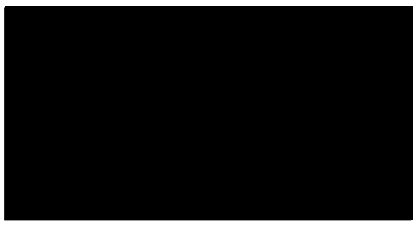

SPATIAL AND TEMPORAL PATTERNS IN THE DRY SEASONAL SUBTROPICAL RAINFORESTS OF EASTERN AUSTRALIA, WITH PARTICULAR REFERENCE TO THE VINE THICKETS OF CENTRAL AND SOUTHERN QUEENSLAND.

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April 1996

A thesis submitted for the degree of Doctor of Philosophy of the University of New England

DECLARATION

I certify that the substance of this thesis has not already been submitted for any degree and is not being currently submitted for any other degree or qualification.

I certify that any assistance received in preparing this thesis, and all sources used, have been acknowledged in this thesis.

William J.F. McDonald

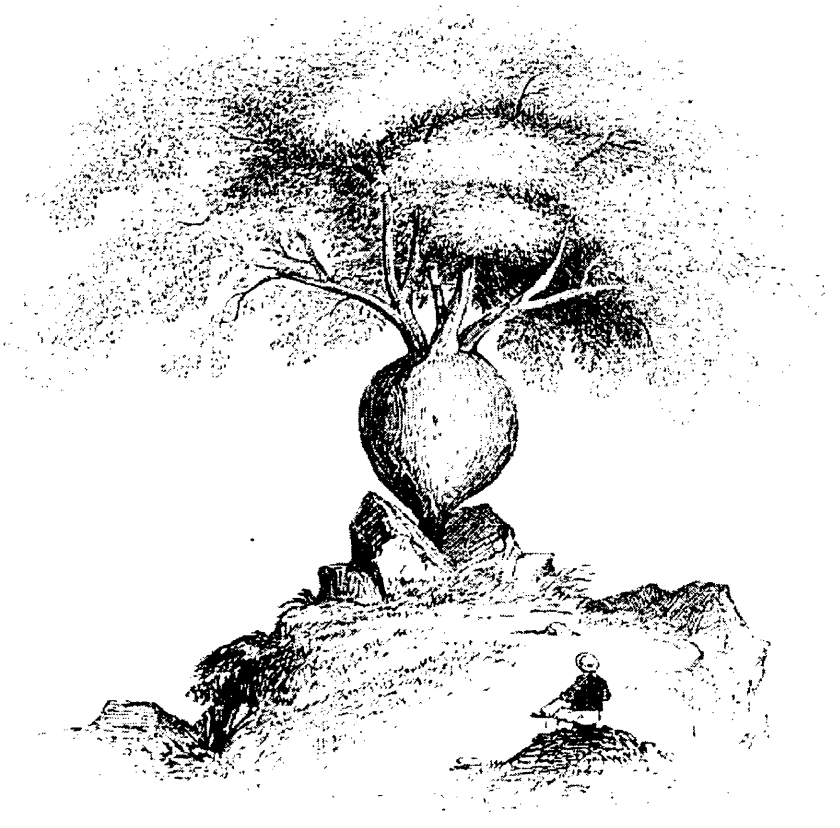
PROLOGUE

8th May (1846) --- - - - In hopes of obtaining an elevated view over the country to the westward, I endeavoured to ascend the northern summit of Mount Abundance, but although the surface to near the top was tolerably smooth, and the bush open, I was met there by rugged rocks, and a scrub of thorny bushes so formidable as to tear leathern overalls, and even my nose. - - - - The trees and bushes there were different from others in the immediate vicinity, and, to me, seemed chiefly new.

- - - Trees of a very droll form chiefly drew my attention here. The trunk bulged out in the middle like a barrel, to nearly twice the diameter at the ground, or of that at the first springing of the branches above. These were small in proportion to their great girth, and the whole tree looked very odd. - - - -

These trees grew here only in that almost inaccessible, crater-like hollow, which had impeded me in my attempt to reach the summit. Leaving the horses, however, I scrambled through the briars and up the rocks to the summit, but found it, after all this trouble, too thickly covered with scrub to afford me the desired view to the westward - - - -

From Mitchell, T.L. (1848) *Journal of an Expedition into the Interior of Tropical Australia, in Search of a. route from Sydney to the Gulf of Carpentaria.*



Drawing by E.B. Kennedy of *Delabechea (Brachychiton) rupestris*, c. 10-15 km SE of Mt Sowerby, 15th May 1846.

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ABSTRACT

A study was undertaken of floristic patterns in remnant dry seasonal rainforest (semi-evergreen vine thicket) in central and southern Queensland. Quantitative (basal area and canopy cover) and binary vegetation data were collected from 75 sites using a multiple nearest-neighbours sampling technique. Areas covered by samples varied between 0.025 and almost 0.1ha. Approximately half the sites occurred on fine-grained sediments, chiefly siltstone, shale and mudstone.

Mean numbers of species in sample of (32) canopy trees ranged from 14 in south-eastern Queensland to 7 in the Central Highlands region. Many of the latter stands were dominated by *Macropteranthes leichhardtii*.

Data were analysed using a range of classificatory and ordination procedures. An agglomerative procedure using the Bray-Curtis coefficient and UPGMA clustering provided more satisfactory groupings of sites than divisive methods. Eight site-groups were distinguished on the basis of cover data for tree and shrub species and were described in terms of structure, site features and frequent species.

Presence/absence data from the sites were incorporated into a regional floristic database covering the Brigalow Belt Biogeographic Region. There was broad agreement between the species and community patterns from the detailed survey and the bioregional analysis, with 3-4 coastal and subcoastal vine thicket groups and 3-4 inland groups.

The vine thickets represent a floristic continuum which is apparent in site and species ordinations. The latter indicate a large "core" group of species with other groups which represent northern/southern and dry/moist extremes of the continuum.

There was found to be close correlation between the community-types from both the detailed and the bioregional classifications and a range of climatic attributes, with coefficient of variation of monthly precipitation accounting for most significant between-group differences Species diversity was also correlated with several climatic attributes, including (negatively) maximum temperature of warmest period.

Large-scale community patterns were studied in an area of vine thicket dominated by *Macropteranthes leichhardtii* (bonewood) and associated brigalow (*Acacia harpophylla*) communities at Brigalow Research Station near Theodore in central Queensland. A 1 km section of a permanent transect established by Johnson (1980) was chosen for studies of community/ site factor relationships and temporal patterns (i.e. the changes since establishment of the transect in 1968-70).

Macropteranthes leichhardtii was associated with duplex and gradational soils with relatively deep, light-textured A horizons, whereas the heavier clay soils carried a brigalow (*Acacia harpophylla*) - belah (*Casuarina cristata*) woodland. Areas of intermediate soils carried a brigalow/vine thicket community.

Over the 20-25 years since establishment of the transect, there have been significant changes in species composition and abundance in both the vine thicket and the brigalow/vine thicket communities. Numbers of species have increased overall in both communities, but abundance of some species, notably *Acacia harpophylla* and *Opuntia tomentosa*, declined. There has also been an increase in numbers of intermediate and larger stems (>2.5cm diameter), but an even larger decrease in smaller stems (>30cm high, but <2.5cm diameter). There results suggest that no effective recruitment has occurred since establishment of the transect.

The results from Brigalow Research Station are discussed in relation to broader species and community patterns in vine thickets.

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