THE VEGETATION OF THE LOWER STANLEY RIVER BASIN.

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(PLATES VI. TO XI.)

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INTRODUCTION.

This paper was prepared as the result of work done in connection with an expedition to Somerset Dam organised by the Science Students' Association of the University of Queensland in February-March, 1939. It gives an account of the vegetation in an area of about 150 square miles in the lower part of the basin of the Stanley River, one of the chief tributaries of the Brisbane River, between Reedy Creek in the south and Villeneuve and Kilcoy to the north.

TOPOGRAPHY.

The country consists of valleys, gently rolling to hilly country, and some mountainous often very rugged areas, the whole varying in altitude from 200 to a little over 2,000 feet above sea level. The valleys between the hills and ranges vary from small narrow gullies with steeply sloping sides and beds to the broad plain flanking the river and the lower courses of its major tributaries.

CLIMATE.

The average annual rainfall for Kilcoy, at the northern limit of the area, is just about 40 inches; that of Mount Brisbane Station, at the southernmost extremity, is about 32·5 inches (for 30 years prior to 1924; no later figures are available for this station). The wettest month at Kilcoy is February, with an average of 6·2 inches, while at Mount Brisbane it is January, with an average of 4·4 inches. At both places the driest month is August, with an average fall of 1·3 at Kilcoy and 1·25 at Mount Brisbane. Both these stations are in valleys, and it seems quite certain from a study of the area that these figures do not give a satisfactory indication of the rainfall of the area as a whole. There seems little doubt that the rainfall is higher in some places, while it may be lower in others. Mists are known to be common on the higher hills and mountains. No data are available as to temperature, humidity, or winds.

GEOLOGY AND SOILS.

The geology of the area is complicated, and is not yet thoroughly understood. No attempt will be made to discuss it here, but reference is made to the work of Hill (1930) and C. W. Ball (1940), where also previous work is discussed. Geological work was carried out concurrently with the botanical work in 1939, and I wish to thank Dr. D. Hill, Mr. E. V. Robinson, and Mr. F. Chippendale for the use of unpublished data in drawing up the few remarks that follow.

There is a wide variety of rock-types, including acid and basic igneous rocks of varied nature, schists, shales, grits, conglomerates, sandstones, and sandy limestones. The igneous rocks are found usually

on the higher ground and the other rocks at the lower levels, though these are frequently seen intruded by the former.

The soils, too, are rather varied, with a tendency for red-brown earths to be formed over the less acid igneous rocks and sometimes over andesite, and podsols over the more acid rocks. Several kinds of podsol occur. Brown forest soils are found in places, sometimes showing an approach to chernozems in depressions and shallow gullies. The plains flanking the river and its major tributaries carry alluvial soils up to 20 feet in depth. They are usually sandy and more or less podsolised, though river gravels occur in places.

VEGETATION.

There has been no previous attempt to describe the vegetation of this area. The following account is based upon a number of traverses and a closer study of particular areas, but no attempt was made to estimate species-frequency. Owing to the unusually dry seasonal conditions, it is probable that the lists of herbaceous species in the Open Forest communities are incomplete, as some species may not have been recognisable. Also, owing to the intrinsic difficulties in studying such communities, the list of species given for some communities of the Closed Forest must be incomplete.

Apart from weeds of cultivation, &c., which were not specially studied, the vegetation may be grouped into four main types:—

I.—Open Forest.

II.—Closed Forest.

III.—Fringing Forest and other fringing communities.

IV.—Aquatic Vegetation.

I. OPEN FOREST.

Open Forest occupied or used to occupy by far the greatest area, occurring in almost all kinds of habitats except stream banks and the sheltered gullies and slopes of the higher mountains. The chief trees forming the forest are species of *Eucalyptus, Angophora,* and *Tristania,* with *Casuarina torulosa* and *Xanthorrhoea arborea.* There is relatively little undergrowth in most communities, but as the result of human interference patches or masses of *Lantana camara* (lantana) are common in places. The trees are often straight and well-formed, attain a considerable height (70 feet or so), and in some communities a practically closed canopy is produced. Since settlement many trees have been destroyed. Some have been removed for timber purposes, others have been merely killed by ringbarking for the purpose of improving the natural pasture, and left standing. As a result of this the original forest has in many places been thinned to parkland or even induced grassland. A few introduced herbaceous plants, chiefly the grasses *Paspalum dilatatum* (paspalum), *Chloris gayana* (Rhodes grass), and *Digitaria didactyla* (blue couch), have become common enough to modify the natural herbaceous communities, and these have been further modified by cattle-grazing, and possibly also by the periodic fires. It has not been possible to trace all the changes which have occurred since the beginning of settlement by white man, but it seems fairly certain that *Themeda australis* (kangaroo grass) was much more abundant than it is to-day.

The chief major communities are:—

1. Mixed Eucalyptus Forest (Fig. 1.).—The trees are *E. racemosa* (narrow-leaved ironbark), *E. decepta* (grey ironbark), *E. melanophloia* (silver-leaved ironbark), *E. tessellaris* (Moreton Bay ash), *E. gummifera* (bloodwood), and occasionally the small trees *Alphitonia excelsa* (red ash) and *Exocarpus cupressiformis* (native cherry—a root parasite). This is the most widely spread forest type and occurs chiefly on podsolised soils on slopes of medium steepness and covering the lower ridges, but it is also one of the types that have suffered most from settlement. Minor variations in habitat seem to be the cause of the observed fact that sometimes one or more of the tree species may be absent and one or other may assume local dominance. The bloodwood seems to have been largely removed (for timber) and very few trees are to be seen now. It may never have been very common. The herbaceous cover is possibly denser than in the virgin forest and *Themeda* has almost disappeared. The chief plants are *Bothriochloa decipiens* (pitted blue grass), *Aristida ramosa* (a spear grass), *Eragrostis leptostachya* (meadow love grass), *Digitaria didactyla* (blue couch), *Fimbristylis* sp., *Cyperus gracilis, Desmodium varians, Glycine tabacina, Zornia diphylla, Glossogyne tenuifolia, Helichrysum apiculatum, Verbena venosa,* and the annuals *Erigeron crispus* and *Erythraea australis. Lantana* is occasional. The remaining plants, all herbaceous, are—firstly, the grasses: *Aristida acuta, A. gracilipes, A. glumaris, Bothriochloa intermedia, Capillipedium parviflorum, Cenchrus australis, Chloris divaricata, Ch. truncata, Cymbopogon refractus, Dichanthium sericeum, D. affine, Digitaria orbata?, Eragrostis Brownii, E. elongata, E. parviflora, Eremochloa bimaculata, Eriochloa procera, Enneapogon pallidus, Heteropogon contortus, Hyparrhenia filipendula, Leptochloa* sp., *Panicum effusum, Paspalidium gracile, Poa australis, Sehima nervosum, Sorghum leiocladum, Sporobolus elongatus, Themeda australis*; and in addition *Alternanthera nana, Arthropodium paniculatum, Brunella vulgaris, Cassia mimosoides, Cheilanthes Sieberi, Crotolaria linifolia, Cyperus fulvus, Erechthites arguta, Erigeron canadensis, Gnaphalium japonicum, Justicia* sp. aff. *J. procumbens, Laxmannia gracilis, Malvastrum coromandelinum, M. spicatum, Notholaena distans, Portulaca oleracea, Rhynchosia minima, Rumex Brownii, Sida rhombifolia,* and *Wahlenbergia multicaulis.*

2. *Eucalyptus umbellata–Angophora subvelutina* (blue gum–apple) Forest.—This type of community occupies the alluvial flats and ascends the lower courses of some of the gullies, mingling to some extent with the previous type. Modifications approaching the mixed Eucalyptus Forest are to be seen on patches of heavy soil approaching the brown forest soils. The gum is usually taller and stouter than the members of the mixed forest, and is frequently parasitised by *Loranthus pendulus,* a mistletoe with long slender drooping branches which also parasitises other species. The apple is usually more or less irregular in form and not so tall as the gum. *Tristania suaveolens* (swamp mahogany) is at times common as a tall straight tree near depressions or small gullies. This forest has also been extensively cleared, and the herbaceous cover tends to be dominated by *Paspalum dilatatum.* As a result of grazing this grass usually forms a short, dense sward through which other members of the community push their way. These are chiefly *Bothriochloa decipiens* (often as co-dominant), *Aristida ramosa, Cyperus gracilis, Desmodium varians, Glycine tabacina,* and *Glossogyne tenuifolia.* In damp depressions tufts of *Juncus polyanthemus* are to be found, and

in still damper places there is a tendency for *Pennisetum alopecuroides* to co-dominate with *Paspalum* to the exclusion of everything else.

The other species of the blue gum–apple forest are *Cyperus fulvus, Dichanthium affine, Eragrostis leptostachya, E. sororia, Erigeron canadensis, E. crispus, Fimbristylis* sp. aff. *F. dichotoma, Kyllinga triceps, Lagenophora bellioides, Phyllanthus minutiflorus, Psoralea tenax, Richardsonia brasiliensis, Rumex Brownii, Sporobolus elongatus, Verbena venosa,* and *Wahlenbergia multicaulis.*

3. *Eucalyptus hemiphloia* (gum-topped box) Forest (Fig. 2).—This occupies fairly large areas of flat or gently sloping country, the soil being a podsol. Often the only tree present is *Eucalyptus hemiphloia,* the individuals of which are straight and often tall and closely spaced. An ironbark (*E. decepta* ?) and a grey gum (*E. propinqua* ?) are occasional. Shrubs are restricted to a few low almost bushy plants of *Eustrephus latifolius* var. *angustifolius* and *Jasminum suavissimum* (both usually slender lianas), an occasional *Solanum* sp., and the prostrate *Myoporum debile,* while the herbaceous layer is sparse and consists chiefly of rather scattered plants of *Aristida vagans, A. ramosa, Eremochloa bimaculata, Eragrostis leptostachya, Panicum fulgidum, Microlaena stipoides, Cyperus gracilis, Desmodium rhytidophyllum,* and *Sida subspicata.* There also occur occasional plants of *Bothriochloa decipiens, Glossogyne tenuifolia,* and *Helichrysum apiculatum.*

4. *Angophora lanceolata* (rusty gum or sugar gum) Forest (Fig. 3).—The communities of this are rather small in area and occupy flat expanses, usually the crests of low undulations, with a more or less strongly gravelly soil. The trees are fairly dense and usually straight and rather well formed with a relatively long and narrow dense crown. This is unusual, as the species is so often an irregular tree. Occasionally *Eucalyptus decepta* and *E. gummifera* are to be seen. Shrubs are absent, and the herbaceous layer is rather sparse and consists chiefly of *Aristida vagans, A. glumaris, Eragrostis sororia, E. leptostachya, Cyperus gracilis, Zornia diphylla,* and *Hardenbergia bimaculata,* though in one or other of the communities there also occur *Brachiaria miliiformis, Chloris ventricosa, Crotolaria linifolia, Digitaria didactyla, Glycine clandestina,* and *Paspalidium distans.* These communities are usually surrounded by and merge into *Eucalyptus hemiphloia* forest with a more or less pronounced ecotone.

5. *Eucalyptus maculata–E. racemosa* (spotted gum–ironbark) Forest (cf. Fig. 4).—This occupies the upper slopes and crests of ridges or low hills on podsolised soils with free quartz pebbles on the surface. There is practically no underwood, and the chief herbaceous plants are somewhat scattered. These are *Themeda australis, Capillipedium parviflorum* (scented golden-beard), *Heteropogon contortus* (bunch spear grass or black spear grass), *Aristida ramosa, Eragrostis Brownii, E. elongata, E. leptostachya, E. sororia, Cyperus gracilis, C. fulvus, Glycine clandestina,* and *Crotolaria linifolia* (a rattle-pod), but there are also present *Bothriochloa decipiens* (rare), *Chloris divaricata, Digitaria divaricatissima* (rare), *Desmodium rhytidophyllum, Erigeron canadensis, E. crispus, Erythraea australis, Helichrysum apiculatum, Panicum effusum, Phyllanthus* sp., *Sida corrugata, S. rhombifolia,* and *Verbena venosa.* Where the ironbark tends to drop out of the community, *Aristida* tends to dominate the ground flora, and where the spotted gum drops out, the community merges into the mixed Eucalyptus forest.

6. *Eucalyptus racemosa–Casuarina torulosa–Xanthorrhoea arborea* (ironbark–oak–grass-tree) Forest (Fig. 5).—This forest is developed on the upper part of the higher hills on generally steeply sloping ground, and is poor in species. The eucalypt averages 50–70 feet in height, the *Casuarina* 20–25 feet, and the *Xanthorrhoea* 10–15 feet. The only other woody plant normally present is an occasional low shrub of *Grewia latifolia.* Completely covering the ground is a dense growth of *Themeda australis* and *Poa australis* with some *Sorghum leiocladum, Cymbopogon refractus* and *Erechthites arguta,* and occasionally *Fimbristylis monostachya, Glycine clandestina,* and *Lespedeza sericea.* At its lower edge this forest passes into mixed Eucalyptus forest, *Casuarina* being the first to drop out. In some places however, as for instance on Little Mount Brisbane, it impinges directly on Closed Forest, often without any ecotone.

7. *Eucalyptus carnea–E. punctata* (stringy-bark–grey gum) Forest (Fig. 6).—This forest was only seen on the range to the west of the township of Somerset Dam at an altitude of 1,400–2,000 feet on a light coloured, light-textured, rather shallow, almost skeletal soil developed on alaskite, boulders of which are scattered here and there over the surface. The dominant trees are well-formed, rather massive, and the tallest eucalypts seen in the area. They form a relatively dense canopy. *Casuarina torulosa* is scattered through the community as a discontinuous under-storey, while the grey gum drops out in places. There is a well-developed underwood, though nowhere really dense, of the spiny-leaved shrubs *Acrotriche aggregata* and *Oxylobium trilobatum,* together with *Monotoca scoparia, Persoonia Mitchelli, Indigofera australis, Tephrosia purpurea, Hovea acutifolia, Macrozamia spiralis* (in places,) and young *Tristania conferta* and *Acacia Maidenii?* The ground flora is dense and rich, composed of many individuals belonging to many families, of which the commonest and tallest (2–3 feet) are the grasses *Themeda australis, Poa australis, Cymbopogon refractus, Digitaria* sp. aff. *D. recta,* and the smaller *Aristida vagans* (rare), besides the sedge *Lepidosperma laterale.* Other common herbs are *Didiscus incisus, Goodenia rotundifolia, Desmodium rhytidophyllum, D. brachypodum, Erechthites arguta, Helichrysum bracteatum, Lomandra longifolia, L. multiflora, Dianella caerulea, Plectranthus australis, Spermacoce* sp., and *Poranthera microphylla.* Herbaceous twiners are the legumes *Glycine clandestina, Hardenbergia bimaculata,* and *Kennedya rubicunda,* and the woody twiners *Cissus opaca* and *Eustrephus latifolius* var. *angustifolius* are also present. Less common herbaceous plants are *Danthonia semiannularis? Desmodium varians, Echinopogon ovatus, Entolasia stricta, Glossogyne tenuifolia, Hybanthus enneaspermus, Imperata cylindrica* var. *Koenigii* (blady grass), *Lagenophora stipitata, Oxalis* sp. and *Vernonia cinerea.* At its lowermost edge this forest frequently borders upon closed forest with a definite ecotone between.

8. *Eucalyptus punctata–E. paniculata?–Tristania conferta Forest.* This is often found on the fringe of Closed Forest, and is rather in the nature of an ecotone community. Sometimes the *Tristania* (scrub box) occurs alone, sometimes it is absent, but when present the canopy is usually closed or nearly so. All variations in composition may occur in sheltered places on hillside gullies, whether Closed Forest be present or not. Shrubs characteristic of the Ecotone (see below) may be present. The chief herbaceous plants are *Themeda australis, Poa australis, Microlaena stipoides, Gymnostachys anceps, Carex declinata,* &c.

9. On very rocky places on hillsides are to be found communities of chiefly herbaceous plants which are more or less independent of the general forest type. The ferns *Drynaria rigidula* and *Notholaena distans* and the labiate *Plectranthus australis* are specially characteristic, and if there are definite rock faces or ledges the orchid *Dendrobium Kingianum* is usually to be found. Other ferns and orchids and a few grasses are also fairly common. These are *Adiantum aethiopicum, A. hispidulum, Davallia pyxidata, Doodia heterophylla, Pteris tremula, Pyrrhosia confluens* and *P. rupestris,* the last two long-creeping; *Bulbophyllum* sp., *Dendrobium, linguiforme* (creeping), *Liparis reflexa,* and *Sarcochilus falcatus; Entolasia stricta, Imperata cylindrica* var. *Koenigii, Leptochloa* sp., *Paspalidium gracile,* and *Tripogon loliiformis.* Other noteworthy plants are *Gymnostachys anceps, Lomandra multiflora,* the wiry twiners *Eustrephus latifolius* var. *angustifolius, Hardenbergia bimaculata, Smilax australis;* and the shrubs *Brachychiton Bidwillii, Indigofera australis, Lantana camara, Phyllanthus similis,* and *Trochocarpa laurina* (this last sometimes a small tree). Some of these species have been mentioned as occurring in communities already dealt with, others are mentioned below in dealing with the origin of Closed Forests.

II. CLOSED FORESTS.

The Closed Forests vary considerably in extent, and are popularly known as "scrubs." Broadly speaking, two main types may be distinguished:—

1.—Pine "Scrubs."

2.—Isolated "Scrubs."

1. The Pine Scrubs occupy the larger continuous areas and are invariably found on mountain sides, often in gullies or on low saddles or other more or less sheltered habitats. The ground is almost invariably steep, often very steep, and usually rocky. The woody plants are numerous in species with dense or fairly dense canopies, and are so closely spaced that relatively little direct sunlight ever reaches the ground. Lianas are common, epiphytes are not very common, and there are very few herbs on the forest floor. The forests approach true Rain Forest in many characters—and indeed there are a few small areas on the banks of some of the creeks which might with justice be called Rain Forest—but on the whole they differ in the paucity of epiphytes, in the absence of *Calamus* (lawyer-vine) among the lianas, in the poor development of buttresses, and in the relative frequency of deciduous or partially deciduous trees. In some communities the hoop pine (*Araucaria Cunninghamii*) is by far the tallest tree and completely dominates the forest, and it is these communities that are least like Rain Forest (Fig. 7). The other trees are relatively small and often shrubby. There are four distinct storeys. The tallest is a discontinuous one, composed of the *Araucaria* alone, the next is about 30 feet high, composed of several species, including *Laportea photiniphylla, Bridelia faginea, Ficus eugenioides,* &c., the third is composed of shrubs 8–15 feet high, of which *Alchornea aquifolium* is very characteristic, while the lowermost consists of a sparse layer of herbaceous or slightly woody plants, of which *Nyssanthes diffusa* is probably the commonest. Owing to the difficulty of thoroughly studying these forests, due partly to the frequent extreme ruggedness of the habitat and the difficulty of penetration

further increased in places by dense masses of *Lantana*, and partly to the difficulty of identifying the numerous species, it is only possible to sketch the salient features of the areas visited. A complete list of species certainly identified is given below. The trees most frequently associated with the pine (second storey) are *Acacia aulacocarpa, Alectryon connatus, A. tomentosus, Atalaya hemiglauca, Bridelia faginea, Microcitrus australis, Erythrina vespertilio, Ficus eugenioides, Flindersia australis, Laportea photiniphylla, Maba fasciculosa, Mallotus philippinensis,* and *Rhodosphaera rhodanthema.* The more frequent shrubs of the third storey are *Acalypha nemorum, Alchornea aquifolium, Canthium lucidum, Capparis nobilis, Citriobatus pauciflorus,* and *Wilkiea macrophylla.* The commoner herbs are *Aneilema biflorum, Oplismenus imbecillis, Pellaea paradoxa, Pyrrhosia rupestris* (creeping on rocks or trees), *Rivina laevis* (introduced), and the somewhat shrubby *Nyssanthes diffusa.* The chief epiphytes are *Dendrobium speciosum, D. teretifolium,* and *Platycerium grande.* Among the frequent lianas may be mentioned *Cissus antarctica, Jasminum didymum, Lonchocarpus Blackii, Pandorea pandorana, Rhipogonum* sp., and *Tetrastigma nitens,* the last-mentioned with long, very fine aerial roots. In many communities the introduced *Lantana camara* has gained entry along tracks and clearings following the removal of pine for milling purposes, and in places forms almost impenetrable masses. The shrubby grass *Ancistrachne uncinulata* is to be seen in places, while some areas are characterised by the predominance of tall straight trees of *Syncarpia subargentea,* very prominent on account of its smooth pink bark and prominent buttresses. In such communities and in others where the pine tends to be or is almost entirely replaced by tall trees belonging to such species as *Euroschinus falcatus, Harpullia pendula, Flindersia australis, Hernandia bivalvis,* &c., a very close approach to true Rain Forest is attained (cf. Fig. 8). The shrubby layer is less dense and more varied than in typical Pine Scrubs, and such communities should probably be given a distinctive name, but they have not yet been sufficiently studied.

There is usually a well-marked ecotone between these Closed Forests and the surrounding Open Forest, frequently *Eucalyptus punctata–E. paniculata?–Tristania conferta* forest. Some trees, such as *Mallotus philippinensis,* simply pass out from the Closed Forest, but there are a number of species which are restricted or nearly restricted to these ecotones. These include *Acacia decurrens, Duboisia myoporoides,* and *Hibiscus heterophyllus* (small trees or tall single-stemmed shrubs), *Cassia retusa, Abutilon acutatum, Brachychiton Bidwillii, Myrtus rhytisperma,* and *Plumbago zeylanicum* (smaller shrubs), *Stipa ramosissima* (a shrubby grass up to 8 feet high), *Macrozamia spiralis* (stemless), *Smilax australis* (a liana), and the herbs *Aristida gracilipes, Carex declinata, Cyperus enervis, C. laevis, Chloris unispicea, Doodia aspera, Gymnostachys anceps,* and *Leptochloa* sp.

Occasionally the Closed Forest shows an advance into the Open Forest, old trees of the latter occurring within the fringe of the former. The advance is initiated by the ecotone species, under whose canopy Closed Forest species can and do multiply, but prevent the growth of the Eucalypts. But at times a complete equilibrium is attained, sometimes over a considerable area, in which seedling and adult trees of both formations are associated. This is the Hoop Pine–Ironbark Forest of Swayne (1928), which is common in the Brisbane Valley, but is very rare in the area discussed in this paper. In other cases there is no perceptible ecotone, so that there is a sharp line of demarcation except

for the fact that *Abutilon acutatum, Aristida gracilipes, Chloris unispicea,* &c., grow round the edge under the Eucalypts.

2. Of great ecological interest are the numerous small isolated "scrubs" scattered about the hillsides, usually on particularly rocky places (Figs. 9, 10, 11). These vary from a few yards up to 100 yards in diameter, and there is usually a complete absence of ecotone, so that from a distance these scrubs are visible as dark-green dots and patches set amongst the grey-green of the Open Forest of the hillsides. Hoop pine is usually absent from the smaller of these communities and certain grasses are characteristic. *Ancistrachne uncinulata* is by far the commonest and it occurs also in the Pine Forests, *Stipa ramosissima* is not uncommon, and *Leptochloa* sp. is universal. The trees and shrubs are all those of the Pine Forest, but as one might expect from the size of the communities, they are not so varied in nature. Lianas are relatively numerous, but epiphytes (other than mosses and lichens) are absent. *Brachychiton Bidwillii* is a common plant at the edges.

The following is a complete list of the twenty-two species found in the community shown in Figs. 9–10: *Alectryon tomentosus, Flindersia australis, Laportea photiniphylla, Mallotus philippinensis,* and *Melia dubia* (trees); *Acalypha capillipes, Alchornea aquifolium, Capparis nobilis, Ellatostachys xylocarpa, Myrsine variabilis, Turraea pubescens* (shrubs) and *Ancistrachne uncinulata* (somewhat shrubby); *Cissus opaca, Hoya australis, Jasminum didymum,* and *Malaisia tortuosa* (lianas); and *Adiantum aethiopicum, Brachiaria foliosa, Cyperus gracilis, Eranthemum variabile, Leptochloa* sp., and *Scleria Brownii* (herbs).

These communities appear to be of some age, but in one case a young community was found on the bank of a small gully (Fig. 11) which consisted of one young plant of *Euroschinus falcatus* about 20 feet high, six young trees of *Mallotus philippinensis* 12–15 feet high and a few smaller ones, a shrub of *Breynia oblongifolia* at the edge, and under the canopy occurred *Adiantum aethiopicum, Eustrephus latifolius* var. *angustifolius,* and a young plant of the liana *Pandorea pandorana.*

There is evidence to indicate that at least some of the isolated scrubs may have originated from the communities of *Drynaria rigidula* on rocky slopes. This fern forms dense patches, accumulates humus at the base of the barren leaves, and throws considerable shade on the substratum. Certain ecotone species appear then to develop among the fern, of which *Gymnostachys anceps, Smilax australis,* and *Lantana camara* are common. *Trochocarpa laurina* sometimes occurs, with or without the fern, and other tree species have been found associated with these patches. In one instance, the appearance of a fig (*Ficus eugenioides*), probably from seed dropped by a bird, has initiated a Closed Forest succession under its canopy. Further, it seems likely that following man's interference, *Lantana* has helped considerably in the advancement of Closed Forest by the amount of shade formed at the margins of the latter. It is possible also that the rocky areas offer protection from fire to any Closed Forest seedlings that may chance to germinate there, a protection which is not required by the seedlings of Open Forest trees.

When Closed Forest is destroyed the area is soon occupied by a dense growth of *Lantana,* through which such pioneer species as *Codonocarpus australis, Pipturus argenteus, Capparis nobilis, Alyxia ruscifolia,* &c., push their way.

III. FRINGING COMMUNITIES.

These communities are developed along the banks of streams, rarely extending any distance beyond the margins. The sandspits and shingle banks of the river are themselves colonised by certain species, often annuals, which may be removed by each flood and do not form a stable vegetation. The species chiefly concerned are *Cyperus polystachyos, Fimbristylis bisumbellata, Polygonum decipiens, P. lapathifolium,* and *P. orientale.* Less frequent are *C. exaltatus, C. difformis, C. trinervis,* and *F. aestivalis.* Distinctive herbaceous communities of a more permanent nature are to be found fringing the banks of small sluggish streams, and similar communities also occur occasionally along the banks of the river. The characteristic plants are the grasses *Pennisetum alopecuroides* and *Paspalum distichum,* and the sedges *Cyperus exaltatus, C. globosus,* and in some places *C. eleusinoides* and *C. vaginatus.* Extending into the water itself are *Typha angustifolia* (bullrush) and *Scirpus lacustris.*

A Fringing Forest of some kind is usually to be found along the watercourses. In its most primitive form this Fringing Forest consists of a few scattered trees of *Tristania suaveolens* on the banks of some of the gullies which contain water only at infrequent intervals. Larger watercourses have usually (in this area) a sandy to rocky bed and retain moisture much longer. Along such are developed a more or less closed community of rather tall trees of *Casuarina Cunninghamiana* (river oak) and *Melaleuca bracteata* (Fig. 12), with a more or less closed ground cover of such shade-loving plants as *Agrostis avenacea, Cyperus enervis, Microlaena stipoides,* and *Paspalidium distans,* with *Cyperus trinervis* at the edge of the shingle. Where there is permanent water, there is a tendency for the *Melaleuca* to be replaced by *Callistemon viminalis* (red tea-tree, red bottle-brush) though the latter may extend further upstream from permanent water. Along the larger streams, such as the Stanley River and Kilcoy Creek, the characteristic tree is the river myrtle, *Eugenia Ventenatii,* often with *Castanospermum australe* (Moreton Bay chestnut, Black bean) associated. Both *Casuarina* and *Callistemon* may be present. The ground flora consists of clumps of *Lomandra longifolia* with *Cyperus gracilis, C. enervis, C. mirus, C. trinervis, Microlaena stipoides, Paspalidium distans,* and more or less *Digitaria didactyla.*

Along many of the tributary creeks a Closed Forest approaching Rain Forest in character is to be found in the narrow valleys near the sources, and *Melia dubia* sometimes with *Laportea* spp. may extend downstream into the *Casuarina–Melaleuca* forest.

IV. AQUATIC VEGETATION.

This was not studied in detail. Apart from numerous *Algae* the following submerged plants are common in the river:—*Ceratophyllum demersum, Hydrilla verticillata, Potamogeton crispus,* and *Vallisneria spiralis*; chiefly submerged are *P. javanicus* and *Myriophyllum verrucosum* (flowering parts emerged); *Ottelia ovalifolia* and *Triglochin procera* are partly floating, while *Limnanthemum indicum* has all its leaves floating. In the small streams *Triglochin* and *Ottelia* are the more common Angiosperms, while *Characeae* also occur. *Typha angustifolia* and *Scirpus lacustris,* which are submerged at base only, are also common.

LIFE-FORMS AND DISTRIBUTION OF THE SPECIES.

Except for a few weeds of cultivation or roadsides and a few roadside waifs all the species recognised in the area are listed in the following tables. For reference the life-forms are given according to the system of Raunkiaer as given by Wood (1937) and discussed by du Rietz (1931). But a caution must be given against the use of the data in statistical analyses*. As pointed out at the beginning of the paper, the lists almost certainly are incomplete. The area described is fairly representative of a considerable part of South-East Queensland, yet a few species which are abundant in neighbouring districts were not recorded from this area. (*Siegesbeckia orientalis,* a common species of the Closed Forest ecotone, is one of these). It is sometimes difficult to assign plants to a definite life-form, and such compound symbols as H-Ch have been employed in an effort to overcome this. In the case of the species of the Closed Forest, the broad divisions are elaborated by the addition of brief notes, as so many of the species have not been mentioned in the descriptions of the communities. In Table II. are listed the species found in the other communities discussed. Almost all these have been mentioned in the earlier part of the paper, and are brought together here to show the distribution of the different species. But some of these are abundant in some communities and very rare in others.

The families of Angiosperms are arranged according to the system of Hutchinson (1926, 1934). The nomenclature of the Eucalypts follows that of Blakely (1934), the trees of the Closed Forests that of Francis (1929), that of the *Cyperaceae* and *Gramineae* follows recent revisional work by various workers, including the present author, while the remainder is very much that of Bailey (1913), except for a few emendations by Domin (1915, 1921-29), where such could be checked. The nomenclature of the ferns follows that of Miss D. A. Goy in the Queensland Herbarium, and is substantially that of Christensen (1906, 1913-1916).

For convenience, an abbreviated table of Raunkiaer's Life Forms adapted from Wood (1937) is given herewith.

a. *Mega-* and *Mesophanaerophytes* (MM); woody plants more than 8 metres high (Megaphanaerophytes are more than 30 metres high and are not specially indicated).
b. *Microphanaerophytes* (M.); woody plants from 2 to 8 metres high.
c. *Nanophanaerophytes* (N.); woody plants from 25 centimetres to 2 metres high.
d. *Chamaephytes* (Ch.); chiefly undershrubs up to 25 centimetres high.
e. *Hemicryptophytes* (H.); plants with perennating buds buried in the surface layers of the soil, as for example, most grasses.
f. *Geophytes* (G); plants with perennating buds buried deep in the soil, such as bulbous and rhizomatous plants.
g. *Helophytes* (HH.); plants growing in water.
h. *Therophytes* (Th.); annual plants.
i. *Epiphytes* (E.); plants growing on other plants, or on rocks.
j. *Succulents* (S.).

* This warning is given in an effort to prevent such misleading statements as that given by Wood in the work quoted above, where on p. 22 he gives Life Spectra of "Typical Australian Plant Communities." For "Tropical Forest, Queensland," he gives 4 per cent. Therophytes and no Epiphytes. Rain forest is evidently meant, particularly as he states there are 18 lianas present, but epiphytes are a *sine qua non* of such communities, and further no living Queensland botanist has ever noticed a therophyte in a rain forest, unless perhaps in clearings or on roadsides or very broad tracks. This, of course, does not mean that such a thing is an impossibility, but it is scarcely characteristic of such communities. Wood, however, cites no authority for his figures.

TABLE I.

THE SPECIES OF THE CLOSED FOREST COMMUNITIES AND ECOTONES

Species.	Life-form.	Remarks.
PTERIDOPHYTA.		
Adiantum aethiopicum L.	H.	Loosely tufted
A. hispidulum Sw. ..	H.	Loosely tufted
Asplenium adiantoides (L.) C. Christens.	E.	On *Platycerium*
Doodia aspera R.Br. ..	H-Ch.	Tufted
Dryopteris queenslandica Domin	H-Ch.	Tufted
Pellæa nana (R.Br.) ..	H-Ch.	Forming masses on rocks
P. paradoxa (R.Br.) Hook.	H.	Not tufted
Platycerium grande J. Sm...	E.	
P. bifurcatum (Cav.) C. Christens.	E.	
Pyrrhosia confluens (R.Br.) Ching	E.	Creeping liana
P. rupestris (R.Br.) Ching..	E.	Creeping liana
GYMNOSPERMAE.		
PINACEAE.		
Araucaria Cunninghamii Ait.	MM.	Often very tall
CYCADACEAE.		
Macrozamia spiralis (R.Br.) Miq.	Ch.	Large Rosette; Ecotone
ANGIOSPERMAE.		
ANONACEAE.		
Melodorum Leichhardtii (F. Muell.) Benth.	M-MM.	Liana
MONIMIACEAE.		
Wilkiea macrophylla (A. Cunn.) A.DC.	N-M	
HERNANDIACEAE.		
Hernandia bivalvis Benth.	MM.	
MENISPERMACEAE.		
Legnephora Moorei (F. Muell.) Benth.	MM.	Liana
CAPPARIDACEAE.		
Capparis nobilis (Endl.) F. Muell.	M.	More or less prickly
C. sarmentosa A. Cunn. ex Benth.	M.	Creeping prickly liana
PHYTOLACCACEAE.		
Codonocarpus australis A. Cunn. ex Moq.	M.	
Rivina laevis L.	Ch.	Introduced, but common
CHENOPODIACEAE.		
Chenopodium triangulare R.Br.	Ch.	Rare
Rhagodia hastata R.Br. ..	Ch.	Rare
AMARANTACEAE.		
Nyssanthes diffusa R.Br. ..	Ch-N.	Divaricating half-shrub
THYMELEACEAE.		
Pimelea altior F. Muell. ..	N.	In ecotone
PROTEACEAE.		
Grevillea robusta A. Cunn...	MM.	
PITTOSPORACEAE.		
Citriobatus pauciflorus A. Cunn. ex Benth.	N-M.	Prickly, with small leaves
Hymenosporum flavum (Hook.) F. Muell.	M.	Deciduous
FLACOURTIACEAE.		
Scolopia Brownii F. Muell.	M.	
PASSIFLORACEAE.		
Passiflora alba Link & Otto	Ch.	Rather tall liana; introduced, rare
MYRTACEAE.		
Backhousia myrtifolia Hook. & Harv.	M.	
Myrtus acmenioides F. Muell.	M.	Stems crooked, bark thin, deciduous
M. rhytisperma F. Muell. ..	N.	
Syncarpia subargentea C. T. White	MM.	Buttressed; bark deciduous
STERCULIACEAE.		
Brachychiton acerifolius (A. Cunn.) F. Muell.	M-MM.	Leaves deciduous
B. Bidwillii Hook. ..	N.	Leaves deciduous
MALVACEAE.		
Abutilon acutatum C. T. White MSS.	N.	Soft-wooded
Hibiscus heterophyllus Vent.	M.	Soft-wooded
EUPHORBIACEAE.		
Acalypha capillipes F. Muell. ex Muell. Arg.	N.	
A. nemorum F. Muell. ex Muell. Arg.	N.	
Alchornea aquifolia (J. Sm.) Domin	N.	Very common
Breynia oblongifolia Muell. Arg.	N.	
Bridelia faginea (Baill.) F. Muell. ex Benth.	M.	
Claoxylon sp.	M.	
Cleistanthus Cunninghamii (Muell. Arg.) Muell. Arg.	M.	
Croton insularis Baill. ..	M.	
Hemicyclia australasica Muell. Arg.	M.	
Mallotus claoxyloides (F. Muell.) Muell. Arg.	N.	
M. philippinensis (Lam.) Muell. Arg.	M.	
Tragia novae-hollandiæ Muell. Arg.	M.	Very slender liana, with stinging hairs
CAESALPINIACEAE.		
Cassia retusa Soland. ex Vog.	N.	In ecotone
MIMOSACEAE.		
Acacia aulacocarpa A. Cunn. ex Benth.	M.	
A. decurrens (Wendl.) Willd. (sens. lat.)	M.	In ecotone
A. Maidenii F. Muell. ..	M.	In ecotone
PAPILIONACEAE.		
Erythrina vespertilio Benth.	M.	Leaves deciduous; trunk slightly prickly
Castanospermum australe A. Cunn. & Fraser	MM.	Chiefly on stream banks
Lonchocarpus Blackii (F. Muell.) Benth.	MM.	Liana
ULMACEAE.		
Aphananthe philippinensis Planch.	M.	
MORACEAE.		
Cudrania javanensis Trecul	M.	Prickly liana
Ficus eugenioides (Miq.) Miq.	M-MM.	Partly deciduous
F. stenocarpa F. Muell. ex Benth.	M.	Partly deciduous
F. Watkinsiana F. M. Bail.	MM.	
Malaisia tortuosa Blanco ..	MM.	Liana
Pseudomorus Brunoniana Bur.	M.	
URTICACEAE.		
Laportea gigas Wedd. ..	M.	With stinging hairs
L. photiniphylla (Kunth) Wedd.	M.	With stinging hairs
Pipturus argenteus (Forst.) Wedd.	M.	
CELASTRACEAE.		
Celastrus bilocularis F. Muell	N.	
Denhamia pittosporoides F. Muell.	M.	
Siphonodon australe Benth.	MM.	
LORANTHACEAE.		
Loranthus dictyophlebus F. Muell.	N., E.	Parasitic
SANTALACEAE.		
Exocarpus latifolius R.Br.	M.	Root parasite
RHAMNACEAE.		
Alphitonia excelsa Reissek ex Endl.	M.	

TABLE 1—*continued.*

THE SPECIES OF THE CLOSED FOREST COMMUNITIES AND ECOTONES—*continued.*

Species.	Life-form.	Remarks.
AMPELIDACEAE (VITACEAE).		
Cayratia acris (F. Muell.) Domin	M-MM.	Liana
Cayratia clematidea (F. Muell.) Domin	M.	Liana
Cissus antarctica Vent. ..	MM.	Liana
Cissus opaca F. Muell. ..	M.	Liana
Tetrastigma nitens (F. Muell.) Planch.	MM.	Liana, with aerial roots
RUTACEAE.		
Melicope neurococca F. Muell.	M.	
Microcitrus australis (A. Cunn.) Swingle	M.	Thorny
Xanthoxylum brachyacanthum F. Muell.	M.	Thorny
SIMARUBACEAE.		
Ailanthus malabarica DC...	M.	Rosette tree, with pinnate leaves
MELIACEAE.		
Dysoxylon sp.	MM.	
Flindersia australis R.Br.	M-MM.	When MM. slightly buttressed; at least partly deciduous
F. collina F. M. Bail ..	M.	Deciduous or partly deciduous
F. Schottiana F. Muell. ..	M.	
Melia dubia Cav.	M.	Deciduous
Turraea pubescens Hellen...	N.	Deciduous
SAPINDACEAE.		
Alectryon connatus (F. Muell.) Radlk.	M.	
A. tomentosus (F. Muell.) Radlk.	M.	
Atalaya hemiglauca (F. Muell.) F. Muell. ex Benth.	M.	Seen chiefly as seedlings
Cupaniopsis parvifolia (F. M. Bail.)	M.	
Dodonaea cuneata Rudge ..	N.	Ecotone sp.
Ellatostachys xylocarpa (A. Cunn.) Radlk.	N.	
Harpullia pendula (Planch.) F. Muell.	M-MM.	
Jagera pseudorhus (A. Rich.) Radlk.	M.	Deciduous
Mischocarpus pyriformis (F. Muell.) Radlk.	M.	
ANACARDIACEAE.		
Euroschinus falcatus Hook. f.	MM.	
Rhodosphæra rhodanthema (F. Muell. ex Benth.) Endl.	M.	
ARALIACEAE.		
Polyscias elegans (Moore & F. Muell.) Harms	M.	Rosette tree, with pinnate or bipinnate leaves
EPACRIDACEAE.		
Trochocarpa laurina (Rudge) R.Br.	M.	
EBENACEAE.		
Diospyros pentamera (F. Muell.) F. Muell. & Woolls	M.	Frequently MM.
Maba fasciculosa F. Muell.	M.	
Maba humilis R.Br. ..	M.	
SAPOTACEAE.		
Amorphospermum antilogum F. Muell.	MM.	
Chrysophyllum pruiniferum F. Muell.	M.	
Lucuma sericea F. Muell. ..	M.	
MYRSINACEAE.		
Myrsine variabilis R.Br. ..	N-M.	
SYMPLOCACEAE.		
Symplocos sp.	M ?	One specimen seen

Species.	Life-form.	Remarks.
OLEACEAE.		
Jasminum didymum Forst.	M.	Liana
J. suavissimum Lindl. ..	M.	Liana
Notelaea longifolia Vent. ..	M.	
Olea paniculata R.Br. ..	M-MM.	
APOCYNACEAE.		
Alstonia constricta F. Muell.	M.	
Carissa ovata R.Br. ..	N.	Divaricate prickly shrub
Alyxia ruscifolia R.Br. ..	N.	Leaves very rigid and pungent
Parsonsia lanceolata R.Br.	M.	Liana
P. velutina R.Br.	M.	Liana
ASCLEPIADACEAE.		
Hoya australis R.Br. ex Treull.	S.	Liana
Marsdenia sp.	M.	Liana
Sarcostemma australe R.Br.	S.	Liana ; leafless
RUBIACEAE.		
Canthium coprosmoides F. Muell.	M.	
C. lucidum Hook. & Arn...	M.	
Hodgkinsonia ovatiflora F. Muell.	M.	
Ixora Beckleri Benth. ..	M.	
Pavetta indica L.	M.	
Psychotria daphnoides A. Cunn.	N-M.	
Ps. loniceroides Sieb. ..	N-M.	
PLUMBAGINACEAE.		
Plumbago zeylanicum L. ..	N.	
GOODENIACEAE.		
Goodenia grandiflora Sims ..	Ch.	Ecotone sp.
SOLANACEAE.		
Duboisia myoporoides R.Br.	M.	
Solanum stelligerum Sm. ..	N.	
Solanum spp.	N.	
BIGNONIACEAE.		
Pandorea pandorana (Andr.) Van Steenis	MM.	Liana
ACANTHACEAE.		
Justicia sp. aff. *J. procumbens* L.	Ch.	
VERBENACEAE.		
Lantana camara L. ..	N-M.	Liana, or forming dense masses; introduced
Spartothamnus junceus A. Cunn.	N.	Small, divaricating, almost leafless
LABIATAE.		
Plectranthus australis R.Br.	Ch.	Somewhat succulent
COMMELINACEAE.		
Commelina biflorum R.Br.	Ch.	A creeping herb
FLAGELLARIACEAE.		
Flagellaria indica L. ..	M-MM.	Liana, with leaf-tendrils
ZINGIBERACEAE.		
Alpinia caerulea (R.Br.) Benth.	H.	
LILIACEAE.		
Dianella caerulea Sims ..	Ch.	Grass-like ; in ecotone
SMILACACEAE.		
Rhipogonum sp.	M.	Liana
Smilax australis R.Br. ..	M.	Liana ; prickly
PHILESIACEAE.		
Eustrephus latifolius R. Br. var. *angustifolius* (R.Br.) Benth.	M.	Liana
ARACEAE.		
Pothos longipes Schott ..	E.	Root climber
Gymnostachys anceps R.Br.	H.	Grasslike ; in ecotone
DIOSCOREACEAE.		
Dioscorea transversa R.Br.	M.	Liana
XANTHORRHOEACEAE.		
Lomandra longifolia Labill. sens. lat.	H.	Grass-like ; in ecotone

TABLE I—*continued.*

THE SPECIES OF THE CLOSED FOREST COMMUNITIES AND ECOTONES—*continued.*

Species.	Life-form.	Remarks.
AGAVACEAE.		
Cordyline terminalis (Jacq.) Kunth	N-M.	Rosette small tree
PALMAE.		
Calamus Muelleri Wendl. & Drude	MM.	Very prickly liana
ORCHIDACEAE.		
Dendrobium gracilicaule F. Muell.	E.	
D. speciosum Sm. ..	E.	
D. teretifolium R.Br. ..	E.	
Sarcochilus falcatus R.Br. ..	E.	
CYPERACEAE.		
Carex declinata Boott ..	H.	Grasslike; tufted; in ecotone
Carex inversa R.Br. ..	H.	Grasslike; loosely tufted
Carex longifolia R.Br. ..	H.	Grasslike; densely tufted
Cyperus enervis R.Br. ..	H.	Grasslike; tufted
C. gracilis R.Br.	H.	Grasslike: tufted
C. laevis R.Br.	H.	Grasslike; tufted; in ecotone
C. tetraphyllus R.Br. ..	H.	Grasslike; loosely tufted
GRAMINEAE.		
Ancistrachne uncinulata (R.Br.) S. T. Blake	H-N.	Somewhat shrubby
Aristida gracilipes (Domin) Henr.	H.	Densely tufted; chiefly ecotone
Brachiaria foliosa (R.Br.) Hughes	H.	Tufted
Chloris unispicea F. Muell.	H-Ch.	Densely tufted
Leptochloa sp.	H.	Tufted
Oplismenus imbecillis (R.Br.) Kunth	Ch.	Creeping and ascending
Panicum pygmæum R.Br.	Ch.	Creeping and ascending; particularly on tracks
Paspalidium sp. aff. *P. distans* (Trin.) Hughes	H.	Densely tufted
Stipa ramosissima (Trin.) Trin.	H-N.	Almost bamboo-like

TABLE II.

PLANTS OF COMMUNITIES OTHER THAN CLOSED FORESTS.

The numbers in the third column (occurrence) refer to the corresponding communities of the Open Forest as treated in the text. A refers to Aquatic Vegetation, and F to the Fringing Communities; C indicates that the species also occurs in the Closed Forest; and E that it also occurs in the Closed Forest–Open Forest Ecotone.

Species.	Life-form.	Occurrence.
PTERIDOPHYTA.		
POLYPODIACEAE.		
Adiantum æthiopicum L. ..	H.	9, C
A. hispidulum Sw. ..	H.	9, C
Cheilanthes Sieberi Kunze..	H.	1
Notholæna distans R.Br. ..	H.	1, 9
Doodia heterophylla (F. M. Bail.) Domin	H.	9
Davallia pyxidata Cav. ..	E.	9
Drynaria rigidula (Sw.) Bedd.	Ch-E.	9,
Pteris tremula Thunb. ..	H.	9
Pyrrhosia confluens (R.Br.) Ching	Ch-E.	9, C
P. rupestris (R.Br.) Ching..	Ch-E.	9, C
GYMNOSPERMAE.		
CYCADACEAE.		
Macrozamia spiralis (R.Br.) Miq.	Ch.	7, E
ANGIOSPERMAE.		
CERATOPHYLLACEAE.		
Ceratophyllum demersum L.	HH.	A
VIOLACEAE.		
Hybanthus enneaspermus (L.) F. Muell.	Ch.	7
PORTULACACEAE.		
Portulaca oleracea L. ..	Th.	1
POLYGONACEAE.		
Polygonum decipiens R.Br.	Ch.	F
P. lapathifolium L. ..	Th	F
P. orientale L.	Th.	F
Rumex Brownii Campd. ..	Ch.	1, 2
AMARANTACEAE.		
Alternanthera nana R.Br. ..	Ch.	1
OXALIDACEAE.		
Oxalis sp. aff. *O. stricta* L...	G.	7
ONAGRACEAE.		
Jussiaea repens L. ..	HH.	F
HALORRHAGACEAE.		
Myriophyllum verrucosum Labill.	HH.	A
PROTEACEAE.		
Persoonia Mitchellii Meissn.	N.	7
MYRTACEAE.		
Angophora lanceolata Cav...	MM.	4
A. subvelutina F. Muell. ..	MM.	2
Callistemon viminalis Banks & Sol. ex Cheel	M.	F
Eucalyptus carnea R. T. Baker	MM.	7
E. decepta Blakely ..	MM.	1, 3 ?, 4
E. gummifera (Gaertn.) Hochr.	MM.	1, 4
E. hemiphloia F. Muell. ..	MM.	3
E. maculata Hook. ..	MM.	5
E. melanophloia F. Muell. ..	MM.	1
E. paniculata Sm. ? ..	MM.	8
E. propinqua Deane & Maiden	MM.	3 ?
E. punctata DC.	MM.	7, 8
E. racemosa Cav.	MM.	1, 5, 6
E. tessellaris F. Muell. ..	MM.	1,
E. umbellata (Gaertn.) Domin	MM.	2
Eugenia Ventenatii Benth.	M-MM.	F
Melaleuca bracteata F. Muell.	MM.	F
Tristania conferta R.Br. ..	MM.	7, 8
T. suaveolens (Gaertn.) Sm.	MM.	2, F
TILIACEAE.		
Grewia latifolia F. Muell. ex Benth.	N.	6
STERCULIACEAE.		
Brachychiton Bidwillii Hook.	N.	9, C, E

TABLE II—*continued.*

PLANTS OF COMMUNITIES OTHER THAN CLOSED FORESTS—*continued.*

Species.	Life-form.	Occurrence.
MALVACEAE.		
Malvastrum spicatum (L.) Gray	A. Ch.	1
Malvastrum coromandelinum (L.) Garcke	Ch.	1
Sida corrugata Lindl. ..	Ch.	5
Sida rhombifolia L. ..	Ch.	1, 5
S. subspicata F. Muell. ex Benth.	Ch.	3
EUPHORBIACEAE.		
Poranthera microphylla Brogn.	Th.	7
Phyllanthus minutiflorus Muell. Arg.	Ch.	2
Ph. similis Muell. Arg. ..	Ch.	9
CAESALPINIACEAE.		
Cassia mimosoides L. ..	Ch.	1
MIMOSACEAE.		
Acacia Maidenii F. Muell. ?	M.	7, E
A. juniperina Willd. ..	N.	7
PAPILIONACEAE.		
Castanospermum australe A. Cunn. & Fraser	MM.	F, C
Crotolaria linifolia L. f. ..	Ch.	1, 4, 5
Desmodium brachypodum A. Gray	Ch-N.	7
D. rhytidophyllum F. Muell. ex Benth.	Ch-N.	3, 5, 7
D. varians (Labill.) G. Don	Ch-N.	1, 2, 7
Glycine clandestina (Spreng.) Wendl.	Ch-N.	4, 6, 7
G. tabacina (Labill.) Benth.	Ch-N.	1, 2
Hardenbergia bimaculata (Curt.) Domin [*H. monophylla* (Vent.) Benth.]	Ch-N.	4, 7, 9
Hovea acutifolia A. Cunn.. .	N.	7
Indigofera australis Willd.	N.	7, 9
Kennedya rubicunda (Curt.) Vent.	Ch-N.	7
Lespedeza sericea (Thunb.) Miq.	Ch.	6
Oxylobium trilobatum (R.Br.) Benth.	N.	7
Psoralea tenax Lindl. ..	Ch.	2
Rhynchosia minima DC. ..	Ch.	1
Tephrosia purpurea Pers. ..	N.	7
Zornia diphylla (L.) Pers...	Ch.	1, 4
CASUARINACEAE.		
Casuarina Cunninghamiana Miq.	MM.	F
C. torulosa Miq.	M-MM.	6, 7
LORANTHACEAE.		
Loranthus pendulus Sieb. ..	E.	1, 2
SANTALACEAE.		
Exocarpus cupressiformis Labill.	M.	1
RHAMNACEAE.		
Alphitonia excelsa Reissek ex Endl.	M.	1, C
AMPELIDACEAE (VITACEAE).		
Cissus opaca F. Muell. ..	N.	7, C, E
UMBELLIFERAE.		
Didiscus incisus (Rudge) Hook.	G.	7
EPACRIDACEAE.		
Acrotriche aggregata R.Br.	N.	7
Monotoca scoparia R.Br. ..	N.	7
Trochocarpa laurina (Rudge) R.Br.	N-M	9, C
OLEACEAE.		
Jasminum suavissimum Lindl.	N.	3, C
RUBIACEAE.		
Richardsonia brasiliensis (Gomez) Hayne	G.	2
Spermacoce sp.	Ch.	7

Species.	Life-form.	Occurrence.
COMPOSITAE.		
Erechthites arguta DC. ..	Th.	1, 6, 7
Erigeron canadensis L. ..	Th.	1, 2, 5
E. crispus Pourret (*E. linifolius* Willd.)	Th.	1, 2, 5
Glossogyne tenuifolia (Labill.) Cass.	G.	1, 2, 3, 7
Gnaphalium japonicum Thunb.	Ch.	1
Helichrysum apiculatum (Labill.) DC.	Ch.	1, 3, 5
H. bracteatum (Vent.) Andr.	Ch.	7
Lagenophora bellioides (Cass.) Domin	H-Ch.	2
L. stipitata (Labill.) Domin	H-Ch.	7
Vernonia cinerea Less. ..	Ch.	7
CAMPANULACEAE.		
Wahlenbergia multicaulis Benth.	Ch.	1, 2
GOODENIACEAE.		
Goodenia rotundifolia R.Br.	Ch.	7
SOLANACEAE.		
Solanum sp.	N.	3
GESNERIACEAE.		
Erythræa australis R.Br. ..	Th.	1, 5, 7
Limnanthemum indicum (L.) Thw.	HH.	A
ACANTHACEAE.		
Justicia sp. aff. *J. procumbens* L.	Ch.	1
MYOPORACEAE.		
Myoporum debile (Andr.) R.Br.	N.	3
VERBENACEAE.		
Lantana camara L. ..	N.	1, 9, C, E
Verbena venosa Gill. & Hook.	Ch.	1, 2, 5
LABIATAE.		
Brunella vulgaris L. ..	Ch.	1
Plectranthus australis R.Br.	Ch.	7, 9, C
HYDROCHARITACEAE.		
Hydrilla verticillata (L.) Casp.	HH.	A
Ottelia ovalifolia (R.Br.) L. C. Rich.	HH.	A
Vallisneria spiralis L. ..	HH.	A
JUNCAGINACEAE.		
Triglochin procera R.Br. ..	HH.	A
POTAMOGETONACEAE.		
Potamogeton crispus L. ..	HH.	A
P. javanicus Hassk. ..	HH.	A
LILIACEAE.		
Arthropodium paniculatum (Andr.) R.Br.	G.	1
Dianella cærulea Sims ..	Ch.	7, E
Laxmannia gracilis R.Br...	Ch.	1
Cæsia sp.	G.	9
SMILACACEAE.		
Smilax australis R.Br. ..	N.	9, C, E
PHILESIACEAE.		
Eustrephus latifolius R.Br. var. *augustifolius* (R.Br.) Benth.	N.	3, 7, 9, C, E
ARACEAE.		
Gymnostachys anceps R.Br.	H.	8, 9, E
TYPHACEAE.		
Typha angustifolia L. sens. lat.	HH.	A
XANTHORRHOEACEAE.		
Lomandra longifolia Labill. sens. lat.	H.	7, F, E
L. multiflora (R.Br.) J. Britten	H.	7, 9
Xanthorrhœa arborea R.Br.	M.	6
ORCHIDACEAE.		
Bulbophyllum sp.	E.	9
Cymbidium canaliculatum R.Br.	E.	1
Dendrobium Kingianum Bidw.	E.	9
D. linguiforme Sw. ..	E.	9
Liparis reflexa (R.Br.) Lindl.	E.	9
Sarcochilus falcatus R.Br.	E.	9, C

TABLE II—*continued.*

PLANTS OF COMMUNITIES OTHER THAN CLOSED FORESTS—*continued.*

Species.	Life-form.	Occurrence.
JUNCACEAE.		
Juncus polyanthemus Buchen.	H.	2
CYPERACEAE.		
Carex declinata Boott ..	H.	8, E
Cyperus cyperoides (L.) O.K.	H.	2
C. difformis L.	Th.	F
C. eleusinoides Kunth ..	H.	F
C. enervis R.Br.	H.	F, C
C. exaltatus Retz.	H.	F
C. ferax L. C. Rich. ..	H.	F
C. fulvus R.Br.	H.	1, 2, 5
C. gracilis R.Br.	H.	1, 2, 3, 4, 5, F, C
C. globosus All.	H.	F
C. mirus C. B. Clarke ..	H.	F
C. polystachyos Rottb. ..	H.	F
C. trinervis R.Br.	H.	F
C. vaginatus R.Br. ..	H.	F
Fimbristylis æstivalis (Retz.) Vahl.	Th.	F
F. bisumbellata (Forsk.) Bubani	H.	F
F. gracilis R.Br. ? ..	H.	2
F. monostachya (L.) Hassk.	H.	6
Kyllinga triceps Rottb. ..	H.	2
Lepidosperma laterale R.Br. ?	H.	7
Scirpus lacustris L. ..	HH.	A
GRAMINEAE.		
Agrostis avenacea Gmel. ..	Th.	F
Aristida acuta S. T. Blake	H.	1
A. glumaris Henr. ..	H.	1, 4
A. gracilipes (Domin) Henr.	H.	1, E
A. ramosa R.Br.	H.	1, 2, 3, 5
A. vagans Cav.	H.	3, 4, 7
Bothriochloa decipiens (Hack.) C. E. Hubb.	H.	1, 2, 3, 5
B. intermedia (R.Br.) A. Camus	H.	1
Brachiaria miliiformis (Presl) Chase	Th.	4
Capillipedium parviflorum (R.Br.) Stapf	H.	1, 5
Cenchrus australis R.Br. ..	H.	1
Chloris divaricata R.Br. ..	Ch-H.	1, 5
Chloris gayana Kunth ..	Ch-H.	1
Ch. truncata R.Br. ..	Ch-H.	1
Ch. ventricosa R.Br. ..	Ch-H.	4
Ch. sclerantha Lindl. ..	Ch-H.	1
Cymbopogon refractus (R.Br.) A. Camus	H.	1, 6, 7
Danthonia semiannularis (Labill.) R.Br. ?	H.	7
Dichanthium affine (R.Br.) A. Camus	H.	1, 2
D. sericeum (R.Br.) A. Camus	H.	1
Digitaria didactyla Willd. ..	Ch-H.	1, 4, F
D. divaricatissima (R.Br.) Hughes	H.	5
D. orbata Hughes ? ..	H.	1
D. sp. aff. *D. recta* Hughes ..	H.	7
Echinopogon ovatus (G. Forst.) Beauv.	H.	7
Enneapogon pallidus (R.Br.) Beauv.	H.	1
Entolasia stricta (R.Br.) Hughes	Ch-H.	7, 9
Eragrostis Brownii (Kunth) Nees	H.	1, 5
E. elongata (Willd.) Jacq. ..	H.	1, 5
E. leptostachya (R.Br.) Steud.	H.	1, 2, 3, 4, 5
E. parviflora (R.Br.) Trin. ..	Th-H.	1
E. sororia Domin	H.	2, 4, 5
Eremochloa bimaculata Hack.	H-G.	1, 3
Heteropogon contortus (L.) Beauv. ex R. & S.	H.	1, 5
Hyparrhenia filipendula (Hochst.) Stapf	H.	1
Imperata cylindrica (L.) Beauv. var. *Koenigii* Dur. & Schinz	G.	7, 9
Leptochloa sp.	H.	1, 9, C
Microlaena stipoides (Labill.) R.Br.	H.	3, 8, F
Panicum effusum R.Br. ..	H.	1, 5
P. fulgidum Hughes ..	H.	3
P. Mitchellii Benth. ? ..	H.	F
P. queenslandicum Domin ..	H.	1
Paspalidium distans (Trin.) Hughes	H.	4, F
P. gracile (R.Br.) Hughes ..	H.	1, F
Paspalum dilatatum Poir. ..	H.	2, F
P. distichum L.	Ch-H.	F
P. orbiculare Forst. ..	H.	F
Pennisetum alopecuroides (L.) Spreng.	H.	2, F
Poa australis R.Br. ..	H.	1, 6, 7, 8
Sehima nervosum (Rottl.) Stapf	H.	1
Sorghum leiocladum (Hack.) C. E. Hubb.	H.	1, 6
Sporobolus elongatus R.Br.	H.	1, 2
Themeda australis (R.Br.) Stapf	H.	1, 5, 6, 7, 8
Tripogon loliiformis (F. Muell.) C. E. Hubb.	Ch-H.	9

SUMMARY.

The vegetation of the lower part of the basin of the Stanley River is described as the result of a fortnight's reconnaisance work. The area exhibits great variety in topography, petrology, soils and vegetation. In many cases time did not allow a sufficiently detailed study of all these factors to permit conclusions to be drawn as to all their interrelationships. Vascular plants only were studied, and four main units of vegetation are recognised—viz., Open Forest, Closed Forest, Fringing Forest, and Aquatic Vegetation. Nine major community-types are recognised in the Open Forest, distinguished primarily upon the dominant trees, the dominant perennial herbs, and the presence or otherwise of a shrubby undergrowth. There is also usually some correlation with the habitat. Lists of all species seen are given, giving firstly the most common species, and then those less generally distributed. The Closed Forests are divided into two main types. The characteristic features of these are described, and the more prominent species listed.

Fig. 1.—Partly cleared mixed eucalyptus forest (largely *E. tessellaris* and *E. melanophloia*), near Somerset Dam, on a podsol overlying porphyrite. The ground cover is chiefly *Bothriochloa decipiens* (the taller grass), *Digitaria didactyla*, and *Eremochloa bimaculata*.

Fig. 2.—*Eucalyptus hemiphloia* forest, near Oakey Creek. Note the flat ground, the close spacing of the trees, and the sparse herbaceous vegetation, consisting chiefly of *Eragrostis leptostachya* and *Aristida vagans*.

[*Photos.*: S.T.B.

Fig. 3.—*Angophora lanceolata* forest, north of Somerset Dam. A tree of *Eucalyptus decepta* to the right. The ground cover consists of chiefly *Aristida vagans, Eragrostis leptostachya, Cyperus gracilis, Glycine tabacina, &c.*

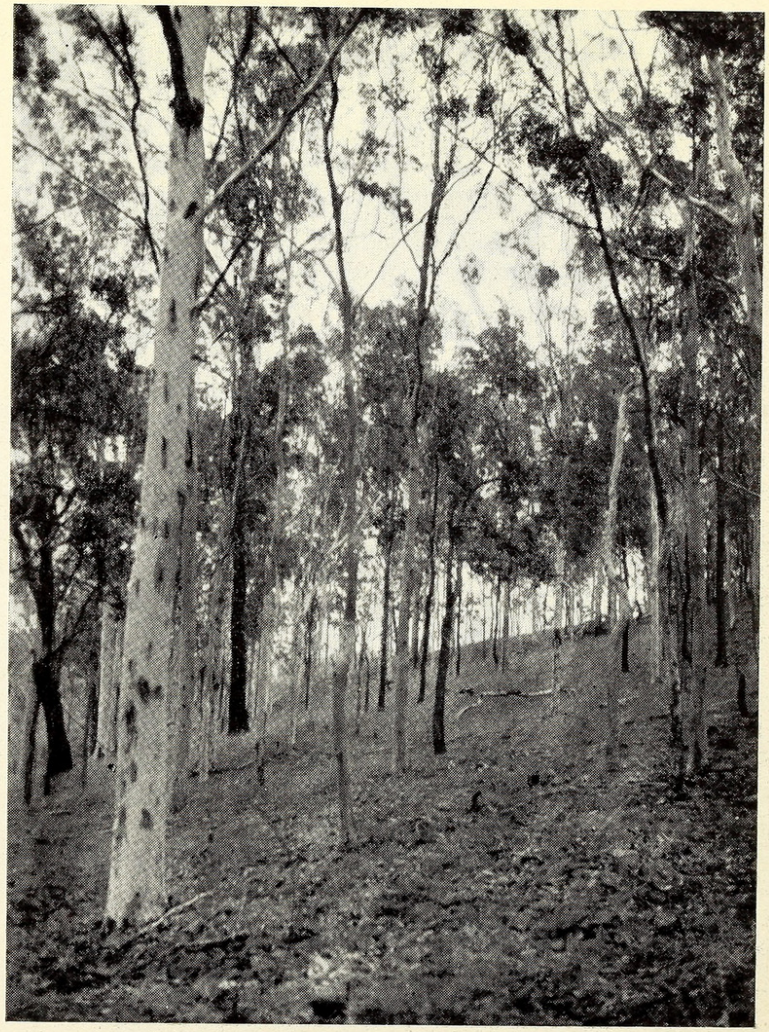

Fig. 4.—*Eucalyptus maculata* forest, near Reedy Creek. Some *E. melanophloia* in centre distance. Note the stony surface.

[*Photos.: S.T.B.*

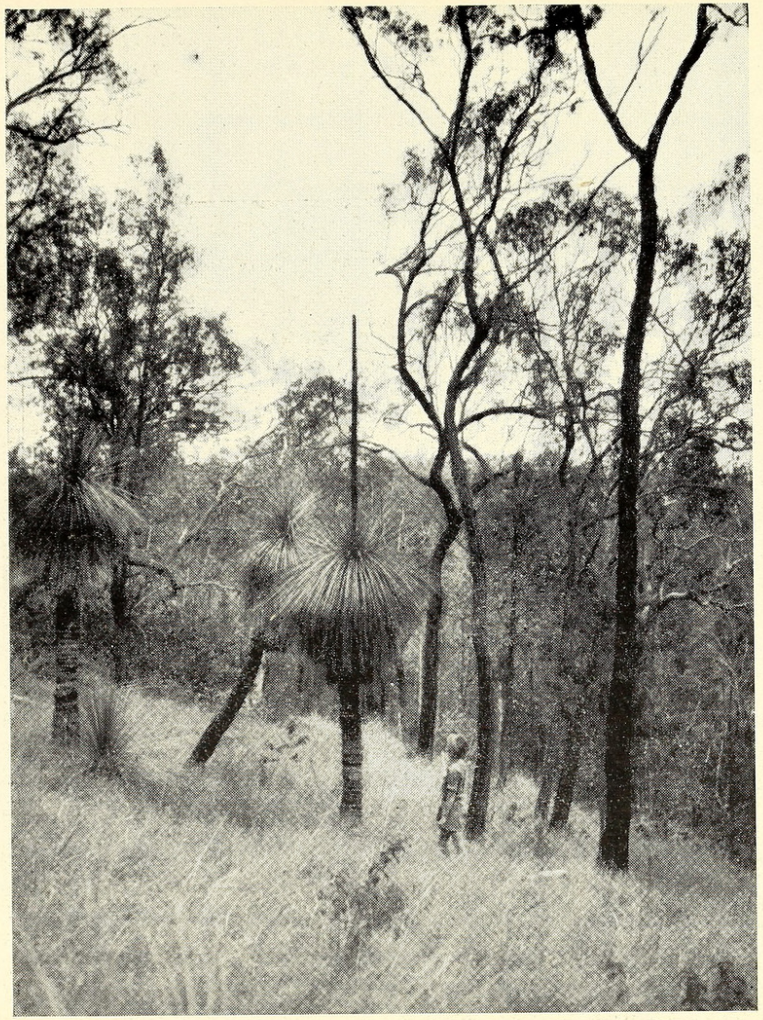

Fig. 5.—*Eucalyptus racemosa–Casuarina–Xanthorrhoea* forest, on upper slope of Little Mount Brisbane. The grass is chiefly *Themeda australis*, and the small shrub in the foreground is *Grewia latifolia*.

Fig. 6.—Forest of *Eucalyptus carnea* (stout trees) and *Casuarina torulosa* (the slender trees), on range to the west of Somerset Dam at 1,730 feet on rocky slope on dark-grey loamy sand. Note the undergrowth of chiefly *Oxylobium* and *Acrotriche*. In extreme right foreground is young *Tristania conferta*.

[*Photos.: S.T.B.*

Fig. 7.—Interior of a '' Pine Scrub '' on Little Mount Brisbane at 1,000 feet. In right background is a large tree of Hoop Pine (*Araucaria Cunninghamii*). Note the lianas, chiefly *Cissus antarctica* and other *Ampelidaceae*.

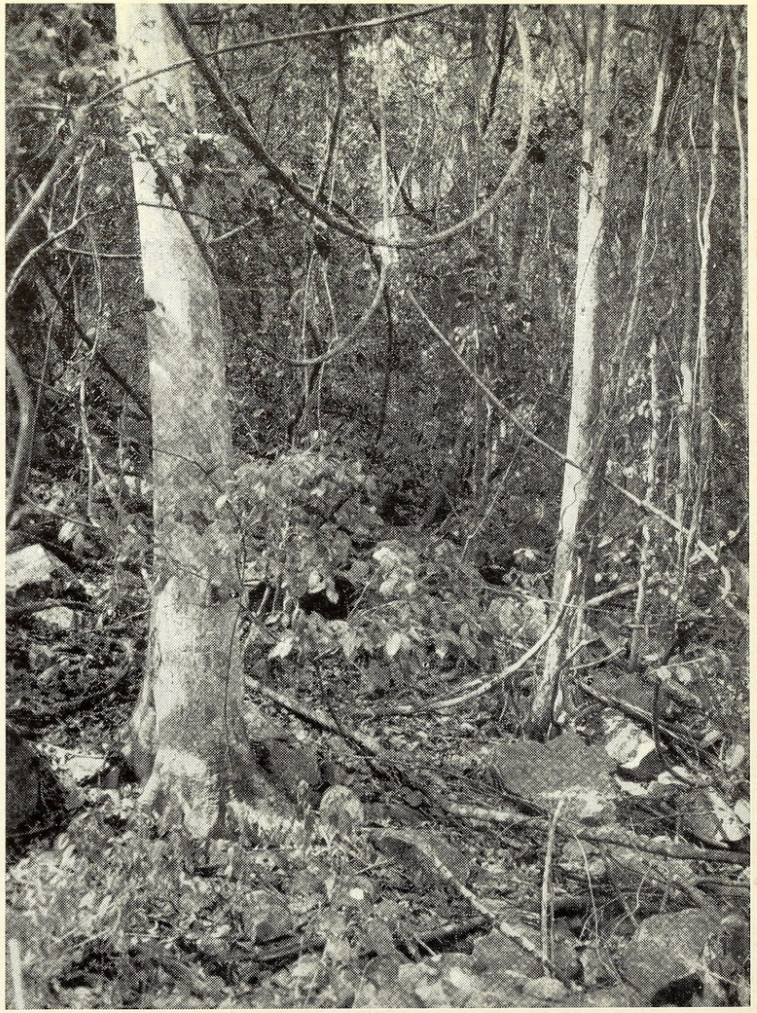

Fig. 8.—In closed forest (approaching rain forest) on a spur of Mount Brisbane at about 700 feet. The tree at left is *Flindersia collina*. The stouter lianas are *Ampelidaceae*, the very slender one is *Tragia novae-hollandiae*. [*Photos.: S.T.B.*

Fig. 10.—Within the closed forest community shown in Fig. 9. Note the rocky surface. The larger trees are chiefly *Laportea photiniphylla*, and the liana in extreme left foreground is *Hoya australis*. [*Photos.: S.T.B.*

Fig. 9.—A small closed forest community in mixed eucalyptus forest (chiefly *E. tessellaris* and *E. melanophloia*) on hillside, about 4 miles north of Somerset Dam. Open forest at right and left.

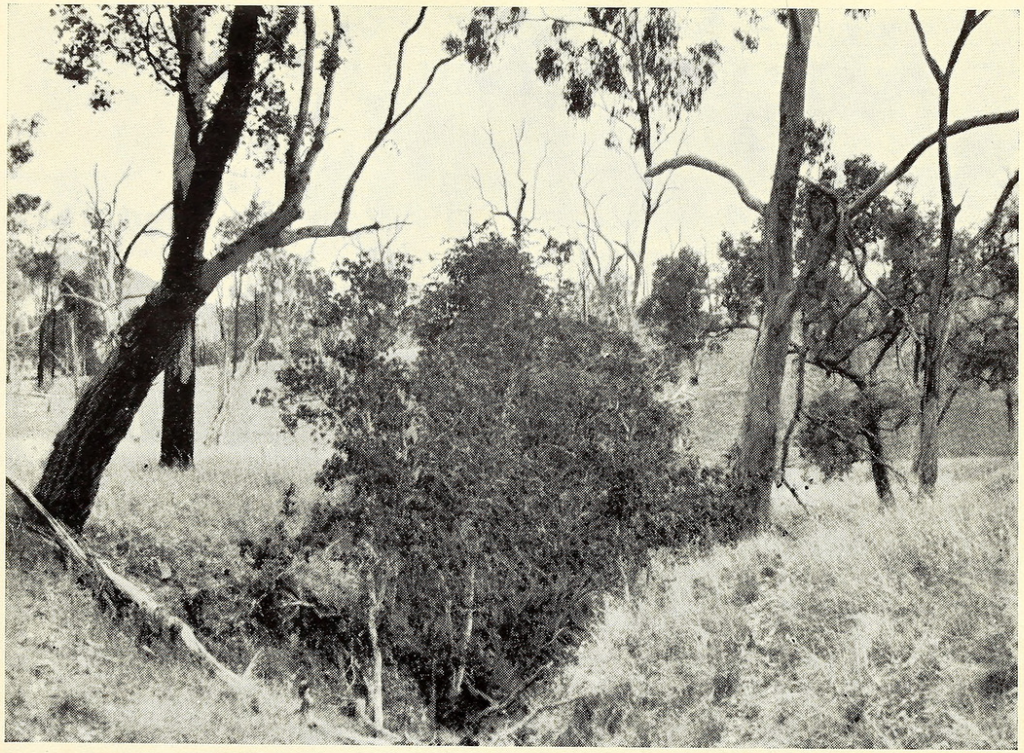

Fig. 11.—Near Somerset Dam, a very young closed forest community.

[*Photos.* : *S.T.B.*

Fig. 12.—Fringing forest of chiefly *Melaleuca bracteata* on the banks of Reedy Creek.

The relationships of the Closed Forest communities to one another and to Open Forest are discussed. Several Fringing Communities are briefly described, all of which depend for their existence upon their proximity to water-courses. Aquatic vegetation was not studied in detail. Finally, two lists of species are given, the first containing all species recognised in the Closed Forests and their ecotones with notes on their habits, the second comprising those species found in the other communities, giving life-form and distribution.

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