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THE DISTRIBUTION OF *NOTHOFAGUS CUNNINGHAMII* RAINFOREST

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ABSTRACT: In Victoria, *Nothofagus cunninghamii* is distributed in three main regions, the Central Highlands, Otway Ranges and Strzelecki-Wilsons Promontory area. In these regions it is found chiefly in gullies where annual rainfalls exceed 150 cm (60 in). On the basis of floristics, the *Nothofagus cunninghamii* and allied forests were divided into three associations which correspond to altitudinal zones 0-650 m (0-2000 ft), 650-1300 m, (2000-4000 ft) and over 1300 m (4000 ft). The associations correspond to the structural forms of tall closed forest, closed forest and low closed forest (Specht 1970) which correspond in turn to nanophyll mossy and fern forests, (Webb 1959, 1968); all these types were formerly called cool temperate rain forest (Wood & Williams 1960). The tall closed forest is rich in fern species and the low closed forest relatively rich in herb species. It is suggested that the forests may be expanding and that neither *Atherosperma moschatum* nor *Nothofagus cunninghamii* have fully exploited new niches due to difficulties of dispersal.

INTRODUCTION

Plant communities containing *Nothofagus cunninghamii* are distributed over much of the western half and north-eastern corner of Tasmania and in the southern central region of Victoria (Fig. 1). In both regions *Nothofagus* may occur either as a forest or scrub or as an understorey to various species of eucalypts, and extend from sea level to the sub-alpine regions. In Victoria it occurs chiefly along rivers and gullies and rarely on mountain sides and plateaux. In Tasmania, however, it may occur over a wide range of topographic situations.

ALTITUDINAL ZONATION

In Victoria *Nothofagus cunninghamii* is associated in forests with *Acacia melanoxylon*, up to 650 m (2000 ft), and with *Atherosperma moschatum* up to 1375 m (4200 ft). At higher altitudes it forms low forest with *Leptospermum grandifolium* up to its limit at 1570 m (4800 ft). Over the last 65 m (200 ft) of its range it may also be associated with *Podocarpus lawrencei*.

Nothofagus cunninghamii may form an understorey of variable density to *Eucalyptus viminalis* up to 650 m (2000 ft), to *E. regnans* from 195-1150 m (600-3500 ft), to *E. delegatensis* from 985-1470 m (3000-4500 ft), to *E. nitens* from 950-1250 m (2900-3800 ft) and to *E. pauciflora* from 1420-1570 m (4300-4800 ft).

In Fig. 2, the distribution of *Nothofagus cunninghamii* in Victoria on a 7½ minute grid is mapped. This shows the three general regions in which it is found: the Otway Ranges, the Central Highlands and South Gippsland-Wilsons Promontory. *Atherosperma moschatum* is more widespread to the E. and NE. of the state, occurs with *Nothofagus cunninghamii* in the central regions and is notably absent from the Otway Ranges. *Acacia melanoxylon* is widely distributed from E. to W. in southern Victoria, and *Leptospermum grandifolium* occurs in most gully areas of poor drainage above 1300 m (4000 ft), but is also found in such situations in some montane and lowland regions.

THE Nothofagus cunninghamii COMMUNITY

The floristics of representative mature *Nothofagus cunninghamii* communities (and those closely allied to them) were studied throughout their geographic and altitudinal range in Victoria. This range includes closed stands in which a mature eucalypt stratum is present or absent. The lists of species occurrence are given in Table 1.

There are few species of tree in any one stand. The closed forest consists of one to three species

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FIG. 1—The distribution of *Nothofagus cunninghamii* Oerst in South Eastern Australia.

of trees which range in height from about 42 m (130 ft) in the lowlands to 8 m (25 ft) at the highest altitudes. *Nothofagus cunninghamii* is dominant in most stands below 1300 m (4000 ft) and is co-dominant in those over this altitude. *Atherosperma moschatum* individuals rarely exceed 23 m (70 ft) in height, and this species is sub-dominant to *Nothofagus cunninghamii* or *Acacia melanoxylon* (Petrie, Jarret & Patton 1929). In the absence of the latter two species, such as on the Errinundra Plateau (EI), *Atherosperma* reaches 33 m (100 ft) in height. The eucalypts, where they occur in association with *Nothofagus* below 1400 m (4300 ft), range in height from 33-82 m (100-250 ft) or more. Above this altitude they may reach only 13-16 m (40-50 ft) in height. A number of other tree and shrub species are present, but they are generally sparse and many are ecotonal in character and assume floristic importance only because many of the rain forest stands are so restricted in area. The species which are more characteristic of the closed forests are *Hedycaria augustifolia, Pittosporum bicolor* and *Coprosma nitida* and *Podocarpus lawrencei* at higher altitudes.

Lianes occur chiefly below 820 m (2500 ft) and are never abundant, *Clematis aristata* and *Parsonia brownii* being the most frequent.

Under the undisturbed canopy, herbs are generally sparse and include *Australina muelleri, Sambucus gaudichaudiana, Unicinia tenella, Luzula campestris, Libertia pulchella* and *Wittsteinia vacciniacea*. Where gaps occur in the canopy these species may be denser and associated with *Hydrocotyle javanica, Viola hederacea, Geranium 'pilosum', Tetrarrhena juncea* and *Festuca dives*.

Ferns are conspicuous members of the forest and show a pronounced altitudinal zonation. Tree ferns are a characteristic feature of these forests up to 1400 m (4300 ft) *Dicksonia antarctica* is the commonest species throughout this range and is associated with *Cyathea australis* below 950 m

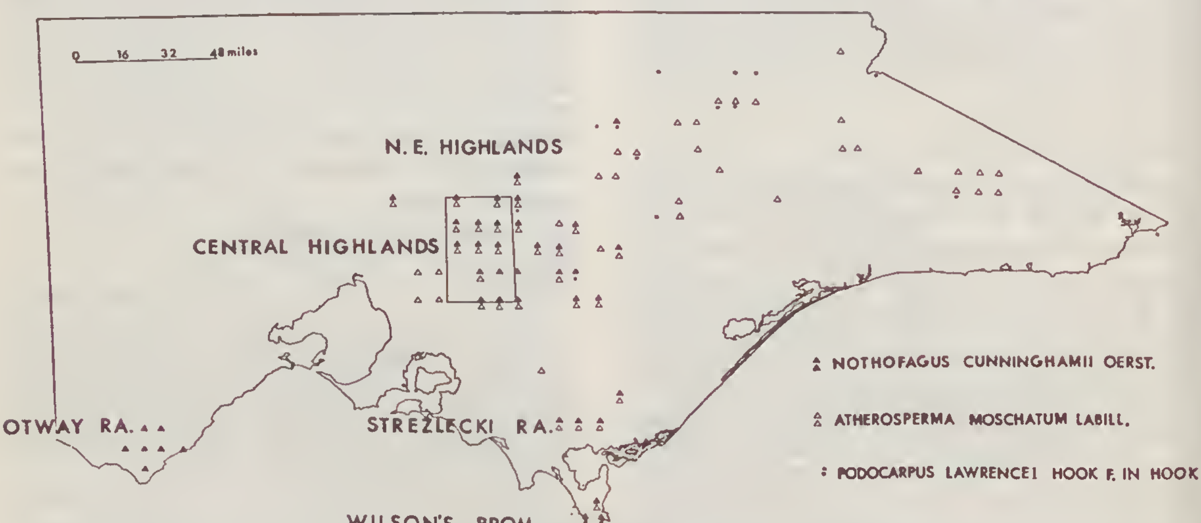

FIG. 2—The distribution of *Nothofagus cunninghamii* and *Atherosperma moschatum* in Victoria mapped on their occurrence in 7½ minute grid squares.

(2900 ft). *Cyathea cunninghamii* and *C. marcescens* are rare and occur in Otway, Strzelecki and Wilsons Promontory forests below 490 m (1500 ft). Ground ferns such as *Polystichum proliferum* and *Blechnum procerum* also occur in adjacent eucalypt forests, and are much more abundant in the gullies where canopy openings are present. *Blechnum aggregatum, B. fluviatile, B. pattersonii* and *Asplenium bulbiferum* occur along stream banks, often in dense shade. At higher altitudes, greater than 1370 m (420 ft), *Blechnum penna-marina* is common.

The majority of epiphytic fern species occur below 820 m (2500 ft). The commonest species in the lowland forests are *Rumohra adiantiformis, Microsorium diversifolium, Grammitis billardieri, Asplenium bulbiferum* and the filmy ferns, *Mecodium australe, M. flabellatum, Hymenophyllum cupressiforme* and *Polyphlebium venosum*, all of which may also occur on rocks and logs. One filmy fern, *Hymenophyllum peltatum* occurs only at higher altitudes. Below 490 m (1500 ft) *Tmesipteris billardieri* is widespread although never abundant.

The epiphytic orchids *Corybas dilatatus* and *Sarcochilus australis* also occur at lower altitudes. *Fieldia australis* occurs below 650 m (2000 ft) in the Strzelecki, Beenak and Wilsons Promontory forests as epiphytic espalier-form shrubs. Many tree and shrub species may establish as epiphytes on *Dicksonia antarctica* trunks below 980 m (3000 ft).

Bryophytes and lichens are very characteristic of these forests and increase in species and abundance with increasing altitude. At high altitudes they clothe tree trunks, logs, rocks and soil. At low altitudes they rarely occur on soil (except steep stream banks) but pendulous mosses commonly hang from the tree canopy in long strands. Dendroid mosses are common at the lower altitudes and do not extend beyond about 1150 m (3500 ft).

CLASSIFICATION OF **Nothofagus cunninghamii** AND ALLIED FORESTS IN VICTORIA

The forests described here have been classified broadly as temperate rainforest by Wood and Williams (1960) and have been segregated as the cool facies of the temperate type by Webb (1959). These forests were later classified by Webb (1968) on the basis of predominant leaf size and dominant trees, as nanophyll mossy forest. However, in Victoria, ferns are a very characteristic feature of the forests up to 1300 m (4000 ft) and it may be more appropriate to call these nanophyll fern forests. The forests have been further classified according to dominant tree height and canopy cover, as suggested by Specht (1970).

Although, as a whole, *Nothofagus* closed forests present a uniform aspect, sufficient floristic and structural diversity was present to warrant a detailed analysis. Seventeen readily accessible mature stands (Nos. 1-17, Table 1) were studied, and their species composition assessed from the total number of species present in five random 2 × m^2 quadrats at each site. This combination of size and number of quadrats was chosen after initial work had been carried out at Mt. Donna Buang to determine the area which contained 85% of the species in the stand. Data on density, basal area and average height were collected also at each sample site.

The floristic data was analysed by a Similarity Anlaysis Program (Lance & Williams 1966) entitled CENTCLAS.

(a) Floristics

The results of the similarity analysis were printed as two hierarchical diagrams (Fig. 3). The 'normal' analysis shows the grouping of sites in terms of their species similarity and the 'inverse' shows the grouping of the species in terms of their site similarities. A subjective decision was made about the number of groups in each analysis which might yield useful information, four (ABCD) in the 'normal' analysis where only 17 sites were involved, and a larger number, 9, (Z-R) in the 'inverse' analysis where 129 species were being analysed. The species components of each site group (A-D) were obtained by tabulating these groups against each of the species groups (Z-R). The percentage probability of a species occurring in a particular site group was then calculated as follows:

$$\frac{\textit{No. of species/site coincidences realized}}{\textit{Total no. of species/site coincidences possible}} \times 100$$

The values obtained for all species/site blocks were then ranked into four categories. Species occurring in more than 75% of sites in one site/species block were considered to have a high probability of occurrence at any site within this block, species occurring in 74-50% of sites to have an intermediate probability, and those in 49-25% to have a low probability of being found at any site in the site/species block. Species present in less than 24% of site/species blocks were considered unimportant in characterizing the site (A-D) groups.

Each of the nine species groups considered from the 'inverse' analysis remained separate on the basis of these calculations; however, in the case of the 'normal' analysis, the four groups originally considered (A-D), were reduced to three by the

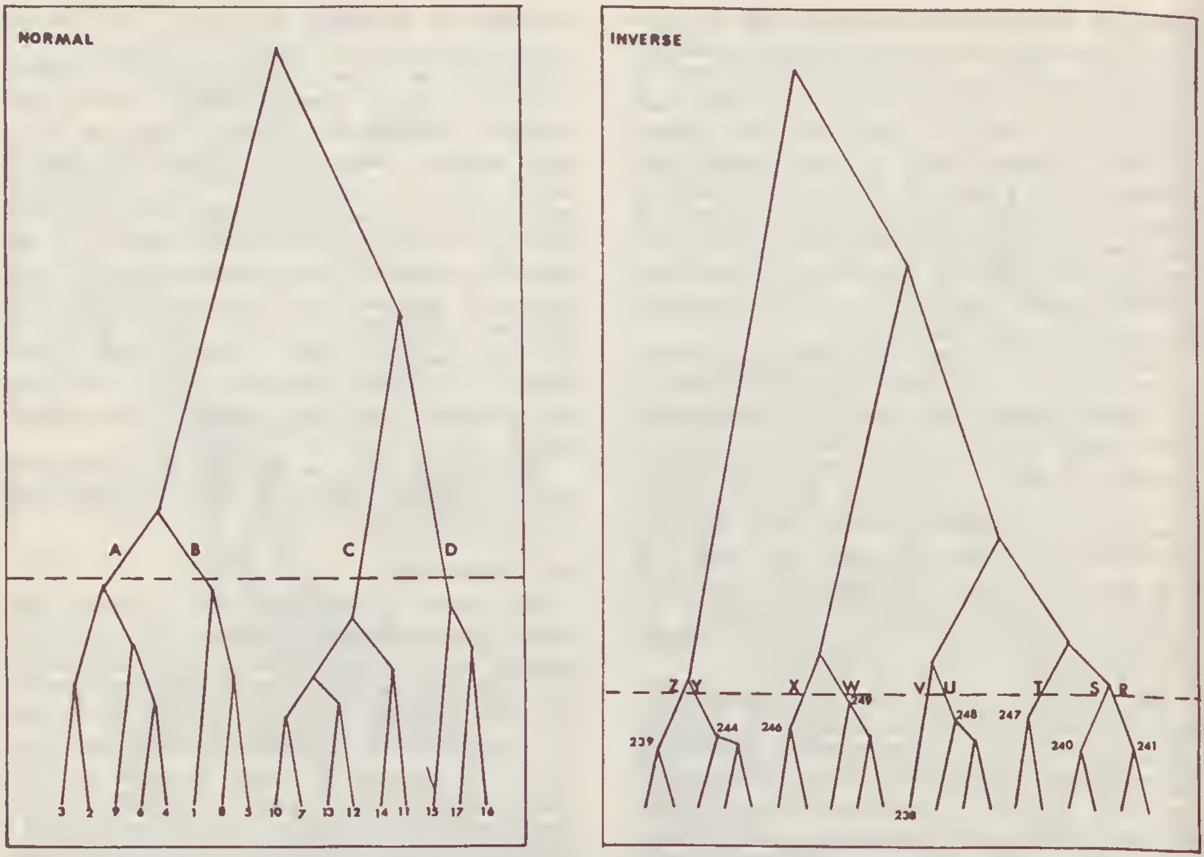

FIG. 3—Results of the Similarity Analysis 'CENTCLAS'. The normal analysis shows the hierarchy of groups into which sites were divided on the basis of their species composition. The inverse analysis shows the groups into which the species were divided on the basis of their site similarities. The broken lines across each level indicate the categories that were considered to be ecologically meaningful. The letters A-D and Z-R respectively indicate the site and species groups which were plotted against each other. The numbers indicate either sites (1-17 as in Table 1) or species groups, the subdivision of which is not shown in the inverse hierarchy.

fusion of A & B, there being no difference in species probability between these latter groups. The groups A-B, C and D remained separate from each other and can be interpreted as reflecting the effect of changes in altitude on the *Nothofagus* community. Sites within A & B all occur below 650 m (2000 ft) (tall closed forest), in C all occur between 650-1300 m (2-4000 ft) (closed forest) and all sites in D occur over 1300 m (4000 ft) (low closed forest). A summary of species probability of occurrence in each of these altitudinal associations is shown in Table 2. Their geographical distribution is shown in Fig. 4.

The major differences between the stands over 1300 m (4000 ft) and those below are the high (over 75%) probability of occurrence of *Leptospermum grandifolium* and *Drimys lanceolata* in those above 1300 m (4000 ft). Below 1300 m (4000 ft), *Nothofagus cunninghamii*, *Atherosperma moschatum*, the ferns *Dicksonia antarctica*, *Blechnum procerum* and *Grammitis billardieri* and the bryophytes *Acanthocladium extenuatum*, *Camptochaete ramulosa*, *Dicranoloma menziesii*, *Acrobolbus tenellus* and *Chiloscyphus fissistipus* have the highest probability of occurrence. The low closed forest (above 1300 m, 4000 ft) is further characterized by a large number of herb species of both high (over 75%) and low (24-49%) probabilities and a characteristic group of bryophytes of low (24-49%) probability. The major difference between closed forest 650-1300 m (2000-4000 ft) and tall closed forest 0-650 m (0-2000 ft) is the intermediate probability (50-74%) of shrubs and lianes, the intermediate to low (24-49%) probability of ferns and the intermediate (50-74%) probability of a large number of bryophyte species occurring in tall closed forest, whereas the closed forest is poor in fern, shrub and herb species.

The floristic analysis indicated that the *Notho-*

FIG. 4—The geographical distribution of the three altitudinal associations of *Nothofagus cunninghamii* in Victoria, A-B, C and D corresponding to tall closed forest, closed forest and low closed forest respectively.

fagus cunninghamii–Acacia melanoxylon forests of the Otway Ranges were not significantly different from the other main low altitude regions in Victoria even though *Atherosperma moschatum* is absent. The *Atherosperma moschatum–Eucalyptus nitens* forest studied on the Errinundra Plateau differed floristically from mid-altitude closed forests in central Victoria chiefly in the absence of *Nothofagus cunninghamii* and the presence of *Telopea oreades* and *Elaeocarpus holopetalus*. This was not, however, sufficient to differentiate this stand from the general closed forest type.

(b) STRUCTURE

The mean height (Fig. 5), form (Fig. 6, 7, 8), density and basal area (Fig. 9) of trees change with increase in altitude. *Nothofagus cunninghamii* in the tall closed forest below 650 m (2000 ft) has a mean height of 37 m (112 ft) and consists predominantly of single stemmed trees. The density of trees is low, and the basal area variable (group A & B in Fig. 9). In the closed forest *Nothofagus* has a mean height of 29 m (90 ft) and is either single or multiple stemmed. The density of trees is greater, and the basal area lower than in the tall closed forest. The low closed forest above 1300 m (4000 ft) has a high density of *Nothofagus cunninghamii* but a low basal area (group D, Fig. 9). The trees are chiefly multi-stemmed and have an average height of 9 m (28 ft). The greatest change in form, therefore, occurs at about 1300 m (4000 ft) (c.f. Fig. 6, 7, and 8). *Atherosperma moschatum* is more or less uniformly sub-dominant in stands up to 1300 m (4000 ft) (excepting the Otways and the Errinundra Plateau) with low densities and basal area and a mean height of 19·6 m (60 ft). At its limit at 1370 m (4200 ft) it is only 3·3 m (10 ft) high. In the Errinundra Plateau forest (see Fig. 10) it reaches a height, density and basal area comparable with that of *Nothofagus cunninghamii* in analogous stands to the west (see Fig. 9).

The crown cover of the tree species exceeds 75% in all stands and the crowns occupy $\frac{1}{3}$ to $\frac{1}{2}$ of the total tree height. Short horizontal branches are often common on the *Nothofagus cunninghamii* trunk down to ground level. At low altitudes, large swollen burls are present at the base of the *Nothofagus* trees, and these frequently bear numerous shoots. At higher altitudes the burls are not obvious, but the plants readily coppice after damage or death of the main shoot. In all stands a large range of size classes of *Nothofagus cunninghamii* is present, and their frequency distribution suggests strongly that the stand is self-perpetuating.

Atherosperma moschatum has a markedly conical crown in its early stages, but develops an open crown with decumbent lower branches at maturity. Layering commonly gives rise to groups of trees.

Acacia melanoxylon is not common in most stands and is single stemmed with a very distinct crown. Young trees are rare except at the edges of the stand or in large gaps.

In the low closed forest *Leptospermum grandifolium* occurs as single or multi-stemmed trees, and possesses a distinct crown. The density and basal area of this species may be greater than that of *Nothofagus cunninghamii* in the same stand.

CONTROLLING FACTORS

The most consistent environmental factor correlated with *Nothofagus cunninghamii* distribution is the high, uniformly distributed rainfall. *Nothofagus cunninghamii* may be found in all areas in Southern Victoria with rainfall exceeding 150 cm

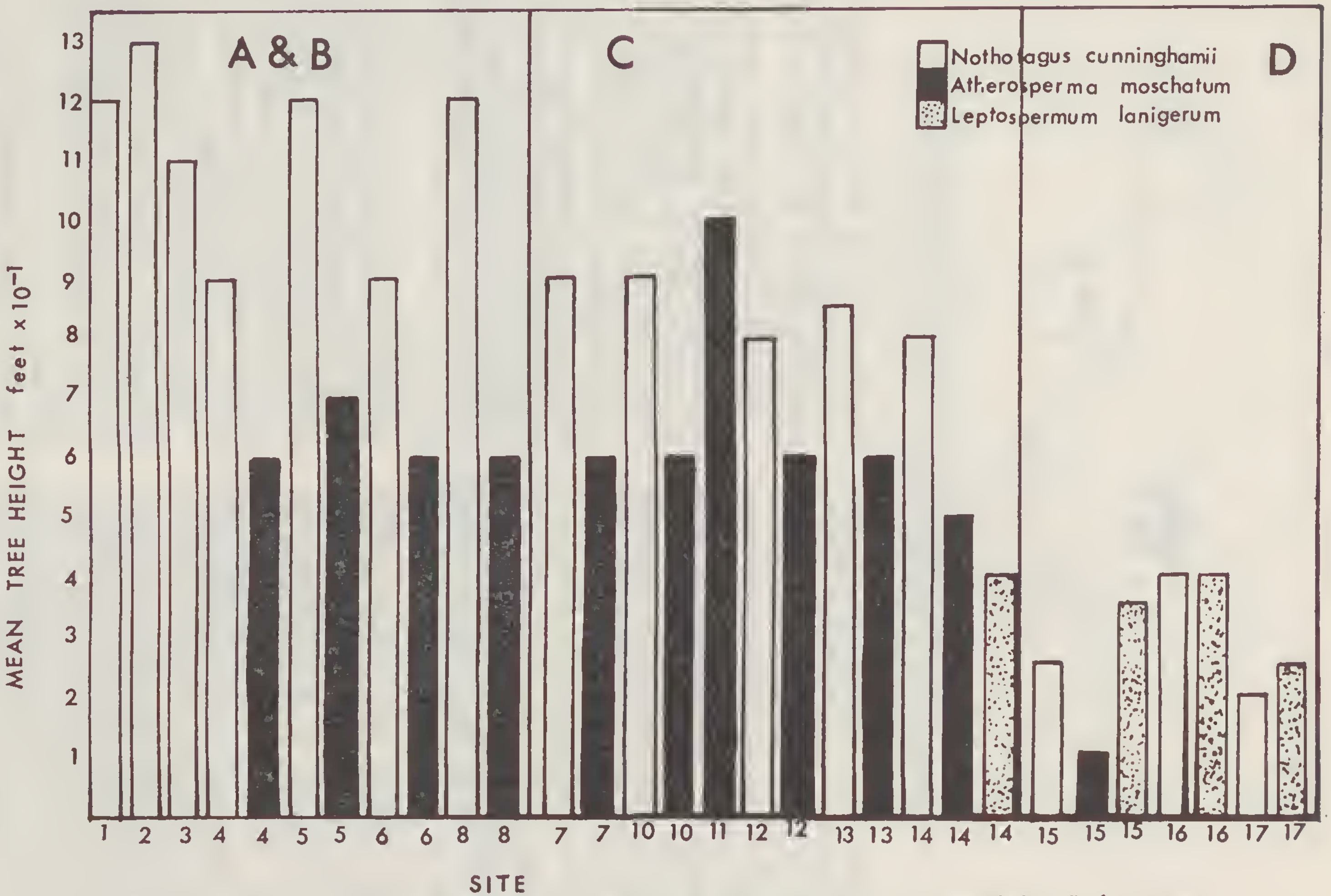

FIG. 5—The mean tree height of each species in each stand, arranged according to association, *L. lanigerum* = *L. grandifolium*, A & B 650 m (2000 ft); C, 650-1300 m (2000-4000 ft); D over 1300 m (4000 ft).

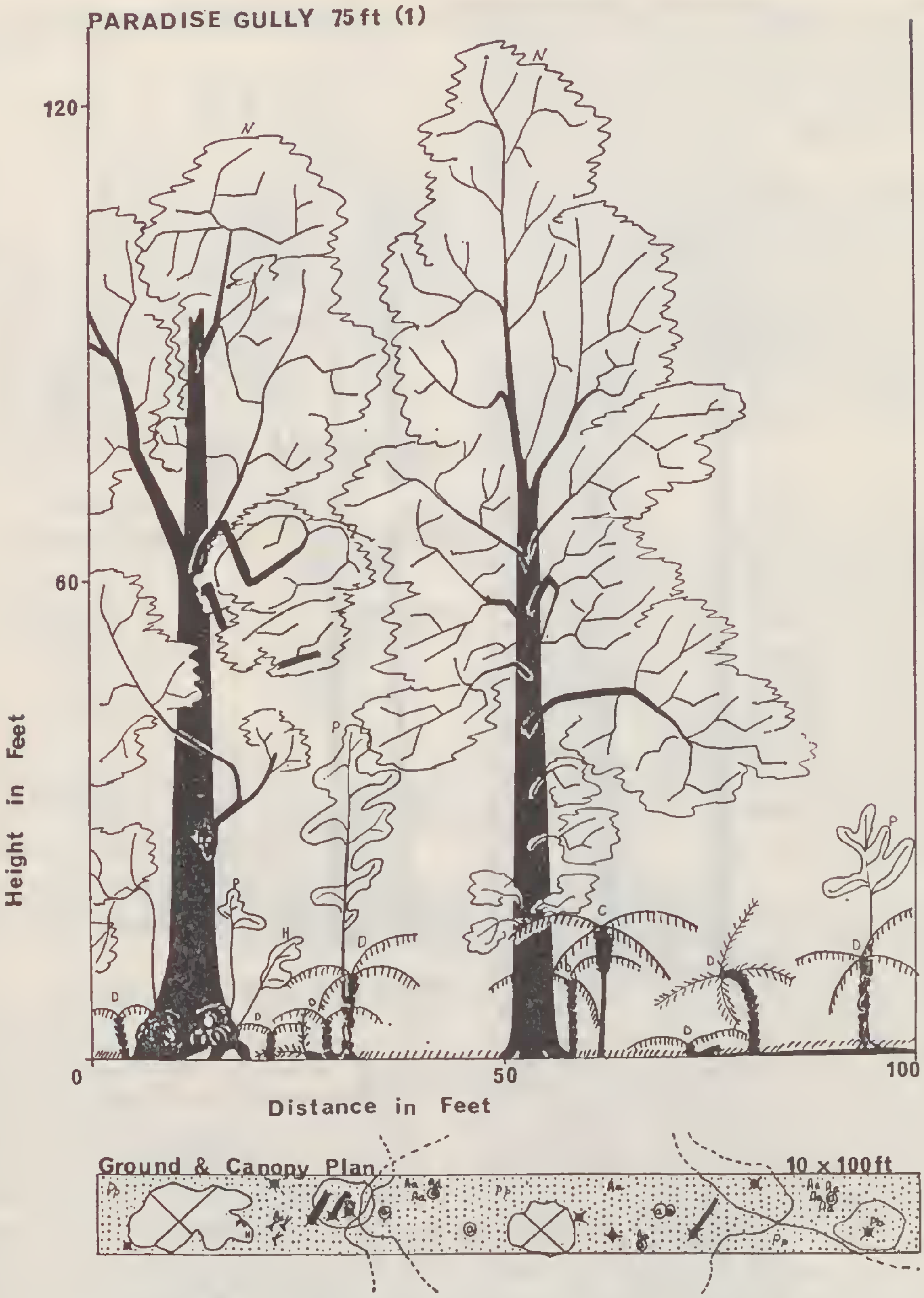

FIG. 6—Plan and profile diagrams of a tall closed forest stand 0-650 m (0-2000 ft). N = *N. cunninghamii*, P = *Prostanthera lasianthos*, D = *Dicksonia antarctica*, H = *Hedycaria augustifolia.*

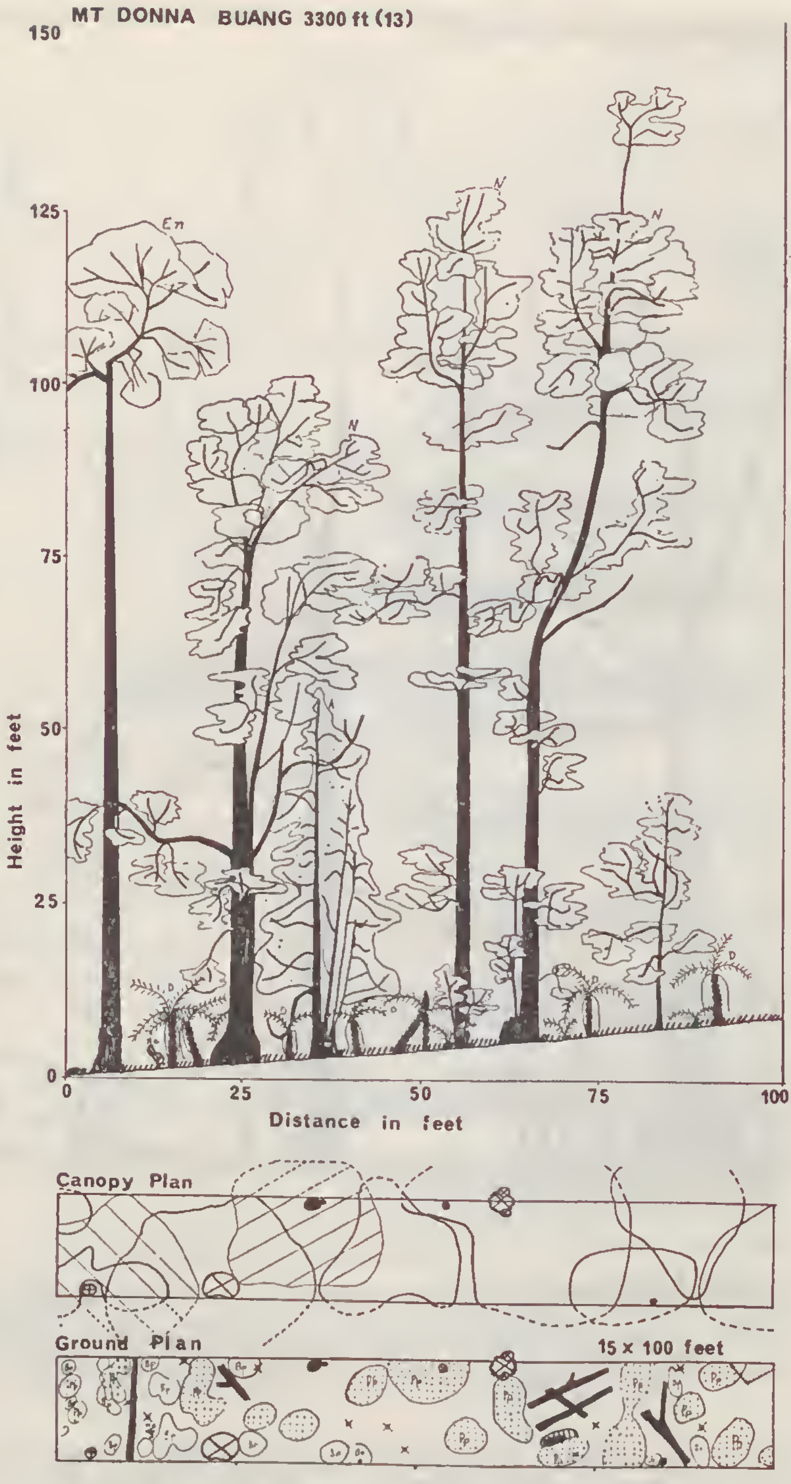

FIG. 7—Plan and profile diagrams of a closed forest stand 650-1300 m (2000-4000 ft). N = *N. cunninghamii*. A = *A. moschatum*, D = *Dicksonia antarctica*, En = *Euc. nitens*.

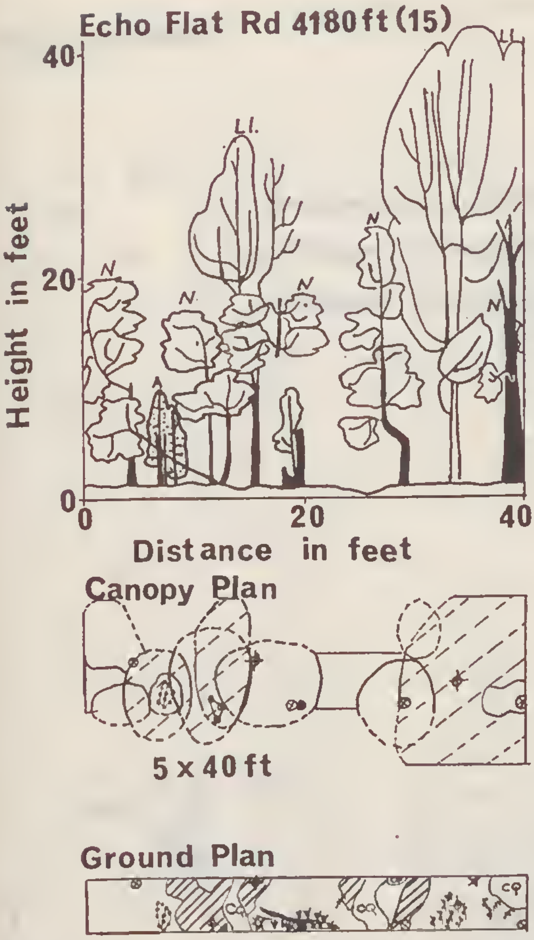

FIG. 8—Plan and profile diagrams of a low closed forest stand 1300 m (over 4000 ft). N = *N. cunninghamii*. A = *A. moschatum*. Ll. = *L. grandifolium*.

(60 ins) per annum, although in sheltered gullies it occurs in rainfalls down to 135 cm (50 ins) per annum. The higher precipitations which occur in the North Eastern Highlands are likely to be less effective due to the lower reliability of summer rainfall. In addition, the intensity of cool changes tends to diminish as they progress E. and N., thus the incidence of low cloud and mist in the summer is likely to be less on the north-eastern mountains than in the Central and Southern districts at equivalent altitudes.

With the increase in altitude the length of the growing season is reduced and the incidence of frost increased. Snow, which is a regular feature of the climate above 1300 m (4000 ft), may lie for several weeks at a time. Below this altitude it becomes more sporadic and is very rare at sea level.

Soil does not appear to be a discriminating factor in *Nothofagus cunninghamii* distribution. In Victoria it occurs on kraznozems, alpine humus soil, grey loams and colluvial and alluvial soils. The fertility of the soils ranges from moderately low to moderately high. The parent materials giving rise to the soils are chiefly granite, granodiorite, dacite and arkose.

Fire is an important factor controlling the distribution of these forests and they may have been destroyed or greatly reduced in area by the spate of repeatedly severe fires since the advent of white man. *Nothofagus cunninghamii* coppices following moderately severe fires, whereas *Atherosperma moschatum* is killed (Howard 1970). Unquestionably the occurrence of fire promotes the perpetuation of the eucalypt overstorey, and greatly modifies the species composition and microenvironment.

DISCUSSION

The distribution of the three *Nothofagus cunninghamii*-dominated associations can be explained by the relationship of topography to rainfall at different distances from Bass Strait. Little land over 650 m (2000 ft) is present in the Southern Highland areas, hence only the tall closed forest occurs there. In the Central Highlands region few areas occur below 650 m (2000 ft) with a sufficiently high rainfall to support this forest. Hence the absence of tall closed forest in this area. At higher altitudes and lower temperatures, snow lie and shorter growing seasons are probably responsible for the low stature of the trees, the absence of many lowland species and the appearance of many sub-alpine species.

The absence of *Atherosperma moschatum* from the tall closed forest of the Otway Ranges is difficult to explain, because these forests are otherwise very similar to those elsewhere in Victoria and in north-eastern and north-western Tasmania. The lower fire resistance of *Atherosperma moschatum* compared with *Nothofagus cunninghamii* may be one reason for this absence. The Otway Ranges are vulnerable to fire because of their exposure to dry country on their whole north-western flank. Hence widespread fire in the past may have eliminated *Atherosperma*, but not *Nothofagus* or *Acacia melanoxylon*. Although *Atherosperma moschatum* is easily wind dispersed, the nearest seed sources for any recolonization of the Otways are at Mt. Disappointment, 192 km (120 miles) to the north east across a large area of rainshadow, and at King Island 96 km (60 miles) to the south across a deep section of Bass Strait.

Many closely associated cool temperate rainforest areas occur in the central north-eastern and

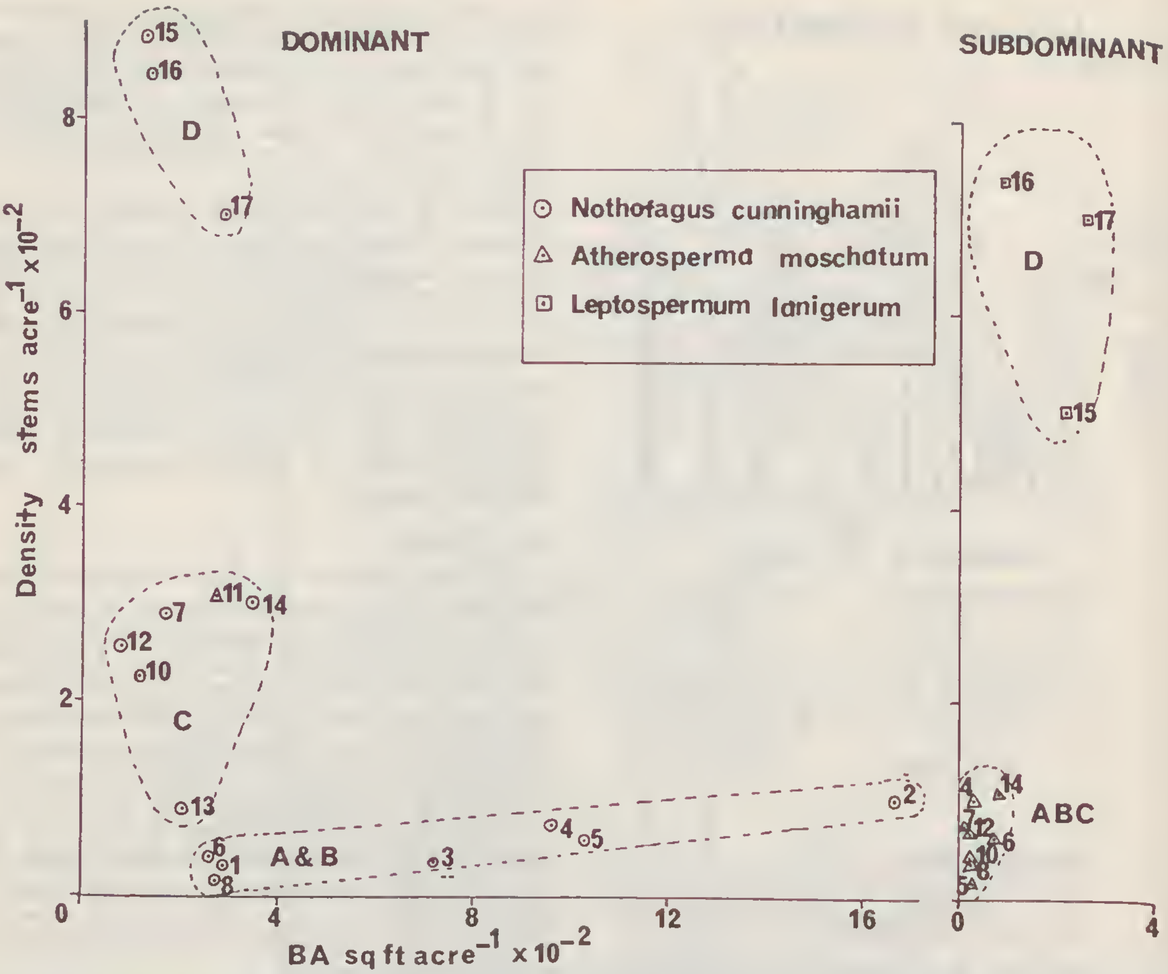

FIG. 9—The relationship between basal area and density in each association for dominant and sub-dominant species. Group A & B, 0-650 m (0-2000 ft) tall closed forest; Group C, 650-1300 m (2000-4000 ft) closed forest; Group D, over 1300 m (4000 ft) low closed forest. Site numbers as in Table 1. *Leptospermum lanigerum* is in the sense of Ewart and now = *L. grandifolium*.

eastern highlands where rainfalls exceed 125-150 cm (50-60 ins) p.a. Below 650 m (2000 ft) in the Central Highlands these are dominated by *Atherosperma moschatum* and *Acacia melanoxylon*. In eastern and north-eastern Victoria cool temperate rainforest is absent below 650 m (2000 ft) and is replaced by a warm temperate facies dominated by *Eugenia smithii* and *Tristania laurina*. Between 650 m and 1300 m (2000 and 4000 ft) in this region the cool temperate rainforest is dominated by *Atherosperma moschatum* alone.

Many gullies dominated by *Atherosperma moschatum* are moist and sheltered throughout the year and the associated species are similar to those in the *Nothofagus*-dominated stands in the same altitudinal zone. In *Atherosperma*-dominated gullies in the Dandenong Ranges where rainfalls are 135 cm (53 ins) p.a., small seedlings of *Nothofagus cunninghamii* were planted in 1967. The subsequent growing season coincided with the worst drought in living memory but *Nothofagus cunninghamii* seedlings survived in both the gully and in the neighbouring moist sites dominated by *Eucalyptus regnans*. These observations suggest that *Nothofagus cunninghamii* is capable of existing in these sites, but establishment from seed would provide the final confirmation of its ability to persist.

Climatic fluctuations during the Quaternary are likely to have greatly affected the distribution of both *Atherosperma moschatum* and *Nothofagus cunninghamii*. Galloway (1971) has recently summed up the available knowledge of the time

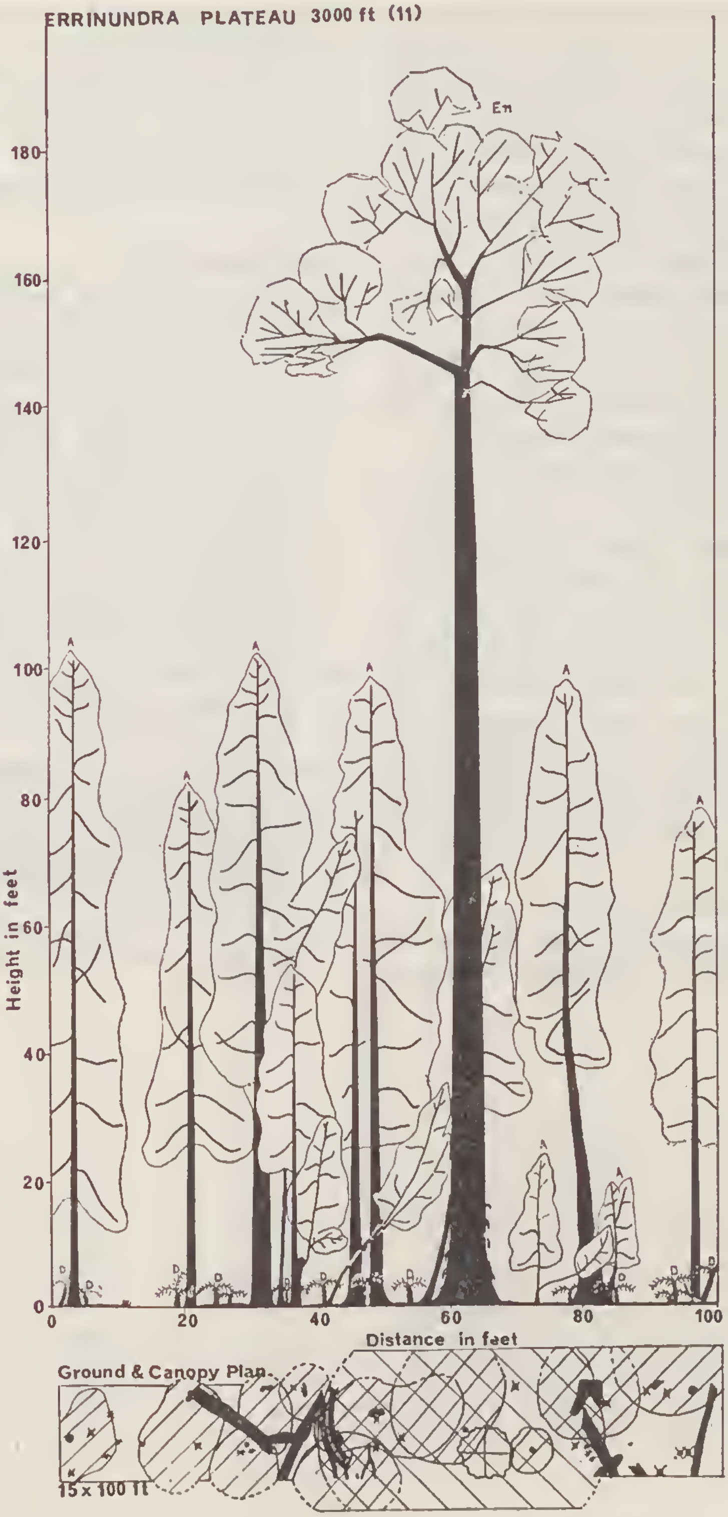

FIG. 10—Plan and profile of *Atherosperma*, closed forest with tall emergent *Eucalyptus nitens* on the Errinundra plateau, East Gippsland. D = *Dicksonia antarctica*.

and type of these changes, and concluded that it is too sparse to act as a guide to pinpointing vegetation changes. However, changes have occurred, and these may have been of sufficient magnitude to cause a contraction of rainforest into the regions in which *Nothafagus* is present today. At the present time at least until pre-white man, *Nothofagus-Atherosperma* forest appears to have been expanding again. The presence of *Atherosperma moschatum*-dominated forests to the E. and NE. of the present distribution of *Nothofagus cunninghamii* may represent the superior ability of *Atherosperma* to disperse seed by wind, enabling it to occupy niches not available to *Nothofagus* because of its inability to cross the rain shadow of the Bairnsdale-Omeo corridor.

Since white settlement, the existing *Nothofagus* forests have been decimated by severe and repeated burning, which may have further arrested *Nothofagus* expansion (Howard & Hope 1970).

In high rainfall areas from near sea level to the lower sub-alpine zone, various closed forests of *Nothofagus cunninghamii* appear to be climax to a number of adjacent open forests dominated by *Eucalyptus* species. The potential limit of such climax in many areas is as yet incompletely known. The dominance of *Nothofagus* over such a wide temperature range may be related to the relative poverty of arborescent species of the 'antarctic' floristic element (Burbidge 1960) at present in Victoria.

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TABLE I

The distribution of species in *Nothofagus cunninghamii* and allied forests in Victoria arranged to show altitudinal trends. Sites 1, 2, 3, W, and X are in the Otway area, sites U. EP, 6, EB, 7, EF, EG, 10, 12, 13, 14, EI, 15, 16 and 17 are in the Central Highlands, sites 5, 4, and 8 are in the Strzelecki Ranges, site 9 on Wilson's Promontory and site 11 in the Eastern Highlands. Site EP (in the Dandenong Ranges) and site 11 contain no *Nothofagus cunninghamii.*

Sites of Stands	Paradise Picnic Res.	Malt's Rest (Reserve)	Powelltown	Calder Riv. (Reserve)	Hardy's Gully	Olangelah Dam	Olangelah River	Tarra Valley (Reserve)	Jeeralang Creek	Beenak	Plenty River	Cement Creek	Mt. Latrobe (Reserve)	Bulga National Park	Britannia Creek	Mississippi Creek	Cumberland Falls Res.	Errinundra Plateau	Mt. Boobyalla	Mt. Donna Buang	Mt. Donna Buang	Taggerty River	Echo Flat Road	Royston Road	Long Flat
ALTITUDE m and ft	25 75	208 645	234 700	324 1000	324 1000	390 1170	470 1400	470 1400	470 1400	500 1700	570 1700	650 1950	650 1960	670 2000	750 2250	820 2450	960 2880	1000 3000	1040 3050	1100 3300	1170 3500	1200 3600	1390 4180	1470 4400	1570 4700
REFERENCE	1	2	U	3	EP	W	X	5	4	6	EB	7	9	8	EF	EG	10	11	12	13	14	EI	15	16	17
TREES AND SHRUBS																									
Atherosperma moschatum Labill.			X		X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Nothofagus cunninghamii Oerst.	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X
Hedyearya angustifolia A. Cunn.	X	X	X	X	X	X	X	X	X		X	X	X	X	X		X			X					
Coprosma quadrifida (Labill.) Robinson	X	X	X	X	X			X		X	X	X	X	X				X	X						
Pittosporum bicolor Hk.	X	X	X	X	X		X	X		X		X	X	X				X	X	X					
Olearia lirata (Sims) Hutch.	X												X	X											
Eucalyptus viminalis Labill.	X																								
Acacia melanoxylon R.Br.	X		X	X	X						X														
Prostanthera lasianthos Labill.	X																								

TABLE 1 (*Continued*)

REFERENCE	1	2	U	3	EP	W	X	5	4	6	EB	7	9	8	EF	EG	10	11	12	13	14	EI	15	16	17
TREES AND SHRUBS (CONT'D)	25 75	208 645	234 700	324 1000	324 1000	390 1170	470 1400	470 1400	470 1400	500 1500	570 1700	650 1950	650 1960	670 2000	750 2250	820 2450	960 2880	1000 3000	1040 3050	1100 3300	1170 3500	1200 3600	1390 4180	1470 4400	1570 4700
Pimelea axiflora F.v.M.	X	X																							
Olearia argophyla F.v.M.		X		X	X																				
Pomaderris aspera Sieber ex D.C.			X																						
Acacia dealbata Link.			X											X					X	X					
Lomatia fraseri R.Br.									X			X					X	X							
Eucalyptus regnans F.Muell										X	X	X			X	X	X								
Bedfordia salicina DC.											X														
Persoonia arborea F.v.M.												X													
Monotoca sp.													X												
Drimys lanceolata (Poir.) Baill.													X			X	X	X			X		X	X	X
Pimelea drupacea Labill.													X												
Olearia phlogopappa (Labill.) DC.															X			X		X					
Acacia frigescens J. H. Willis															X							X			
Correa lawrenciana Hk.																X		X			X				
Prostanthera melissifolia F.v.M.																X	X								
Eucalyptus nitens Maiden																X		X	X	X					
Notelaea ligustrina Vent.																	X								
Tieghemopanax sambucifolius (Sieber ex. DC.) Viguier																	X								

TABLE 1 (*Continued*)

REFERENCE	1	2	U	3	EP	W	X	5	4	6	EB	7	9	8	EF	EG	10	11	12	13	14	EI	15	16	17
	75	645	700	1000	1000	1170	1400	1400	1400	1500	1700	1950	1960	2000	2250	2450	2880	3000	3050	3300	3500	3600	4180	4400	4700
TREES AND SHRUBS (CONT'D)	25	208	234	324	324	390	470	470	470	500	570	650	650	670	750	820	960	1000	1040	1100	1170	1200	1390	1470	1570
Eucalyptus delegatensis R.T. Bak.																					X	X	X		
Gaultheria appressa A.W. Hill																	X							X	
Telopea oreades F.v.M.																		X							
Leptospermum myrsinoides ? Schlecht.																		X							
Elaeocarpus holopetalus F.v.M.																		X							
Coprosma nitida Hk.f.																					X		X	X	
Acacia obliquinervia Tindale																					X				X
Leptospermum grandifolium (= lanigerum sens. Ewart) Smith																						X	X	X	X
Prostanthera cuneata Bth.																						X		X	X
Coprosma hirtella Labill.																						X			
Daviesia mimosoides R.Br. var. laxiflora (J. H. Willis) J. H. Willis																						X			
Baeckea utilis F. Muell. ex Mig. var. latifolia (Beth.) J. H. Willis																								X	X
Podocarpus lawrencei Hook f. in Hook																									X
Epacris paludosa R. Br.																									

TABLE 1 (*Continued*)

REFERENCE	1	2	U	3	EP	W	X	5	4	6	EB	7	9	8	EF	EG	10	11	12	13	14	EI	15	16	17
	75	645	700	1000	1000	1170	1400	1400	1400	1500	1700	1950	1960	2000	2250	2450	2880	3000	3050	3300	3500	3600	4180	4400	4700
LIANES	25	208	234	324	324	390	470	470	470	500	570	650	650	670	750	820	960	1000	1040	1100	1170	1200	1390	1470	1570
Clematis aristata R. Br.	X	X	X	X	X		X			X	X	X	X	X	X										
Pandorea pandorana (Andr.) Steenis			X		X																				
Parsonia brownii (J.Britt.) Pichon					X					X	X	X		X											
Billardiera longiflora Labill.												X													
HERBS																									
Australina muelleri Wedd.	X	X	X	X	X	X	X	X	X		X	X		X	X		X			X					
Ranunculus hirtus Bks. and Sol.	X											X										X	X	X	X
Carex appressa R. Br.	X						X		X				X									X	X	X	X
Urtica incisa Poir	X		X						X			X								X					
Sambucus gaudichaudiana DC.	X		X		X									X			X								
Cynoglossum latifolium R.Br		X																							
Stellaria flaccida Hook.		X	X																						
Corybas dilatatus (H.M.R. Rupp & W.H. Nicholls) H.M.R. Rupp			X		X																				
Tetrarrhena juncea R. Br.	X									X				X											
Hydrocotyle javanica R.Br.	X											X				X				X			X	X	X
Uncinia tenella R. Br.				X	X				X		X	X	X		X	X	X			X		X		X	X
Chiloglottis sp.					X																	X		X	

TABLE 1 (*Continued*)

REFERENCE	1	2	U	3	EP	W	X	5	4	6	EB	7	9	8	EF	EG	10	11	12	13	14	EI	15	16	17
HERBS (CONT'D)	25 75	208 645	234 700	324 1000	324 1000	390 1170	470 1400	470 1400	470 1400	500 1500	570 1700	650 1950	650 1960	670 2000	750 2250	820 2450	960 2880	1000 3000	1040 3050	1100 3300	1170 3500	1200 3600	1390 4180	1470 4400	1570 4700
Fieldia australis A. Cunn.								X	X	X			X	X											
Acaena anserinifolia (J.R. & G. Forst.) Druce.								X	X						X					X				X	X
Viola hederacea Labill.								X	X		X	X		X	X		X			X		X		X	
Gahnia psitticorum Labill. forma psilocaulon (Boeckl.) Bent.													X												
Sarcochilus australis (Lindl Reichenb. f. in Walp.										X															
Libertia pulchella (R. Br.) Spreng.												X					X	X			X	X	X	X	X
Geranium pilosum Forst.														X			X							X	
Carex longibrachiata Boeck.																X									
Nertera depressa Banks and Sol.																	X							X	
Cotula filicula (hk. F.) Benth.																	X			X		X		X	
Gnaphalium sp.																	X							X	
Luzula campestris (L.) DC. in Lam. & DC.																	X		X	X					
Lagenophora stipitata (Labill.) Druce																	X							X	X
Cxalis lactea Hook																	X			X		X			
Dianella tasmanica Hook. f.																		X							X
Festuca dives F. Muell.																				X					X

TABLE 1 (*Continued*)

REFERENCE	1	2	U	3	EP	W	X	5	4	6	EB	7	9	8	EF	EG	10	11	12	13	14	EI	15	16	17
HERBS (CONT'D)	25 75	208 645	234 700	324 1000	324 1000	390 1170	470 1400	470 1400	470 1400	500 1500	570 1700	650 1950	650 1960	670 2000	750 2250	820 2450	960 2880	1000 3000	1040 3050	1100 3300	1170 3500	1200 3600	1390 4180	1470 4400	1570 4700
Wittsteinia vacciniacea F.v.M.																					X	X	X	X	X
Poa australis Sens lat.																						X			
Oreomyrrhis eriopoda (DC)Hook f.																							X		
Asperula pusilla Shaw and Turrill.																							X		X
Hypochoeris radicata L.																							X		X
Scirpus antarcticus L.																							X		
Heirochloe redolens (Soland ex Vahl.) Roem. and Schult.																								X	
Astelia alpina R. Br.																									X
Stylidium graminifolium Swartz																									X
FERNS																									
Dennstaedtia davallioides (R. Br.) T. Moore	X																								
Asplenium flaccidum Forst. f.	X	X						X						X											
Blechnum nudum (Labill.) Mett. ex Luerss.	X							X				X													
Blechnum aggregatum (Colenso) M. D. Tindale	X		X			X	X	X	X	X	X	X		X	X										
Asplenium bulbiferum Forst. f.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X										
Cyathea australis (R. Br.) Domin	X	X	X	X	X			X	X		X	X		X		X	X								
Lastreopsis shepherdii (Kunze ex Met) M. D. Tindale	X						X	X		X	X														

TABLE 1 (*Continued*)

REFERENCE	1	2	U	3	EP	W	X	5	4	6	EB	7	9	8	EF	EG	10	11	12	13	14	EI	15	16	17
	75	645	700	1000	1000	1170	1400	1400	1400	1500	1700	1950	1960	2000	2250	2450	2880	3000	3050	3300	3500	3600	4180	4400	4700
FERNS (CONT'D)	25	208	234	324	324	390	470	470	470	500	570	650	650	670	750	820	960	1000	1040	1100	1170	1200	1390	1470	1570
Microsorium diversifolium (Willd.) Copeland	X	X	X	X	X	X	X	X	X	X	X	X	X		X										
Dicksonia antarctica Labill.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Polystichum proliferum (R. Br.) C. Presl	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	
Blechnum procerum (Forst. f.) Swartz in Shrad.	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Grammitis billardieri Willd.	X	X		X	X	X	X	X			X	X	X	X	X	X		X	X		X	X		X	
Rumhora adiantiformis (Forst. f.) Ching	X	X	X		X			X	X				X			X	X								
Lastreopsis hispida (Swartz) M. D. Tindale		X						X		X															
Athyrium australe C. Presl	X	X	X			X		X																	
Histiopteris incisa (Thunb.) J. Sm.		X					X	X	X			X			X			X		X					
Cyathea cunninghamii Hook f. in Hook		X		X				X	X																
Blechnum pattersonii (R. Br.) Mett.			X					X	X	X				X											
Blechnum fluviatile (R. Br.) E. J. Lowe ex Salomon			X			X	X	X	X	X		X	X		X		X	X		X	X	X		X	
Ctenopteris heterophylla (Labill.) M. D. Tindale				X				X																	
Microsorium scandens (Forst. f.) M. D. Tindale								X	X	X				X											
Hypolepis punctata (Thunb.) Kuhn								X						X											

TABLE 1 (*Continued*)

REFERENCE	1	2	U	3	EP	W	X	5	4	6	EB	7	9	8	EF	EG	10	11	12	13	14	EI	15	16	17
	75	645	700	1000	1000	1170	1400	1400	1400	1500	1700	1950	1960	2000	2250	2450	2880	3000	3050	3300	3500	3600	4180	4400	4700
	25	208	234	324	324	390	470	470	470	500	570	650	650	670	750	820	960	1000	1040	1100	1170	1200	1390	1470	1570
FERNS (CONT'D)																									
Hypolepis rugulosa (Labill.) J. Sm.								X												X					
Blechnum minus (R. Br.) Ettingsh.								X																	
Cyathea marcescens N.A. Wakefield								X																	
Sticherus lobatus N.A. Wakefield								X							X										
Todea barbara (L.) T. Moore					X				X																
Hypolepis australis N.A. Wakefield											X									X					
Blechnum penna-marina (Poir.) Kuhn																						X	X	X	X
FILMY FERNS																									
Hymenophyllum cupressiforme Labill.	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X		X						
Mecodium flabellatum (Labill.) Copeland	X	X		X	X			X	X	X	X	X	X	X		X				X					
Polyphlebium venosum (R. Br.) Copeland		X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X					
Mecodium australe (Willd.) Copeland		X		X	X	X	X	X	X	X	X	X	X	X	X	X									
Mecodium rarum (R. Br.) Copeland								X				X													
Hymenophyllum peltatum (Labill.) Copeland																	X				X	X	X	X	X

TABLE 1 (*Continued*)

REFERENCE	1	2	U	3	EP	W	X	5	4	6	EB	7	9	8	EF	EG	10	11	12	13	14	EI	15	16	17
	25 75	208 645	234 700	324 1000	324 1000	390 1170	470 1400	470 1400	470 1400	500 1500	570 1700	650 1950	650 1960	670 2000	750 2250	820 2450	960 2880	1000 3000	1040 3050	1100 3300	1170 3500	1200 3600	1390 4180	1470 4400	1570 4700
LYCOPODS AND PSILOTALES																									
Tmesipteris billardieri Endl.		X		X			X	X	X																
Lycopodium scariosum Forst. f.																									X
Lycopodium selago L.																								X	X
Lycopodium fastigiatum R. Br.																									X
Selaginella uliginosa(Labill.) Spring.																									X
MOSSES																									
Rhacopilum convolutaceum (C. Muell.) Mitt.	X																								
Goniobryum subbasilare (Hook.) Lindb.	X	X																							
Thuidium furfurosum (Hook. f. and Wils.) Jaeg.	X				X																				
Papillaria flavo-limbata (C.M. and Hampe) Jaeg.	X	X	X	X	X	X	X	X	X	X	X	X	X												
Plagiothecium denticulatum (Hedw.)	X							X			X						X								
Rhizogonium distichum (Sw.) Brid.	X			X	X			X	X					X	X		X	X		X					
Lopidium concinnum H.f. and W.	X	X	X	X	X		X	X		X					X										
Cyathophorum bulbosum (Hedw.) C.M.	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X		X	X					
Ptychomnion aciculare (Brid.) Mitt.	X	X	X	X		X	X	X	X	X		X	X			X	X			X	X				
Leucobryum candidum (Brid.) H.f. and W.	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	X	X	X	X				
Hypnodendron arcuatum (Hedw.) Mitt.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X				

TABLE 1 (*Continued*)

REFERENCE	1	2	U	3	EP	W	X	5	4	6	EB	7	9	8	EF	EG	10	11	12	13	14	EI	15	16	17
	75	645	700	1000	1000	1170	1400	1400	1400	1500	1700	1950	1960	2000	2250	2450	2880	3000	3050	3300	3500	3600	4180	4400	4700
MOSSES (CONT'D)	25	208	234	324	324	390	470	470	470	500	570	650	650	670	750	820	960	1000	1040	1100	1170	1200	1390	1470	1570
Acanthocladium extenuatum (Brid.) Mitt.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Dicranoloma menziesii (H.f. and W.) Par.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hypnum cupressiforme var. filiforme Brid.	X									X		X	X					X		X	X		X	X	X
Hypnum cupressiforme Hedw.	X	X		X	X		X	X	X	X		X	X	X			X	X		X	X	X	X	X	X
Pterygophyllum dentatum (H.f. and W.) Mitt.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Atrichum ligulatum Mitt.	X	X	X	X		X		X		X	X	X	X	X			X			X				X	X
Camptochaete ramulosa (Mitt.) Jaeg.	X	X	X	X			X		X	X	X	X	X	X			X	X	X	X		X	X	X	X
Hymenodon pilifer H.f.and W.		X						X						X				X							
Trachyloma planifolium (Hedw. Brid)		X																							
Rhizogonium sp.		X																							
Dicnemoloma sieberanium (Hornsch) Ren.		X																							
Campylopus introflexus (Hedw.) Brid.				X																					
Hypnum cupressiforme Hedw. var. chrysogaster (C. Muell.) Sainsb.				X																					
Thuidium furfurosum (H.f. and W.) Jaeg. var sparsum (H.f. and W.) Sainsb.				X		X								X											
Cyathophorum bulbosum (Hedw.) C.M. var. minus H.f. and W.				X		X	X			X		X													

TABLE 1 (*Continued*)

REFERENCE	1	2	U	3	EP	W	X	5	4	6	EB	7	9	8	EF	EG	10	11	12	13	14	EI	15	16	17
MOSSES (CONT'D)	25 75	208 645	234 700	324 1000	324 1000	390 1170	470 1400	470 1400	470 1400	500 1500	570 1700	650 1950	650 1960	670 2000	750 2250	820 2450	960 2880	1000 3000	1040 3050	1100 3300	1170 3500	1200 3600	1390 4180	1470 4400	1570 4700
Dawsonia superba Grev.					X																				
Weymouthia mollis (Hedw.). Broth.					X			X	X																
Leptostomum inclinans (Hedw.) R. Br.							X			X		X		X				X		X	X		X	X	X
Lembophyllum clandestinum (H.f. and W.) Lindb.								X			X														
Rhizogonium mnioides (Hook.) Schimp								X			X			X		X		X	X	X	X	X	X	X	
Philontis scabrifolia (H.f. and W.) Broth.								X			X														
Camptochaete gracilis (H.f. and W.) Par.								X		X		X					X								
Breutelia affinis (Hook.) Mitt.								X		X										X					
Dicranoloma billardieri (Schwaegr.) Per								X				X	X					X		X	X				
Catagonium politum (H.f. and W.) Dus.								X				X		X			X	X	X	X	X	X	X	X	
Breutelia elongata (Hook.) Mitt.								X				X										X	X	X	X
Leptotheca gaudichaudii Schwaegr.								X	X			X											X		
Sauloma tenella (H.f. and W.) Mitt.								X					X												X
Fissidens dealbatus Hook. f. and Wils								X																	
Mniodendron comosus (Labill.) ex Broth.												X								X	X				
Rhizogonium novae-hollandiae Brid.											X														
Fissidens oblongifolius H.f. & W.								X				X		X											

TABLE 1 (*Continued*)

REFERENCE	1	2	U	3	EP	W	X	5	4	6	EB	7	9	8	EF	EG	10	11	12	13	14	EI	15	16	17
	75	645	700	1000	1000	1170	1400	1400	1400	1500	1700	1950	1960	2000	2250	2450	2880	3000	3050	3300	3500	3600	4180	4400	4700
MOSSES (CONT'D)	25	208	234	324	324	390	470	470	470	500	570	650	650	670	750	820	960	1000	1040	1100	1170	1200	1390	1470	1570
Weissia controversa Hedw.											X														
Rhacomitrium crispulum (H.f. & W.) Wils.													X										X		X
Ditrichum cylindricarpum (C. Muell.) Mitt.																	X						X		
Distichophyllum pulchellum (Hook f. and Wils.) Mitt.																		X					X		
Pogonatum subulatum (Menz.) Brid.																				X					
Bryum billardieri Schwaegr.																					X			X	
Sphagnum cristatum Hpe.																						X	X	X	X
Zygodon hookeri. Hampe.																							X		
Tridontium tasmanicum Hook. f.																							X		
Ditrichum rufo-aureum (Hampe) J. H. Willis																							X		
Sematophyllum amoenum (Hedw.) Mitt.																							X		
Sphagnum australe Mitt. ex Wils.																								X	
Ceratodon purpureus (Hedw.) Brid.																								X	
Tortella calycina (Schwaegr.) Dix.																								X	
Orthotrichum tasmanicum Wils.																									X
LIVERWORTS																									
Chiloscyphus argutus Nees	X	X																							
Radula buccinifera Tayl.	X		X	X	X			X																	

TABLE 1 (*Continued*)

REFERENCE	1	2	U	3	EP	W	X	5	4	6	EB	7	9	8	EF	EG	10	11	12	13	14	EI	15	16	17
	75	645	700	1000	1000	1170	1400	1400	1400	1500	1700	1950	1960	2000	2250	2450	2880	3000	3050	3300	3500	3600	4180	4400	4700
LIVERWORTS (CONT'D)	25	208	234	324	324	390	470	470	470	500	570	650	650	670	750	820	960	1000	1040	1100	1170	1200	1390	1470	1570
Metzgeria sp.	X				X					X	X	X		X		X				X					
Plagiochila fasciculata Lindenb.	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X				
Acrobolbus tenellus (Hook. f. & Tayl. Trev.	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X		X	X			X	
Chiloscyphus coalitus (Hook.) Nees	X	X	X	X		X	X		X	X		X			X				X	X	X			X	
Chiloscyphus sp.	X											X													
Chiloscyphus fissistipus (Hk. et. T.) Tayl.	X	X		X	X			X	X	X	X	X	X	X	X	X	X		X	X	X		X		X
Umbraculum flabellatum		X	X	X	X	X	X		X	X	X	X		X	X		X	X	X	X	X	X	X	X	X
Balantiopsis sp.		X						X														X	X		
Trichocolea australis St.		X		X		X		X	X	X		X	X			X	X		X	X	X	X	X		
Symphyogyna sp.		X	X	X	X	X	X		X	X	X	X	X		X		X	X	X	X			X		
Lepidozia glaucophylla (H.f. et Tayl.) Tayl.		X						X			X			X		X	X	X		X		X			
Chiloscyphus echinellus (L.G.) Mitt.		X											X						X	X	X				
Schistochila lehmannia (Lindb.) Nees.		X		X		X	X	X	X	X		X	X		X	X				X	X				
Marsupidium abbreviatum (Tayl.) Steph.		X		X								X								X	X				
Acromastigium colersoanum (Mitt.) Evans		X	X		X			X	X			X	X		X										
Cuspidatula monodon (H.T.) Stephn.		X		X									X												
Bazzania sp.		X			X																				
Riccardia spp.			X	X		X	X	X	X		X		X	X	X			X		X	X		X	X	X

TABLE 1 (*Continued*)

REFERENCE	1	2	U	3	EP	W	X	5	4	6	EB	7	9	8	EF	EG	10	11	12	13	14	EI	15	16	17
	75	645	700	1000	1000	1170	1400	1400	1400	1500	1700	1950	1960	2000	2250	2450	2880	3000	3050	3300	3500	3600	4180	4400	4700
LIVERWORTS (CONT'D)	25	208	234	324	324	390	470	470	470	500	570	650	650	670	750	820	960	1000	1040	1100	1170	1200	1390	1470	1570
Lophocolea sp.			X																	X	X				
Frullania rostrata (Hook. f. et. T.) G.L. and N.			X															X							
Chiloscyphus tridentatus Mitt.			X						X			X	X		X										
Lepidozea laevifolia Tayl.				X					X		X	X			X			X		X	X	X	X	X	X
Gackstroemia weindoferi Herz.				X			X	X			X	X			X		X			X	X	X		X	
Marchantia sp.				X				X							X										
Psiloclada clandestina Mitt.				X																					
Saccogyna sp.				X																					
Zoopsis argentia Hook.				X																					
Frullania spp.						X		X													X				X
Frullania falciloba Lehm.							X																		
Balantiopsis convexiuscula Berggr.							X	X	X				X	X			X	X		X	X		X		
Lepidozea ulothrix (Schwaegr.) G.L. and N.								X				X	X	X	X		X	X		X	X	X	X	X	
Bazzania adnexa (L. et L.) Trev.								X				X			X		X	X		X	X		X	X	
Leujeunea sp.								X																	
Chiloscyphus multifolus Steph.										X															
Jamesoniella colorata (Lehm.) Spr.											X														
Plagiochila fuscella (H.f. and T.) Tayl.																X									
Plagiochila circinalis L. and L.																	X	X							

TABLE 1 (*Continued*)

REFERENCE	1	2	U	3	EP	W	X	5	4	6	EB	7	9	8	EF	EG	10	11	12	13	14	EI	15	16	17
	75	645	700	1000	1000	1170	1400	1400	1400	1500	1700	1950	1960	2000	2250	2450	2880	3000	3050	3300	3500	3600	4180	4400	4700
LIVERWORTS (CONT'D)	25	208	234	324	324	390	470	470	470	500	570	650	650	670	750	820	960	1000	1040	1100	1170	1200	1390	1470	1570
Frullania diplanata																		X							
Jungermannia sp.																				X					
Lepicolea scolpendra (Hook.) Dumort																				X			X	X	
Lophocolea austrigena (H. and T.) Tayl.																				X			X		
Lepidozia novae zelandiae St.																								X	
Lepidizia obtusiloba Steph.																								X	
Lophocolea bidentata (L.) Dum.																									X
Lophocolea semiteres (L. and L.) Mitt.																									X

TABLE 2

The per cent probability of species occurrence in three forest types as determined from the similarity analysis. The three probability groups were arbitrarily decided, species occurring in less than 25 per cent of species/site combinations were regarded as non-significant. The sites making up each forest type are: Tall closed forest 0-650 m (0-2000 ft) 1, 2, 3, 4, 5, 6, 8, 9 (Table 1, AB Fig. 3). Closed forest 650-1300 m (2-4000 ft) 7, 10, 11, 12, 13, 14, (Table 1, C Fig. 3). Low closed forest over 1300 m (4000 ft) 15, 16, 17 (Table 1, D Fig. 3).

FOREST TYPE	Tall Closed			Closed			Low Closed		
ALTITUDINAL RANGE (ft) (m)	0-2,000 0-650			2,000-4,000 650-1,300			over 4,000 1,300		
% PROBABILITY OF SPECIES OCCURRENCE	100-75	74-50	49-25	100-75	74-50	49-25	100-75	74-50	49-25
TREES & SHRUBS									
Nothofagus cunninghamii	-			-				-	
Atherosperma moschatum	-			-				-	
Drimys lanceolata							-		
Leptospermum lanigerum							-		
Hedycarya angustifolia		-							
Coprosma quadrifida		-							
Pittosporum bicolor		-							
Clematis aristata		-							
Parsonia brownii		-							
Eucalyptus regnans			-						
Acacia dealbata						-			
Eucalyptus nitens						-			
Telopea oreades						-			
Elaeocarpus holopetalus						-			
Coprosma nitida									-
Eucalyptus delegatensis									-
Olearia lirata									-
Drimys xerophila									-
Prostanthera cuneata									-
Epacris paludosa									-
Pimelea drupacea									-
HERBS									
Uncinia tenella							-		
Viola hederacea							-		
Hydrocotyle javanica							-		
Libertia pulchella							-		
Wittsteinia vacciniacea							-		
Fieldia australis			-						
Stellaria flaccida						-			
Acaena anserinifolia									-
Geranium pilosum									-
Cotula filicula									-
Gnaphalium sp.									-
Luzula campestris									-
Lagenophera stipitata									-
Carex appressa									-
Chiloglottis sp.									-
Asperula pusilla									-
Hypochoeris radicata									-
Ranunculus hirtus									-
Astelia alpina									-
Hierochloe redolens									-
FERNS & ALLIES									
Dicksonia antarctica	-			-				-	
Blechnum procerum	-			-				-	
Grammitis billardieri	-			-				-	
Hymenophyllum peltatum							-		

TABLE 2 (*Continued*)

FOREST TYPE	Tall Closed			Closed			Low Closed		
ALTITUDINAL RANGE (ft) (m)	0-2,000 0-650			2,000-4,000 650-1,300			over 4,000 1,300		
% PROBABILITY OF SPECIES OCCURRENCE	100-75	74-50	49-25	100-75	74-50	49-25	100-75	74-50	49-25
Blechnum fluviatile		–			–			–	
Polystichum proliferum		–			–			–	
Microsorium diversifolium		–							
Asplenium bulbiferum		–							
Polyphlebium venosum			–						
Mecodium flabellatum			–						
Cyathea cunninghamii			–						
Blechnum aggregatum			–						
Blechnum pattersonii			–						
Histiopteris incisa						–			
Lycopodium selago									–
Blechnum penna-marina									–
BRYOPHYTES									
Acanthocladium extenuatum	–			–				–	
Camptochaete ramulosa	–			–				–	
Dicranoloma menziesii	–			–				–	
Chiloscyphus fissistipus	–			–				–	
Hypnum cupressiforme		–			–			–	
Pterygophyllum dentatum		–			–			–	
Chiloscyphus coalitus		–			–			–	
Riccardia spp.		–			–			–	
Acrobolbus tenellus		–			–			–	
Umbraculum flabellatum		–			–			–	
Atrichum ligulatum		–							
Cyathophorum bulbosum		–							
Hypnodendron arcuatum		–							
Leucobryum candidum		–							
Papillaria flavo-limbata		–							
Ptychomnion aciculare		–							
Plagiochila fasciculata		–							
Schistochila lehmannia		–							
Symphyogyna sp.		–							
Trichocolea australis		–							
Catagonium politum			–						
Metzgeria sp.			–						
Chiloscyphus echinellus						–			
Lophocolea sp.						–			
Plagiochila sp.						–			
Plagiochila circinnalis						–			
Breutelia elongata									–
Hypnum cupressiforme var. filiforme									–
Leptostomum inclinans									–
Rhizogonium mnioides									–
Frullania sp.									–
Lepidozea obtusiloba									–
Lepidozea novae zelandiae									–
Lophocolea semiteres									–
Lophocolea bidentata									–