the branchlets into the pond in which the silt and clay was accumulating before it advanced over the deposit.

A sample of clay was processed for pollen using the extraction method of Faegri & Iversen (1975). The pollen taxa were identified from modern reference slides prepared by M.K. Macphail in 1969-1972 and were allocated to plant taxa following the nomenclature of Curtis (1963, 1967) and Curtis & Morris (1975). The percentages of pollen recorded are calculated from a sum of 337 grains of tree, shrub and dry-land taxa (table 1).

The pollen assemblage is typical of assemblages that have been recorded from non-forested environments in western Tasmania during times

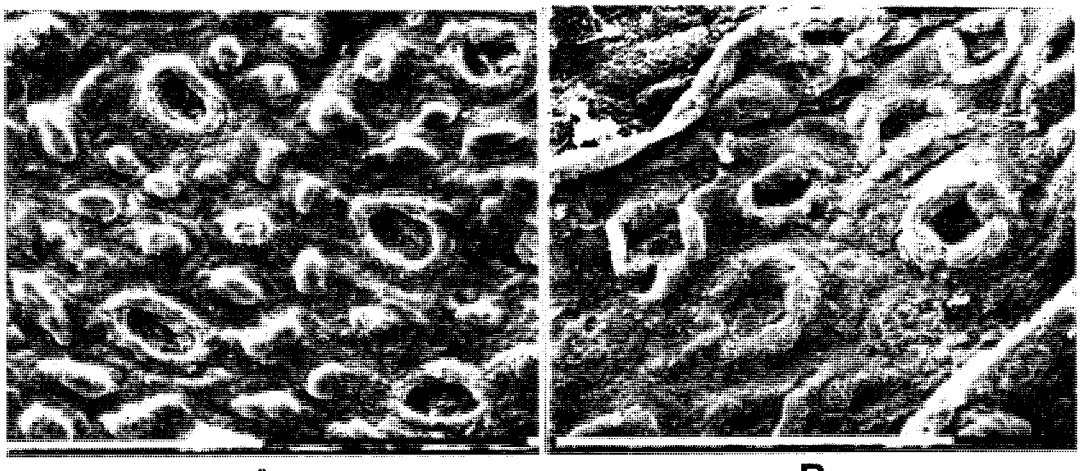

PLATE 1 — Scanning electron micrographs. A, fossil Microstrobos *cuticle; B, fossil cuticle, probably* Diselma, *possibly* Microcachrys. *In both cases scale unit* = 100μm. *Photographs per courtesy of Dr R.S. Hill.*

when ice was present in the mountains and the lowland climate was cold. The assemblage is dominated by herbs particularly grasses and Compositae, with small amounts of *Plantago*, *Gentianella* and *Oreomyrrhis* which are usually recorded in alpine assemblages. The relatively high values for alpine-subalpine shrubs including *Microstrobos*, *Diselma* and *Microcachrys*, plus the high shrub values particularly of Epacridaceae T-type, indicates the presence of alpine and subalpine heath communities. The low percentage of tree pollen and very low percentage of rainforest tree types (many of which could have survived in shrub form) suggest that only scattered shrubs and small trees occurred within the wet alpine-subalpine heathland-herbfield communities which occurred at or above the equivalent altitude of modern treeline.

The lake deposits and pollen preparations contains abundant finely divided charcoal fragments. The charcoal indicates that natural burning of the vegetation occurred in close juxtaposition to the advancing glaciers at a time which greatly preceded the advent of Man to Tasmania about 20 000 yr b.p. (Kiernan *et al.* 1983).

SIGNIFICANCE

The Rosebery site is significant for several reasons. Firstly, it is the only site known from the lowland temperate forest country of western Tasmania where macrofossils of *Microstrobos* and microfossils that indicate an alpine floral assemblage are associated with glacial deposits that precede in stratigraphic age the Last Glacial Stage. Secondly, because the lake deposits are clearly overlain by till deposits of the Boco glaciation, which in the Mackintosh Valley have been radiocarbon dated to more than 43 800 yr b.p. (SUA 1047), they are most unlikely to have been formed during the middle of the Last Glacial Stage (25 000–50 000 yr b.p.) when deposits that contain similar pollen assemblages were formed at Henty Bridge, Tullabardine Dam, and Newall Creek (Colhoun 1985a, Colhoun & van de Geer 1986, van de Geer *et al.* unpublished). It is notable that the assemblage at Rosebery contains only pollen that could be derived from the modern subalpine-alpine vegetation of the West Coast Ranges above 1000 m and does not contain any ancient types with Tertiary affinities. Thus, although stratigraphically and radiometrically dated as preceding the Last or

TABLE 1

Percentages of pollen taxa recorded.

Temperate rainforest trees	2.7	
Lagarostrobos franklinii		0.6
Nothofagus cunninghamii		1.8
Phyllocladus aspleniifolius		0.3
Other trees	11.3	
Acacia		0.6
Casuarina		3.6
Eucalyptus		7.1
Small trees and shrubs	17.6	
Boronia		0.3
Coprosma		0.6
Epacridaceae T-type		10.7
Epacridaceae *Monotoca*		0.3
Hakea		0.3
Letospermum		0.6
Melaleuca		0.9
Orites		2.4
Indeterminate Proteaceae, probably small		1.2
Tasmannia lanceolata		0.3
Alpine-subalpine shrubs	12.0	
Athrotaxis-Diselma archeri type		2.1
Belendena montana		0.3
Microcachrys tetragona		3.0
Microstrobos niphophilus		6.0
Podocarpus lawrenceii		0.6
Herbs	57.6	
Chenopodiaceae		3.0
Compositae Tubuliflorae		24.0
Cruciferae		1.2
Gentianella		0.3
Gramineae		25.5
Labiatae		0.3
Liliaceae		0.3
Plantago		1.2
Umbelliferae		0.9
Oreomyrrhis		0.9
Outside Percentage Sum		
Sedges	7.1	
Cyperaceae		5.3
Restionaceae		1.8
Aquatics	0.6	
Neopaxia		0.3
Myriophyllum		0.3
Fern spores	6.6	
Monolete		1.8
Gleichenia		3.6
Trilete		1.2
Lycopodiaceae	15.8	
Lycopodium australianum		1.5
L. fastigiatum		9.8
L. scariosum		4.5

Margaret Glaciation of the West Coast Range (Colhoun 1985b) the deposit cannot be very old which is consistent with the interpretation of a Penultimate Glaciation age.

The occurrence of the *Microstrobos* macrofossils at 200-240 m can be compared to the distribution of the same taxon today at over 1000 m altitude in the West Coast Range. Such altitude difference implies a minimum temperature reduction of about 4.5 to 5° C compared with present (mean annual temperature, 11° C). The temperature depression is also comparable with that estimated for the period (35 000-25 000 yr b.p.) that immediately preceded the maximum of the Last or Margaret Glaciation as recorded at Henty Bridge (5° C) (Colhoun 1985a) and Tullabardine Dam (3.5 to 4.5° C) (Colhoun & van de Geer 1986).

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