Forests Department Bulletin No. 32.

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Botanical Notes

Kimberley Division of Western Australia

by

C. A. Gardner
Kimberley Exploration Expedition, 1921.

Prepared under the supervision of S. L. Kessell,
Conservator of Forests.

Issued under the authority of Hon. J. Scaddan, M.L.A.,
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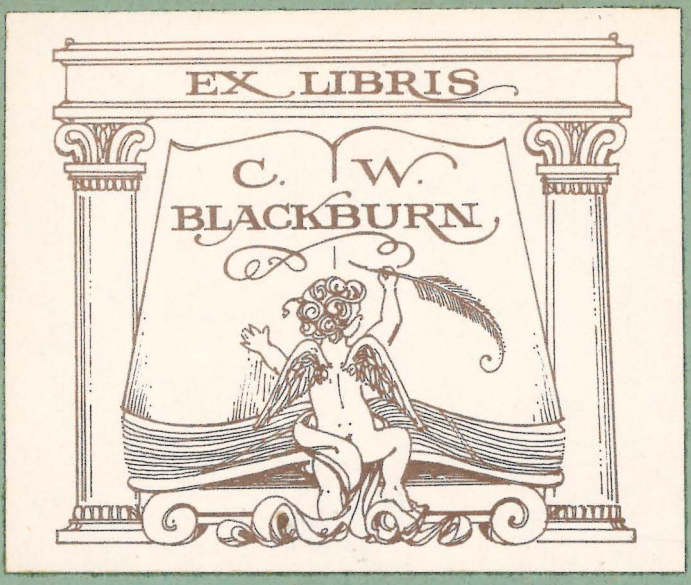
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FOREWORD.

When the Exploration Expedition to the Northern Kimberley district was being organised early in 1921, Mr. H. S. King, the ex-Surveyor General, suggested the desirability of a Botanist being included in the party for the purpose of obtaining some knowledge of the vegetation of that little known region. As a result the Forests Department was approached, and the services of Mr. C. A. Gardner were made available to report upon the commercial timbers and fodder plants of that unexplored portion of the North.

The scientific knowledge gained by the Expedition has added much to the botany of this State, and its report contains descriptions of twenty new species and several new varieties. One family and a number of species are recorded, which had not been found previously in the Northern part of this State.

Special attention has been paid to the distribution of species, their environment, and associates. Valuable knowledge has been gained concerning timber trees, tan barks, edible fruits, and fodder plants, and the purpose of this publication is primarily to make a permanent record of the data collected.

It is hoped that the general descriptions of physiographical conditions and of plant formations have been made sufficiently non-technical to prove useful to interested persons who may desire information concerning the country traversed.

It is interesting to note that this region of summer rainfall is only lightly wooded and carries, during many months of the year, a luxuriant growth of indigenous grasses and other fodder plants.

The commonest arboricultural species belong to the typical Australian genus, Eucalyptus. The dense tropical jungle which covers large areas in the same latitude on the Eastern side of the continent is here confined to very narrow strips along river courses.

Extracts from reports by Head Forester D. McVicar, who visited the East Kimberley region in the latter part of 1922, are included as appendices. This inspection definitely established the fact that the Cypress Pine forests of this region are of limited extent, and not likely to support an export trade. Annual grass fires are rapidly diminishing the comparatively limited quantities of this valuable timber which now exist.

Thanks are due to Mr. J. H. Maiden, I.S.O., F.R.S., F.L.S., Government Botanist of New South Wales, for assistance in the determination of the Eucalypts and Acacias collected.

S. L. KESSELL,
Conservator of Forests.

CONTENTS.

	Page.
Introduction	7
I. Physiography	8
II. Climate	9
III. General Remarks upon the Vegetation	10
IV. The Plant Formations	13
Savannah Woodlands	13
River forest	16
Mangrove forest	18
Northern sclerophyllous Woodlands	19
Littoral forest	20
Grasslands	21
Pindan	22
Swampy lands	23
V. Classification of Specimens Collected	24
Character of the Flora	24
Systematic notes and additions to Flora	29
VI. Appendix	96
Index of genera and species	100

BOTANICAL NOTES.

KIMBERLEY DIVISION OF WESTERN AUSTRALIA.

By C. A. Gardner,
Kimberley Exploration Expedition, 1921.

INTRODUCTION.

The flora of tropical Western Australia is, even at the present day, not well known. A history of such investigation as has been carried out, takes us back to the early part of the nineteenth century, when Robert Brown and Allan Cunningham explored portions of the country from its seaboard. Probably also Cunningham travelled into the interior up the Prince Regent River, as many of the species described by him are now recorded from Central Kimberley. The late Baron von Mueller entered the East Kimberley district in the vicinity of Sturt's Creek in 1856 while attached to Gregory's Expedition, and recorded several species now known to be common to the whole of Kimberley. Bradshaw and Allan collected in the Prince Regent, Carson, and Drysdale River districts, and Dr. F. M. House, who accompanied the Brockman Expedition in 1901, traversed almost the whole of the Northern Kimberleys, but no notes were taken on the habit or occurrence of species, no precise localities were given, and the specimens themselves were mostly fragmentary.

It is largely due to the systematic collecting and notes of Mr. W. V. Fitzgerald—who accompanied the Crossland Expedition of 1905, and who again visited Kimberley in 1906—that we owe much of our knowledge of the Kimberley flora to-day. Fitzgerald's work* deals with the flora of that portion of the country extending southwards from the Calder River, and eastwards from the Chamberlain River and Wyndham.

The early collections of the late Lord Forrest, Alexander Forrest, and H. S. King, while of importance, deal only with the tract of country lying to the south of the King Leopold Range.

Attached to the Kimberley Exploration Expedition, under the command of W. R. Easton, the writer visited the Northern Kimberleys in 1921, during the months from April to October. This period corresponds to the dry winter season, consequently the country was seen to a disadvantage, but winter travelling is necessary owing to the impassable nature of this country in the summer when the soil is soft and swampy in many places, and large swollen rivers have to be forded. The first portion of the collection made was destroyed by a fire which occurred at the camp towards the end of April, when over one hundred sets of specimens were burned, only the notes being saved. With the help of these notes, and sketches made on the spot, I have been enabled to identify some of the destroyed plants, and have included them in the systematic portion of the present paper, since some of them are not in the existing collection. After this misfortune further collecing was impossible until the end of May, when fresh drying material arrived by lugger from Broome, and, since by that time most of the *Gramineae* and smaller herbs had ceased to flower, the present collection consists mainly of woody plants.

*"Botany of the Kimberleys, North-West Australia." Journ. Roy Soc., W.A. vol. iii. (1916-1917).

In these notes have also been included particulars of a small collection made by Mr. Douglas McVicar from the Wyndham district in 1922, and a collection from Mount Marmion forwarded by Mr. Vivian Edwards during the same year. My own collection consists of upwards of four hundred sets of specimens, none of them very large on account of the difficulties of transport and the small nature of the party, hence little material will be available for other herbaria. There is still a small number of plants not identified, all of which are herbs of uncommon occurrence, and little economic value. The woody species are well represented, and may be taken as typical of the flora to the north of the King Leopold Range.

The sketch map reference to appendix on page 106 shows the route taken, and the types of country met with throughout the trip.

I.—PHYSIOGRAPHY.

There is extensive evidence that at some remote period the North Kimberley district has formed part of a great plateau, principally of a sedimentary formation, consisting of sandstones and quartzites, which have become disrupted by the intrusion of huge masses of igneous rock, principally basalts. The gradual process of weathering, and the more rapid work of river erosion have, in many places, worn down this plateau until the basic rocks have been left exposed, forming narrow sunken plains, or in other cases along the lines of separation between the igneous and sedimentary rocks, deep gorges have formed.

The chief mountain system is the King Leopold Range, which on the southern edge of the plateau reaches an average height of 2,500 feet. The Ranges extend in a south-easterly direction from Collier Bay to near Hall's Creek, and descend abruptly on their southern side to a series of low granite foothills, which extend in turn to the wide plain of the Fitzroy and Lennard Rivers. The highest peaks of the King Leopold Ranges are:—Mount Ord (3,070 feet), Mount Broome (3,040 feet), and Mount Leake (2,246 feet). Although not of a great height, the Range is extremely rugged, and in many places is faced with precipitous cliffs of considerable height. One portion goes under the name of Precipice Range, as for thirty miles of its length it has a sheer perpendicular face rising from 600 to 800 feet above the surrounding country. The King Leopold Ranges are intersected by the wildly picturesque gorges of the Lennard, Fitzroy, and small rivers which, rising on the Northern side, flow southerly and westerly through gorges in the main system to the Southern plain.

The plateau to the North of the King Leopold Ranges consists principally of a sedimentary formation—sandstones and quartzites. In the Northern portions of the plateau a considerable quantity of laterite is found, and has arrested to a certain extent the processes of erosion. This is manifested by the number of plateaux and flat-topped hills which occur in these parts, all having a protective capping of laterite.

The coastline is very rugged, and deeply indented near the Roe, Prince Regent, Hunter, and Mitchell Rivers, where the elevated plateau extends to the seaboard, but to the North, around Vansittart and Napier Broome Bays, narrow coastal plains occur. The highest point of the plateau is Mount Hann (2,800 feet), which is situated near the centre, and forms the main watershed. The principal Kimberley rivers, excepting the Fitzroy and Ord, rise in its vicinity, and flow radially outwards to the Indian Ocean—the Drysdale, Carson, King Edward, and Mitchell Rivers in a northerly direction; the Moran, Roe, Prince Regent, Glenelg, and Sale Rivers to the west; while the

Calder, Isdell, Adcock, and Hann Rivers flow in a more southerly direction, the two later being branches of the Fitzroy River. Many of these rivers have cut gorges of considerable depth in the sandstone near their upper reaches. The Charnley River, which is situated between the Calder and Isdell Rivers, has a gorge of over thirty miles in length, and a maximum depth of five hundred feet with vertical and overhanging cliffs. The Prince Regent River is in the main a sunken valley and forms a fiord, flanked on either side by rugged and precipitous cliffs. It is tidal for a distance of some fifty miles from the ocean.

The continental shelf is studded with numerous islands, which rise abruptly from the sea, but none of these are of any great extent. In places, the tides have a rise and fall of thirty-six feet, but the less indented coast to the North and East of Vansittart Bay has a much lower tidal range, the greatest range in Napier Broome Bay being about six feet.

The Fitzroy and Lennard Rivers flow across the plain to the South of the King Leopold Ranges after having cut through them. While all the northern rivers are permanent, these two lose their waters during the dry season in their lower reaches through seepage, but during the wet summer season they enter King Sound near Derby through delta-like distributaries. The extensive southern plain is intersected near its northern limits by the Napier and Oscar Ranges, which are composed of limestone and run parallel to, but at some distance from, the King Leopold Ranges. Although not of a great height, they are very rugged, rising suddenly from the plain, and forming a barrier which is impassable except at a few isolated points. The plain consists of low scrubby undulations known as "Pindan," with alternating lower lying areas of a richer soil of volcanic origin, known as "Black-soil Plains." To the south of the Fitzroy River is a waterless tract, extending over the southern boundary of the Kimberleys to the De Grey River in the North-West, and, as a consequence, the tree life in this area is largely reduced to shrubs, the undergrowth being principally "Spinifex" (*Triodia*).

II.—CLIMATE.

The coastal climate of the Kimberleys is equable, but low temperatures are experienced in the higher altitudes of the interior. The diurnal range throughout the year for the coastal districts averages from 65 to 85 degrees Fahrenheit, and the records show that the maximum temperature seldom exceeds 100 degrees. From April to October the temperature of the interior is lower. The maxima of the interior, as far as is known, are as high as those of the coastal plain, but a minimum of 28 degrees has been recorded from the plateau in the middle of the dry season. The atmospheric conditions of the river valleys are, however, almost as humid as those of the coastal region.

The summer and rainy season coincide. The rains commence with heavy thunderstorms about the middle of November, and are accompanied by monsoonal winds. Heavy falls of rain continue, with more or less regularity, until the end of March; after this, little, or no rain falls until the following November. Throughout the interior, in the dry season, the great decrease in temperature during the night causes heavy dews which are benficial to the vegetation, particularly the herbaceous growth. The dew is always heavier in the river valleys than on the plateau.

Unfortunately, the meteorological records of this region are very incomplete, and with the exception of a few isolated stations observations have not been carried out over a prolonged period. It appears probable, however,

that the region of greatest rainfall is that of the mountainous tableland, particularly in the vicinity of the Prince Regent River. The rainfall at Derby, on the coastal plain, is about 35 inches. This rises as we travel north to the maximum of the State, 70 inches or more, in the vicinity of the Prince Regent River, decreasing again to about 37 inches at Napier Broome Bay. The cloudless skies which are experienced during the dry season promote excessive transpiration from such plants as are not adapted to desert conditions, and favours the formations of dews. The rains which fall during the dry season are usually associated with sudden thunderstorms.

The intense light and the atmospheric conditions are such that not infrequently landmarks, such as mountain peaks, are rendered invisible or very indistinct at close range in the middle of the day; and very clear reflections are noticed from the river pools.

III.—GENERAL REMARKS UPON THE VEGETATION.

From the foregoing remarks upon the climatic conditions, it will be seen that rain-forest, in the strict sense of the word, cannot exist in the Kimberley district. The long dry season and cloudless skies promote excessive transpiration, and as a consequence the vegetation has adopted two modes of protection against the loss of water.

Evergreens.—First we have those trees which retain their leaves throughout the year. These possess various xerophytic (drought-resisting) adaptations, as follows:—

Perpendicular leaves.—This type is common to the larger trees, particularly *Eucalyptus*. The leaves hang in the same direction as the hottest rays of the sun, thereby exposing a minimum surface, and diminishing transpiration. In addition to this, which in *Eucalyptus* is accomplished by a twisting of the petiole or leaf-stalk, many leaves have also an external covering of wax.

Hairy leaves.—Many plants possess a leaf-covering of hairs, either simple or interlocked, generally the latter. Hairy leaves are met with in almost all the *Hibiscus* species and allied genera.

Leaf reduction.—In some plants the leaves are dispensed with, and the assimilatory functions are performed by the leaf-stalks themselves (*e.g., Acacia*), or flattened branches. Examples are: *Jacksonia, Bossiaea, Templetonia, Acacia.*

Leaf movements.—Among the Leguminosae are species which have large pinnate leaves. These are delicate and expanded only during the early morning and evening. During the hottest part of the day they are able to fold their leaves perpendicularly, thus reducing considerably the transpiring surface. Examples are the Cork tree (*Sesbania grandiflora*) and the various species of Mimosa (*Acacia Bidwilli, A. suberosa, A. Farnesiana,* and *Dichrostachys Muelleri*).

Deciduous trees lose their foliage in the dry season (*i.e.,* from April to October), and the majority flower while leafless. The leaves of the deciduous species are usually large and horizontally expanded. As a rule, when large they are hairy, as in many of the Kurrajongs or Flame trees (*Sterculia*). Thhe process of leaf-fall is, as a rule a slow one, the leaves commencing to fall at the beginning of April, though some persist until the middle of June.

The majority of the deciduous trees resume their foliage *before* the commencement of the rains, therefore some protection against drought is needed to protect the leaf-buds which are formed during the dry season.

This protection usually takes the form of brown over-lapping scales which totally enclose the young bud during its formation, and these are seen to advantage in *Cochlospermum* and *Adansonia*. The trunks of many deciduous trees are provided with a thick corky bark.

The above remarks apply generally to the vegetation. Exceptions, however, occur, as, for example, the position of the leaves of evergreen species. These, as a rule, are perpendicular in *Eucalyptus*, but such trees as *E. clavigera, E. grandifolia* and *E. perfoliata* have horizontal leaves which are rigid, and in the first two examples sparsely covered with small bristly hairs. The "Illyarie" (*Eugenia grandis*), another evergreen tree, has large thick leaves which are perfectly horizontal, affording a dense shade. Many species of the river forest in particular afford a dense shade, and the evergreen undergrowth is without xerophytic adaptations on account of this.

In general, the rate of growth is slow, particularly among the Eucalypts and other hard wooded species, *e.g.*, Coolibah (*Eucalyptus microtheca*) and Grey Box (*E. Spenceriana*). The deciduous trees are usually of more rapid growth and characterised by soft timbers, such as Coral and Cork-trees (*Erythrina*), Cotton tree (*Cochlospermum*), Kapok (*Bombax*), and the Kurrajong and Flame trees (*Sterculia*). The deciduous trees are characteristic of the localities removed from streams and rivers, and are most abundant in the sandstone areas, but even here the evergreens preponderate considerably

It would appear that growth, particularly among the Monocotyledons, is most rapid during the night. Grasslands which have been swept by fire during the afternoon frequently exhibit a vigorous growth of young shoots one to two inches in height by the following morning.

The growing season commences with the advent of the rains in November, when the parched carpet of grasses is replaced by a luxuriant ground covering of new shoots of grass and many herbaceous perennials. The deciduous trees at that period come into full leaf also. The flowering season for the grasses, herbs, and herbaceous perennials commences in March, and continues until the beginning of May. The rains having ceased towards the end of March the grass becomes parched and the herbs die. At the beginning of May many trees begin to flower, such as the majority of deciduous trees, and some of the more attractive Eucalypts *e.g.*, the Woolly-butt (*E. miniata*), the Messmate (*E. tetrodonta*), Ironbark (*E. terminalis*), and others. The Proteaceae, with few exceptions, flower at this time also, and the large areas of Silky Oak (*Grevillea chrysodendron*) are then a feature of the landscape. The Mangroves, and Nutwoods (*Terminalia*), Kapok (*Bombax*), and Cork try—*Eugenia Armstrongii, E. eucalyptoides*, and *E. grandis, Terminalia* flowering as late as October, when they are coming into leaf. The Kimberley Eucalypts are remarkable for their diversity of form, both with regard to habit and leaves. One species is quite deciduous (*E. brachyandra*), being leafless from May to September. The new leaves are a pale delicate yellowish-green. The Ridge Gum (*E. alba*) is partially deciduous, and it is of interest to note that this species, occurring on stony ridges as "Ridge Gum" in the Eastern Kimberleys, is confined to alluvial flats and river valleys in Western Kimberley. *Eucalyptus perfoliata* is rendered a most distinct species by reason of its opposite connate leaves, which are either erect or spreading. Among the curious trees of this country mention may be made of the Baobab (*Adansonia Gregorii*). This tree, confined to the North-West of Australia, belongs to a genus otherwise limited to Madagascar and Africa. Although the most luxuriant tree of the Kimberleys when in leaf, it is admirably fitted to withstand the drought of the dry season. Its protective

devices include a grotesque bottle-shaped water-storing trunk, a cuticularised bark, and scale-protected winter-buds. It has foliage only during the wet summer months, and flowers during this season also, affording a wide dense shade. The trees withstand fire and live for centuries.

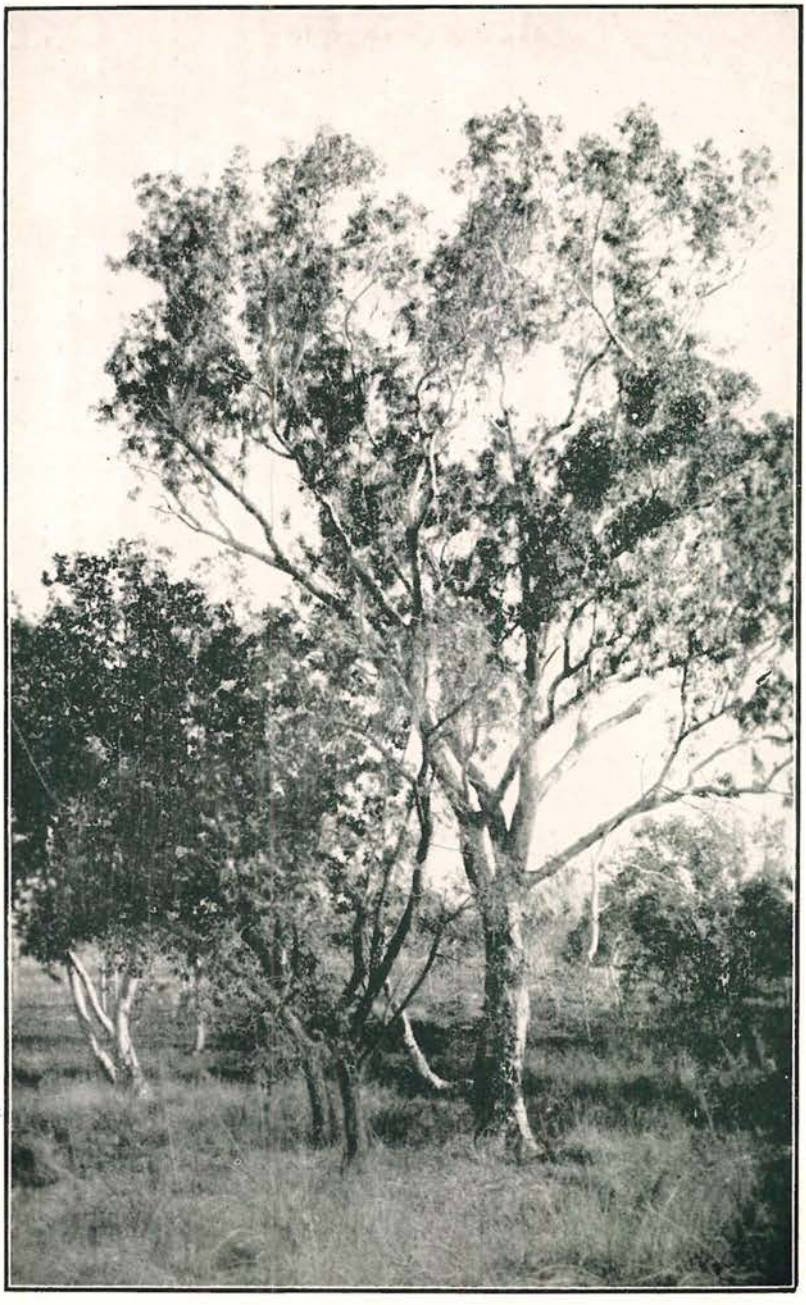
In the main, the type of Kimberley vegetation forms Savannah forest, *i.e.*, trees forming open park-like forests devoid of scrub, and underneath is a thick covering of perennial grasses. These grasses average from 2 to 5 feet in height. The only dense forests are the river forests, which present the typical appearance of a tropical rain forest.

Mangroves are of a feature of the coast, particularly in the estuaries and creeks. On account of the salinity of the soil in which they grow they are markedly xerophilous, the xerophily being exhibited in thick cuticularised leathery leaves. The majority of Mangroves occur in tidal mud, and have stilt-like (*Rhizophora*) or buttress-like (*Bruguiera*) roots to enable them to withstand the movements of the strong tides on the soft mud. The stilt-like roots act as stays or anchors to the tree, and probably the buttressed stems perform a similar service. Other Mangroves (*Ceriops* and *Ægiceras*) occur more along the open coast above high-tide mark in sandy soil, and the roots of the former are only washed by the equinoctial tides, *i.e.*, twice a year.

Some of the Mangroves (*Ceriops* and *Rhizophora*) are of special interest in that the seeds germinate while attached to the parent plant (vivapary). The fruits are inverted pear-shaped, with the heavier end uppermost. These commence to shoot downwards, and when the hypocotyl has attained a sufficient length they fall off, the basal portion which is next to the stem falls into the mud, so that the growing shoot is now uppermost and ready to root immediately. The writer has observed the unrooted fruit of *Rhizophora mucronata*, the Black Mangrove, with a hypocotyl of 22 centimetres in length. The majority of Mangroves possess pneumatophores which protrude for some 6 or 8 inches. These respiratory roots are closely distributed around the trunks for a distance of some yards, and are characteristic of the Black Mangroves (*Rhizophora* and *Bruguiera*) and *Sonneratia*.

Lianes are not well represented considering the latitude, except in the littoral formations and humid valleys, where, ascending the trees, they form dense, frequently impenetrable entanglements. *Flagellaria indica*, the so-called Bamboo, is the commonest; *Abrus precatorius*, the Lucky Bean, is a common twiner of the littoral forest.

Epiphytes are comparatively scarce, and confined to the Orchids (*Orchidaceae*) and Figs (*Moraceae*). The latter are only hemi-epiphytic, however, the most conspicuously epiphytic species being the Rock Fig (*Ficus nesophila*). Of the *Orchidaceae* three epiphytic species were seen, but only two procured, namely, *Cymbidium canaliculatum* and *Dendrobium dicuphum*. The third species, probably a *Dendrobium*, was observed on a tree near the Prince Regent River, and was conspicuous by reason of its large purple flowers. These species are of a xerophilous type, and occur in open savannah, not, as might be expected, in the river forest. *Dendrobium dicuphum* has long spindle-shaped pseudo-bulbs which contain reserve food material, but the *Cymbidium* is without these, and dependent directly upon the dews for its existence. All species flower towards the end of the dry season. Eucalyptus trees are the hosts, particularly those with a rough bark such as the Grey Box (*E. Spenceriana*), and the orchids are usually found in dense patches on the leaning trunks (*Dendrobium*), on the forks of branches or bases of fallen limbs. In the latter case the roots penetrate into the hollow trunk for nutriment.



GREY BOX (*Eucalyptus Spenceriana*).
(*Careya australis* in foreground, *Eucalyptus clavigera* on left).
Type: Savannah Woodland.

Parasites are represented by the Mistletoes (*Loranthaceae*), Sandalwoods (*Santalaceae*), and Dodders (*Lauraceae*). The first named are the most common, and include *Loranthus* and *Viscum*. *Loranthus* is commonly found in the Eucalyptus Savannah, parasitic upon *Eucalyptus, Acacia, Cochlospermum* (Cotton tree), Baobab (*Adansonia*), *Banksia, Buchanania, Eugenia,* Nutwood (*Terminalia*), Sandalwood (*Santalum*), *Grevillea,* and the Mangroves (*Rhizophora*). *Loranthus acacioides* occurs on all these species with the exception of *Banksia,* and *Loranthus Miquelii* is the commonest on species of *Eucalyptus.* The latter was observed to possess a twining stem with haustoria occurring at intervals—the only species of this habit. The *Santalaceae* are all root parasites, though not perhaps obligatory. The Sandalwood (*Santalum lanceolatum*) shows a preference for *Acacia,* particularly *A. tanumbirinense,* as a host plant, while the Wild Cherry (*Exocarpus latifolia*) is generally parasitic upon *Callitris,* the Kimberley Pine.

While the flora in the South-West of the State is typically Australian in character, we find that in the Kimberleys there is extensive evidence of the Indo-Malayan element in the flora, principally in that of the littoral districts, and in the river forest. Many species indigenous in India and Burma, as well as Papua, are now recorded as occurring in Australia. A relationship with the flora of Africa exists, but is not so noticeable, except in the conspicuous case of *Adansonia,* the Baobab, and a few minor species, such as *Helichrysum.*

IV.—PLANT FORMATIONS.

The following formations of vegetation found in the Kimberleys are more or less distinctive in character:—Savanah woodlands, River forests, Northern sclerophyllous woodland, Mangrove forest, Littoral forest, Grasslands, Pindan, and Swampy lands. (See map.)

A.—Savannah Woodlands.

Savannah is that type of country which is park-like, that is, with a few scattered trees, and a grassy ground covering. It is essentially a tropical or sub-tropical formation, determined by a rainfall which is not sufficient to maintain rain-forests, and by the coincidence of the hot months of the year and the wettest period. This promotes the occurrence of grass, which only needs moisture in the growing season, after which it withers, only to shoot forth again with the commencement of the rains after the drought. Although the optimum conditions for forests do not exist, there is sufficient rain for the growth of trees. There is, therefore, a continual struggle for ascendency between the grasslands and the woodlands, but the grasslands are gradually gaining predominance by choking out the young trees, and are further assisted by fires. The type resulting is savannah forest, with trees of an average height of 35 or 40 feet, and a dense ground covering of grass, mostly perennial. This formation occupies the greater part of the Kimberley district. Amongst its woody plants evergreen species predominate.

2. *Location.*

The Savannah forest occupies that portion of Kimberley which lies to the east and north of the King Leopold Range, exclusive of the region around Admiralty Gulf, Vansittart and Napier Broome Bays, which is occupied by the *sclerophyllous* woodlands.

3. *Topography and Soils.*

Two distinct types of this formation exist, and are determined by the geological features, giving basaltic savannah and sandstone savannah, the former being exhibited where basalt prevails, and the latter, on the usually more elevated sandstone-quartzite areas.

(a) *Basaltic savannah.*—This class is more sparsely timbered than the sandstone savannah. The dominant tree is the Grey Box (*Eucalyptus Spenceriana*). Associated with it are Cabbage Gum (*Eucalyptus clavigera*, A. Cunn.), and to a less extent Bloodwoods (*Euc. latifolia, E. pyrophora,* and *E. Foelscheana*). These trees are small (25-35ft.), the average height being about 30 feet. With them are also found the Cotton tree (*Cochlospermum heteronemum*), Ironwood (*Terminalia circumalata*), Camel poison or Steelwood (*Erythrophloeum Laboucheri*), Cork or Coral-tree (*Erythrina vespertilio*), Beefwood (*Hakea arborescens*), Bohemia tree (*Bauhinia Cunninghamii*), *Albizzia,* and on the stony hills Kapok tree (*Bombax malabaricum*), and a scrubby species of Ebony (*Diospyros nitens*). *Gramineae, Malvaceae,* and *Amarantaceae* constitute the prevailing ground-covering, which is herbaceous, the chief species being Kangaroo grass (*Themeda avenacea*). The absence of young Eucalyptus trees is very noticeable, and as before mentioned, is probably due to the prevalence of fires caused by the natives, to attract game with the re-growth of grass on the burnt area. The timber of the Grey Box has many of the qualities of Coolibah—with which it is frequently confused—and besides being termite-resistant, it is fire-resistant to a remarkable degree. The older trees put forth new foliage near the ends of the branches after fire. These new leaves are of a reddish colour, and form a contrast to the bright green of the other species. The deciduous trees of the basaltic savannah are all soft-wooded species.

(b) *Sandstone savannah.*—Whereas the basaltic formation usually inhabits undulating country, the sandstone savannah occupies in the main, the central plateau, with its steep scarpes and ranges. The average height of the forest is about 45ft. Cypress pine (*Callitris intratropica*) forms fairly thick patches of forest, attaining a height of over 80 feet, occupying the ridges, usually where laterite is present in the soil. The vegetation of the basaltic savannah is uniform, while that of the sandstone-quartzite savannah shows a greater density with an increase in rainfall. Thus, in the Prince Regent River zone we have a higher, denser savannah. The western limit of the range of *Eucalyptus tetrodonta*, the Mesmate, alters the aspect of the savannah, both to the east and west of this line. Where Messmate predominates in the savannah the grass is not so well developed as where Woolly-butt (*Eucalyptus miniata*) occurs in an almost pure state. The following trees are characteristic of the sandstone savannah:—*Eucalyptus terminalis*, many species of wild fig (*Ficus*)—which are more characteristic of the hilly country—*Eugenia Armstrongii, E. eucalyptoides,* and *E. grandis, Treminalia discolor, T. edulis, T. Cunninghamii, Denhamia obscura, Celastrus Muelleri, Celtis philippinensis, Strychnos lucida,* known as Strychnine tree, Ebony (*Maba humilis*), and several species of *Sterculia,* principally *S. quadrifida,* the "Kurrajong," and Flame tree (*Sterculia ramiflora* and S. *viscidula*). *Eucalyptus alba,* the "Ridge Gum," forms open savannah with *Grevillea chrysodendron,* the Honey tree, and *Eucalyptus Houseana,* White Gum. *Eucalyptus perfoliata,* and *E. brachyandra,* both stunted Bloodwoods, are characteristic trees, the latter being deciduous. The tree Verticordia (*V. Cunninghamii*), with a timber resembling Rosewood, is widely dispersed. The grasses of the sandstone savannah are numerous in number of species, and occur

along with *Cyperaceae,* and smaller herbs. They are not of the same fodder value as the basaltic species, being usually coarser. Sugar—or straw-grass (*Andropogon affinis*) is the dominant species.

4. *Climate.*

The climate of the savannah is the coolest of the Kimberleys. This is probably due to the greater elevation. Cool nights are experienced during the greater part of the year. The average rainfall is about 45 inches and the general climatic conditions would appear favourable for settlement of a white population.

5. *Plants of economic value.*

(a) *Structual Timbers.*—With the exception of the Grey Box (*Eucalyptus Spenceriana*), *Coolibah* (*E. microtheca*), and Kimberley Cypress (*Callitris intratropica*), the savannah contains no structual timbers. The Kimberley Pine yields a fine timber, which is durable and impervious to the ravages of termites. Close-grained, and of a yellowish-brown colour, it is also exceptionally strong. The tree attains a height of over 80 feet and nine feet in girth. The trunk being straight and tapering, this species affords logs of 60 feet in length. The most accessible patches of this timber are in the vicinity of the Prince Regent River, Lizard Point on the Glenelg estuary, and the immediate South of Vansittart Bay. The Cooliabah is widely used for fences and dwellings, but this fine timber is worthy of better use. Grey Box (*Eucalyptus Spenceriana*) has almost the same strength and durability as Coolibah, but is usually a smaller tree. The supply of this timber is sufficient to meet all local requirements for many years to come, as its habitat includes the whole of the basaltic savannah.

(b) *Cabinet Woods.*—The savannah country is rich in woody species which, though not of sufficient size to be of commercial importance as structural timbers, possess woods of great beauty. Among these mention may be made of the Ebony (*Maba humilis*), Gutta-percha tree (*Excaecaria parviflora*) and *Denhamia obscura.* Ebony is a small tree of upwards of 30 feet in height with a trunk 8-12 inches diameter. The yellow sapwood contrasts with the deep black heartwood. Unfortunately, this species is not very well distributed. A smaller species of 6-15 feet (*Diospyros nitens*) occurs on the basaltic hills, but is too small to be extensively used. The timber of the Gutta-percha tree is highly valued as a cabinet wood. *Denhamia obscura* is common on the sandstone hills, attaining a diameter of 8in. The timber is pale yellow, and dense, and has the appearance and qualities of boxwood. Other trees of the savannah with suitable qualities for higher class work include:—*Grevillea chrysodendron,* the Silky Oak (*Banksia dentata*), Beefwood (*Grevillea heliosperma*), Kurrajong (*Sterculia caudata*), Ironwood (*Terminalia circumalata*), and Steelwood (*Erythrophloeum Laboucheri*).

(c) *Forest Products.*—Although these have not been investigated to any great extent, it appears probable that many species of the savannah produce plants of value, both for medicinal and commercial purposes. The natives have remedies for their various diseases in the plants of this country. *Andropogon procerus,* the lemon-scented grass, is used by the natives as a specific against colds. The roots of this species would doubtless be of commercial value in the manufacture of an essence. The Quinine tree (*Petalostigma quadriloculare*) bears an abundance of yellow fruits, which the natives use as a substitute for Quinine. *Euphorbia pilulifera* is used as a cure for skin diseases and asthma. *Grewia polygama,* a small shrub, common throughout the savannah, yields a medical astringent.

Trees of use in the tanning industry include the Ridge Gum (*Eucalyptus alba*), the bark of which contains 32 per cent. of tannin. *Terminalia platyphylla*, the River Chestnut, is another useful species, the bark containing 10 per cent. tannin, and the fruits 8.6 per cent.

(d) *Fodder plants.*—The savannah is primarily a pastoral country. Cattle stations are scattered over the southern portion, and settlement is gradually creeping northwards. The fodder plants are too numerous to set down here, but mention may be made of the principal species. These are the "Bundle Bundle" (*Themeda imberbis*), Flinders Grass (*Themeda membranacea*), Kangaroo Grass (*Themeda avenacea*), and species of *Panicum*, *Imperata* and *Xerochloa*. Kangaroo Grass has the most extensive range of the above, being found wherever there is basalt, but the other species have a more limited habitat, especially Flinders Grass and Bundle Bundle, which do not extend further north than Mount Hann. Rice (*Oryza sativa*) occurs along the banks of most of the creeks in Northern Kimberley, and is relished by stock. A reed (*Phragmites communis*), though a tall, coarse species, is of great value as a fodder for cattle. A few herbs are of even greater value than the grasses, and some, such as *Gomphrena canescens*, *Polycarpaea longiflora*, and *Buchnera ramosissima*, are such favourites with horses that they will travel some distance in search of these plants. *Gomphrena canescens*, the best of these, readily attracts the attention by reason of its bright pink, clover-like flowers.

Top-feed plants are widely distributed and belong to the families *Leguminosae* and *Apocynaceae*. Three species of *Acacia*, known as "Mimosa" (*A. Bidwilli*, *A. Farnesiana*, and *A. suberosa*), are the leading fodder trees. The last named is quite common between the Lennard River and Calder River, and although prickly, is nevertheless a favourite. Other shrubs eaten by cattle include Milk Bush (*Wrightia saligna*), *Acacia translucens*, *Jacksonia thesioides*, and the dried leaves of *Grevillea chrysodendron*. Of secondary importance are *Bauhinia Cunninghamii*, the Bohemia tree, and *Erythrina vespertilio*, the Coral tree.

(e) *Poison Plants.*—Poison plants are of much less economic importance in the Kimberley than in the southern portions of the State. The Camel poison or Steelwood (*Erythrophloeum Laboucheri*) is the one most frequently met with. A tree of some size, its branches are usually above the reach of cattle and sheep, and although a dangerous species, it is not attractive to either horses or cattle. Many miles of country containing this species were ridden over, but never did our horses attempt to eat the leaves of the young plants. A plant very similar to York Road poison (*Gastrolobium grandiflorum*) exists on the King Leopold Ranges. This species, known as "Wallflower poison" was not seen to the north by the author, although it has been reported from the Drysdale River by early travellers. Evidently it is not common. Species of *Tephrosia*, notably *T. rosea*, and *T. purpurea* are reputed poison plants from this district, but their occurrence is restricted to the sandstone hills. *Strychnos lucida*, the Strychnine tree, has not been proved to possess toxic principles, yet it is regarded by some as a poison plant. Its habitat is somewhat restricted.

B.—River Forest.

1. *General description.*—This formation, a mixed forest, occupies the valleys of the larger rivers, fringing their banks to a depth of from 20 to 200 yards with a zone of luxuriant vegetation. From an elevated situation, the courses of the rivers are traceable for many miles by reason of this bright green strip of luxuriant forest, which extends from near the source of a

river to its estuary. By the infiltration of water from the river the soil in the river forest is always kept quite moist. The result is that the species are evergreen and soft-leaved. The leaf canopy afforded is very dense, consequently shade-loving species such as ferns are able to thrive in the undergrowth. Despite the moist soil conditions the larger trees have a more or less xerophilous foliage but larger leaf surfaces than the trees of the other formations. An exception is the Leichhardt tree (*Sarcocephalus cordatus*), which has delicate large horizontally expanded leaves. The common trees of this formation are—Leichhardt Pine (*Sarcocephalus cordatus*), Cadjuput (*Melaleuca leucadendron*), Silver Cadjuput (*Melaleuca argentea*), Rubber tree (*Ficus coronulata*), River Fig (*Ficus glomerata*), Cork tree (*Sesbania grandiflora*), *Carallia integerrima,* and *Barringtonia sphaerocarpa.*

The undergrowth consists principally of the River Screw palm (*Pandanus aquaticus*) and *Osbeckia australiana.* Beneath the undergrowth are many ferns, notably the climbing *Lygodium scandens,* which climbs over the smaller trees, a species of *Blechnum* and the common *Aspidium unitum. Coleus scutellarioides,* an aromatic species, is frequently found together with *Polygonum barbatum.* The larger pools of the rivers, where river forest is found, are fringed with the beautiful pink and blue water lily (*Nymphaea stellata*).

Eucalypts are never found in typical river forest. *Eucalyptus rostrata,* the River Gum, and *Eucalptus Houseana,* the White Gum, do, however, occur infrequently, the latter sometimes with buttressed roots.

2. *Location.*—River forests are not found to any extent south of the King Leopold Range, and attain their greatest development in the vicinity of the Prince Regent River, where the rainfall exceeds 65 inches per annum.

3. *Topography and Soils.*—Confined to the alluvium of the rivers, the soil is usually a rich black swampy loam, rarely a light loam.

4. *Climate.*—This is very humid, and rather unhealthy. The undergrowth is almost always moist.

5. *Plants of economic value.*

(a) *Structural timbers.*—The Cadjuput is the most important of these. It attains a height of 120 feet, with a bole of 70 feet, and a diameter of over 3 feet. The timber is light red but dense, and impervious to termites. The Silver Cadjuput does not attain the same proportions, but has the same properties. Leichhardt Pine (*Sarcocephalus cordatus*) is a fine softwood with lasting qualities, and a beautiful yellow timber. Although termite-resistant, it is subject to rot when placed in the ground, but possesses a beautiful grain, and works well. The trunk tapers gradually from its base to the summit of the tree, and it is probably this habit which has earned it the vernacular name of "Pine." *Barringtonia sphaerocarpa, Carallia,* and *Ficus glomerata,* all produce timbers for which no use has been found in these unsettled parts.

(b) *Cabinet Woods.*—The Leichhardt Pine takes the leading place among these, owing to the beauty of its timber, but otherwise cabinet woods are scarce in the river forest.

(c) *Forests Products.*—The Cadjuput yields the useful Cadjuput oil, but, up to the present, in this district has not been exploited. A dye is extracted from the timber of the Leichhardt Pine. The bark of *Carallia integerrima,* one of the Mangroves, might be a profitable source of tanning, and this applies also to the bark and fruits of the River Chestnut (*Terminalia platyphylla,* as their tannin yields are respectively 10 per cent. and 8.6 per cent. *Euphorbia pilulifera,* which occurs plentifully, has medicinal uses, and is used locally as a cure for asthma.

(d) *Fodder plants.*—There are few fodder plants in the River forest, owing to the paucity of grasses. The Reed (*Phragmites communis*) is the favourite fodder for horses and cattle, and the Wild Rice (*Orzya sativa*) is a fattening fodder for stock.

(e) *Poison Plants.*—No poison plants are known to occur in this formation.

C.—Mangrove Forest.

1. *General description.*—Fringing the entire Kimberley coast, and extending southwards to below the Ashburton River, Mangroves prevail. The Mangrove forest attains its best development to the north of Derby, the average height of its component trees being about 35 feet, while around the Prince Regent estuary they attain a height up to 50 feet. The formation is thickest in the estuaries and tidal creeks where the water is slightly fresh, and here the common species are Black Mangrove (*Rhizophora mucronata*), *Bruguiera gymnorrhiza, Carapa obovata,* and on the inner fringe the Indian Tulip tree (*Thespesia populnea*). The two former also occur along the open coast, the first named being the only species which has stilt-like roots enabling the plant to withstand the force of the tides in the soft mud.

On the open coast the following species are typical:—Red Mangrove (*Ceriops Candolleana*), White Mangrove (*Aegiceras majus*), a Black Mangrove (*Bruguiera gymnorrhiza*), Cork Wood (*Avicennia officinalis*), *Sonmeratia alba,* and *Lumnitzera racemosa. Sonneratia alba* and *Rhizophora mucronata* occupy the outermost fringe of the Mangrove forest, the latter being much more scarce here than in the estuaries; *Bruguiera gymnorrhiza* and *Avicennia officinalis* occupy a zone just below the high tide line, while *Ceriops Candolleana, Egiceras majus,* and *Lumnitzera racemosa* occur above the diurnal tidal mark in saline soil, their roots being washed only by the equinoctial tides. *Sonneratia alba* has a stout trunk and the habit of a normal tree, but possesses numerous respiratory vertically ascending roots which protrude above the soil. It occurs only where the soil is sandy, and never in the thick mud of the estuaries. At low tide the roots of all the species are exposed to view, but at high tide only the crowns of those species occupying the outer fringe are visible. No undergrowth occurs beneath the outer Mangroves, where the roots form an intricate mass, but salt bushes (*Chenopodiaceae*), and other small seaside plants, together with the maritime Spinifex (*S. longifolius*) occur in the sandy soil beneath the inner Mangroves. The Nipa Palm, a feature of the Mangrove forests of the Old World, is entirely absent from the Kimberley Mangroves.

Vivapary is exhibited by *Rhizophora* and *Ceriops.* Parasites are absent from the Mangrove forest, with the single exception of *Loranthus maritima,* which is parasitic upon two or three species. The xeromorphy of the Mangroves consists of thick leathery leaves.

2. *Location.*—The entire coastline, extending southwards to near Carnarvon.

3. *Topography and soils.*—The Mangrove forest attains its best development in the muddy estuaries where there is a great depth of soft black mud. The estuarine Mangroves are conspicuous by reason of their stem-supporting devices. The Mangroves of the open coast are best developed where there is a shallow coast (*e.g.,* Napier, Broome, and Vansittart Bays), the soil here being of a sandy nature.

4. *Climate.*—This is the most unhealthy of the Kimberley district, on account of its excessive humidity.



KIMBERLEY FAN PALM (*Livistona Eastoni*, Gardner).
Northern sclerophyllous woodland, near the Lawley River.
(Illustrating Northern sclerophyllous Woodlands.)

5. *Economic value.*—The entire economic value of this formation lies in the products of the Mangroves themselves. Structural timbers are wanting, also cabinet woods, the timber of the component species being used only for firewood. The natives, however, manufacture rafts (catamarans) from the stems of the Cork Wood (*Avicennia officinalis*), the timber of which is very light, and paddles are fashioned from the flattened trunks of Bruguiera.

Almost all the species of the Mangrove forest yield tannins from their barks. The following results were obtained from analyses made by the Forests Products Laboratory:—*

Red Mangrove (*Ceriops Candolleana*)—41.4 per cent. tans.
Black Mangrove (*Bruguiera gymnorrhiza*)—36.2 per cent. tans.
Sonneratia alba—8.0 per cent. tans.

A previous analysis of the bark of *Rhizophora mucronata* showed a yield of 40 per cent. tannin.

The Mangrove forest is obviously of no value for pastoral purposes. Stock eat the leaves of *Avicennia officinalis,* but they have little value as a fodder. In a few places a salt grass (*Sporobolus virginicus*), which is a fair fodder plant, is present. *Myoporum acuminatum,* known as "Pituri," occurs among the inner mangroves, but no toxic principle has been proved in this species.

D.—Northern sclerophyllous woodlands.

(1.) *General description.*—This type of country is comparable generally with the forests of the interior of the South-West, differing chiefly from these in that it produces grass along with its shrubs. The characteristics which separate it from the typical savannah woodland are (1) a more slender growth of individual trees, but a great number of trees to the acre, particularly Eucalypts: (2) the prevalence of harsh (xerophilous) shrubs such as *Acacia, Jacksonia, Grevillea,* in its undergrowth, and (3) the comparative scarcity of grass, of which the chief is the Straw grass (*Andropogon affinis*). The denser thickets occur on the poor lateritic soils, reminding one of a stunted Jarrah forest in the South-West, but the presence of palms (*Livistona Eastoni* and *L. Alfredi*) lend to the landscape a decidedly tropical appearance.

The commonest trees are the Messmate (*Eucalyptus tetrodonta*) and Ironbark (*E. terminalis*), associated with which are the Fan Palm (*Livistona Eastoni*), Wattle (*Acacia tumida*), *Jacksonia thesioides, Jacksonia argentea,* Beefwood (*Grevillea heliosperma*), *Grevillea agrifolia,* and a few other species. The Wolly-butt, which is so general elsewhere, is comparatively scarce. *Callitris intratropica,* the Kimberley Pine, is represented by small patches, which, however, in the immediate vicinity of Vansittart Bay, extend to a considerable forest.

(2.) *Location.*—Northwards from the vicinity of the Couchman Range and lower King Edward River to the shores of Admiralty Gulf, Vansittart, and Napier Broome Bays, except where littoral forest occurs, and indefinitely eastwards.

(3.) *Topography and soils.*—The formation occupies principally a portion of the main plateau, but extends to lower levels in the north, where it merges into the littoral forest. The soil is a sandy loam, often mixed with laterite over large tracts, and where laterite is present, the shrubs predominate.

* Report of the Forests Department for the year ended 30th June, 1922.

(4.) *Climate.*—The climate, in conjunction with the soil, determines the range of this formation. The rainfall is 33-40 inches, and the climate is equable. Watercourses are scarce, and, next to the "Pindan," the formation is the most arid of the Kimberleys. The plants of the undergrowth are very xerophytic, and *Acacias* with phyllodes, also *Jacksonias,* are a feature of the scrubby growth. The xeromorphy consists of reduced leaves, leathery leaves, and coatings of interlocked hairs. Species of *Tiliaceae* and some *Malvaceae* are common.

(5.) *Economic value.*

(a.) *Structural timbers.*—Since the average height of the forest is about 40 feet, the timbers should be of use for local purposes, such as building and fencing.

(b.) *Cabinet woods.*—These, with few exceptions, are the same as those of the savannah forest.

(c.) *Forests products.*—The resources of the formation in this capacity are not known. A few species of *Terminalia* occur, which may have possibilities from a tanning viewpoint, and medicinal plants are not wanting. Species of the *Euphorbiaceae* occur in quantity.

(d) *Fodder plants.*—From a pastoral standpoint this country is inferior to the savanah. The grasses are few and coarse, and, over the greater part, are almost exclusively restricted to the Straw grass (*Andropogon affinis*). The top-feed plants include *Acacia, Jacksonia,* and, to a less extent, *Grevillea.*

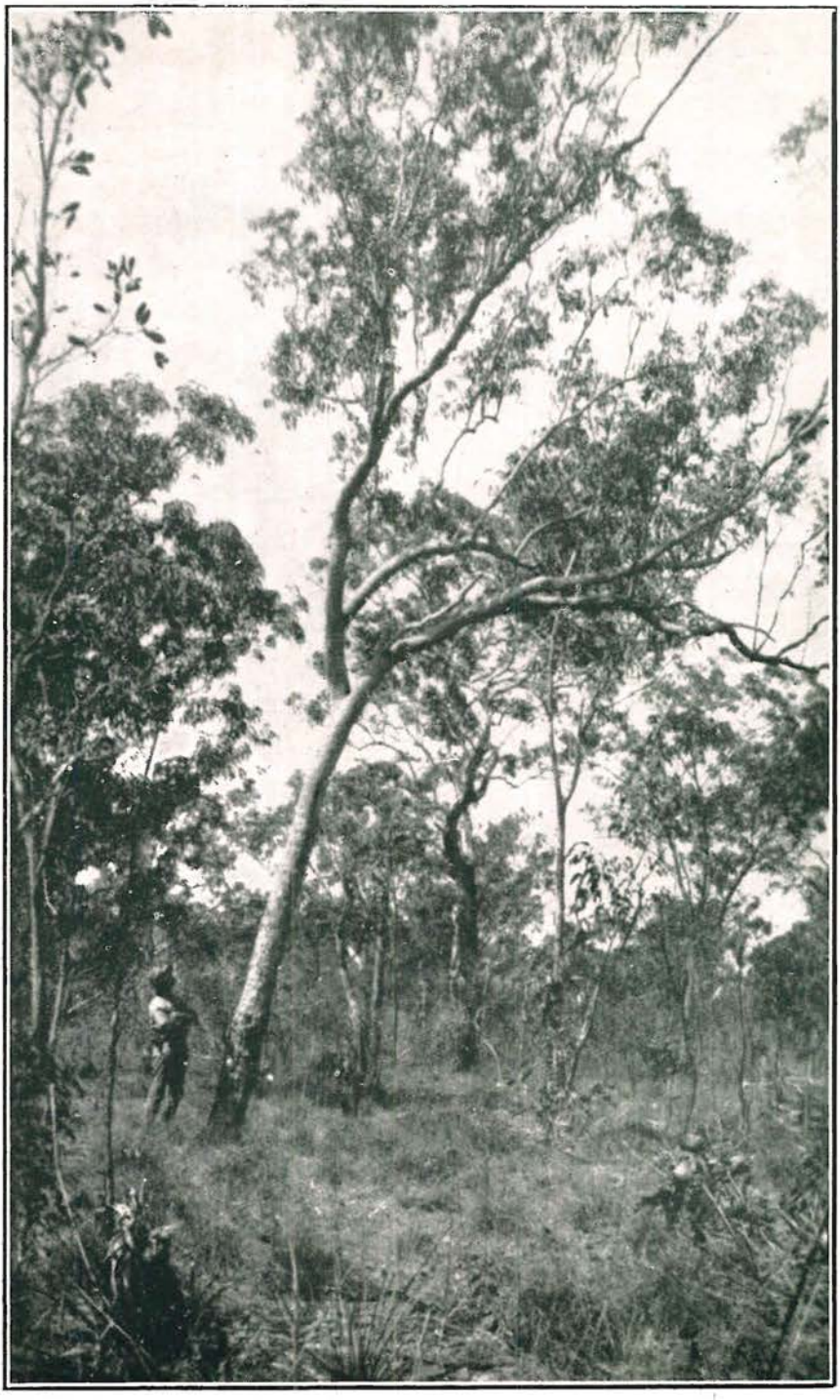
(e.) *Poison plants.*—None peculiar to this formation are known.

E.—Littoral Forest.

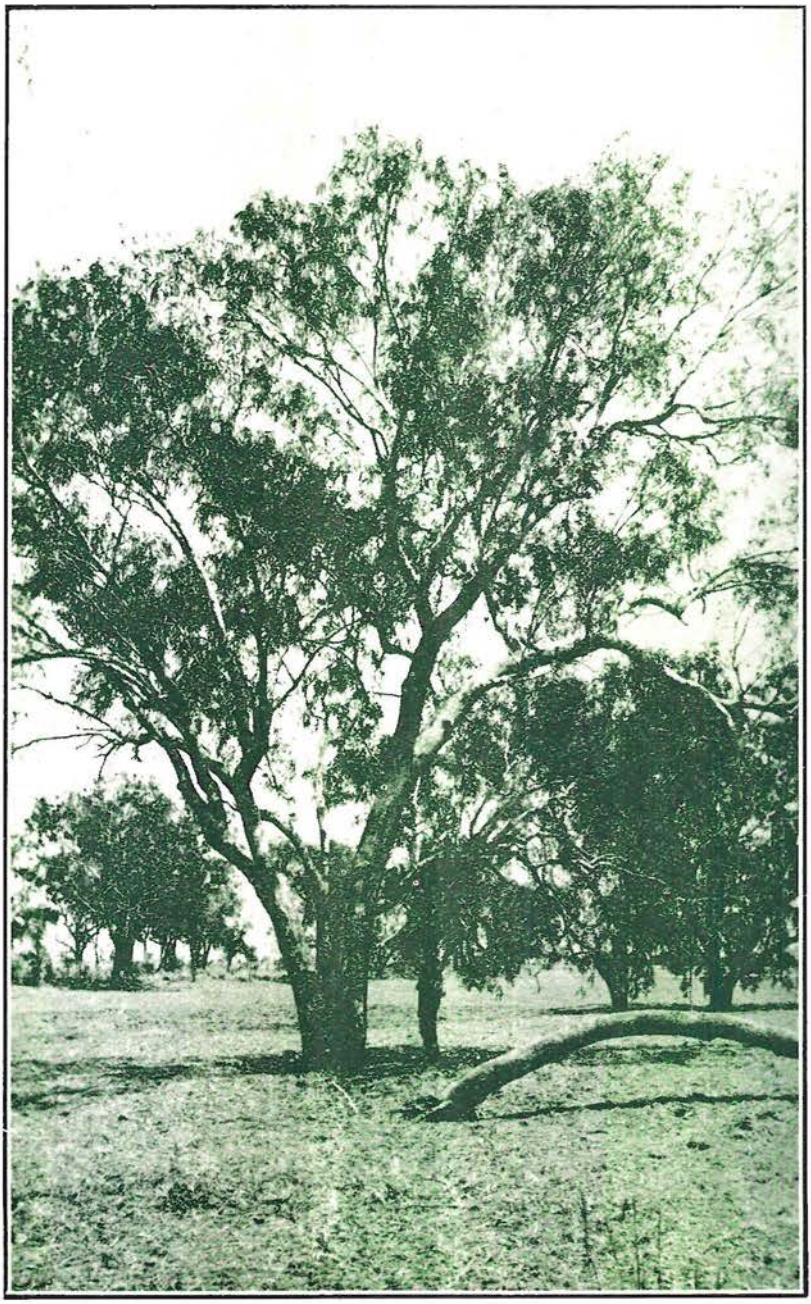
(1.) *General description.*—The component trees of the littoral forest are, in density, less than those of the sclerophyllous woodlands, but greater than those of the savannah. They vary from 15-35 feet in height; an understorey of smaller trees affords a shade second only to that of the river-forest and the Mangrove forest. Lianes are a feature. The leaves of these trees are generally large, and there are many deciduous species. Xerophily is the rule among the evergreens. It is chiefly in the littoral forest that evidences of a foreign flora are discernible. The Baobab (*Adansonia Gregorii*) is the most conspicuous tree, and is practically confined to this formation. *Pandanus odoratissimus,* the screw palm, is very common, and extends in places to the seashore.

Terminalia Cunninghamii and *Terminalia grandiflora* are characteristic trees, along with *Careya australis,* known to the natives as "Mangaloo." Where Mangroves are scarce on the seaboard, as in the case along the open sandy shores, the tree life of the littoral forest is greatly reduced, and the sandy soil is inhabited by creeping plants and low shrubs serviceable as sand-binders. *Spinifex longifolius, Ipomoea pes-caprae,* and *Scaevola Koenigii* illustrate these cases. Among the twiners *Asparagus racemosus, Abrus precatorius, Canavalia,* and *Cassytha* are common, climbing among the shrubs and smaller trees.

The localities which are more protected by the Mangroves produce a greater abundance of arborescent species. The commoner trees of the littoral forest are the Woolly-butt (*Eucalyptus miniata*), Messmate (*Euc. tetrodonta*), Cotton tree (*Cochlospermum heteronemum*), a Flame Tree (*Sterculia ramiflora*), *Albizzia lebbek,* Nutwood (*Terminalia Cunninghamii* and *T. grandiflora*), *Eugenia grandis, Pandanus odoratissimus, Petalostigma quadriloculare, Grevillea agrifolia, Verticordia Cunninghamii, Canthium attenuatum,* and *Owenia reticulata.*



IRONBARK (*Eucalyptus terminalis*, F.v.M.)
Vansittart Bay, Northern Kimberley.
(Illustrating the littoral forest.)



COOLIBAH (*Eucalyptus microtheca*, F.v.M.)
Lennard River, near Mt. Marmion.
(Billabongs of the Grasslands.)

(2.) *Location.*—The littoral forest is most evident where a narrow coastal plain separates the sea from the plateau, particularly to the north of the Prince Regent River. It is also apparent to a less extent around Derby, where it merges into the Pindan.

(3.) *Topography and soils.*—The soil is usually of a sandy nature, and fairly well watered. Owing to the density and diversity of its trees the ground is fairly well covered with humus.

(4.) *Climate.*—The rainfall varies from 35 to 70 inches, and, owing to its proximity to the sea, the climate is humid.

(5.) *Economic value.*

(a.) *Structural timbers..*—No important timber trees occur in this formation.

(b.) *Cabinet woods.*—Principal among these is the Ebony (*Maba humilis*), which occurs in quantity towards the north. Several other trees of value, for which no use has been made owing to inaccessibility, occur in the littoral forest. Mention may be made of the Gutta-percha tree (*Excaecaria parviflora*), Fresh-water Mangrove (*Tristania suaveolens*), and Steelwood (*Erythrophloeum Laboucheri*), also the Flame tree or Kurrajong (*Sterculia ramiflora*).

(c.) *Forests Products.*—No plants from the littoral forest have been dealt with from this aspect. Plants with possibilities in this direction include the Indian Tulip tree (*Thespesia populnea*), Quinine tree (*Petalostigma quadriloculare*), the various species of *Euphorbia*, and the Fresh-water Mangrove (*Tristania suaveolens*).

(d.) *Fodder plants.*—These may be rated as being of the same value as those of the sclerophyllous woodlands.

(e.) *Poison plants.*—With the exception of the Camel poison or Steelwood (*Erythrophloeum Laboucheri*), and occasionally Strychnine tree (*Strychnos lucida*), no poisons occur.

F.—Grasslands.

(1.) *General description.*—Although these merge gradually into the savannah formation, particularly that of the basaltic country, there are certain areas in which grass forms extensive plains, with few small isolated trees. These plains are intersected in parts by areas of scrubby forest known as "Pindan," *q.v.*, which vary considerably in width. The grasslands occupy the alluvial flats known as "black soil plains." Depressions known as "pools" or "billabongs" occur throughout these plains. They are empty in the dry season but filled with water in the wet season. The trees, which are of low stature (15-30 feet), usually of widely spreading habit, are but thinly distributed and yield extremely hard timbers.

The densest growth occurs around the depressions, where the Coolibah (*Eucalyptus microtheca*) predominates, it being associated with Chestnut (*Terminalia platyphylla*), and *Eucalyptus papuana.*

The species of the open country are *Eucalyptus pyrophora, Careya australis,* Mimosa (*Acacia suberosa* and *A. Farnesiana*), Bohemia tree (*Bauhinia Cunninghamii*), *Ventilago viminalis,* and to a less extent Baobab (*Adansonia Gregorii*). The undergrowth is very scattered, and consists almost exclusively of "Konkerberri" (*Carissa lanceolata*), and *Acacia impressa.* The ground covering is dense, and almost exclusively grass (*Gramineae*), and species of *Hibiscus.* The commonest grasses are Flinders grass (*Themeda membranacea*), Bundle-bundle (*Themeda imberbis*), Kangaroo grass (*Themeda avenacea*), together with numerous minor species. Species of *Hibiscus* and

many small *Leguminosae* are common, notably *Tephrosia, Sesbania, Indigofera,* and *Neptunia,* the last named trailing over the ground.

(2.) *Location.*—The grasslands occur principally along the wide plains of the Lennard, May, Meda, and Isdell Rivers.

(3.) *Topography and soils.*—Alluvial flats, usually composed of a rich black loam.

(4.) *Climate.*—The climate is the same as that of the savannah woodlands.

(5.) *Economic value.*

(a) *Structural timbers.*—The Coolibah (*Eucalyptus microtheca*) is practically the only serviceable timber. Its extreme density and hardness earn it a place of importance among the timbers of Western Australia. In addition it is termite-resistant, and hence is in great demand locally for building purposes.

(b.) *Cabinet woods.*—These are scarce and unimportant.

(c.) *Forests products.*—The lemon-scented grass (*Andropogon procerus*) has medicinal properties, and is used by the natives as a specific against colds. *Grewia polygama* is also used both by the settlers and natives. Edible fruits are scarce.

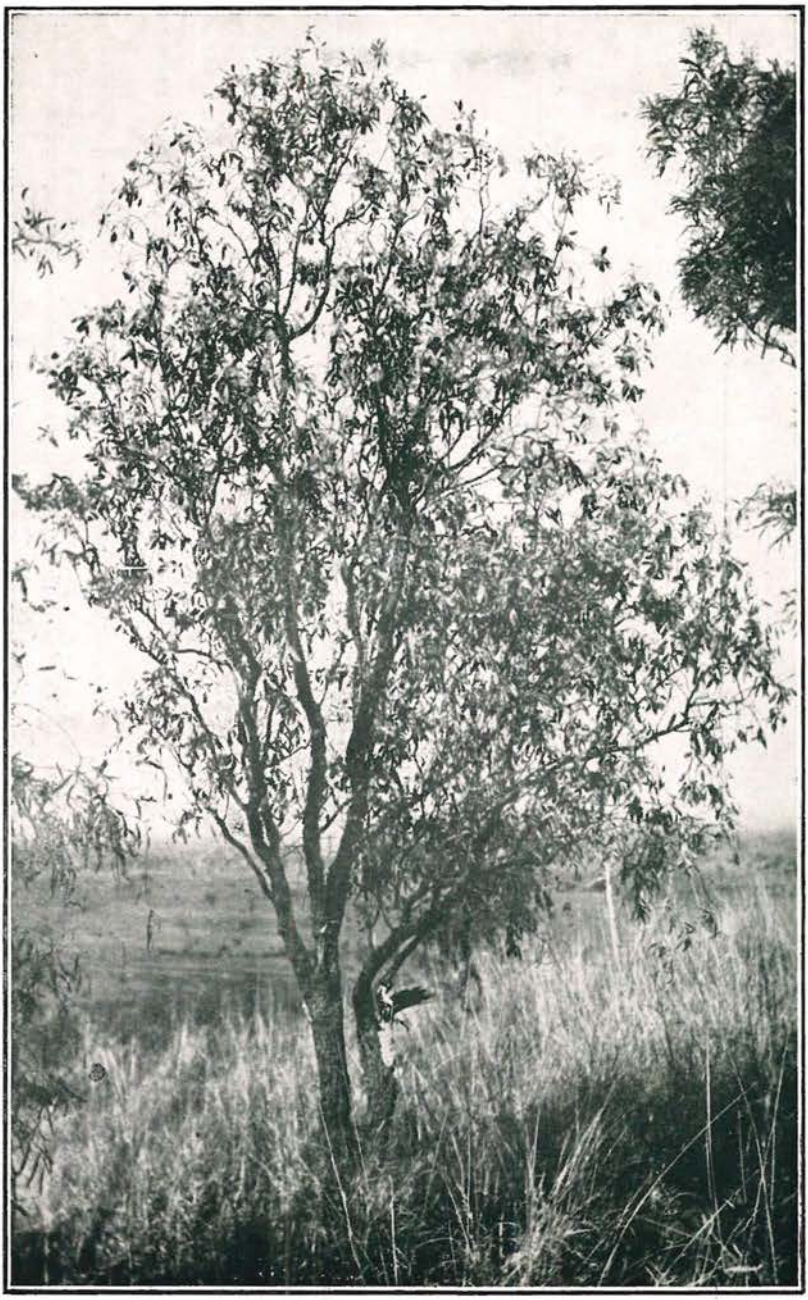
(d.) *Fodder plants.*—These have been dealt with under the general description. In addition, *Cynodon tenellus,* the couch grass, and species of *Panicum, Xerochloa,* and *Perotis,* which are all good feed, are common. The formation is essentially a pastoral country.

(e.) *Poison plants.*—These have not been investigated, but if they occur they are few and not troublesome.

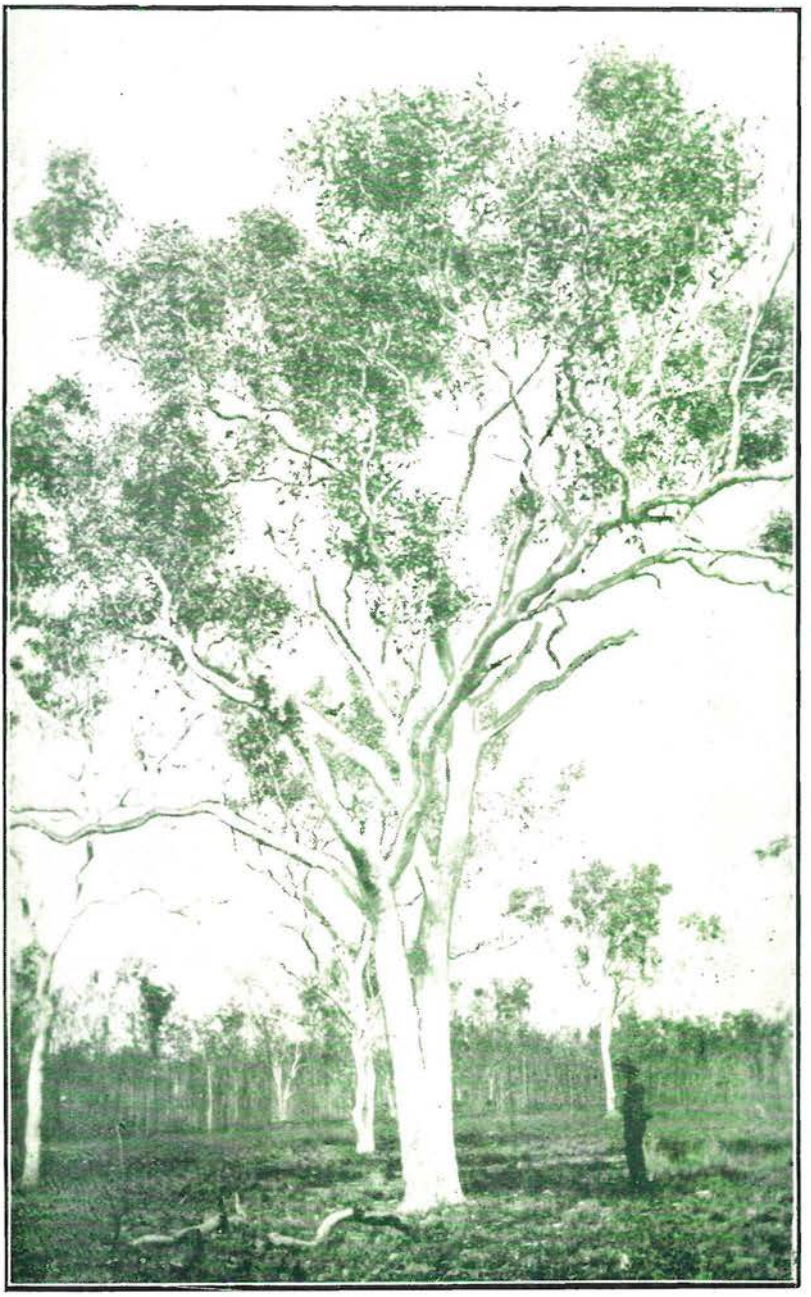
G.—Pindan.

(1.) *General description.*—This type is really a form of low sclerophyllous woodland, occupying low rainfall belts, but is so characteristic that it has been included as a separate formation. The average height of the trees is about 25 feet. As a rule, the areas of Pindan around the Lennard River are only a few acres in extent, but as the grasslands decrease to the south so the Pindan predominates, until it occupies tracts of country over the Fitzroy River several miles in width. *Acacia tumida,* the Pindan Wattle, is the dominant species. Its large blue-grey leaves (phyllodes) render it at once conspicuous. Associated with it are other species, prominent among which are a bloodwood (*Eucalyptus pyrophora*), often shrubby, *Eucalyptus miniata, E. dichromophloia,* Cabbage Gum (*E. papuana*), Camel poison (*Erythrophloeum Laboucheri*), *Careya australis,* Fig (*Ficus orbicularis*), and Stinkwood (*Gyrocarpus Jacquini*). The shrubby species include the "Konkerberri" (*Carissa lanceolata*), Scrubby Cadjuput (*Melaleuca alsophila*), Milk bush (*Wrightia saligna*), *Acacia impressa,* Ironwood (*Terminalia circumalata*), and *T. volucris.* Herbaceous species are not so numerous, and the grasses are coarse, *Andropogon affinis,* the Spear grass, and *A. procerus,* the Lemon-scented grass, being the most common. Other herbs are *Polycarpaea longiflora,* a pretty plant of the *Caryophyllaceae,* and species of *Hibiscus* and *Portulaca.* The shrubby vegetation is markedly xerophytic, the protective devices being in the main shiny leathery leaves; while leaf-reduction is evident in the *Acacias.*

(2) *Location.*—The Pindan occupies an extensive tract, much of which is unknown, particularly that to the east of Broome. This tract extends to, and alternates with, the grasslands south of the King Leopold Range.



KIMBERLEY SANDALWOOD (*Santalum lanceolatum*, R.Br.).
Mount Marmion, Lennard River.
(Showing Grasslands in distance.)



RIDGE GUM (*Eucalyptus alba*, Reinw.)
Savannah, near Mt. Agnes.

In the background can be seen thickets of *Grevillea chrysodendron* inhabiting the swampy lands.

(3) *Topography and Soils.*—The Pindan inhabits low undulating country, and the soil is of a sedimentary formation, varying from a sandy to a light red soil, with occasional outcrops of conglomerates.

(4) *Climate.*—The climate is more or less arid. The rainfall at Derby, in the northern part of the Pindan, is about 35 inches, but this decreases considerably towards the south. Generally the climatic conditions are the same as those of the North-West.

(5) *Economic Value.*—The only use to which this country has been put is that of pastoral pursuits. Cattle stations are scattered throughout the northern portions of the Pindan, but the greater part remains unexplored.

H.—Swamp Lands.

(1) *General Description.*—Near the sources of creeks and rivers, and in the broad depressions of the sandstone areas to the north of the King Leopold Range, there are patches of sandy soil rendered swampy through the infiltration of water from the adjacent watercourses. The silicious soil appears to be unfavourable to the growth of the commoner grasses and trees, and this type has a more or less distinctive vegetation. The commoner trees are: Cadjuput—a stunted form—(*Melaleuca leucadendron*), White Gum (*Eucalyptus Houseana*), Swamp Gum (*E. ptychocarpa*), *Banksia dentata, Grevillea chrysodendron* the Honey Tree or Silky Oak, *Verticordia Cunninghamii* var. *longistyla, Jacksonia thesioides,* and *Pandanus odoratissimus,* the last named being commonly known as "Screw palm." The undergrowth is small, consisting of many species of Sedge (*Cyperaceae*), small grasses, and the following very characteristic herbs, all of which have brightly coloured and conspicuous flowers: Flowering Rush (*Xyris complanata*), Fringed Lily (*Thysanotus chrysantherus*), Bloodroot (*Haemodorum parviflorum*), *Burmannia disticha,* Native Clover (*Gomphrena canescens*), Sundew (*Drosera indica*), *Byblis liniflora, Hemiarrhena plantaginea,* and species of Bladderworts (*Utricularia*).

The herbaceous vegetation is green throughout the year.

(2) *Location.*—Swampy lands occur in the depressions of the main plateau, around the sources of the Calder, Charnley, Drysdale, King Edward and Mitchell Rivers.

(3) *Topography and Soils.*—The soil is a silicious sand, swampy throughout the year.

(4) The climate is that of the savannah woodlands.

(5) *Economic Value.*—Apart from its cabinet woods, *Grevillea chrysodendron* and *Verticordia Cunninghamii,* the economic value of this formation lies in its pastoral capabilities. The vegetation is green and succulent throughout the year, and the Wild Clover (*Gomphrena canescens*), one of its characteristic herbs, is a favourite fodder plant with stock.

Mention may be here made of the *hill flora* of Kimberley. The vegetation of the basaltic hills is, with the exception of a few trees, such as Kapok tree (*Bombax*) and Cycas Palms (*Cycas*), the same as that of the basalt plains and undulations. The sandstone hills, which form a considerable part of the Northern Kimberleys, have in their scanty soil a more or less characteristic flora. On the higher peaks of the King Leopold Range, and those of the central plateau, plants belonging peculiarly to temperate zones make their appearance, examples being *Hibbertia, Trachymene, Wahlenbergia, Cryptandra, Pimelea, Boronia and Gastrolobium,* all of which are well represented in the South-West Division of the State. These sandstone elevations are rich in arborescent species, of which the following are characteristic:—*Cycas furfuracea, Cycas Lane-Poolei, Callitris intratropica,* Cabbage Palm (*Livistona*

Alfredi), *Celtis philippinensis*, species of Fig (*Ficus leucotricha* and *F. puberula*), *Grevillea Wickhami*, *G. heliosperma*, Sandalwood (*Santalum lanceolatum*), *Acacia Kelleri*, *Dicrastachys Muelleri*, *Denhamia obscura*, species of *Sterculia*, *Calythrix microphylla*, *Eucalyptus brachyandra*, *E. Mooreana*, *Xanthostemon paradoxus*, Ebony (*Maba hunilis*), and the beautiful flowered *Gardenias*. The grasses are scanty and harsh, being principally straw grass (*Andropogon*), and *Spinifex* (*Triodia Cunninghamii*). Many of the above trees, particularly the Flame trees (*Sterculia*), are deciduous, and have large conspicuous flowers. Their vegetative season is in advance of that of the lower situations, and they shed their leaves earlier than the trees of the plains, resuming them some time before the advent of the rains.

V.—CLASSIFICATION OF SPECIMENS COLLECTED.

Character of the Kimberley Flora.

It is probably on account of the total absence of rain-forest, and the predominance of savannah, that writers have stated that the Kimberley vegetation is not of a tropical character, but a review of the families of flowering plants shows that the district possesses a hot climate flora, with a few exceptions, such as on its mountain peaks.

Pteridophyta.

Owing to the scarcity of shade, and the dry conditions between the months of April and October, the ferns are but poorly represented for a tropical country. They are, of course, most common in the river forest, with the exception of *Notholaena vellea*, and *Platyzoma microphyllum*, both of which thrive in open sunny situations; the former among dry rocks, and the latter in sandy swampy places. Hairiness is the xeromorphic character of *Notholaena*, and reduced size of the pinnae that of *Platyzoma*. The family *Polypodiaceae* is fairly well represented, but cannot be considered typically tropical. The *Gleicheniaceae* and *Schizeaceae* are exclusively tropical, and represented by one species to each family, each of which is climbing. The *Marsileaceae* has three species, common in swampy places or around billabongs.

Gymnospermae.

Cycadaceae are more or less characteristic of a tropical flora, and are represented in the Kimberleys by four species. All of them are found on rising ground, or on the summits of hills, and attain large proportions. In this report two new species have been added, only two being previously known from this district. *Callitris intratropica* is the sole representative of the *Coniferae* and the largest species of this group in Western Australia. It is typical of the high lands, and only descends to the coast on the northern seaboard.

Monocotyledoneae.

Among the species which form the ground covering, Monocotyledons predominate. With the exception of the Palms, and *Pandanaceae*, they are all herbaceous. The grasses (*Gramineae*) are important, as being of primary value to the pastoralist, and the grasslands of Kimberley constitute one of the district's greatest assets. They attain their greatest height on the sandstone hills, where the Straw Grass (*Andropogon*) is frequently 12-15 feet high. Many of these large species send out roots from their lower nodes,

which spread at an angle of about 45 degrees, and serve as supports to the long stems. The majority of grasses are perennial, and form dense tufts. They flower and seed in the early months of the dry season. The tropical genus *Pandanus* is represented by two species, both of which are found in moist soil, and are an indication of fresh water. The palms are not so well represented, only two species of the genus having been recorded. Of these *Livistona Eastoni* is the more common, and the taller species. Its exclusive habitat is the northern sclerophyllous forest, where its presence relieves the monotony of the *Eucalyptus*. The tropical *Araceae* are poorly represented by two species, *Typhonium* and *Calocasia*. The *Liliaceae, Haemodoraceae* and *Amaryllidaceae* have beautiful species, but do not take a prominent place in the forest flora. The *Burmanniaceae* have a solitary representative, and of the *Orchidaceae* four species were observed, three of these being epiphytic; the terrestrial one (*Eulophia*) occurring in swampy grasslands. The epiphytic species flower in the middle of the dry season.

Dicotyledoneae.

Almost the entire woody species of Kimberley are dicotyledons, but the number of purely tropical families is small. The *Myrtacae* predominate among the trees, and *Eucalyptus* preponderates considerably over the other genera.

The *Urticales* possess the tropical genera of *Ficus, Celtis* and *Trema,* the first named being a conspicuous feature of the flora, providing many useful trees and edible fruits.

The Proteaceae cannot be considered tropical, but although the genera *Grevillea, Hakea, Stenocarpus* and *Banksia,* which with *Persoonia* constitute all the Kimberley representatives of this family, and take an important place among the trees, they do not attain to the same prominence in this flora as in that of temperate Australia. With the exception of *Grevillea mimosoides, G. viscidula* and *Hakea macrocarpa,* the family is restricted to the sandstones and conglomerates, and more particularly to the hills and mountains, where the temperature is lower than elsewhere. All the species of this family are either trees or shrubs, none are armed, and the xeromorphy is not very highly developed, consisting of coriaceous and shiny, but not reduced, leaves.

Among the *Santalales,* which appear to be without exception parasitical, the Loranthaceae are prominent. They are all aerial plants, growing principally on the branches of *Eucalyptus,* but also occur on *Adansonia, Acacia, Cachlospermum, Denhamia, Banksia,* and *Buchanania.* The flowers vary in colour from yellow to red, and are usually conspicuous from a distance. Of the *Santalaceae, Santalum lanceolatum,* the Sandalwood, has commercial value, its wood being used in distillation of Sandalwood oil. The species is vigorously parasitic.

The *Polygonales* are represented by *Polygonum* only; the *Piperaceae* are entirely absent.

Among the *Centrospermae* are herbs that are of value as fodder plants. Various species of *Gomphrena, Trichinium* and *Polycarpaea* are common.

The *Ranales* are represented by *Nymphaea* and *Tinospora,* the former, with its beautiful and conspicuous flowers, inhabits the pools of the larger swamps and rivers, and the latter occurs as a liane on the plains to the south of the King Leopold Range.

The *Rhoeadales* are almost entirely restricted to the *Capparidaceae.* A species of the *Cruciferae* was seen on the mountains of the interior.

Of the *Sarraceniales, Drosera,* and *Byblis* are represented by a few species in the sandy swampy places.

The *Rosales* comprise *Pittosporaceae* and *Leguminosae.* The latter has numerous species, some being of importance as fodder plants, others as timber trees or cabinet woods, and a few as poison plants. The *Acacias* are not nearly so numerous as might be expected for an Australian district, and occupy a comparatively minor place in the flora. Many species of the *Leguminosae* are deciduous, and xeromorphy is exhibited in many forms: pinnate leaves among *Acacia, Albizzia, Cassia, Sesbania,* and others, leaf-reduction in *Jacksonia, Acacia* and *Bossiaea,* and among other species by hairy, cuticularised or coriaceous leaves.

The *Geraniales* are not numberous in this district, with the exception of *Meliaceae* and *Euphorbiaceae,* which have many characteristic tropical species. The *Meliaceae* are most abundant around the coast, particularly on the sandstone ranges; all the known species are woody plants. *Carapa obovata* is a mangrove. The *Euphorbiaceae* provide trees in *Petalostigma,* the Quinine tree, and *Excaecaria,* the former having medicinal properties. All the species of *Euphorbia* are small plants.

The *Sapindales* are of importance, since they provide many woody species, some of which are deciduous, or at least partially so. The various species of *Buchanania* form a conspicuous feature of the savannah; the Celastraceae are confined to the hills, and the species of *Atalaya* which occur on alluvial soil are of value as top-feed plants. *Atalaya hemiglauca,* which possesses a fine timber, does not attain good proportions, and is therefore of little value.

The *Rhamnales* are woody plants—twiners in the *Vitaceae,* and the genus *Cryptandra,* which is typically mesothermic, is represented by a solitary mountain species.

The *Malvales,* with numerous species, are conspicuous by reason of their large beautiful flowers. Hibiscus, in particular, has many species which might well be cultivated. The xeromorphy consists in these of thick hairy coverings to the leaves. The *Bombacaeae* are represented by two important woody species, *Adansonia* and *Bombax,* both being deciduous and exclusively tropical.

One species of Hibbertia, of rare occurrence, represents the *Dilleniaceae.* It is a highland species. The remaining species of the *Parietales* are: *Cochlospermum,* the Cotton tree; *Bergia, Ionidium* (which is purely herbaceous, and two species of the *Passifloraceae,* of which one (*Passiflora foetida*) appears to be introduced.

The *Myrtiflorae* are predominant among the trees. *Pimelea* is a mountain genus. The *Lecythidaceae,* represented by four species, are all arborescent, and one (*Sonneratia alba*) is a Mangrove. The *Rhizophoraceae* provide the commercially valuable Mangroves, which are strictly megathermic and, with the exception of *Carallia,* confined to the coast. The *Combretaceae,* also tropical, is represented by several species of *Terminalia,* all trees, and a single species of *Gyrocarpus,* which is a deciduous tree of the Southern Kimberley. The *Myrtaceae,* which is as much a temperate as a tropical family, has many species, ranging from small shrubs in *Calythrix* to the giant *Melaleuca,* and many species of Eucalyptus, to which the majority of Kimberley trees belong. Certain species are endemic. The Eucalypts have generally the habit and characteristics of the temperate species, but notable exceptions are the deciduous *E. brachyandra,* the connate-leaved *E. perfoliata,* and the large and hairy-leaved *E. grandifolia* and *E. clavigera,* both

of which have horizontal leaves. *Eucalyptus Herbertiana* is the sole representative of the Mallee type, with a habit similar to that of *E. erythronema*. All other Eucalypts have the pendant foliage and twisted petioles of the temperate species. *Xanthostemon* and *Eugenia* are small trees belonging almost exclusively to the sandstone areas. *Eugenia grandis*, a tree remarkable for its large leathery leaves, is never found far from the coast. The genus provides edible fruits.

The *Umbelliferae*, an almost exclusively mesothermic family, is represented solely by *Trachymene hemicarpa*, a large herbaceous perennial and mountain plant.

The Primulales have as a sole representative *Ægiceras majus*, one of the Mangroves.

The Ebenales consist of *Ebenaceae* and *Sapotaceae*; the former has two species producing Ebony, *Maba humilis* being the more valuable species.

Of the *Contortae*, the *Loganiaceae*, *Apocynaceae*, and *Asclepiadaceae* are represented by many species, ranging from trees to small creepers.

The *Tubiflorae* are well represented by *Convolvulaceae*, *Verbenaceae*, *Labiatae*, *Solanaceae*, and *Scrophulariaceae*. *Avicennia officinalis* of the *Verbenaceae* is a Mangrove, *Ipomoea* of the *Convolvulaceae* provides the native yams, and species of *Buchnera* (*Scrophulariaceae*) are of value as fodder plants. The species of *Utricularia* inhabit sandy swampy localities.

Among the *Rubiales* are trees which take a prominent place in the flora. *Sarcocephalus cordatus*, the "Leichhardt tree," is the largest, and has been mentioned elsewhere. Species of *Gardenia* are partially deciduous, and conspicuous by reason of their beautiful flowers. *Randia* and *Timonius* are important trees of the river forest, extending into the smaller valleys of creeks. The family *Rubiaceae* also includes scented herbs.

The *Cucurbitales*, while of frequent occurrence in some places, do not take a conspicuous part in the flora. Species of *Cucumis* and *Luffa* occur as twining or prostrate herbs.

The *Campanulatae* occur as shrubs or herbs, and are not well represented. *Wahlenbergia gracilis* and *Helichrysum bracteatum* are common to the Kimberleys and the South-West, but the former is restricted to the mountains in Kimberley. *Scaevola* is only found near the coast. *Stylidium* has a few inconspicuous species.

The following are proposed as new species:—

CYCADACEAE:

Cycas Lane-Poolei.
Cycas basaltica.

PALMAE:

Livistona Eastoni.

LILIACEAE:

Borya subulata.

PROTEACEAE:

Grevillea latifolia.
Grevillea viscidula.

LORANTHACEAE:
Loranthus Kimberleyensis.
Loranthus maritima.

LEGUMINOSAE:
Jacksonia argentea.
Alysicarpus Cheeli.

MALVACEAE:
Fugosia pulchella.
Hibiscus superbus.

DILLENIACEAE:
Hibbertia Kimberleyensis.

LECYTHIDACEAE:
Barringtonia sphaerocarpa.

COMBRETACEAE:
Terminalia Fitzgeraldi.
Terminalia Cunninghamii.

SOLANACEAE:
Solanum vansittartensis.

LENTIBULARIACEAE:
Utricularia Kimberleyensis.

ACANTHACEAE:
Hypoestes suaveolens

LOGANIACEAE:
Mitrasacme foliosa.

VARIETIES:
Tephrosia flammea, F. v. M. var. pilosa.
Atalaya salicifolia, F. v M. var intermedia.
Verticordia Cunninghamii, Schau. var. longistyla.

The following notes, besides containing the descriptions of the new species enumerated above, give information concerning species hitherto unpublished, besides recording new localities.

Immediately following the name of each species is a reference showing where the description can be conveniently found.

Abbreviations explained.

B. Fl.—Bentham, Flora Australiensis.

F. v. M. Fragm.—Baron Ferdinand von Muller, Fragmenta.

W.V.F.—W. V. Fitzgerald, Journal and Proceedings of the Royal Society of Western Australia, Vol. III.

Gardner.—Collection in the Herbarium of the Forests Department, Perth, Western Australia.

PTERIDOPHYTA.

FILICALES.

POLYPODIACEÆ.

Lindsaea ensifolia, Swartz. B. Fl. vii. 721.

Rhizomes tufted. Fronds from 12-16ins. high.

Mitchell River, in moist humid valleys, among sandstone rocks on the banks of streams.

Adiantum lunulatum, Burm. B. Fl. vii. 723.

Fronds tufted, 4-9ins. high, the rhachis wiry, the pinnules large and flabelliform.

In damp spots in the Napier Range near the gorge of the Barker River, in black loam among limestone rocks.

Cheilanthes tenuifolia, Swartz. B. Fl. vii. 726.

This common south-west species is found in open sunny and stony situations in damp soil.

Prince Regent and Mitchell Rivers, Admiralty Gulf.

Blechnum orientale, Linn. B. Fl. vii. 740.

Rhizome forming a short thick trunk 6-9ins. high. Fronds 2-4 feet high, glabrous.

The specimens answer fairly well to the description of this species, but the pinnæ are smaller, and not cuneate at the base. It may prove to be a new species.

Aspidium unitum, Swartz. B. Fl. vii. 755.

Aquatic, or growing in running water on the banks of streams in black loam. Rhizomes shortly creeping, fronds 18 inches to 2 feet high.

Prince Regent, Mitchell, Moran, King Edward, and Drysdale Rivers.

Polypodium phymatodes, Linn. B. Fl. vii. 769.

Rhizomes shortly creeping.

Prince Regent River, in crevices of sandstone rocks, in running water.

Notholaena vellea, R. Br. B. Fl. vii. 773.

Rhizomes tufted. Fronds 4-10ins. high, closely invested with a loose cottony wool which covers the pinnules and rhachis.

In sandy soil on rises among quartzite rocks.

Prince Regent, Mitchell, and King Edward Rivers.

Acrostichum scandens, J. Smith. B. Fl. vii. 778.

Rhizomes trailing over rocks, or climbing for many feet.

Prince Regent River, in black boggy soil.

PARKERIACEÆ.

Ceratopteris thalictroides, Brong. B. Fl. vii. 695.

Fronds tufted from a thickened rhizome which is submerged.

In crevices of sandstone rocks in running water.

Sale, Glenelg, and Calder Rivers, Bachsten Creek.

GLEICHENIACEÆ.

Platyzoma microphyllum, R. Br. B. Fl. vii. 696.

Common on the central plateau around Mount Agnes, in sandy swampy soil in open spaces, forming dense colonies of many feet in diameter. Pinnæ yellowish-green, the rhachis rigid and wiry.

Sources of the Calder, Charnley, Glenelg, Prince Regent, Moran, and King Edward Rivers.

Gleichenia dichotoma, Hook. B. Fl. vii. 608.

Fronds branching, 18 inches to over 2 feet in height, light green.

In moist shady spots in valleys and gorges, growing in rock crevices. Near Mount Agnes (O. T. Siddins), Prince Regent River (C.A.G.).

SCHIZEACEÆ.

Lygodium scandens, Swartz. B. Fl. vii. 691.

Trailing over rocks or climbing trees for several feet. In black soil among sandstone rocks on the banks of streams in river-forest formation, in dense thickets of *Pandanus aquaticus.*

MARSILEACEÆ.

Marsilea Brownii, A. Br. Bailey Qld. Fl. vi. 1929.

Rhizome creeping for a few feet and rooting in soft mud. Leaflets spreading, on a long slender stipes, either floating, or erect and terrestrial.

Near the margins of still shallow pools near the Carson River, fruiting in September.

Marsilea angustifolia, R. Br. B. Fl. vii. 683.

Billabongs near the Isdell River.

Marsilea hirsuta, R. Br. B. Fl. vii. 683.

Fronds erect, in dry soil which is probably swampy during the summer months. Leaflets sensitive, bluish-green and covered with a fine hirsute pubescence.

Walcott Inlet, Duck Pool, Isdell River, near Grace's Knob, and near Mount Marmion.

GYMNOSPERMAE.

CYCADALES.

CYCADACEÆ.

Cycas furfuracea, W. V. Fitzg. Journ. Roy. Soc. W.A. iii. 108.

Apparently confined to the summits of the King Leopold Range, since the species was not seen on any of the mountains to the north.

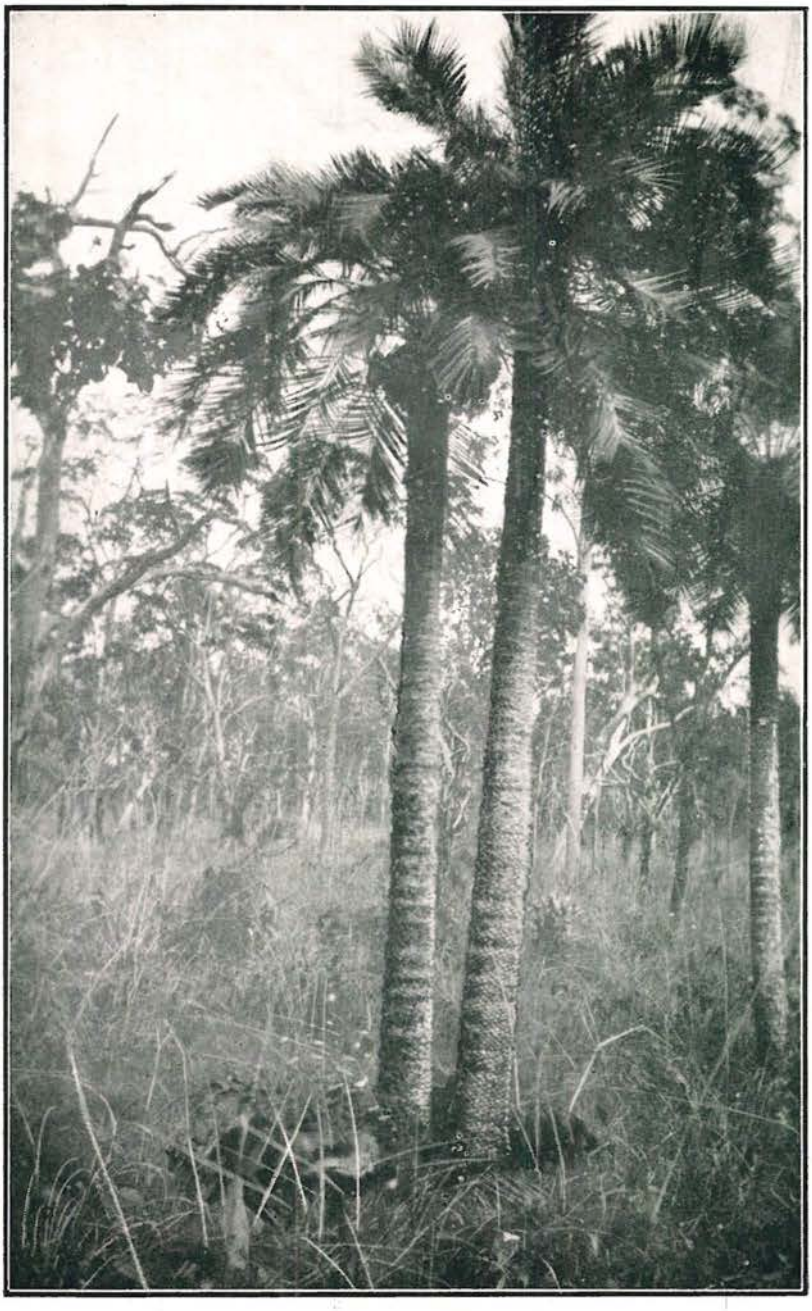
Cycas Lane-Poolei, Gardner n. sp.

An erect palm-like plant with a stout simple trunk of 10-12 feet, and 6-9ins. diameter, the leaves forming a graceful drooping crown at the summit.

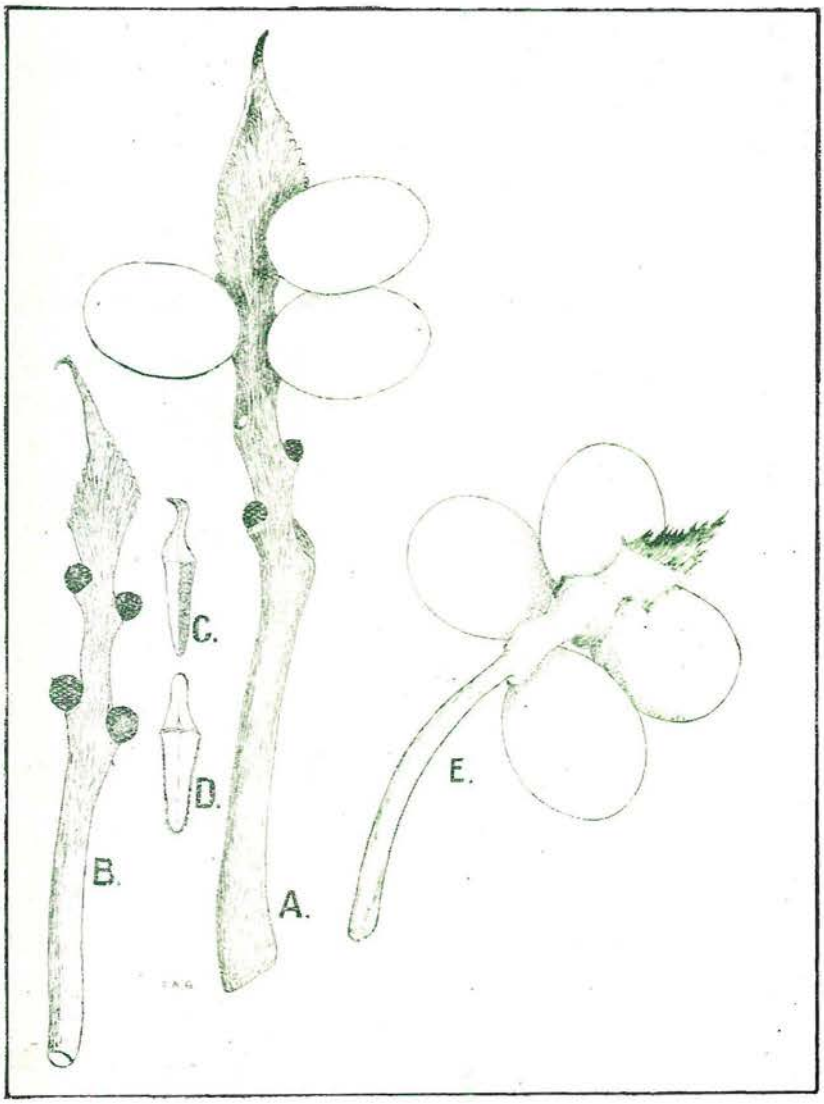
Leaves petiolate, quite glabrous: leaflets numerous, entire, linear, straight and acuminate with yellowish-brown tips, the midribs very conspicuous, the lamina flat, shining and dark green above, paler underneath, the upper leaflets decurrent to the next one below, the lowest not at all, or very slightly decurrent, the petiole armed with short stout spines which are arranged alternately through their entire length.

Male cones not seen.

Carpophylls petiolate, flattened, quite glabrous, bearing usually four ovules above the middle, the blade ovate-triangular, with two auricles or lateral basal lobes, the margins and apex toothed with sharp pungent spines.



CYCAD PALM (*Cycas Lane-Poolei*, Gardner).
Near Mount Hann, Central Kimberley.



CYCADACEAE.

A-D. *Cycas media*, R. Br. A. Mature carpophyll. B. Young carpophyll. C. Staminal scale. D. Same, seen from above. E. *Cycas Lane-Poolei*, Gardner. Mature carpophyll.

Seeds ovoid-globular, hard and glabrous, yellowish-green, covered with a glaucous powder when young, and shining.

Leaves 60-76 cms. long; petioles 23-30 cms. long, and .6-.8 cm. broad. Spines .4 cm. long. Leaflets 10-13 cm. long, and .6 to 1.1 cm. broad.

Carpophylls about 20 cm. long, and 1.27 cm. wide, blade 4.4 cm. wide, the apex 5 cm. long.

Seeds 5.7 cm. long, and 5 cm. diameter.

Found in the Kimberley district to the North-East of Mount Hann, near the source of the Moran River, on rising ground in sandy soil, forming open forests with Eucalyptus latifolia and Eucalyptus spenceriana. Fruiting in June and July.

The type is No. 1444 of the Forests Department Herbarium.

This new species, which has no close affinities, is quite distinct in its being quite glabrous, and is intended to commemorate the name of Charles Edward Lane-Poole, the late Conservator of Forests in Western Australia. It was originally recorded from this spot by F. S. Brockman, the late Surveyor General, who reported its existence as a "fruit-bearing palm" while leading the Exploration Expedition of 1901.

Cycas media, R. Br. B. Fl. vi. 249.

Since the description given in the "Flora Australiensis" is rather unsatisfactory, I have added the following, taken from the typical Kimberley form:—

Erect, and palm-like. Trunk simple, 6-10 feet high, and 12 to 18 inches diameter, rough, but in some of the very old specimens light grey and smooth, having lost the persistent leaf-bases.

Leaves petiolate, the rhachis almost terete; leaflets numerous, entire, linear, rigid and straight, mucronate, the midrib conspicuous, somewhat keeled, hoary on both sides with a dense ferruginous pubescence, the upper leaflets decurrent to the next one below, the middle and lower ones only very slightly decurrent, and the lowest reduced to sharp straight spines which extend halfway down the petiole.

Male cones shortly pedunculate, narrow, ovoid-conical, the scales thick, and covered with a dense wool, the apices of the blades terete, acute, very brittle and incurved, the scales broad at the top, cuneate, the anther-cells covering the lower surfaces from the base to the bottom of the scale-point.

Carpophylls petiolate, with two or three pairs of ovules above the middle, the rhachis densely woolly, the blade ovate-lanceolate, with a pungent apex, and serrated crisped margins.

Seeds green, smooth, glabrous and glaucous, ovoid.

Trunk 6-10 feet high. Leaves 120 cms. long. Leaflets 10-13 cm. long and 1.3 cm. wide.

Male cones 46 cm. long, and 11.5 cm. diameter; scales 5 cm. long, 1.27 cm. wide, acumina 2.5 cm. long.

Carpophylls 38 cm. long, stalk 1.2 cm. diameter. Blade 2.5 cm. diameter, apex 5 cm. long. Seeds 3.9 cm. long, and 2.6 cm. diameter.

Common around Camden Sound, on rocky hills among quartzite rocks, forming a conspicuous feature of the woolly-butt forest.

Cycas basaltica, Gardner n. sp.

Palm-like, with a stout erect trunk of 4-8 feet, swollen at the base to a diameter of two feet, otherwise 18 inches diameter, rough and dark grey.

Leaves to 4 feet in length, hoary-tomentose when young, but becoming glabrous with age. Petioles to 8 inches in length, with concave bases. Leaflets numerous, rigid, linear, mucronate, hoary beneath, even when old, the margins somewhat recurved, the upper ones decurrent to the next one below, the lowest not at all or scarcely decurrent and distant, the spines

of the petiole not evident on the mature leaves, and but few on the younger leaves. Leaf-rhachis convex, or with a prominent ridge or angle above, narrower than the lower side, which is quite invisible from above.

Male-cones narrow-conical, the scales narrow-cuneate, with incurved points, anther-cells covering the scales beneath from the base to the incurved portion of the scale.

Carpophylls petiolate, densely ferruginous-tomentose; ovules usually four, globular, the blade of the carpophyll entire, lanceolate, with an acuminate apex ending in a rigid pungent glabrous point.

Seeds globular, very slightly depressed, hard and glabrous, glaucous when young.

Basalt hills near the Lawley river, in open forests of *Eucalyptus Foelscheana*, and *E. Spenceriana*, fruiting in August.

The type is 1490, of the Forests Department Herbarium.

This new species has a close affinity to *Cycas media*, R.Br., but the carpophylls are very different, having a narrow entire blade; the leaves are slightly different, those of *C. media* having a flat midrib broader below than above; glabrous leaflets in the adult, with flat margins not at all recurved.

The material of *Cycas basaltica* is not very complete, but is sufficient to exhibit the decided differences of carpophylls, and the completely globular smaller seeds, together with the smaller differences of the leaves. I have considered these collectively as sufficient to maintain this as a distinct species. It has affinity also with *C. Cairnsiana*, F.v.M., differing chiefly in the number of ovules.

CONIFERAE.

CUPRESSEÆ (ACTINOSTROBINÆ).

Callitris intratropica, Benth et Hook, B. Fl. vi. 237, sub. *Frenela robusta*.

A tree of 40 to 90 feet, known as Kimberley Cypress. The trunks are usually straight and tapering, branching from near the base when young, but in the older tree with the lowest branches at a height of 15-20 feet from the ground. Bark dark grey, rugose or longitudinally fissured, thick. Timber deep dull yellow, fairly hard and strongly scented, very resinous and termite-resistant The trees are usually symmetrical and of a pyramidal shape, with a straight trunk extending to the summit. The coastal trees are, however, usually more branched, with a stouter shorter trunk. The timber is never attacked by termites, but is easily destroyed by fire, and fallen trunks are subject to dry rot, though not at an early stage. Although not of commercial importance at the present time, owing to its isolated habitat and infrequent occurrence, it should come into prominence as a valuable timber when this country is settled.

Cones small, ovoid-globular, not verrucose, the three large valves ovate, and alternating with three much smaller ones of a lanceolate shape. The valves are smooth with a dorsal point near the summits of the larger valves.

Range:—Summits of the King Leopold Range, and the summits of all sandstone ranges as far north as Napier Broome and Vansittart Bays, where it descends to lower elevations. The larger forests or patches of this species occur between the Edkins Range and Mount Hann, the highlands to the immediate south of the Prince Regent River, Lizard Point near the Glenelg estuary, and to the south of Vansittart Bay. Its occurrence is restricted to the sandstone-quartzite formations, usually where laterite is present in the surface soil, and seldom forms pure forest, being almost always intermixed with the Woolly butt (*Eucalyptus miniata*) and Messmate (*Eucalyptus tetrodonta*).

TYPHACEÆ.

MONOCOTYLEDONEAE.

PANDANALES.

TYPHACEAE.

21. *Typha angustifolia,* Linn. B. F. vii. 159.

The tropical form has smaller spikes than the southern one. Scapes slightly exceeding the leaves in length, 4-5 feet high.

Springs, and fringing the banks of still pools. Calder river near Walcott Inlet, Port Warrender, Admiralty Gulf, and Lawley River.

PANDANACEÆ.

22. *Pandanus odoratissimus,* Linn. B. Fl. vii. 148.

Stems erect, simple or clustered, 20 to 35 feet high, usually trifurcate, or the lowest branches bifurcate.

Leaves 3 to 5 feet, armed along the margins and midrib with short pungent spines either directed forward or reversed.

Fruits scarlet, in ovoid heads 8 to 10 inches long, eaten by the natives.

Common throughout the Kimberleys northwards from the King Leopold Range, in sandy soil never far from fresh water, of which it is an indication. The species occurs in swampy soil and along the smaller creeks, but is never found fringing the larger rivers, where its place is taken by *P. aquaticus.*

23. *Pandanus aquaticus,* F. v. M. B. Fl. vii. 148.

Confined to the courses of rivers and very common to the north of the King Leopold Ranges, but extending as far south as the Fitzroy River. Stems erect, clustered, emitting adventitious roots from the lower parts, simple or branched, 6 to 18 feet high, slender and fairly smooth. Leaves similar to those of *P. odoratissimus,* but smaller. Drupes free, but clustered into globular heads of 4 to 6 inches diameter, not seen ripe.

GLUMIFLORAE.

GRAMINEÆ.

ANDROPOGONEÆ.

Andropogon affinis, R. Br. B. Fl. vii. 530.

Six to 12 feet high, caespitose. "Spear grass, Sugar grass, and Straw grass." This species emits roots from the lower nodes of its stems, which spread outwards at an angle of 45 degrees before penetrating the ground, these acting as supports to the long stem.

A common species of the sandstone and "Pindan" areas, covering large tracts, in sandy loam, frequently among sandstone rocks. Achenes black, with a long awn. The seeds are very troublesome to stock and man, and frequently cause the death of sheep by piercing the body.

May, Meda, Lennard, Glenelg, Prince Regent and King Edward Rivers, Camden Sound.

Andropogon procerus, R. Br. B. Fl. vii. 532.

"Lemon-scented grass." Caespitose, attaining a height of 4-6 feet. The natives use the fleshy rhizomes in a medicinal infusion.

Common on the basaltic areas, and also found among sandstone rocks on hills, in sandy loam. Fl. April-June.

Mount Marmion, Camden Sound, Mitchell, Carson, and King Edward Rivers.

Andropogon exaltatus, R. Br. B. Fl. vii. 532.

Three-four feet high and densely tufted.

In moist sandstone valleys near the Prince Regent River (O. T. Siddins); in sandy loam on hills, near Moran River (C. A. G.).

Andropogon sericeus, R. Br. B. Fl. vii. 529.

Specimens in an advanced condition were collected near the Moran River, height 4-5 feet.

May, Lennard, Isdell and Moran Rivers, in black loam near creeks and billabongs.

Rottboellia ophiuroides, Benth. B. Fl. vii. 514.

"Cane grass," 4-10 feet high, and reed-like.

In sandy swampy soil near creeks and rivers. Of little fodder value, being a coarse species.

Glenelg, Sale, Calder, Prince Regent, Mitchell, and King Edward Rivers. Fl. May-July.

Ischaemum laxum, R. Br. B. Fl. vii. 522.

A slender species, attaining a height of 3 feet.

In open savannah, May, Lennard and Isdell Rivers.

Themeda imberbis, Retz. B. Fl. vii. 542, sub. *Anthistiria ciliata*.

The "Bundle Bundle." In black basaltic soil or rich loam, 2-3 feet high, densely caespitose.

May, Lennard, Isdell, Charnley, and Upper Prince Regent Rivers, Mount Agnes.

The principal fodder grass of Kimberley.

Themeda avenacea, F. v. M. B. Fl. vii. 543.

"Oat or Kangaroo grass." A common species found widely dispersed over the basaltic areas, attaining a height of 5 feet and occurrring in dense patches.

Themeda membranacea, Lindl. B. Fl. vii. 543.

"Flinders grass." One of the best of the fodder grasses of the Kimberley district. Although common to the south of the Sale River, it is very scarce further north.

Densely caespitose, and 1-2½ feet high. The cattle eat the fallen seeds from the ground.

A specimen collected near Admiralty Gulf appears to be a form of this species, but the flowering glumes are empty.

Imperata arundinacea, Cyrillo. B. Fl. vii. 536.

This beautiful species has a shining silky spike and rigid leaves of 2 feet in length. It was observed on the banks of the Calder River near Walcott Inlet occurring in rich black loam. Fl. m. September.

PANICEÆ.

Xerochloa imberbis, R. Br. B. Fl. vii. 501.

A slender species common along the Lennard River.

Spinifex longifolius, R. Br. B. Fl. vii. 504.

Stems densely clustered, spreading or erect, 18 inches to 2 feet in height. The female inflorescences, which are almost globular, break away when nearly ripe and are blown away for a considerable distance by the wind.

Admiralty Gulf and Vansittart Bay, on sandy shores in white sand.

ORYZEÆ.

Oryza sativa, Linn. B. Fl. vii. 550.

"Wild Rice." This species, which attains a height of 6 feet, is common in the Northern parts of Kimberley along the banks of watercourses, and fringing still pools.

FESTUCEÆ.

Phragmites communis, Trinius. B. Fl. vii. 637.

"Bamboo, or Reed." Stems clustered, rigid, attaining 15 feet in height. Inflorescences large and silvery white.

Walcott Inlet, Prince Regent, Sale, Glenelg, Calder, Charnley, Moran, Mitchell, King Edward, and Drysdale Rivers, in black boggy soil around lagoons, or fringing the river banks.

Cattle eat the leaves of this species.

Ectrosia Schultzii, Benth. Fl. vii. 633.

Caespitose, 18 inches to 2 feet in height. Spikes purple.

Drysdale River, near Mount Hann, also Lawley and Carson Rivers. Fl. June-July.

Eragrostis chaetophylla, Steud, B. Fl. vii. 648.

Point Sampson, in arid sandy soil near the sea, and among rocks. Fl. m. March.

Triodia pungens, R. Br. B. Fl. vii. 606.

"Spinifex." Caespitose, 8-24 inches high, leaves rigid and spreading, pungent-pointed, not very glutinous.

Point Sampson, in arid sandy soil near the sea. Mount Marmion, Lennard, Barker and Charnley Rivers, Edkins Range and Mount Agnes.

Triodia Cunninghamii, Benth. B. Fl. vii. 606.

"Spinifex." Stems diffuse, glutinous.

Edkins, Whatley, and Macdonald Ranges, Prince Regent and Carson Rivers.

CHLORIDEÆ.

Cynodon tenellus, R. Br. B. Fl. vii. 609.

Stems ascending or creeping, 6-9 inches high.

Billabongs of the Lennard River, in swampy sandy soil, Karl Lagoon, Calder River, in sandy loam. Fl. Sept.-October.

Eleusine Aegyptiaca, Pers. B. Fl. vii. 615.

"Button grass." Caespitose, 4-10 inches high, and spreading to a diameter of 12 inches. A good fodder plant.

Mount Marmion, in sandy gravelly soil; Native well, near Derby. Fl. April-October.

CYPERACEÆ.

Cyperus, sp.

Point Sampson, in sandy depressions near Mangrove swamps. Fl. m. April.

Crosslandia setifolia, W. V. Fitzg. Journ. Roy. Soc., W.A., iii. 122.

A low annual. Near Meda Station, Lennard River (Vivian Edwards).

Fuirena umbellata. Rottb. B. Fl. vii. 337.

Caespitose. Stems erect, slender, 18-30 inches high.

Moran River, in rich black loam, on the river banks, in thickets of *Pandanus aquaticus*.

PRINCIPES.

PALMÆ.

Livistona Alfredi, F. v. M. Fragm.

"Cabbage Palm." Erect and slender, 20-40 feet high, the trunk about 5in. diameter, rough when young with the persistent bases of fallen leaves, ultimately smooth and leaden-grey in colour.

Leaves petiolate, petioles 2-3 feet long, slender but rigid, some of the younger ones unarmed, the mature ones armed at the base only, the lamina palmately lobed, recurved and much undulate, the segments narrow-linear, giving the plant a feathery appearance. The lateral leaf-segments radiate in every direction.

Spadices compound, much shorter than the leaves, rarely more than 20 inches in length. Flowers yellowish-white, only seen in the bud. Outer perianth-lobes acute.

Fruit elliptical in outline, about 1 inch long, brown when ripe, with a horny endosperm.

Synnott Creek near Charnley River, King Leopold Ranges, Macdonald Ranges near Prince Regent River, and sandstone ranges near the Lower King Edward River and Napier Broome Bay.

Among sandstone rocks in elevated situations. King Leopold Ranges and Sir Frederick Hills.

Livistona Mariae, F. v. M. Fragm. viii. 283.

John Forrest collected this species near the Fortescue River. I have received a photo and some fruits of *L. Mariae* from the Millstream Station, collected in 1922 by F. Lawson Whitlock. Fruits globular, about 1 inch diameter, pale brown outside, the endosperm detached from the pericarp.

Livistona Eastoni, Gardner n. sp.

Stem 30-70 feet high, and 6-7 inches diameter, with a slightly swollen base, and short fibrous roots. The persistent remains of the leaf-bases project upwards at an angle of 75 deg. on the younger plants, completely covering the trunk; the older specimens are without these, at least in their lower portions, and are quite smooth and leaden-grey.

Leaves palmate. Petioles over 2 feet in length, flat above, convex-trigonous underneath, and armed in the lower portion with stout prickles, which project from the flattened edges horizontally, the upper portion of the petiole, and frequently the whole petiole, unarmed. Leaves ovate-orbicular in circumscription, broader than long, undulate, and more or less folded longitudinally, divided to the middle or below the middle into numerous linear segments which are in turn again divided to half their length, with a thread-life fibre between the lobes, the ultimate segments with acutely acuminate apices.

Spadices compound, as long as the leaves, loose, the partial spadices very variable in length, their bases concealed in the rigid brown obtuse bracts, and the ultimate branches of the spadices recurved and profusely branched. The spathas are covered with a white waxy powder. Flowers very small, numerous, in sessile clusters along the branches of the spadices. Outer perianth small, scarious, 3-lobed, with acute ovate lobes. Inner perianth segments twice as long, ovate, obtuse.

Fruit ellipsoidal, the pericarp more or less wrinkled, hard and brown, the endosperm horny.

Plant 9-21 metres high. Leaves 20-30, in a dense drooping crown at the summit. Petioles to 70 cm. long, and 2 cm. wide. Lamina 90 cm. long, and over 1 metre wide, the primary segments 1.5 cm. wide, the secondary segments

7 mm. wide and 30 cm. long. Inflorescence up to 1.2 metres in length, the lower spathes over 30 cm. long, and 4 cm. wide. Outer perianth under 1 mm. long; inner perianth-segments 1.5 mm. long and .5 mm. wide. Fruit 2cm. long and 7 mm. wide.

Common to the South of Admiralty Gulf and the Mitchell River, on basalt plains, hills, or lateritic tablelands, forming on the latter dense woodland with *Eucalyptus tetrodonta* and *E. miniata,* from thence to the Lawley River and Southwards to the Couchman Range in lateritic soil, flowering m. June and July, fruiting in September.

This species is named out of compliment to William Robert Easton, who commanded the Kimberley Exploration Expedition in 1921, of which the author was a member.

Affinities *L. Mariae* and *L. Muelleri.* It is closest to L. Mariae, F. v. M., differing chiefly in the much smaller elliptical fruit, which shows an approach to *L. Muelleri,* F. v. M.

SPATHIFLORAE.

ARACEÆ.

Calocasia antiquorum, Schott. B. Fl. vii. 155.

The specimens are in leaf only, and therefore somewhat doubtful.

Leaves on long sheathing petioles, peltately attached, broadly sagittate, green and shining.

Flowers not seen.

Forming dense colonies in humid valleys, in swampy black soil, near Mount Leaming, lower King Edward River.

Not previously recorded from Western Australia.

FARINOSÆ.

Flagellaria indica, Linn. B. Fl. vii. 10.

Stems flexuose, climbing by means of leaf-tendrils to a height of 15 feet or more, the stems tough and wiry.

Flowers pale yellow or almost white, in dense terminal pyramidal panicles; perianth segments ovate-oblong.

Common on the sandstone ranges northwards from the Edkins Range to Napier Broome Bay, in stony valleys or on hills among quartzite or sandstone rocks, forming dense impenetrable masses or entanglements. Fl. m. August-September.

XYRIDACEÆ.

Xyris complanata, R. Br. B. Fl. vii. 77.

Caespitose. Leaves numerous, 4 to 6 inches high, narrow-linear. Scapes to 18 inches. Fl. yellow.

In wet sandy soil. Edkins Range to Lower King Edward River. Common on the Mount Hann plateau. Fl. m. June-August.

ERIOCAULACEÆ.

The species of this family are confined to streams and their surroundings. *Eriocaulon setaceum* is common in all still water, rooting in the mud with long slender stems bearing the inflorescences above water.

Eriocaulon sp. (near *E. quinquangulare,* L.).

Among basalt rocks in running water.

Lawley River and Lower King Edward River.

COMMELINACEÆ.

Commelina lanceolata, R. Br. B. Fl. vii. 84.

Stems flexuose, erect or ascending, 1 to 2 feet high. Flowers bright blue.

In muddy spots.

Isdell, Lennard, Calder, Sale and Glenelg rivers. Fl. April-July.

PHILYDRACEÆ.

Philydrum lanuginosum, Banks. B. Fl. vii. 73.

Caespitose 15 to 30 inches in height. Leaves distichous, thick, fleshy and glabrous, yellowish-green in colour.

Flowers yellow, hairy without. Ovary hairy.

A common plant along rivers and still pools in muddy soil. Fl. May-August. Prince Regent, Lawley, King Edward, Carson and Drysdale rivers.

LILIFLOREA.

LILIACEÆ.

Thysanotus chrysantherus, F. v. M. B. Fl. vii. 40.

Flowers purple, anthers large, yellow. Caespitose. Scapes erect, 10 to 14 inches high.

Edkins Range, Charnley, Calder, Sale, Glenelg, Prince Regent, King Edward and Drysdale rivers, Whatley and Macdonald Ranges, and in moist grassy places in the interior. F. May-August.

Asparagus racemosus, Willd. B. Fl. vii. 73.

Climbing over shrubs and trees to a height of 12 feet, the stems tough and wiry. Flowers and fruits not seen.

Port Warrender, Admiralty Gulf, Vansittart and Napier Broome Bays, in open forests of *Eucalyptus tetrodonta* and *E. miniata*.

Borya subulata, Gardner n. sp.

Stems short and tufted or shortly creeping, spreading to a diameter of 6-8 inches, but not exceeding four inches in height.

Leaves in dense tufts crowded and imbricate along the upper portions of the stems, narrow-linear, acutely-acuminate with black pungent points, the bases much dilated, brown, scarious and sheathing, and ciliate in the upper portions with short hairs; the lamina of the leaf doubly groved above and below.

Peduncles shorter than, or as long as, the leaves, not longer, erect, stout, rigid and striate with raised lines. Flower-heads globular or ovoid, from 8 to 16 of the outer bracts empty, linear-subulate, much longer than the head, and some of them more than twice as long; inner flowering bracts yellow, scarious, lanceolate with a long terminal black point; bracteoles similar to the bracts, but shorter and more obtuse. Perianth not seen.

Plant 7-9 cms. high. Leaves 4-5 cm. long, the dilated bases 1.2 cm. long and 5 mm. broad. Peduncles 3-4 cms. long; outer involucral bracts 1.5-2 cm. long. Flower-heads 1 cm. diameter. Inner bracts 5 mm. long with a terminal point 2 mm. long.

Habitat, Central Kimberley near Mount Agnes, in elevated situations, in crevices of sandstone rocks in scanty soil.

The new species has affinity to *B. septentrionalis*, differing in the broad sheathing leaf-bases, and in the much shorter, stouter striate peduncle, longer bracts and comparatively shorter bracteoles. It is known only from the single locality given.

HAEMODORACEÆ.

Haemodorum longifolium, W. V. Fitzg. Journ. Roy. Soc. W.A. iii. 127.

Rhizome hard and woody, vermilion-coloured in section. "Bloodroot."

Sandstone ranges near the Prince Regent River, Edkins, Macdonald and Synnot Ranges, in high situations in sandy soil among sandstone rocks. Fl. April-May.

Haemodorum flaviflorum, W. V. Fitzg. Journ. Roy. Soc. W.A. iii. 128.

Plant 18 to 30 inches high. Flowers light yellow, style longer than the perianth.

Added to the description:

Capsule half superior monodymous or didymous, and when didymous about 4 lines diameter

Edkins and Artesian Ranges in swampy sandy soil. Fl. m. September-October.

Haemodorum parviflorum, Benth. Fl. vi. 423.

Outer perianth-segments ovate-lanceolate, acute, the inner narrower, but all of equal length. Stamens shorter than the perianth-segments. Anthers light yellow, large; filaments scarlet, about one-fourth the length of the perianth-segments. Style slightly exceeding the stamens, but shorter than the perianth, slender, tapering, scarlet, with a minute stigma. Bracts and bracteoles lanceolate, acute. Fl. scarlet.

Edkins Range, near the Calder River, in sandy damp soil. Fl. m. September.

AMARYLLIDACEÆ.

Crinum asiaticum, Linn. B. Fl. vi. 454.

Leaves succulent, 2 to 3 feet high. Flowers white.

Lower King Edward River, in sandy loam or boggy soil.

MICROSPERMAE.

BURMANNIACEÆ.

Burmannia disticha, Linn. B.Fl. vi. 397.

Scapes erect, simple, or rarely with few erect branches from near the base, 8 to 12 inches high. Flowers purple, drying a brown colour. The specimens collected have a small broad perianth of 5-6 mm., and very small inner lobes. The anther cells are separated by a broad spurred connective, the dorsal appendages behind the cells longer and ovate, minutely fringed. The leaves are seldom over 1 cm. long, lanceolate and sheathing at the base.

In sandy, swampy places, Ashton Creek, head of the Charnley River, near Mount Agnes, flowering m. June.

The genus has not been previously recorded from Western Australia. The flowers are much smaller than those of typical *B. disticha*, and of about the same size as those of *B. juncea*, but the perianth-wings are longer than broad. It may prove to be a form or even variety of *B. disticha*, but I can find no essential differences in the structure to separate the specimens from *B. disticha*.

ORCHIDACEÆ.

Dendrobium dicuphum, F.v.M. B. Fl. vi. 277.

Only one colony seen, epiphytic upon *Eucalyptus Spenceriana*, and occurring in dense patches at intervals on the leaning trunk.

Scapes 18 inches high. Leaves distichous, small, tough and bright green, rigid and keeled, with red margins. Pseudo-bulbs fusiform, 3-6 inches long.

Flowers pure white, in loose racemes of few flowers, without scent.

In a shady valley, near F.B. 50, head of the Calder River, flowering in June and July.

The genus not previously recorded from Western Australia.

Dendrobium sp.

A purple-flowered Dendrobium was observed near the Prince Regent River, epiphytic upon *Eucalyptus Houseana*, flowering in June. The flowers were large and conspicuous.

Cymbidium canaliculatum, R.Br. B.Fl. vi. 202.

A common species, epiphytic upon many species of Eucalyptus, notably on *Eucalyptus Spenceriana* and *E. papuana*. Caespitose, forming dense clumps in the forks of branches, or the hollow dead remains of fallen limbs. Flowers greenish-yellow, yellow-brown within, spotted with red, and the labellum spotted with purple.

Flowers sweetly scented. Flowers October—November.

Pender Bay, near Broome (C. E. Lane-Poole), Barker River, King Leopold Range, and Northwards to Vansittart Bay and the Lawley River (C.A.G.).

Eulophia venosa, Reichb. f. B. Fl. vi. 300.

Apparently a rare species. Scapes simple, 2-3 feet high, leafless. Flowers greenish-yellow, with prominent purple striations, petals, and labellum with crisped margins.

Artesian and King Leopold Ranges, in black moist soil among tall grass. Fl. Sept.—Oct.

DICOTYLEDONEAE.

ARCHICHLAMYDEAE.

CASUARINACEÆ.

Casuarina equisetifolia, Forst, B. Fl. vi. 197.

The species has been reported from the vicinity of Cambridge Gulf, but does not occur in the North-West Kimberleys.

URTICALES.

ULMACEÆ.

Celtis philippinensis. Blanco. B.Fl. vi. 156.

Observed as a tree of 10 to 20 feet with erect, dense branches. Evergreen. Trunk to 8 feet. Bark dark grey and smooth. Timber yellow, close-grained, but not very hard. Fruits green, small and wrinkled, but not seen ripe.

Rocky elevations near Mount Agnes, also Edkins Range.

MORACEÆ.

Ficus nesophila, Miquel. B. Fl. vi. 167.

A much-branched, widely spreading tree of 25 to 35 feet, with a smooth light grey bark. Trunk to 15 feet and 20 inches diameter, timber white and soft. Leaves shining, glabrous, pale underneath.

Fruits white, globular.

Prince Regent River, in rock crevices in gorges, near running water, emitting adventitious roots, which travel over the rocks for a considerable distance. The species is infested with green ants.

Observed also in the valleys and gorges of the Edkins Range, and in the Charnley River gorge. Fl. April-June.

Ficus leucotricha, Miquel. B.Fl. vi. 167.

A small tree of 10 to 20 feet with a smooth, grey bark, a stout trunk of 10-12 feet and 9 inches diameter, giving off adventitious roots. Timber white, soft and very light.

Leaves clustered at the ends of the branches, glabrous, shining and coriaceous. Fruits yellow, densely tomentose, globular.

A common species on sandstone and quartzite hills, either in rock-crevices or in scanty soil among rocks.

Widely dispersed over the ranges of North and West Kimberley.

Ficus puberula, A. Cunn., B.Fl. vi. 169.

A small, erect, robust tree of 10 to 40 feet with a stout trunk of 6-18 feet, and 12-18 inches diameter, bark smooth and almost white. Timber pale, spongy. Fruits yellow glabrous or nearly so.

Nr. Mount Agnes is sandstone gorges and valleys, Edkins and Elizabeth-Catherine Ranges, summit of Mount Marmion. Fl. June-September.

Ficus coronulata, F. v. M. B. Fl. vi. 172.

"Rubber tree." A tree of 35-50 feet with lax pendulous branches and abundant latex. Trunk to 20 feet and 12-18 inches diameter. Bark yellowish-grey, almost smooth. Occurs on the banks of streams. Calder, Sale, Isdell, Barker and Lennard Rivers, in sandy loam.

Fiscus scabra, Forst. B.. Fl. vi. 174.

Native name "Kired." The fruit is edible and, when ripe, turns black. Pender Bay, nr. Broome (C. E. Lane-Poole.)

Fiscus orbicularis, A. Cunn. B. Fl. vi. 175.

A tree of 25-35 feet, densely branched, the branches drooping. Trunk to 15 feet and 9-12 inches diameter, the bark rough and dark grey in colour. Fruits small, scabrous, yellowish when ripe. Derby, Vansittart Bay and Prince Regent River. Fl. m. Oct. (1522, 1656.)

Ficus glomerata, Willd. B. Fl. vi. 177.

"Wild Fig." A spreading tree of 30 to 60 feet, trunk to 15 feet and 3 feet diameter. Bark grey, smooth or rugose.

Leaves lanceolate, 4-5 inches long, undulate, soft.

Fruits not seen quite ripe, green, globular, over ¾ inch diameter, in rigid pedunculate clusters along the trunk and branches, infested with green ants.

Basalt creeks near the Lawley River, in sandy loam on the banks, and in the beds of watercourses. Lennard, Barker, Isdell, Calder, Sale, Glenelg Prince Regent, Moran and King Edward Rivers.

PROTEALES.

PROTEACEÆ.

Persoonia falcata, R. Br. B. Fl. v. 385.

An erect shrub or small tree known as "Emu Bush," 10 to 20 feet in height, the branches spreading or drooping. Trunk to 12 feet high and 6-7 inches diameter, the bark of a deep purple-grey colour, flaky, thick and fissured.

Leaves lanceolate to linear-lanceolate, falcate, obtuse, thick, sessile, narrowed towards the base, and of a pale green, drying black, obscurely veined.

Flowers lemon-yellow, in axillary or lateral racemes, the whole inflorescence glabrous. Anthers white, torus oblique.

Fruits green, compressed, ovoid-globular.

Hab. in Kimberley district, in sandy soil overlying sandstone rocks, in open forests of *Eucalyptus miniata* and *E. tetrodonta*, flowering m. June-August.

Roebuck Plains near Broome (C. E. Lane-Poole); Artesian and Edkins Ranges, Calder, Charnley, Prince Regent, King Edward and Carson Rivers, Vansittart and Napier Broome Bays, fl. m. August-September (C.A.G.).

The timber is of a light colour with a reddish centre, and the bark very astringent. The presence of the species is said to be an indication of fresh water.

Grevillea chrysodendron, R. Br. B. Fl. v. 434.

A beautiful tree of 30-45 feet in height, with graceful spreading branches, known as "Silky Oak" or "Honey Tree." Trunk to 15 feet high and 20 inches diameter, the bark almost black, fibrous and moderately rough; timber pale red, beautifully grained. Flowers handsome, in dense terminal racemes, red, the prominent styles long and orange-yellow, the stigmatic disk a pale yellow. Fruits almost reniform, ¾in. long, pubescent, the style persistent. Seeds flat, but the transparent seed wing deeply concave.

This beautiful species is commonly distributed over the swampy parts of the sandstone areas to the north of the Edkins Range. Flowers May-July, fruiting in August. The flowers secrete large quantities of nectar, which falls from the trees during the early hours of the morning. The dried foliage is eaten by stock.

Grevillea Wickhami, Meissn. B. Fl. v. 455.

A shrub of 3 to 9 feet, with widely spreading wiry branches. Bark reddish, fibrous in the lower parts. Leaves glaucous.

Flowers in short sparse racemes, secund, rarely more than 2½in. long, deep crimson.

Moran River, Mount Agnes, Edkins and Artesian Ranges, in scanty sandy soil among quartzite rocks. Fl. June-July.

Grevillea agrifolia, A. Cunn. B. Fl. v. 455.

A small spreading tree or densely branched shrub of 15-25 feet, branching from near the base, the branches slender and spreading. Leaves silvery-glaucous. Racemes dense, secund, mostly axillary. Pedicels 3 lines long. Perianth green without, white and silky hairy within, the anthers purple-brown, and the limb of the perianth is also slightly brown. Style sparingly pubescent, green, stigma yellow.

Bell Creek, King Leopold Range, and Northwards to Napier Broome Bay, in sandstone valleys, and on hills. Fl. April-June; fruiting July and August (C.A.G.). Wyndham, June, 1922 (D. McVicar).

Grevillea latifolia, Gardner n. sp.

A slender erect shrub of 4 to 8 feet, loosely branched with smooth slightly flattened branches, the bark smooth and light reddish-brown in colour.

Leaves simple, alternate, orbicular or obovate, obtuse, the midrib projecting in a minute point, invested when young with a closely appressed silky pubescence which soon wears off, leaving the whole plant glabrous, the leaves coriaceous, shining and light yellow-green in colour, the midrib very prominent, the oblique lateral veins parallel and confluent in an intramarginal vein quite distinct, the secondary veins anastomosing.

Flowers in short loose secund racemes, branched and forming small axillary or terminal panicles, the primary and secondary rhachises shortly and softly pubescent. Pedicels glabrous, slightly thickened into the torus. Perianth glabrous without, cinnabar-red, contrasting with the green pedicels, lilac limb and yellow style, the tube broad, slightly bearded inside at the throat, the segments attenuate upwards, the limb broadly cordate, angular in the bud and reflexed. Torus oblique, the gland semi-cupular, entire, truncate. Ovary stipitate, glabrous, style shortly exceeding the perianth-lobes, thick, the stigmatic disc obliquely lateral, shortly conical in the centre, where it is sparingly bearded.

Shrub 1½ to 2½ m. high. Leaves 10 to 13 cm. long, 10 to 14 cm. wide, petioles ½ cm. long. Racemes about 2-3 cm. long. Pedicels 5 mm. long. Perianth 1.5 cm. long. Style 1.8 cm. long. Fruit 2 cm. long, 7 mm. wide.

Habitat: Plateau between Lawley and King Edward Rivers, among sandstone and laterite, in sandy gravelly soil in open forests of *Callitris intratropica* and *Eucalyptus tetrodonta*. Also near Vansittart Bay in shady valleys with *Eucalyptus miniata*. Fl. m. July and August.

The new species has affinity to *Grevillea angulata,* and belongs to the section *Calothyrsus,* the leaves are somewhat similar to those of *Grevillea gibbosa* but the flowers are quite different. The type is No. 1498 of the Forests Department Herbarium.

Grevillea heliosperma, R. Br. B. Fl. v. 457.

An erect shrub or small tree attaining a height of 20 feet, trunk 6 to 10 feet and 4-6 ins. diameter, the bark black, fibrous and fairly rough. Timber reddish, with a yellow sapwood.

Flowers dep pink, the gland yellowish-green, the upper portion of the style also green. Pedicels red, slender.

Synnott Range, King Leopold Range and Northwards to the lower King Edward River, in sandy soil among sandstone rocks usually on hills. Fl. m. April to June.

Grevillea refracta, R. B. B. Fl. v. 458.

An erect shrub or small tree of 10 to 20 feet, sparingly branched. Leaves glaucous, the segments oblong-cuneate. Perianth dull red at the base, becoming light yellow in the segments, which are orange-coloured inside. Style white with a pink stigma. Fruit glabrous, depressed ovate-globular, 3 cm. long.

Camden Sound, Prince Regent, Moran, Mitchell, King Edward and Drysdale Rivers, in sandy quartzite soil on hills or rising ground. Fl. May to July.

Grevillea refracta, R. Br. var. *veluntina,* Meissn.

A robust shrub of 5 to 15 feet, densely branched, and flowering when very young. Trunk to 5ins. diameter, bark corky and dark grey in colour.

Leaf-segments 3 to 11, very variable in shape and size, but all silky tomentose on both sides, and prominently reticulate. Flowers large in secund racemes, which are united to form a short dense terminal panicle. Gland very prominent, semi-cupular. Style long, thick and white.

Fruits oblique, compressed-globular, green, glabrous, and woody.

The flowers secrete an abundance of nectar which is much sought after by birds.

Glenelg, Prince Regent, Moran, Mitchell, Carson and Drysdale Rivers, in sandy soil. Fl. May-July.

Grevillea heteroneura, W. V. Fitzg. Journ. Roy. Soc., W.A., iii. 132.

A small tree of 25 to 30 feet, with few short branches and a stout erect trunk of 12 feet and 8 inches diameter; bark dark grey or almost black, rough and longitudinally fissured; timber fairly hard, yellowish-white in colour, the medullary rays very prominent.

Flowers yellowish-white in rather dense racemes. Fruit smooth, glaucous, about 2 cm. long. Seed orbicular with a broad annular membranous wing.

Summit of Table Top Mountain (W. V. F.), Drysdale River, near Mount Hann and hills to the south, in open forests of *Eucalyptus alba* and *Eucalyptus Spenceriana.* Fl. June-July. Fruiting Sept-Oct.

Grevillea viscidula, Gardner, n. sp:

A small tree of 10 to 25 feet, pyramidal, with a stout erect tapering trunk of 6 inches diameter, and numerous short horizontal branches. Timber soft and pale.

Leaves pinnate, segments 10 to 15, narrow-linear, or almost terete, subacute with dark-coloured points, the uppermost pairs simple, but the lowest four pinnately divided into 2-6 linear filiform segments, all the segments silvery-glaucous and sparsely scattered with short brittle hairs.

Flowers small and numerous in short dense rigid spreading racemes arranged in large terminal panicles exceeding the leaves, with a long black peduncle and stout secondary rhachises, glabrous. Perianth white, drying yellow, the tube slender and much revolute under the globular limb, torus very oblique, gland semi-annular, not very conspicuous. Ovary glabrous, black, on a long slender stipes; style terete, slender, with a broad terminal stigmatic cone of a brown colour.

Fruit obliquely ovate, much compressed and very viscid; seed-wing annular and broad.

Tree 3-8 metres high. Leaves 25-28 cm. long, the uppermost rather shorter. Segments 15-20 cm. long, the ultimate segments of the lowest pinnae 8-10 cm. long.

Racemes 5-8 cm. long, the panicles about 30 cm. long; pedicels 1 mm. long; perianth 5 mm. long; ovary-stipes 2.5 mm. long, style 3 mm. long. Fruits 1.6 cm. long.

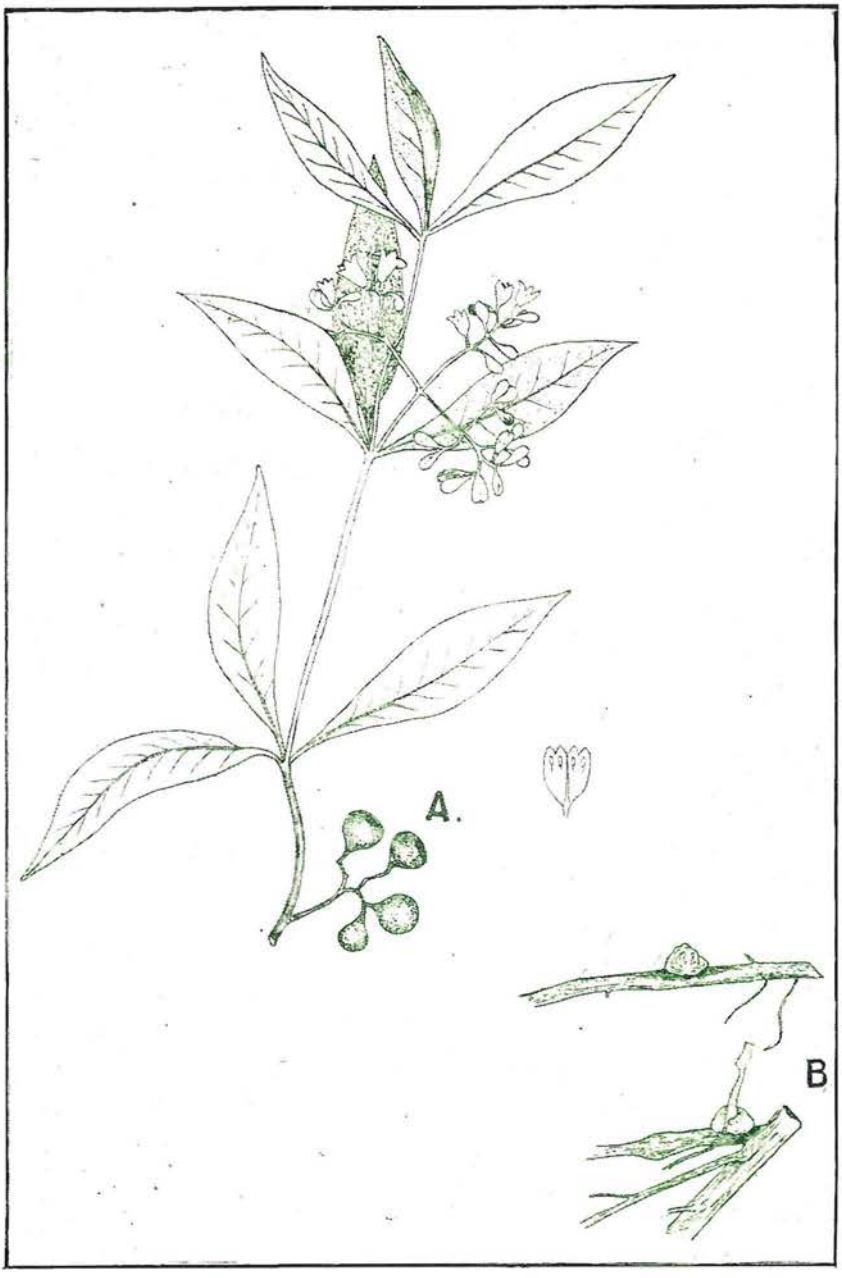
Carson River, near Hunter River and Napier Broome Bay, on basaltic hills with *Eucalyptus Spenceriana.* Fl. August-September (1558).

The glutinous material surrounding the fruits is used by the natives, who apply it to their tribal marks to prevent healing.

The new species has a close affinity to *Grevillea erythroclada,* W. V. Fitzg., but the leaves are very different. The pedicels are shorter, more angular, and the fruit more compressed.

Grevillea mimosoides, R. Br. B. Fl. v. 462.

A shrub or small tree of 10 to 15 feet, erect and slender, but widely branched at the summit, the branches spreading. Bark dark grey, rough and fibrous. Leaves falcate, glaucous, obtuse. Flowers sweetly scented in large terminal panicles, greenish-white.



SANTALUM lanceolatum, R. Br. "Sandalwood."

A. Twig with flowers and fruits. B. Haustoria attached to the roots of *Acacia tanumbirinense*, Maiden.

Basalt hills near Napier Broome Bay, Lower King Edward River, Carson and Drysdale Rivers and Walcott Inlet on basaltic plains and foothills in open forests of *Eucalyptus Spenceriana*. Fl. August-Sept. Fruits not seen.

Hakea Cunninghamii, R. Br. B. Fl. v. 495.

A specimen collected near the Mitchell River is without fruits, and has been referred to this species.

A tree of 15 to 20 feet, erect and slender, with few short horizontal branches. Trunk to 6 inches diameter, the bark soft, rather corky, dark grey and longitudinally fissured. Timber pink, soft and spongy. Flowers yellowish white.

SANTALALES.

SANTALACEÆ.

Santalum lanceolatum, R. Br. B. Fl. vi. 214.

Usually a slender tree of 15 to 20 feet with a bole of 6 to 8 feet and a diameter of 6 to 9 inches. Branches spreading and drooping, the bark rough and persistent, brown and more or less flaky-fibrous. Timber yellowish-brown, deeper in colour than the South-West Sandalwood. Leaves very glaucous. Flowers rather large, yellowish-white, sweetly scented. Fruit globular, small, purple when ripe, about 1cm. diameter.

Mount Marmion, Synnott and Edkins Ranges, Glenelg and Prince Regent Rivers, Camden Sound, Mt. Agnes, Calder, Moran, Mitchell, King Edward and Carson Rivers, usually on sandstone ranges among quartzite or sandstone rocks in scanty soil. Fl. April-September, fruiting in October.

The species is parasitic upon several plants, observed upon *Acacia Tanumbirinense, Ficus leucotricha, Bauhinia Cunninghamii*, and other species.

Like the southern Sandalwood, it shows a preference for Acacias. Haustoria hemispherical or almost subglobose, 7mm. diameter, soft and fleshy, collected on the roots of *Acacia Tanumbirinense*.

Exocarpus latifolia, R. Br. B. Fl. vi. 228.

A spreading shrub to a tree of 20ft. with a slender trunk and widely spreading branches, bark yellowish-grey, moderately rough. Flowers greenish-yellow. Fruits green, becoming more or less brick-red when ripe. Endosperm oily.

The species is of parasitic habit, and has numerous large haustoria. It is parasitic upon *Petalostigma, Canthium, Terminalia circumalata*, and *Callitris intratropica*, and also to a great extent upon itself.

Haustoria slug-shaped, about 2cm. long and 1.5cm. wide, thick and fleshy, numerous.

Near Mount Agnes, Vansittart and Napier Broome Bays (C.A.G.).

OPILIACEÆ.

Opilia amentacea, Boxb. B. Fl. i. 394.

A straggling shrub half-climbing to a height of 20 feet, or an erect bushy shrub of 6 to 8 feet with slender branches. Leaves thick, yellowish-green. Flowers yellow. Drupe about 4 lines long on a thickened pedicel.

Probably parasitic in habit. *Callitris* and *Eucalyptus* forests between Vansittart and Napier Broome Bays, in sandy soil, Admiralty Gulf, King Edward and Mitchell Rivers; in sandy soil among sandstone rocks. Fl. m. August.

LORANTHACEÆ.

Loranthus longiflorus, Desr. B. Fl. iii. 390.

W. V. Fitzgerald records this species from the East Kimberleys. I have not seen it in the West Kimberley.

Loranthus Exocarpi, Behr. var *spathulata,* Blakely.

Parasitic upon *Santalum lanceolatum.* Flowers scarlet. Leaves often conspicuously triplinerved, but here and there penniveined. Petals united to 2/3 their length. Fruits globular, viscid. Near Mount Agnes, Fl. m. June.

An uncommon species.

Loranthus Kimberleyensis, Gardner, n. sp.

Parasitic upon *Acacia tumida.*

Branches erect and spreading, conspicuously marked with the scars of the older fallen leaves, quite glabrous.

Leaves oblong-elliptical, glabrous and glaucous, flat, narrowed at the base but not petiolate, more or less triplinerved, the midrib alone conspicuous, the specimens seen infested with scale-insects.

Flowers axillary, either solitary or two together, orange-red in colour, quite glabrous. Pedicles sessile, slender and short. Bracts appressed, widely triangular, embracing the base of the calyx. Calyx-limb truncate, or obscurely toothed, buds clavate and angular at the apex. Corolla united almost to the summit, lobes 5, narrow. Anthers adnate, oblong-linear; style slender, with a capitate stigma. Fruit not seen mature, ovoid-globose, crowned by the persistent summit of the calyx.

Upper Moran River, flowering in June.

Leaves 3-4 cm. long and 1-1.3 cm. wide. Pedicels 2 mm. long. Corolla about 2.5 cm. long, the segments 8 mm. long. Fruit (immature) 5 mm. long.

Affinity to *L. acacioides,* A. Cunn.

Loranthus amplexans, van Tiegh.

A form from near Napier Broome Bay, has sessile cordate auriculate, leaves 5-6 c.m. long and nearly as broad. Flowers scarlet with green segments.

Parasitic upon *Banksia dentata,* with broad cordate leaves. Fl. m. August. Parasitic upon *Denhamia obscura,* Mitchell River. Fl. m. July.

Loranthus signatus, F. v. M.

Parasitical upon *Denhamia obscura.* Flowers red, the tips of the segments green together with the anthers.

Mitchell River. Fl. m. July.

Loranthus Miqueli, Lehm. Pl. Preiss. i. 280.

Branches slender and pedulous, 10 to 30 inches in length, quite glabrous. Flowers scarlet, the segments widely spreading. Style deep red.

Lawley River and King Edward River, parasitic upon *Eucalyptus tetrodonta* and *E. miniata.* Fl. m. July-August. (1495, C.A.G.)

Loranthus maritima, Gardner n. sp.

Branches spreading. Leaves opposite, broadly obovate or almost orbicular, thick and fleshy, quite glabrous with the rest of the plant, narrowed at the base or petiolate, obscurely 3 or 5-nerved. Flowers in terminal or axillary cymes, the branches angular, once or twice-forked. Bracts orbicular,

small, concave. Calyx tube turbinate, with a spreading limb finely and obscurely toothed. Petals red at the base and green at the tips, erect, not spreading, the buds clavate, obtuse, not angular. Anthers adnate, oblong-linear. Style filiform, more or less 4-furrowed or angular, with a small stigma.

Fruit not seen.

Pender Bay, near Broome, parasitic upon the three common Mangroves. Fl. m. October. The native name is given as "Nyelinyal." (C. E. Lane-Poole.)

Loranthus acacioides, A. Cunn. B. Fl. iii. 392.

Parasitic upon several species of Acacia, also *Cochlospermum heteronemum* and *Adansonia Gregorii.* Leaves glaucous, flowers scarlet, fruits ovoid-globular. Derby to Napier Broome Bay, a common species.

Loranthus ferruginiflorus, W. V. Fitzg. Journ. Roy. Soc. W.A. 136.

Parasitic upon *Eucalyptus Foelscheana* and *E. pyrophora.* Fl. m. July. Port Warrender, Admiralty Gulf (1654). The flowers in my specimens are solitary at the ends of the branches of the inflorescence.

Loranthus Benthami, Blakely.

Roebuck Plains, near Broome. Fl. m. October-November. (C. E. Lane-Poole.)

Viscum articulatum, Burm. B. Fl. iii. 396.

Parasitic upon small trees, the branches greenish-yellow. Fl. not seen. Edkins Range, Kimberley. (O. T. Siddins.)

POLYGONALES.

POLYGONACEÆ.

Polygonum barbatum, Linn. B. Fl. v. 270.

Stems 2 to 3 feet high, erect, herbaceous. Flowers white, in slender panicles, the spikes 1-2 inches long. Stipules scarious.

Prince Regent and Moran rivers, in rich black mud at the water's edge, in thickets of *Pandanus aquaticus* and *Melaleuca leucadendron.* Fl. May-July. (1362.)

CENTROSPERMAE.

AMARANTACEÆ.

Trichinium axillare, F. v. M. B. Fl. v. 232.

Stems prostrate, spreading to a diameter of several feet. Flowers pink. Point Sampson, N.W. coast.

Trichinium exaltatum, Benth. B. Fl. v. 227.

Stems 2 to 3 feet high, rigid, erect Fl. purple-pink. Saline soil at the high-water level, Camden Sound. Basaltic plains, Carson River. Fl. June to September. (1339.)

Gomphrena canescens, R. Br. B. Fl. v. 253.

Stems erect, much branched, pink and woolly-hairy at the nodes. Spikes white or pink. This species, which is apparently an annual, is a favourite fodder plant with horses, and is much sought after by them when in flower.

King Leopold Range, northwards to Napier Broome Bay, a common species of the moister soil of the sandstone areas. Fl. May-August.

G. brachystylis, F. v. M. B Fl. v. 255.

A small form was collected near Mount Marmion with small white and pink spikes. Fl. m. January. (V. Edwards.)

G. leptoclada, Benth. B. Fl. v. 255.

Stems slender, erect, loosely branched, 8 to 20 ins. high, covered with a more or less cottony wool. Leaves with broad sessile bases, glabrous above, silky-white underneath. Spikes small, pink, the involucral bracts green, with white scarious margins. Anthers prominent.

Prince Regent River and Glenelg River, in sandy soil among sandstone rocks and *Gramineae.* Fl. May-July.

CARYOPHYLLACEÆ.

Polycarpaea longiflora, F. v. M. B. Fl. i. 164.

Stems numerous, erect, 1-2 feet high. Flowers dull purple-crimson, in large corymbs.

Derby (N. G. Wright), Edkins Range to Camden Sound and Prince Regent River, in sandy soil in open forests of *Eucalyptus miniata,* among sandstone rocks. Fl. April-May.

RANALES.

NYMPHACEÆ.

Nymphaea stellata, Willd. B. Fl. i. 61, sub. *N. gigantea,* Hook.

Stems 3 to 6 feet long, submerged for the greater part of their length. Leaves with entire or toothed margins, pale green above, prominently reticulate and purple underneath.

Flowers very variable in size, attaining a diameter of eight inches, purple-blue to pale pink, sweetly scented. Anthers light yellow. Fruiting carpels submerged, seeds pink.

Lennard and Charnley Rivers northwards to the King Edward and Drysdale Rivers, in billabongs or fringing the still pools of the larger rivers. Flowers throughout the year.

The rhizomes are collected and eaten by the natives after being roasted, but are unpalatable.

MENISPERMACEÆ.

Tinospora smilacina, Benth. B. Fl. i. 55.

A glabrous twiner with fleshy stems, twining over trees to a height of from 15 to 25 feet. Leaves almost fleshy, dark green. Flowers yellowish-green; fruits red.

Lennard River below Devil's Pass, common between the King Leopold Ranges and Derby. Fl. August-September.

RHOEADALES.

CAPPARIDACEÆ.

Cleome viscosa, Linn. B. Fl. i. 90.

Stems erect, succulent, 12 to 18 ins. high. Flowers light yellow.

Point Sampson, in sandy soil on stony hills near the sea.

Capparis mummularia, D.C. B. Fl. i. 94.

A climbing shrub of 4 to 8 feet. Leaves flat and coriaceous. Flowers white, opening at night, fading to a pale purple with the light. The species is infested with ants.

"Moon Flower." Roebourne (F. L. Whitlock).

Capparis lasiantha, R. Br. B. Fl. i. 94.

Climbing to a height of several feet by means of thorns. Branches and leaves rusty. Flowers pale yellow, the sepals yellowish-green. Ovary-stipes slightly curved, exceeding the stamens. Young fruit ovoid, slightly tomentose.

Lennard River and Derby, climbing over rocks and trees. Fl. m. October.

SARRACENIALES.

DROSERACEÆ.

Drosera indica, Linn. B. Fl. ii. 456.

Flowers orange-red. Stems half scandent or ascending, 6 inches to 1 foot high.

Common in the swampy spots of the sandstone ranges, usually around the marshy sources of creeks and rivers, among grass, associated with *Hemiarrhena plantaginea.*

Drosera petiolaris, R. Br. B. Fl. ii. 460.

Stock thick. Leaves rosulate, in dense clusters, silky-hairy underneath, including the broad petiole.

Scapes not above 5 inches high, usually much less, densely silky-villous as well as the calyx. Flowers white or orange-pink. Ovary 3 or 4-lobed, the branching styles dichotomous.

King Edward River to Vansittart Bay, in moist sandy soil. Fl. July-August.

Byblis liniflora, Salisb. B. Fl. ii. 470.

Stems ascending, or erect and flexuose, 8 to 12 ins. high, thick in the lower part, glandular-hairy. Leaves linear, slender, acuminate, slightly broadened at the base, glandular-hairy. Peduncles long and slender, bearing a single purple flower of about 1in. diameter. Sepals slightly hairy, the tips more or less recurved. Petals glabrous, obovate, ½in. long, serrated or toothed at the obtuse apex, striate in the lower part with deep purple lines. Filaments short and thick. Style purple, slightly exceeding the anthers, glabrous with a capitate bearded stigma, the base projected from the summit of the ovary.

Charnley, Calder, Glenelg, Prince Regent, Moran, and King Edward Rivers, in sandy swampy places, or in stagnant shallow pools. Fl. June-September.

ROSALES.

LEGUMINOSÆ.

MIMOSOIDEÆ.

Acacia Luehmanni, F. v. M. Fragm. Fragm. xi. 116.

An erect shrub of 4 to 7 feet, densely branched with widely spreading branches, the bark smooth and brown. Phyllodia oblique, ovate-triangular with a short straight or recurved terminal point. Stipules setaceous. Peduncles solitary, axillary, about 1 inch long, flower-heads globular. Pod

flat, oblong-falcate, obtuse, 2-2½ins. long with thickened sutures, sparsely glandular-hairy. Seeds ovate, black and smooth, the funicle white.

A common shrub between the Lawley River and Napier Broome Bay, in sandy soil in forests of *Eucalyptus tetrodonta*, forming thickets. Fl. July-August.

Acacia translucens, Benth. Fl. ii. 379.

Stems erect, clustered from a woody stock, 2 to 3 feet high. Phyllodia glaucous, broadly ovate, oblique, undulate with the terminal recurved gland prominent. Peduncles solitary, rigid but slender. Flowers deep yellow.

A smaller form from Vansittart Bay has much narrower oblong phyllodia.

Prince Regent River and Vansittart Bay, in sandy soil among rocks. Fl. June to September.

Acacia impressa, Benth. Fl. ii. 380.

A shrub of 6 to 15 feet with a rough brown fibrous bark and spreading intricate branches. Petals obovate, striate. Pod 5-7cm. long, with thickened sutures, with upwards of 15 seeds, flattened between the seeds and glutinous. Seeds black.

A common shrub of the "Pindan" near Derby, extending eastwards to the Napier Range. Fl. March-April. Fruiting in October.

Acacia coriacea, D. C. Benth. Fl. ii. 385.

A shrub of 6 to 12 feet with a smooth grey-green bark and numerous spreading branches. Phyllodia glaucous, the nerves prominent. Seeds black and shining, ovoid-globose, the funicle thickened into a yellow fleshy arillus turing red when the seed is quite ripe, and enveloping its lower portion.

Sandhills near the coast, Point Sampson. Fruiting in October.

Acacia hemignosta, F. v. M. B. Fl. ii. 385.

A glabrous shrub or small tree of 8 to 16 feet, with an erect trunk and spreading drooping branches; bark dark brown, rather fibrous. Phyllodia glaucous. Pedicels 2 lines long, reddish. Sepals linear, petals spathulate.

Laterite hills near the Mitchell River, in open forests of *Eucalyptus tetrodonta*. Fl. m. June-July.

Acacia sericata, A. Cunn. B. Fl. ii. 391.

An erect slender shrub of 8 to 15 feet, with a smooth bark, glaucous on the young branches.

Phyllodia glaucous, over 18 inches long when young, but 4 to 6 inches long in the adult tree, the margins nerve-like with 3 or 4 glands situated in the notches of the upper margin, the principal nerves confluent with the lower margin.

Flowers in large racemes in the upper axils, or lateral owing to leaf-suppression. Pod glaucous, but not seen ripe, oblong and prominently reticulate.

Source of Calder River, in open forests of *Eucalyptus miniata*, thence northwards to the King Edward River. Near Wyndham (D. McVicar). Fl. m. June.

The species forms thicket-like patches.

Acacia Kelleri, F. v. M. Proc. Linn. Soc. N.S.W., xvi. 468.

A much-branched shrub of 10 to over 20 feet in height with erect slender branches.

Bark grey and fibrous, rough. Phyllodia crowded at the ends of the branches. Flowers deep yellow, in dense spikes.

Pod 3 inches long, linear, densely villous.

Upper Moran River, in sandy soil among quartzite rocks, Wade Creek, Vansittart Bay, and rocky valleys south of Napier Broome Bay. Fl. June-July. Fruiting in September-October.

Acacia lysiphloea, F. v. M. B. Fl. ii. 393.

A rigid shrub of several feet with a smooth bark. Spikes on peduncles of half an inch, not dense. Sepals narrow, free or almost so. Petals white, united to the middle, with prominent midribs.

Near Wyndham. Fl. m. June. (D. McVicar.)

Acacia linarioides, Benth. Fl. ii. 393.

A slender shrub of 10 to 14 feet with erect branches, and a smooth greyish-brown bark. Phyllodia narrow-linear 4 to 5ins. long, decurrent on the branches. Spikes much shorter than the phyllodia. Petals obtuse.

Pod glutinous, at least when young.

Mount Agnes, in sandy soil among sandstone rocks. Fl. m. June.

Acacia stigmatophylla, A. Cunn. B. Fl. ii. 394.

A slender shrub, branching from the base with erect branches and numerous side-branches, 3-5 feet high. Phyllodia obovate-oblong, prominently nerved, with nerve-like margins, the nerves usually seven with the middle one more prominent, and a conspicuous broad apical gland.

Calyx small and broad, petals over twice as long with prominent midribs. Pod rigid, the seeds oblong, transversely oblique.

Summits of hills near the Prince Regent River, in sandy soil among sandstone rocks. Fl. m. June. (O. T. Siddins.)

Acacia tanumbirinense, Maiden. Flora of Northern Territory 338.

An erect slender tree of 25 to 30 feet, not much branched, the branches drooping; bark brown and fibrous-flaky. Trunk 6 to 8 ins. diameter. Phyllodia attaining a length of 18cm., the gland resembling a small black puncture.

Bell Creek, King Leopold Range, Moran, Mitchell, and King Edward Rivers, and creeks near Napier Broome Bay. Fl. m. May-July.

The species occurs in sandy black soil near running water, and is one of the chief host-plants of *Santalum lanceolatum.*

Acacia sp. affin. *A. plectocarpa.*

The species is a shrub of 4 to 10 feet with numerous erect wiry branches, and the young shoots very glutinous; bark fibrous-flaky.

The material being without fruits is not sufficient for description. It has affinity to *A. plectocarpa* with the following differences:—Phyllodia glutinous when young, 2½-4 ins. long, laanceolate-falcate, with a marginal gland near the base of the outer margin. The small calyx is united to the middle. Pod narrow-linear.

Hills near the Prince Regent River, in scanty sandy soil in crevices of sandstone rocks. Fl. May-June.

Acacia tumida, F. v. M. B. Fl. ii. 409.

In the specimens examined I fail to find any internal division to the pod.

A shrub of 6 to 15 feet with widely spreading branches, the bark smooth and glaucous in the young shrubs, becoming dark grey, rough and fibrous in the larger ones.

Camden Sound, Prince Regent, Mitchell, King Edward, and Drysdale Rivers, in open forests of *Eucalyptus tetrodonta* and *E. miniata.*

The "Pindan Wattle" is referable to this species. It is more glaucous than the typical form and the young branches are powdery-white. The phyllodes are very glaucous when fresh. Derby, Lennard and Barker Rivers (in fruit), forming thicket-like patches.

Acacia latifolia, Benth. Fl. ii. 411.

An erect slender shrub of 6 to 10 feet, not much branched, bark smooth.

Phyllodia decurrent on the angular branches, the gland at the base of the inner margin.

Spikes narrow and loose, on peduncles of 3.5cm. Calyx scarious.

Near Mount Agnes, in stony basalt creeks. Fl. m. June.

Acacia holsericea, A. Cunn. B. Fl. ii. 411.

A bushy shrub of 8 to 15 feet, branching from the base, the branches rigid and glaucous.

Gland at the base of the inner margin of the phyllode. Spikes on peduncles of 5mm.

Basalt creeks near the Lawley River in gravelly soil at the water's edge. Fl. m. July-August. (C.A.G.)

80 miles east of Wyndham near Grant's Creek (D. McVicar).

Wattle to a height of 15 feet. Common around Broome and the whole coastal country and known under the name of "Pindan" where it occurs in dense thickets (C. E. Lane-Poole).

Acacia Farnesiana, Willd. B. Fl. ii. 419.

A shrub with erect stems of 2 to 6 feet, armed with long straight stipular spines. Specimens in leaf only.

Common along the Lennard River on black soil plains with *Bauhinia Cunninghamii* and "Coolibah."

Acacia Farnesiana, Willd. var. *lenticularis* (F. v. M.), Bailey.

A shrub or small tree of 6 to 20 feet with slender trunk and a smooth bark.

Lennard River on black soil plains in black loam. Fruiting m. October.

Acacia suberosa, A. Cunn. B. Fl. ii 419.

"Mimosa." An erect pyramidal tree of 20 to 35 feet in height with numerous rigid short horizontal branches shortly tapering. Bark thick and corky, rough and longitudinally fissured. Stipules thorny, short and rigid.

Common on the plains of the Lennard and May Rivers, and to the north of the King Leopold Range where it is restricted to the basaltic formations of the Isdell, Calder, Prince Regent, Moran, Carson, and Drysdale Rivers. The species is a favourite fodder with all kinds of stock. Fruiting in October.

Acacia Bidwilli, Benth. Fl. ii. 420.

A small tree of 6 to 15 feet with elegant spreading leafy branches and a light brown corky bark.

Rhachis 4-5 ins. long; leaflets glaucous.

Pod rigid, light brown.

Port Warrender, Admiralty Gulf, where the species is common, to Lawley River, in basalt soil in open forests of *Eucalyptus Foelscheana.* A smaller form was observed on the Synnot Range. Fruiting in June-July.

The species is an excellent fodder plant.

Erythrophloeum Laboucheri, F. v. M. B. Fl. ii. 297.

A tree of 30 to 40 feet in height with spreading branches; trunk to 25 feet and 18 inches diameter, bark dark iron-grey, rough tessellated; timber deep purple-brown with a beautiful grain, and exceedingly dense and hard.

Pod dark brown, flat and hard; seeds orbicular, much compressed, large.

Artesian and Edkins Ranges, Macdonald Range, Prince Regent, Moran, Mitchell, Lawley, King Edward, and Carson Rivers, Couchman Range, Napier, Broome and Vansittart Bays. The species occurs on both the basaltic and sandstone formations, but is commoner on the latter.

"Camel poison," "Steelwood." The species poisonous to stock, particularly camels. Horses do not eat it.

Dichrostachys Muelleri, Benth. Fl. ii. 299.

A small tree of 12 to 20 feet with a slender trunk and a rough dark grey or almost black bark, the branches almost pendulous.

The foliage is eaten by stock.

King Leopold, Edkins, and Couchman Ranges. Not a common species. Basalt hills near Admiralty Gulf. Fruiting in October.

Neptunia gracilis, Benth. Fl. ii. 300.

Stems prostrate or rarely erect, spreading to a diameter of 3 or 4 feet.
Lennard and May Rivers, Isdell River flats. Fl. m. April.

Neptunia monosperma, F. v. M. B. Fl. ii. 300.

Stems prostrate and spreading.
Lennard River, Mount Marmion. Fl. m. March-April.

Albizzia lebbek, Benth. Fl. ii. 421.

A tree of 20 to 30 feet in height, with a stout trunk of up to 18 ins. diameter, and a smooth greenish-grey bark. Timber dark-coloured but soft.

Stamens silky, yellowish-green in the lower part, bright green above.

Napier Range, in limestone, King Leopold Range, Isdell and Calder Rivers. Fl. September-October. Fruiting in March.

CÆSALPINIOIDEÆ.

Bauhinia Cunninghamii, Benth. Fl. ii. 295.

A stout tree of 10 to 30 feet, with dense spreading branches, trunk to 10 feet and 10 to 20 ins. diameter Timber dark brown; bark dark grey, rough and longitudinally fissured.

Flowers dull red. Pod reddish-brown, tough and undulate.

Lennard River, Derby, Calder, and Prince Regent Rivers. The species is commonly used for firewood to the south of the King Leopold Range, where it is common. To the north it is rarely seen, and restricted to the basaltic formations. Fl. m. June to September. Fruiting October to March. The pods are persistent.

Cassia venusta, F. v. M. B. Fl. ii. 284.

Leaves pale green, large, flowers light yellow. Pod oblong, transversely wrinkled, black and shining. Seeds black, angular.

This elegant shrub was observed in the sandstone gorges of the Edkins Range, near Mount Agnes, and to the south of Vansittart Bay. Flowering in May-July.

Cassia neurophylla, W. V. Fitzg. Journ. & Proc. Roy. Soc. W.A. iii. 147.

A shrub of 2 to 4 feet, with slender wiry branches. Petals deep yellow, striate.

Prince Regent River, in sandy soil among sandstone rocks on hills. Fl. May-June.

Cassia oligophylla, F. v. M. B. Fl. ii. 289.

Sandhills near the sea at Point Sampson. Fl. September-October.

PAPILIONATÆ.

Jacksonia argentea, Gardner n. sp.

An erect shrub of 4 to 10 feet, densely branched with erect virgate branches and angular pubescent branchlets. Bark light brown fibrous. Phylloclads oblong, slightly falcate, irregularly toothed with scale-like lobes which are obtuse or sometimes bear a second smaller phylloclad, densely silvery villous on both sides, tapering towards the base and subtended by a small bract, the midrib prominent, the very oblique secondary veins connecting with the lobes, the margins nerve-like and slightly undulate.

Flowers solitary, shortly pedunculate on the teeth or lobes of the phylloclad, with 2 bracteoles close under the calyx. Calyx densely villous, the lobes free almost to the base, oblong-obovate with a tapering point, more or less concave, valvate and angular in the bud. Corolla shorter than the calyx, the standard broad and emarginate, reddish-yellow, the wings much shorter and obtuse; keel as long as, or slightly longer than the standard but shorter than the calyx, the petals free below the middle but united above, obtuse and emarginate. Pod shortly stipitate, exceeding the calyx, oblong, with a long straight point, densely villous.

Shrub 1-3.5 metres high. Phylloclads 7-9 cm. long and .6 to 1 cm. wide, teeth 1-4 cm. distant. Peduncles 2-3 mm. long. Calyx 1-1.3 cm. long. Ovary-stipes 2 mm. long. Pod 1 cm. long and 4 mm. wide.

Plateau between the King Edward and Lawley Rivers, Mount Connor, and northwards to Vansittart Bay, in sandy soil among sandstone rocks, forming thicket-like patches in forests of *Eucalyptus tetrodonta* and *Callitris intratropica.* Fl. July-August.

The type is from the vicinity of the King Edward River in lat. 16° 38′ South. (Forests Department Herbarium n. 1499.)

The new species has affinity with *Jacksonia eremodendron* Pritzel, differing in the densely pubescent phylloclads, obtuse teeth, densely villous ovary and in habit generally.

Jacksonia thesioides, A. Cunn. B. Fl. ii. 59.

Bark of the trunk and branches moderately rough and yellowish-brown in colour, more or less corky. Fl. yellow.

The species is a favourite fodder plant with horses, and is conspicuous by reason of its silvery drooping branches. Fl. May-July.

Common in the sandstone country in open forests of *Eucalyptus miniata,* in sandy soil usually on flats near the rivers.

Bossiaea phylloclada, F. v. M. B. Fl. ii. 168.

In my specimens the upper stamen is constantly free, making the identification of this species somewhat difficult.

A glaucous rigid shrub of 3-4 feet. Flowers light yellow, the keel pink within.

Edkins, Whatley, and Macdonald Ranges, Upper Charnley, Glenelg, Prince Regent, and King Edward Rivers, and Mount Agnes, in humid valleys and along the banks of creeks in shady places in moist sandy loam. Fl. May-June.

Crotalaria crassipes, Hook. B. Fl. ii. 182.

Glabrous and succulent, the decurrent leaves giving the stems an angular appearance. Flowers light yellow, the keel orange.

Prince Regent, Mitchell, Isdell, Barker and Lennard Rivers. Fl. April-June.

Crotalaria Cunninghamii, R. Br. B. Fl. ii. 182.

"Bird Flower" or "Parrot plant." A common shrub of the littoral tracts between N.W. Cape and Broome. Fl. throughout the year.

Point Sampson. Fl. m. April (C.A.G.), Broome (C. E. Lane-Poole).

Crotalaria trifoliastrum, Willd. B. Fl. ii. 183.

A slender perennial, of 1-2 feet high. Flowers deep yellow in racemes of 7 to 12cm. Calyx enlarged after flowering.

Near Mount Marmion, Lennard River. Fl. January-March (Vivian Edwards).

Crotalaria laburnifolia, Linn. B. Fl. ii. 184.

Erect, slender and loosely branched, 4 to 8 feet high. Leaflets obtuse. Flowers light yellow.

Near the Prince Regent River, in shady basalt valleys among *Gramineae,* in open forests of *Eucalyptus Spenceriana.* Fl. May-June.

Not previously reported from Western Australia.

Psoralea badocana, Benth. Fl. ii. 190.

Erect and bushy, 5-6 feet high, very aromatic. Flowers yellowish-white with a large purple-blue blotch at the apex of the keel.

Camden Sound to Prince Regent River, and Glenelg River in sandy basalt soil, in open forests of *Eucalyptus Spenceriana.* Fl. m. May.

Psoralea cuneata, W. V. Fitzg. Proc. Roy. Soc. W.A. iii. 151.

On hills in sandy soil among sandstone rocks near Mount Agnes. Fl. m. August-September.

Psoralea virens, W. V. Fitzg. Journ. Proc. Roy. Soc. W.A. 151.

"Willow." A shrub of 6 to 12 feet, with slender flexuose branches, not much branched, the stem virgate and very supple, the whole plant glabrous. Midrib pubescent, at least above, the calyx brown, conspicuously glandular-resinous, scantily pubescent. Corolla purple, the keel white underneath.

Glenelg, Prince Regent, and Moran Rivers, Whatley Range, and near Camden Sound, in humid shady valleys near running water. Fl. April-June.

Indigofera hirsuta, Linn. B. Fl. ii. 198.

An ascending shrub with trailing branches. Flowers purple.

Prince Regent River. Fl. m. June (O. T. Siddins).

Tephrosia conspicua, W. V. Fitzg. (?) Journ. Pro. Roy. Soc. W.A. iii. 152.

A shrub of 2-4 feet, with erect clustered stems, collected near the source of the Mitchell river, appears to be a robust form of this species, but in the absence of pods cannot be ascertained with certainty. The racemes are contracted into dense terminal and axillary heads, the leaves are not densely tomentose however, and the flowers are purple.

Moist loamy soil in springs, source of Mitchell River, and near Napier Broome Bay. Fl. June-August. The roots are eaten by the natives.

Tephrosia purpurea, Pers. B. Fl. ii. 209.

Edkins Range. Fl. July-August. In sandy soil among sandstone rocks.

Tephrosia rosea, F. v. M. B. Fl. ii. 211.

Erect, 2-3 feet high. Flowers purple-pink.

Hann's Pass, King Leopold Range, and upper Barker River.

Fl. m. August-September.

Tephrosia flammea, var. pilosa, Gardner, n. var.

Stems branching at the base, erect, numerous and much branched, 3-4 feet high, invested with a dense yellow tomentum. Leaflets solitary, broadly obovate or orbicular, obtuse or emarginate, thick and soft. Flowers small, orange-scarlet.

Near Mount Agnes and Moran River, in scanty soil among sandstone rocks in creeks and gorges. Fl. June-July (1424).

Closely related to *var. monophylla,* differing in the shorter much broader leaflets, straight pod, and much denser tomentum.

Tephrosia remotiflora, F. v. M. B. Fl. ii. 209.

Apparently a medium sized shrub. Flowers purple.

Common on the Pindan country on Dampier Land, a dangerous poison plant, and one used by the natives as a fish-poison. (H. W. Townsend.)

Tephrosia phaeosperma, F. v. M. B. Fl. ii. 207.

An erect shrub of 4 to 8 feet, common on the littoral sand dunes. Fl. September-October. Point Sampson (C.A.G.).

Sesbania grandiflora, Pers. B. Fl. ii. 212.

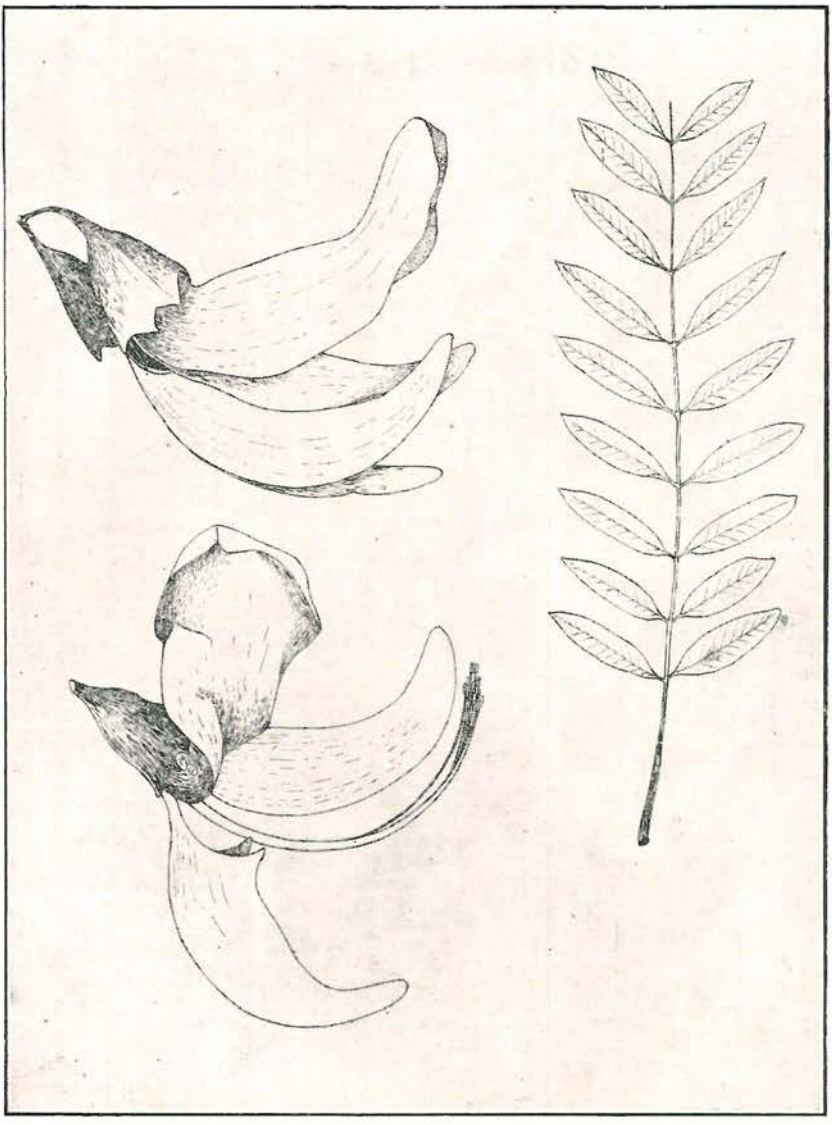
"Cork-tree." A handsome tree of 20-35 feet, with loosely spreading branches; trunk to 20 feet and 12 ins. diameter, the bark brown, often charred black by fire, thick and corky, much fissured; timber fibrous, soft and white, very buoyant in water.

Leaflets about 20. Flowers large, in drooping racemes, white. Calyx-tube urceolate or campanulate, 5-toothed or lobed, the lobes irregular. Standard on a short stout claw, greenish towards the base, oblong, emarginate with two auricles near the base. Wings lanceolate-falcate, united for a short distance at the apices. Keel on a long stout claw of about 1¾ ins., concave, falcate, with obtuse free tips; base of the keel with two acute lobes. Anthers linear. Ovary about 3½ ins. long, narrow-linear. Pod about 3 feet long, glabrous, flattened and narrow, spirally twisted and acuminate. Seeds oblong-reniform.

Occurs throughout the entire Kimberleys, as far south as the Barker and Fitzroy Rivers, occurring again in the North-West. In black boggy deep soil along the fringes of rivers in the river-forest formation, common in the basaltic valleys, rarely in the sandstone formation. Fl. May-August, fruiting August-October.

Sesbania aculeata, Pers. B. Fl. ii. 213.

Slender and erect, 5-8 feet high, quite glabrous. Leaves 6-8 ins. long, leaflets about 1 in. long. Flowers yellow, the standard large, streaked with purple. Pod 6-9 ins. contracted between the seeds; seeds hard and shining, oblong, smooth, yellow in colour.



SESBANIA grandiflora, Pers. "Cork Tree."
Prince Regent River, Kimberley.
Above: Flower.
Below: Flower with the keel lowered showing stamens.

Creeks near the Prince Regent River, in moist sandy soil with *Eucalyptus Houseana*. Fl. April-June.

Alysicarpus Cheeli, Gardner, n. sp.

A small spreading herb, apparently with a perennial stock and numerous erect, clustered, slightly spreading stems, 15-20cms. high, pubescent with silky appressed hairs.

Leaves 3-foliate, the common petiole short; leaflets oblong-lanceolate, obtuse or with a minute point, dull green, almost glabrous, slightly rugose above and prominently reticulate underneath, the midrib and pinnate veins silky-hairy. Stipules linear-lanceolate, acute, sub-sheathing and scarious, brown, and minutely silky. Racemes axillary and short, the terminal ones longer owing to leaf-suppression. Flowers yellow, the petals tipped with orange-pink. Bracts narrow lanceolate, densely silky-hairy, but deciduous. Pedicels usually in pairs, slender under the expanded flower, as long as, or silghtly exceeding the calyx in length, and together with the calyx minutely silky-hairy. Calyx campanulate, the lobes shorter than the tube, ovate-lanceolate, the two upper ones united into a broadly triangular lobe, the other lobes acute, overlapping in the bud. Standard more than twice as long as the calyx, the wings and keel shorter; wings obtuse with a small beak; keel obtuse and somewhat incurved. Pod—only imperfectly seen—much longer than the calyx, obovate, flat, beaked, and almost as broad as long.

Plant 15—20 cms. high. Middle leaflet 2.5 cm. long, the lateral leaflets 2 cm. long, and .5 cm. broad; common petiole 4 mm. long, the middle petiolule 2.5 mm. long, the lateral ones about 1 mm. long. Stipules 5 mm. long, and 1.5 mm. broad at the base. Terminal racemes 4 cms. long; bracts 3-4 mm. long. Pedicels 4 mm. long. Calyx 2.5 mm. long, the lobes 1 mm. long. Standard to 6 mm. long and 4 mm. wide; wings and keel 4.5 mm. long. Pod 7 mm. long, and 4 mm. wide in the single specimen seen.

Hab.: Between Vansittart and Napier Broome Bays, in sandy loam among sandstone rocks near watercourses, in open spaces. Fl. m. August.

The type is No. 1540 of the Forests Department Herbarium.

The new species has affinity to the Indian form of *A. rugosus*, differing essentially in the larger flowers, pod, longer pedicels, and shorter and broader calyx-lobes.

It is named out of compliment to Edwin Cheel, of the Sydney Botanic Gardens, who has rendered me valuable assistance with some species of Kimberley plants.

Erythrina vespertilio, Benth. B. Fl. ii. 253.

"Coral-tree." A deciduous tree of 20-40 feet, with a stout trunk of 10-20 feet and 12-18 ins. diameter; bark a light dull yellowish-brown in colour, thick and corky (often 2 inches thick), deeply fissured. Timber white or pink, very soft, fibrous and spongy.

The lateral leaflets are smaller than the terminal ones, and all are thick and coriaceous, spreading horizontally. Flowers scarlet. I failed to find the dark blotch at the base of the standard referred to by W. V. Fitzgerald. Pod slightly moniliform, yellow and very tough; seeds smooth, hard, and a bright scarlet.

Fairly common throughout the basaltic areas, never occurring in the sandstone formations, but reappearing in the conglomerates of the Lennard River. Flowering July-October while leafless, when it is at once rendered conspicuous by reason of its numerous bright flowers. The tree thrives in open sunny situations.

Canavalia obtusifolia, D.C. B. Fl. ii. 256.

Stems tough, twining over the rocks and small trees of the sandstone valleys. Calyx enlarges after flowering. Seeds hard and black. Common over the West Kimberleys generally.

Atylosia lanceolata, W. V. Fitz. Journ. Proc. Roy. Soc. W.A. iii. 156.

A slender erect shrub of 3-5 feet, loosely branched, the branches erect and slender. Upper leaves simple, the lower ones trifoliate. Flowers yellow, the back of the standard striate with crimson lines.

Common to the north of Mount Hann in basalt country near streams. (1465, Mitchell River, in basalt soil with a lime subsoil, Fl. June-August.)

Rhynchosia rhomboidea, F. v. M. B. Fl. ii. 265.

Stems trailing over rocks and shrubs for many yards, forming dense matted patches, the plant very aromatic and viscid-pubescent. Flowers yellow, the back of the standard suffused with crimson and striate with crimson markings.

Prince Regent River to Artesian Range, in shady humid valleys, in rich black boggy soil. Fl. May-July.

Abrus precatorius, Linn. B. Fl. ii. 270.

"Lucky-bean." Twining to a height of 60-70 feet or trailing over rocks. Leaves delicate, pale green. Flowers not seen. Pod glutinous when green, almost white when ripe, the seeds very hard, shining, red with a black spot near the hilum. The species is restricted to the littoral tracts, and is usually found in shady valleys. The plants are infested with green ants.

GERANIALES.

ZYGOPHYLLACEÆ.

Tribulus occidentalis, R. Br.

Stems prostrate or ascending, the whole plant with the exception of the corolla, sericeous. Fl. yellow.

Point Sampson, Carnarvon, on sand dunes near the sea. Fl. March-September.

RUTACEÆ.

Boronia artemisiaefolia, F. v. M. var *Wilsoni,* F. v. M. B. Fl. i. 311.

A small shrub of 2-3 feet erect with virgate branches, clothed with a soft pubescence. Flowers dull pink.

Prince Regent River and Mitchell River, on the summits of standstone ranges in scanty soil among rocks. Fl. June-August.

MELIACEÆ.

Melia dubia, Cavan. B. Fl. i. 380, sub. *M. composita,* Willd.

Napier Range, near the Barker River gorge. A stout tree of 30-40 feet with a thin greyish-brown bark and spreading branches. Fruits yellowish.

Melia (?) sp.

A willow-like shrub or small tree of 10-15 feet with an erect trunk of 6-8 feet and 5 inches diameter. Branches long and pendulous. Flowers greenish-white, fruits orange-yellow.

Near Mount Agnes, in sandy soil among sandstone rocks in open forests of *E. miniata.* Fl. May-June.

Owenia vernicosa, F. v. M. B. Fl. i. 385.

A stout tree of 20-30 feet with a thick trunk of 10-15 feet and numerous widely spreading branches. Bark purple-brown and flaky, moderately rough, timber deep purple-brown and hard. Flowers not seen. Fruits greenish-purple, over 1 inch diameter. On sandstone ranges among rocks, near the sea.

Glenelg, Prince Regent, and King Edward Rivers, Admiralty Gulf, and Vansittart Bay.

Carapa obovata, Blume.

A tree of 10 to 30 feet with an almost rough dark grey bark, timber not seen Flowers yellowish-white, the staminal tube brown. Fruit not seen.

Tidal creeks, Rocky Cove, Vansittart Bay, in saline mud among Mangroves. Fl. m. August.

EUPHORBIACEÆ.

Euphorbia chrysochaeta, W. V. Fitzgerald, Journ. Proc. Roy. Soc. W.A. iii.

Erect or ascending, stems 12-18 inches long.

Lennard River, near Mount Marmion. Fl. m. Sept.-Oct.

Leaves very glaucous underneath, green above. The bright yellow hairs are only conspicuous in the upper portions of the stems.

Euphorbia pilulifera, Linn. B. Fl. vi. 51.

"Asthma plant." Stems erect. Near Wyndham. Fl. m. June. (D. McVicar). An infusion of the leaves is used by the natives as a specific for asthma.

Petalostigma quadriloculare, F. v. M. B. Fl. vi. 92.

"Quinine tree." A small bushy tree of 10 to 20 feet in height with a stout short trunk of 4-8 feet and 10 inches diameter, the bark rough and fibrous, almost black. Branches widely spreading, rigid and numerous. Timber dark coloured with a conspicuous yellow sapwood, dense and hard. Leaves coriaceous and shining above, dark green. Flowers pale yellow, densely villous. Fruit orange-yellow when ripe, 1 inch diameter, drying to ¾ inch diameter, smooth, the exocarp very bitter, and said to have medicinal properties. Seeds light brown.

The cocci divide when the fruit dries, the whole fruit separating into eight segments.

Widely distributed over the entire Kimberley district as far south as the King Leopold Range, a common species of the sandstone areas, in open forests of *Eucalyptus miniata* and *E. tetrodonta*, but occasionally found on the basaltic areas. Fl. June-July, fruiting March-June.

Phyllanthus maderaspatensis, Linn. B. Fl. vi. 103.

Stems clustered, erect and slender, 12-18 inches high. Stipules lanceolate and scarious, spreading or recurved. Leaves glaucous, turning red with age.

Mount Marmion, around depressions in damp spots, in sandy loam. Fl. August-September.

Mallotus Derbyensis, W. V. Fitzg. Proc. Roy. Soc. W.A. iii. 165.

An erect shrub of 8-12 feet, quite glabrous, with an almost smooth light reddish-brown bark, the branches drooping.

Between Meda and Derby, in sandy loam in thickets of *Acacia tumida*. Fruiting m. October.

Excaecaria parvifolia, J. Müll. B. Fl. vi. 153.

"Gutta-percha tree." A tree of 20-30 feet with a smooth grey bark and a pale coloured timber, valued as a cabinet wood.

Eight miles east of Wyndham (D. McVicar) in leaf only.

The species is found in East Kimberley, extending eastwards to the Gulf of Carpenteria.

SAPINDALES.

ANACARDIACEÆ.

Buchanania oblongifolia, W. V. Fitzg. Journ. Roy. Soc. W.A. iii. 166.

A stout tree of 20-30 feet with rigid spreading branches. Trunk to 15 feet and 10 inches diameter, the bark moderately rough and flaky.

Edkins Range, Mount Agnes, and Artesian Range. Fl. m. September. Fl. yellowish-white. On sandstone elevations.

Buchanania latifolia, Roxb.

"Plum tree." A tree of 20-30 feet with a stout trunk and numerous horizontally spreading branches. Bark purple-grey, rough and flaky. Flowers yellow.

Artesian Range, Edkins Range, Prince Regent River and Mount Hann plateau. Fl. m. September. On sandstone ranges and plateaux in sandy loam.

Buchanania lucida, Blume.

An erect tree of 15 to 25 feet with many rigid spreading branches; trunk 6-12 feet high and 8-12 inches diameter, the bark dark grey, rough, and somewhat fissured longitudinally.

Leaves light green, rigid and shining, the base narrowed into the petiole.

Flowers in panicles shorter than the leaves, the branches rusty-tomentose. Sepals small, orbicular, petals narrow-ovate.

Carson River, Couchman Range, and northwards to Napier Broome Bay, in sandy loam on tablelands. Fl. August-September.

The timber is pink in colour, soft and light.

Not previously recorded from Western Australia. The specimens differ from the Indian ones in the densely-tomentose branches of the panicles.

CELASTRACEÆ.

This family, which is mainly tropical, is represented in the Kimberleys by two genera, each of one species with a wide range. Both are trees of the denser formation of Eucalyptus forest.

Celastrus Muelleri, Benth. Fl. i. 399.

A small tree of 10 to 18 feet with a short stout trunk of 4-9 feet and 5-9 inches diameter, the bark smooth, or nearly so, light grey and rather thick. Timber almost white. Deciduous, flowering white leafless, or the leaves very young. The adult leaves are widely lanceolate or obovate, the young leaves being elliptical-lanceolate.

Flowers yellowish-white and very sweetly scented, the petals ovate, obtuse; filaments slightly flattened.

Edkins and Macdonald Ranges, Prince Regent, Moran and King Edward Rivers, Mount Hann, Mount Agnes, and Napier Broome Bay. Fl. June-July. In sandy soil among sandstone rocks on hills.

Denhamia obscura, Meissner. B. Fl. i. 401.

"Boxwood." A slender tree of 15-25 feet with an erect trunk of 10-15 feet and 6-8 inches diameter; bark leaden-coloured, smooth or scarcely rough. Timber pale yellow, dense. Branches pendulous.

Leaves coriaceous, prominently veined, shining above but glaucous underneath, the reticulations conspicuous. Flowers not seen.

Fruits ovoid-globular, woody, light yellow or orange yellow when ripe, the valves opening widely, the seeds yellowish-brown.

An inhabitant of stony sandstone ranges and hills, usually in forests of *Eucalyptus tetrodonta* and *Callitris.* Fruiting in September.

Edkins, Macdonald and Elizabeth-Catherine Ranges, Prince Regent, Moran, King Edward and Carson Rivers.

SAPINDACEÆ.

Atalaya salicifolia, F. v. M. var. *intermedia,* Gardner n. var.

A shrub of 10-15 feet, branching from the base with widely spreading drooping leafy stems.

Leaves pinnate. Leaflets 4 or 5, oblong-lanceolate, obtuse, abruptly narrowed at the base, sessile, distant , the midribs very conspicuous and the fine reticulations prominent, dark green and shining above, perfectly glabrous, paler underneath but not glaucous, the rhachis broadly winged between the leaflets, and less winged on the common petiole.

Panicles terminal or in the upper axils, the branches acutely angular, glabrous in the lower parts, but the upper branches sparingly pubescent; bracts lanceolate, ciliate with soft hairs. Sepals broadly ovate or almost orbicular, glabrous. Petals obovate, much narrowed at the base, pubescent outside, at least at the base. Filaments flattened, hairy in the lower half. Ovary sparingly pubescent. Samarae only seen in an immature state, dark green with a few scattered hairs.

Shrub of 3-5 metres high. Leaflets 9-12 cm. long and 2-3 cm. wide. Panicles to 24 cm. long more or less pyramidal in shape. Bracts 1 mm. long. Sepals 3 mm. long. Petals slightly longer.

Carson River, Lat. 14° 29′ in sandy soil among basalt rocks on the river banks beneath *Melaleuca argentea.* Fl. August-September.

The variety differs from the species only in the pubescent bracts, petals and young fruit.

Atalaya hemiglauca, F. v. M. B. Fl. i. 463.

A slender shrub or small tree of 12-20 feet, with a small slender trunk of about 6 feet in height and 4-5 ins. diameter. Branches pendulous or drooping. Timber yellowish-white, dense, but soft. Flowers white. Fruits yellowish-green. A whitish gum is exuded in small quantities from the trunk.

Barker and Lennard Rivers, in sandy soil on the river banks. Fl. m. September.

A form from the Roebuck plains near Broome is a tree of 25 feet, with a rough grey bark. The panicles are more rigid and the leaves more rigid and obtuse than the form of the Lennard and Barker Rivers (C. E. Lane-Poole, 490).

Dodonaea lanceolata, F. v. M. B. Fl. i. 475.

A slender shrub of 3-5 feet, with erect wiry stems. Capsules yellowish-green.

Napier Range and near Admiralty Gulf, among limestone rocks in the former locality, and sandstone rocks on hills in the latter. Flowers not seen.

Dodonaea physocarpa, F. v. M. B. Fl. i. 484.

A diffuse spreading shrub of 12 to 30 inches. Leaves yellowish-green, and together with the young shoots glutinous. Capsules brown-pink, much inflated, 1 in. long.

Stony basalt hills, King Leopold Range, Isdell River, and near the Artesian Range.

Distichostemon phyllopterus, F. v. M. B. Fl. i. 487.

A bushy shrub of 3-5 feet. Fl. m. September-October.

Mount Marmion, Meda, and near Derby.

RHAMNALES.

RHAMNACEÆ.

Ventilago viminalis, Hooker. B. Fl. i. 411.

A small tree of 10-20 feet, trunk to 10 feet and 8 ins. diameter; bark dark grey, rough and fissured. Leaves green and shining. Fruits yellow. "Steelwood."

Mount Marmion, on the slopes and summit in stony soil among "Spinifex." (*Triodia*) fruiting m. October. Also on the plains between Derby and Meda, in the Pindan thickets.

VITACEÆ.

Cissus acetosa, F. v. M. B. Fl. i. 449.

Climbing by means of tendrils to a height of 5-7 feet, or trailing over rocks. Berries ovoid-globose, purple, over ½in. long, succulent and of a pleasant flavour. "Wild grape."

Artesian, Synnott, and Edkins Ranges. Isdell, Charnley, Calder, Sale, Glenelg, and Prince Regent Rivers, Lushington Bluff. Fruiting April-June.

MALVALES.

TILIACEÆ.

Grewia polygama, Roxb. B. Fl. i. 271.

A small shrub with erect or ascending stems of 10-30 ins. Fruits usually 2-lobed, but occasionally 3 or 4-lobed, red when ripe.

Calder, Sale, Glenelg, Prince Regent, and Mitchell Rivers, Mount Hann and Mt. Bradshaw in basalt soil among *Gramineae* either on plains or small hills.

The fruits are used as an article of food by the natives and are said to have medicinal properties, being used in cases of dysentry.

Corchorus sidoides, F. v. M. B. Fl. i. 278.

A small diffuse shrub of 12-18 ins. in height, spreading to a diameter of over 2 feet. Flowers small, petals pale yellow.

Rocky places on rising ground near Mount Marmion. Fl. m. September-October.

Corchorus Walcottii, F. v. M. B. Fl. i. 278.

Stems erect or spreading, several from a woody stock 12-18 ins. high. Flowers yellow, rather large. Capsule densely tomentose, oblong, over ½in. long, 5-celled.

Point Sampson, in arid sandy soil near the sea. Fl. March-April.

Triumfetta appendiculata, F. v. M. B. Fl. i. 273.

Scabrous-tomentose, 4-6 feet high. Fruits globose-cylindrical, and tuberculer-echinate, villous.

Edkins Range, King Edward River, Mount Shadforth, Mitchell River, and Vansittart Bay. Fruiting in September.

Triumfetta plumigera, F. v. M. B. Fl. i. 274.

Stellate-tomentose. Stems 2-3 feet high, erect and slender. Leaves oblong-lanceolate, crenate. Peduncles axillary, few flowered, the flowers yellow. Fruits pilose with dense white hairs, but only seen in very young state.

Mount Marmion, among rocks and triodia. Fl. September-October.

MALVACEÆ.

Sida sp.

A spreading intricately branched shrub of 2-3 feet, invested with a close hoary pubescence. Leaves alterate, oblong-lanceolate. Flowers pale yellow, small, the stamens of a deep yellow colour.

Mount Agnes, on sandstone ranges in sandy stony places. Fl. m. June.

Abutilon Andrewsianum, W. V. Fitzg. Journ. Roy. Soc. W.A. iii. 172.

A handsome perennial of 3-4 feet. Lower leaves 2-3 ins. long, the upper ones much smaller, the uppermost bract-like.

In the original description the length of the leaves is given as 1½-4 lines long. This should read 1½-4 inches long.

Calyx divided to below the middle, the lobes ovate-triangular. Carpels 8-12, 2 or 3-seeded.

Derby, Lennard, and Barker Rivers. Fl. m. March-April (C.A.G.), Mount Marmion (Vivian Edwards).

Abutilon crispum, G. Don. B. Fl. i. 206.

An intricately branched shrub of 2-4 feet. Leaves cordate-orbicular. Pedicels twice as long as the leaves, slender but rigid, spreading. Flowers purple with an orange-coloured centre. Carpels 1-seeded, the seeds reniform.

Mount Marmion, in sandy stony soil. Fl. m. August-September.

Fugosia pulchella, Gardner, n. sp.

A shrub of 1-3 feet, with erect or spreading stems, the branches somewhat angular and minutely hoary as well as the leaves. Leaves on long petioles, orbicular-cordate but shortly acuminate and acute, prominently 5-nerved at the base, the reticulations conspicuous. Flowers large, white, with a crimson centre, on pedicels of medium length articulate below the middle with a linear bract at the articulation, the upper leaves reduced to bracts. Bracteoles 3, linear-oblong, obtuse. Calyx minutely pubescent, the tube broadly campanulate, the lobes lanceolate, acuminate, 1-nerved, marked with a few inconspicuous black dots. Petals large, tomentose where exposed in the bud, minutely marked with small black dots. Column slender, the filaments crowded in the lower half, the stigmas decurrent almost to the stamens.

Capsule ovoid or almost globose, shortly acuminate with a straight beak, 3 or 4-valved, quite glabrous, covered with small black tubercles. Seeds one to each carpel, black, striate with raised lines, oblong.

Shrub of 30-90 cms. Petioles slightly decurrent on the stems, 2-3 cm. long. Lamina 3-5.5 cm. long and as broad. Pedicels 1-1.5 cm. long, bracteoles 6-8 mm. long and nearly 2 mm. wide. Calyx 1.4 cm. long, the lobes 7 mm. long. Petals 4 cm. long. Style 1.5 cm. long. Capsule 1.3 cm. long, seeds 7 mm. long.

Admiralty Gulf and Vansittart Bay, in sandy or gravelly soil among sandstone rocks. Fl. August-September.

The type is No. 1520 of the Forests Department Herbarium.

Affinity to *F. australis*, differing in the much wider but acuminate leaves, longer pedicels which are articulate with a small bract, glabrous capsule and seeds, and from *F. latifolia* in the much shorter pedicels, bracteoles, and calyx which is not ribbed, smaller flowers, and much larger seeds, which are all solitary in the specimens seen.

Fugosia latifolia, Bentham. Fl. i. 221.

Stems procumbent, 2-3 high and spreading to 3 or 4 feet in diameter. Leaves 6-8 cm. long, nearly glabrous underneath, and quite glabrous above when old. Pedicels 4-5 cm. long, articulate below the middle. Flowers white with a crimson centre, pink where exposed in the bud. Petals 4-5 cm. long, very broad at the summit, striate with faint pink lines without, tomentose at the base. Styles 3.5 cm. long. Capsule glabrous, 3-celled, obtuse. Seeds glabrous, small and angular, 3 to each cell.

Basaltic hills near Camden Sound, among *Gramineae*. Fl. May-July.

Fugosia populifolia, Benth. Fl. i. 221.

Stems entirely prostrate, leaves thick, cordate-orbicular. Calyx-lobes ovate-lanceolate. Flowers deep pink.

Mitchell River, Prince Regent River, Glenelg River, and Camden Sound. Fl. June-August.

Hibiscus ficulneus, Linn. B. Fl. i. 209.

A biennial or perennial, 6-8 feet high. Bracts narrow, leaf-like. Flowers white with a purple centre. Calyx densely pubescent. Capsule hispid, slightly constricted near the middle, 4 or 5-valved.

Crystal Head, Admiralty Gulf, in saline soil on the fringe of the Mangrove formation. Fl. June-July.

Hibiscus microchlaenus, F. v. M. B. Fl. i. 211.

Flowers bluish-lilac with a deep crimson centre. Mount Marmion. Fl. m. February-March (Vivian Edwards).

Hibiscus pinonianus, Gaudich. B. Fl. i. 211.

Stems erect or spreading, 3-4 feet high, rigid. Leaves pale green. Flowers lilac with a crimson centre. Bracteoles 3. Calyx-lobes short and broad. Capsule minutely tomentose outside.

King Leopold Ranges, Isdell River, Barker River, and Mount Marmion. Fl. September-March.

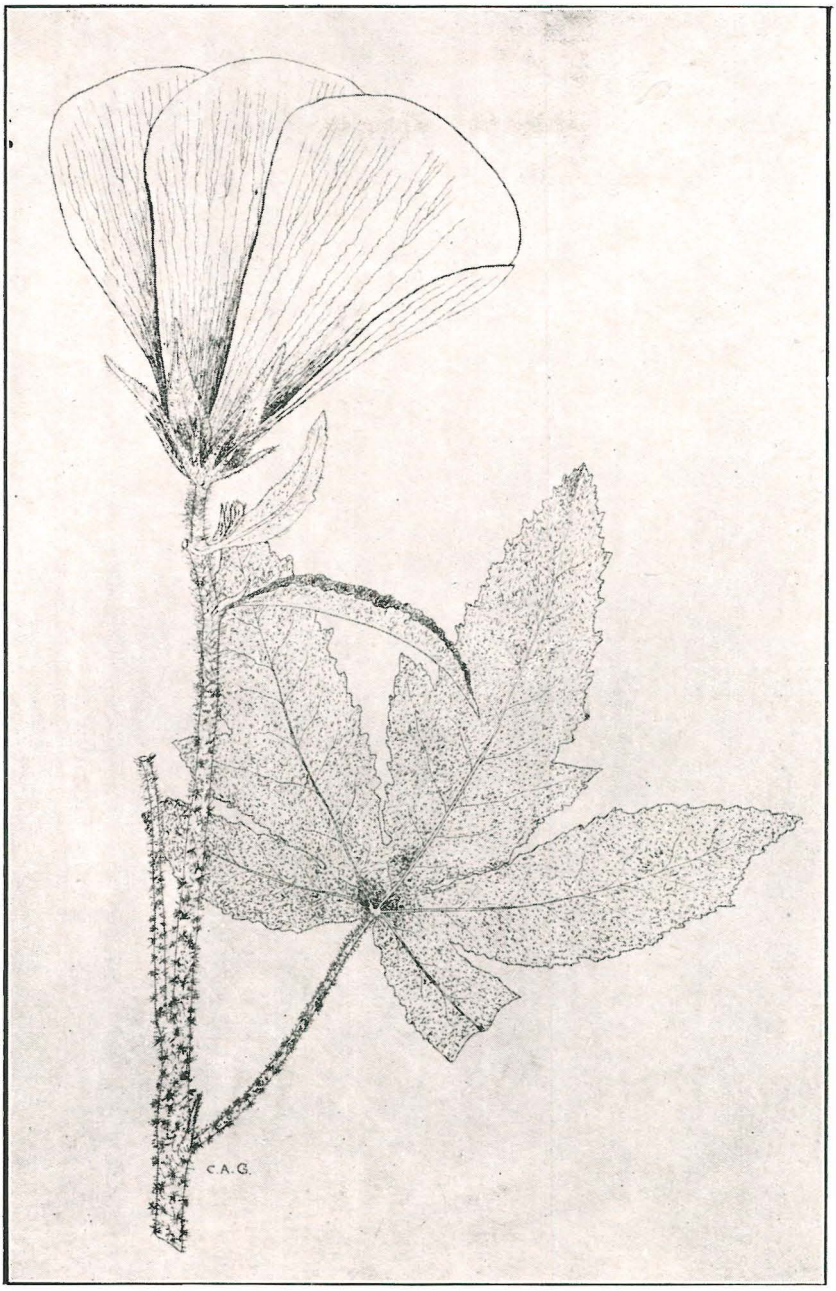
Hibiscus cannabinus, Linn. B. Fl. i. 212.

Stems slender, 4-6 feet high. Upper leaves linear-lanceolate, crenate, the lower ones deeply 3-5-lobed. Flowers white with a pink centre. Bracteoles rigid, spinescent. Calyx-lobes rigid, acuminate, the margins with short erect prickles, the prickles of the midrib glandular. Petals 2½-3 ins. long. Seeds small, brown.

Lennard, Isdell, and Barker Rivers, Napier Range, in rich black soil, usually in moist depressions. Fl. April-June.

Hibiscus superbus, Gardner, n. sp.

Stems erect, rigid, not much branched, 6 to 12 feet high, the branches short and spreading, the whole plant with the exception of the corolla, stellate hairy, the hairs of the leaves much softer than those of the branches, petioles, and calyx. Branches and petioles golden with rigid stellate hairs



HIBISCUS superbus, Gardner n. sp.

The Type. West Kimberley, W.A., 1901. Dr. F. M. House.

arising from small tubercles. Petioles long and rigid. Leaves broadly cordate in circumscription, palmately 5 or 7-lobed, the lobes lanceolate, scarcely acute, with serrated margins, the whole lamina densely hairy with yellow stellate hairs mixed with a shorter pubescence. Stipules setaceous, linear-lanceolate. Flowers very large, rose-pink in colour, on short thick pedicels. Bracteoles 10 in the specimens seen, linear-acuminate, rather more than half as long as the calyx and shortly united at the base, conspicuously stellate bristly with golden hairs. Calyx shortly stellate hairy, the hairs arising from numerous small tubercles, divided to below the middle into rigid lanceolate lobes with dorsal and marginal conspicuous nerves, the base broadly campanulate, and more or less 10-ribbed. Petals broadly obovate, striate with numerous longitudinal purple striations, glabrous. Capsule globular, shorter than the calyx, with a short straight point, silky-hairy. Seeds few in each cell, brown and yellow variegated.

Plant 2-3 metres high. Petioles 6 cms. long. Leaf-lamina to 10 cms. long, the central lobe 9 cms. long and 3-5 cms. wide. Pedicels 1.5 cms. long. Bracteoles 1.5 cms. long and 2 mm. wide. Calyx 3 cms. long, the lobes 2 cms. long and 7 mms. wide. Petals 9 cms. long, spreading to 17 cms. in the open flower. Capsule 1.7 cms. diameter. Seeds flattened, 3 mms. diameter.

West Kimberley, Dr. F. M. House, 1901. The Type. Dr. House was attached to the Brockman Expedition of 1901 as Naturalist and Botanist. Unfortunately no notes were taken with his specimens.

I observed this species in the gorges near the Prince Regent and Mitchell Rivers, and have supplied the above notes on its habits from my observations. The new species has affinity to *Hibiscus splendens* and *H. zonatus*.

Hibiscus zonatus, F. v. M. B. Fl. i. 213.

A shrub of 6-10 feet with erect stems. Flowers deep pink with a red centre.

Common to the north of the Prince Regent River, on sandstone ranges and in rocky valleys. Fl. June-September.

Hibiscus geranioides. A. Cunn. B. Fl. i. 215.

Stems slender, diffuse, 1-2ft. high. Fl. white with a purple centre.

Vansittart Bay, in sandy soil among sandstone rocks. Flowering in June.

Hibiscus vitifolius. Limm. B. Fl. i. 215.

Stems slender, erect, 3-5ft. high. Flowers yellow with a crimson-purple centre.

This handsome species was observed in the Napier Range, and in valleys near Mount Hart. Fl. m. April.

Hibiscus panduriformis, Burn. B. Fl. i. 215.

Stems usually erect or ascending, 3-4 feet high. Leaves 1¼ins. long and about 1in. broad in the Kimberley specimens, with crenate crisped margins. Braceles broadly spathulate, two thirds as long as the calyx, the calyx-lobes 3-nerved. Flowers a bright yellow with a crimson centre. Capsule with short points to the valves, the seeds glabrous.

A form from the Carson river, has much narrower leaves, more or less tri-lobed. It is an erect shrub of 4-7 feet.

Barker River Gorge, Napier Range, Isdell River, near Grace's Knob. Lennard River, Carson River, and King Leopold Range, a species occurring near streams. Fl. March-October.

Thespesia populnea, Corr. B. Fl. i. 221.

A small tree of 20-30 feet, erect and slender, with widely spreading branches, evergreen. Trunk to 12 feet and 8-12 ins. diameter, the bark ash-grey, smooth or moderately rough. The leaves are coriaceous, and seldom above 3ins. long, on long petioles of 2-3½ inches. Flowers yellow with a crimson centre. Capsules ovoid globular, woody, opening in five valves. The species is known in India as the "Tulip Tree."

Camden Sound, Prince Regent River, and Vansittart Bay. Occurs along the coast and in tidal estuaries in sandy sub-saline soil, on the inner fringe of the Mangroves. Fl. April-June.

Thespesia lampas, Dalz et Giles.

Stems erect, 3-7 feet. Leaves dark green and shining. Flowers large, bright yellow, with a deep crimson-purple centre.

Barker River Gorge, Upper Barker River, King Leopold Ranges, near Mount Hart, Isdell River, Grace's Knob.

This handsome species, with its large brilliant flowers, is well worthy of cultivation. It occurs in sandy soil along the banks of streams and rivers. Fl. February-April.

BOMBACACEÆ.

Adansonia Gregorii, F. v. M. B. Fl. i. 223.

A deciduous tree of 30-40 feet, with a remarkably stout bottle- or barrel-shaped trunk, which attains a circumference of over 60 feet. Bark leaden-grey, smooth and shining, timber soft and spongy, but fibrous. Flowers white or pink. There are two forms of fruits, an ellipsoid form 8-10ins. long, narrow, and an ovoid form of 4-5ins. Both forms occur in the same locality, but never on the same tree. They are the only differences I can find. The young leaves, which I collected, are perfectly glabrous.

A drink is made from the diluted mucilage exuded from the trunk, and the mealy endosperm is eaten by the natives. It is rather palatable, but somewhat acid. The trees live to a great age, probably hundreds of years. I have, however, seen dead trees. The species is not attacked by termites, and is not affected by bush-fires. It would seem from the fibrous nature of the timber that it has qualities that would make it useful for paper-making, but the tree is of slow growth, and the crop rotation period would cover many hundreds of years. The water stored in the pits or hollows of the branches is quite sweet. Some of these hollows hold many gallons of water.

The species is not found very far from the coast, and is an inhabitant of all classes of soil, although most common on the sandstone hills, the coastal plain, and the granite hills between the King Leopold and Napier ranges. It extends to the northern limits of the State, and southwards to below Broome. The tree flowers while in leaf.

Bombax malabaricum, D.C. B. Fl. i. 223.

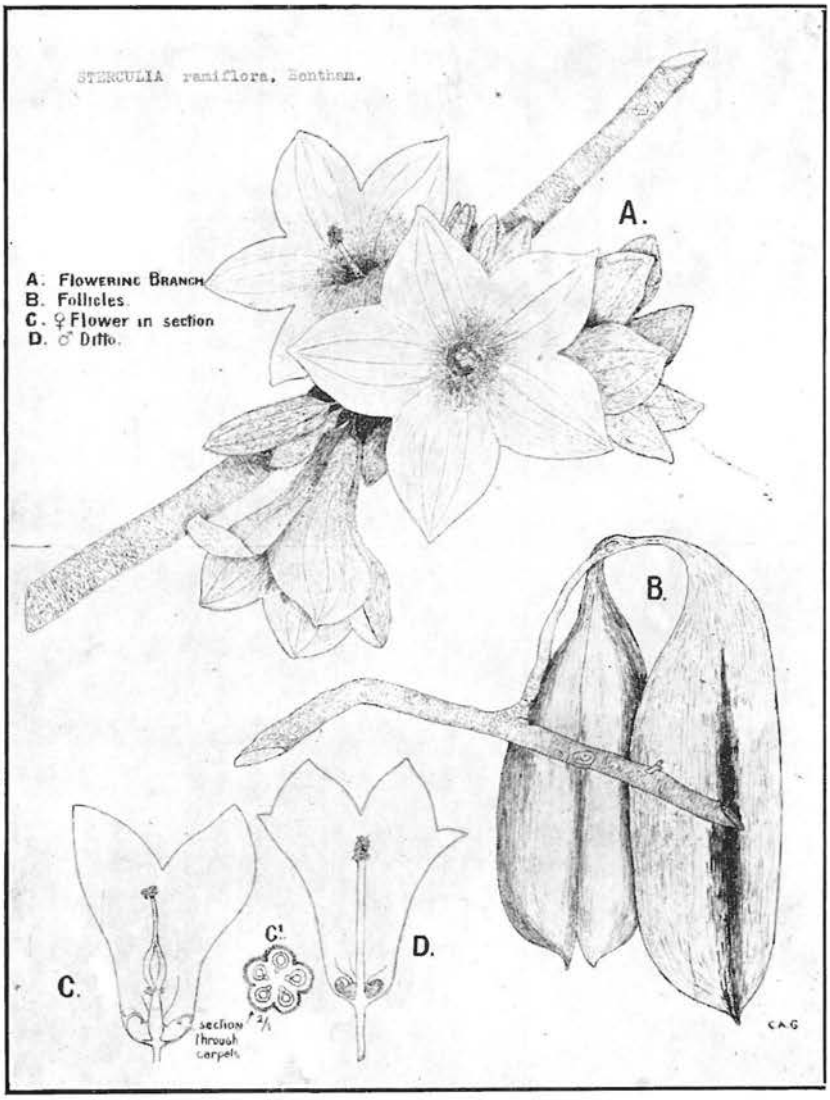
A deciduous tree, flowering while leafless.

Erect with very horizontal branches, 50-60 feet high. Trunk to 35 feet, diameter 30 inches, the branches armed with stout thorns. Timber white, soft. Flowers deep crimson, large and handsome, the petals recurved, the calyx leathery, brown.

"Kapok Tree." An inhabitant of stony hills, sandstone ranges south of the Glenelg River, but to the north it is restricted to the steep basaltic hills. F. August-October.



BAOBAB (*Adansonia Gregorii*, F.v.M.)
Derby, W.A.



STERCULIA ramiflora, Benth.

A. Flowering branch. B. Follicles. C. Female flower in longitudinal section. C1. Section of ovary. D. Male flower in section.
Vansittart Bay, Kimberley, Aug., 1921.

STERCULIACEÆ.

Sterculia quadrifida, R. Br. B. Fl. i. 227.

A deciduous tree of 20-30 feet with a stout trunk and almost smooth, greenish-grey bark. Follicles scarlet.

Prince Regent River, Mount Agnes and Mitchell River, on sandstone ranges.

Sterculia viscidula, W. V. Fitzg. Journ. Roy. Soc. W.A., iii. 176

Deciduous, flowering immediately before the falling of the leaves and continuing to flower throughout the dry season. Erect 20-30 feet, but usually smaller. Trunk to 12 feet and 10-12ins. diameter, bark rough, dark grey or almost black, but not fissured. Timber light pink, very soft and light, fibrous, weak. Leaves dull green, stellate tomentose. Flowers in dense clusters on the old wood, occasionally on the trunk. Calyx 2ins. long or more, scarlet, broadly campanulate. Pedicels ½in. long. Column stellate pubescent in the lower half. Follicles densely clustered and sharply recurved.

King Leopold Range to the Mitchell and Carson Rivers, on sandstone ranges and hills, a common species conspicuous when in flower, in sandy soil among rocks. Fl. April-September.

The species differs from *S. ramiflora,* chiefly in the viscid calyx and smaller recurved follicles.

S. ramiflora, Bentham. Fl. i. 227.

A deciduous tree of 20-35 feet, trunk to 14 feet and 18 inches diameter, bark dark-grey, rough but not fissured. Leaves not seen. Flowers dull scarlet, in large clusters on the trunk and branches. Calyx stellate-tomentose outside, prominently 3-nerved, rusty between the nerves towards the centre. Staminal column stellate, hairy to the summit.

Follicles large, usually two, on a long stipes, grey and glabrous without.

"Flame Tree." Sandstone flats, near the coast, Vansittart and Napier Broome Bays, Carson River. Fl. July-September.

Sterculia caudata, Heward. B. Fl. i. 230.

An erect tree of 30-45 feet with a trunk attaining a height of 30 feet and 20ins. diameter. Bark light grey, fibrous, slightly rough. Timber yellow, soft, of a beautiful grain. Tree partially deciduous. Leaves light green, coriaceous, shining, 4-5ins. long. Flowers in small, dense axillary panicles, green without, red within. Follicles ovoid, much flattened, reddish-brown, glabrous and tough, yellow-hairy within.

Drysdale, Mitchell, Moran, Prince Regent and Glenelg Rivers, in sandy country in open forests of *Eucalyptus miniata,* and *E. tetrodonta.* Fl. m. September.

Melochia pyramidata, Linn. B. Fl. i. 234.

This is given as *M. pyramidalis,* L. in Fitzgerald's Botany of the Kimberleys.

An erect woody shrub of 2-5 feet with numerous slender branches. Leaves bright green. Flowers lilac.

Lennard, May, Barker and Isdell Rivers, Mount Marmion, and near Derby. Fl. April-October.

Waltheria indica, Linn. B. Fl. i. 236.

An erect shrub of 3-5 feet, branching from the base, with virgate branches. Leaves dark green with denticulate, crisped margins. Flowers yellow, in dense terminal panicles.

Upper Drysdale River, near Mount Hann, in sandy soil, on the river banks, among *Pandanus aquaticus*. Fl. m. September.

PARIETALES.

DILLENIACEÆ.

Hibbertia Kimberleyensis, Gardner, n. sp.

A small spreading shrub of 18 to 30 inches in height, spreading to an equal diameter. Stems wiry. Branchlets acutely angular from the decurrent midribs of the leaves, covered with silvery scales. Leaves oblong-lancelate, obtuse, much narrowed at the base, sessile, covered with silvery-hoary scales, the midrib prominent and decurrent, the lateral veins not visible, but with a conspicuous intramarginal vein distant from the edge, the margins quite flat. Peduncles solitary, terminal, or also in the upper axils, on very angular peduncles.

Sepals broadly ovate, very obtuse and concave, the margins ciliate with short red hairs. Petals obovate, broad, emarginate. Stamens numerous, all perfect, or two or three reduced to staminodia on the side where they are fewest; the anthers large, oblong-linear.

Carpels 3, scaly, but not tomentose, 3-ovulate.

Shrub of under 1 metre high. Leaves 3-4 cm. long and 4-6 mm. wide. Peduncles 6-8 mm. long. Sepals 6 by 4 mm.; petals over 1 cm. long and nearly as broad. Stamens much shorter than the petals.

Between Calder and Prince Regent Rivers, in sandy soil, among sandstone rocks in open forests of *Eucalyptus miniata* and *E. tetrodonta*, and in the Charnley River Gorge, in rock crevices. Fl. April-July. (1392.)

The new species has a close affinity to *H. oblongata*, differing chiefly in the absence of tomentum, larger leaves, the number of carpels 3, and not tomentose.

COCHLOSPERMACEÆ.

Cochlospermum heteronemum, F. v. M. B. Fl. i. 106.

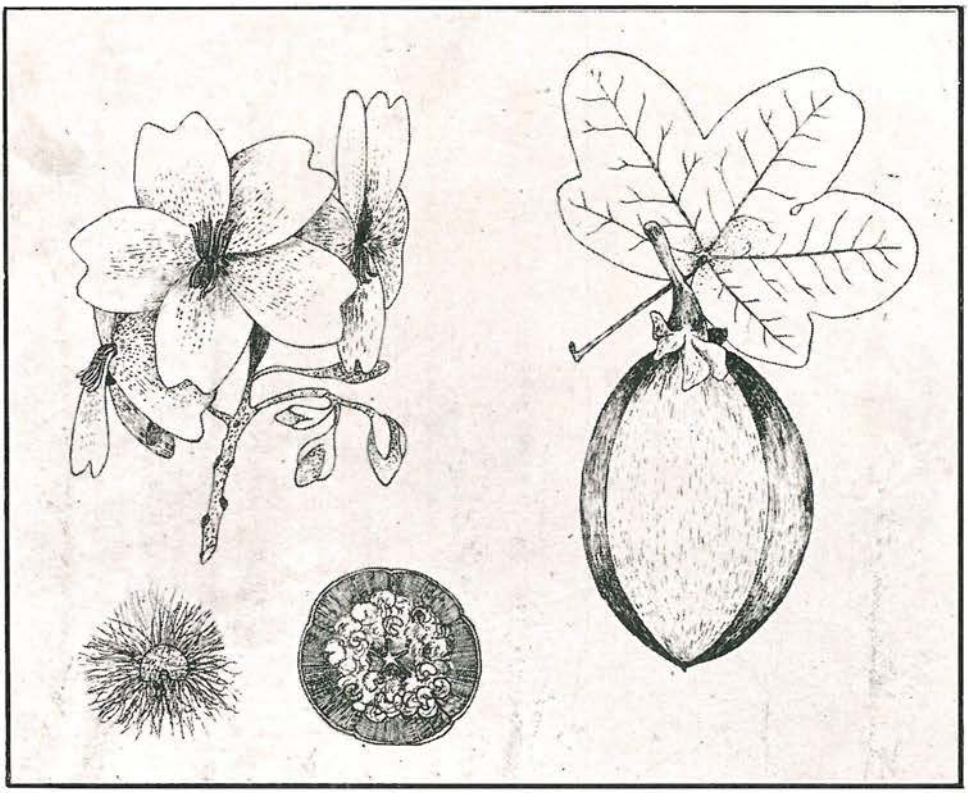
A deciduous tree, leafless from March to November, flowering while leafless.

A small tree of 8 to 25 feet; trunk to 10 feet, and 10 inches diameter, the bark almost smooth or slightly rough, light grey, thick, the cambium mucilaginous. Timber soft and white, remarkably supple but fibrous. Branches horizontally spreading, shortly tapering. Flowers large and delicate, light yellow, the petals streaked with purple spots in the middle. Stamens numerous, the lowest sharply recurved, on longer filaments than the upper, which are straight and numerous. Anthers on very slender filaments oblong-acuminate. Capsules ovate-cylindrical, 2½ to 3½ ins. long, glabrous when mature, and longitudinally wrinkled, the pericarp opening in five valves, the valves of the endocarp alternating, of a horny substance and holding the seeds even after the valves are opened. The placentas are membranous and project considerably into the fruit.

Seeds reniform or nearly horseshoe-shaped, brown and smooth, covered with long fine silky hairs.

Widely distributed over the Kimberleys, chiefly on rocky sandstone or basalt hills, flowering when only a small shrub. Fl. April-July. Fruiting in August-October.

The fibre of the seeds is of no commercial value.



COCHLOSPERMUM heteronemum, F.v.M. "Cotton Tree."
Flowers, leaf, fruit, section of fruit, and seed.

VIOLACEÆ.

Ionidium suffruticosum, Ging. B. Fl. i. 101.

A slender herb of 12-18 inches, the stems flexuose and ascending. Flowers lilac or blue, the lowest petal yellowish. Capsule ovoid, glabrous.

Mount Marmion, in stony soil among spinifex (*Triodia*). Fl. m. April (C.A.G.). Further specimens were received from V. Edwards from an adjacent locality. Fl. m. February.

UMBELLIFERÆ.

Passiflora foetida, Linn., Benth. Fl. Hongkongensis.

This species evidently introduced by birds during recent years has become quite common around Meda and Goody Goody. The flowers are whitish-purple, the fruits yellow, globular, and 1 in. or more in diameter, sweet and palatable. Fl. March-September, and fruiting in the same period.

The species has not previously been recorded from Australia.

MYRTIFLORAE.

THYMELAEACEÆ.

Pimelea punicea, R. Br. B. vi. 6.

Stems rigid, fleshy, corymbosely branched, 1-2 feet high. Leaves 1½ ins. long, erect. Peduncles much swollen into a fleshy receptacle. Filaments longer than the perianth-lobes, filiform. Flowers crimson.

Mountains of the King Leopold Range, in sandy soil near the summits. Fl. March to May.

LECYTHIDACEÆ.

Careya australis, F. v. M. B. Fl. iii. 289.

Deciduous. A small tree of 10-25 feet, with a stout trunk of 10-12 feet and 10 ins. diameter, the bark rough and much furrowed, corky and thick, brown to dark grey. Timber pink, soft and light. Calyx dark green, petals greenish-white, or yellowish-white, or even pink. Stamens white or pink. Fl. August-October.

Stamens united in a thick ring at the base.

Common throughout the West Kimberleys on sandstone and basalt formations, most abundant to the south of the Calder River, and observed at Derby and Broome. Flowers sweetly scented.

The fruits are edible, and known to the Drysdale River natives under the name of "Mangaloo."

A tree attaining 30 feet, Pender Bay (C. E. Lane-Poole).

Barringtonia sphaerocarpa, Gardner n. sp.

A tree of 30-50 feet, with widely spreading drooping branches, bark smooth, a light grey in colour. Trunk to 20 feet and 2 feet diameter. Timber not seen.

Leaves broadly elliptical-ovate, dark green, thick and coriaceous, quite glabrous, prominently veined. the smaller reticulations prominent, the margins serrulate. Petioles slender, more or less twisted.

Flowers not seen.

Fruits solitary in the specimens seen, hard, glabrous, smooth and woody, globular, 1-seeded.

Tree of 9 to 15 metres high. Leaves 9-14 cm. and 4-5.5 cm. wide. Petioles 1.5 cm. long.

Fruit 2 cm. diameter

Basalt creeks near the Lawley River, in the stony beds, forming fairly dense forest with *Sarcocephalus cordatus*, *Ficus glomerata*, and *Eugenia eucalyptoides*. Fruiting in October.

Affinity to *B. macrostachya*, Kurz., but the fruits are smaller and not angular. The other Australian species are characterised by angular fruits. Its affinities lie among Indian and Asiatic species.

Sonneratia alba, Smith. B. Fl. iii. 301.

A small spreading tree of 10-25 feet, with a stout trunk and widely spreading branches. Trunk 4 to 8 feet and 10 ins. diameter, not emitting any adventitious roots, but several vertical respiratory conical roots arising vertically above the soil from the lateral roots to a height of 6 ins. above ground, and thickly distributed around the tree for several yards.

Leaves dark green, coriaceous and shining, rigid. Flowers white. Fruit slightly over 1 in. diameter, the base enclosed in the enlarged persistent calyx, but not adnate to it, except at the base. Fruiting calyx much enlarged, obscurely angular. Fruit depressed-globular, shortly narrowed into a long straight beak (the persistent style), yellowish, quite smooth, without ribs or angles.

Napier Broome and Vansittart Bays to Prince Regent River and Camden Sound. Fl. m. July-August.

Occurs on the outer fringe of the Mangrove formation, in several feet of water. The bark contains 8.0 per cent. of tannin.

The fruits partially enclosed in the persistent calyx, the lobes of which expand horizontally to form a kind of float, may be seen along the coast for many miles out of the range of the species.

RHIZOPHORACEÆ.

Ceriops Candolleana, Arnott. B. Fl. ii. 494.

"Red Mangrove." Usually a shrubby species, but occasionally attaining a height of 20 feet. Trunk short, not emitting adventitious roots, but expanded at the base into a buttress-like stock, often 24 inches in diameter. Bark light grey, smooth or almost so. Leaves yellowish-green, thick, coriaceous and shining, paler beneath than above. Fruit conical or inverted pear-shaped, the seed germinating while upon the parent plant, the hypocotyl usually attaining a length of 2 cms. before the fruit falls.

Flowers small and yellowish.

Broome and Pender Bay (C. E. Lane-Poole), Derby, Camden Sound, Prince Regent River, Admiralty Gulf, Vansittart Bay and Napier Broome Bay. Flowering in September and October.

The species is usually an inhabitant of sandy saline soil, near the high-water mark, or further back from the Mangrove fringe, in places inundated only by the equinoctial tides.

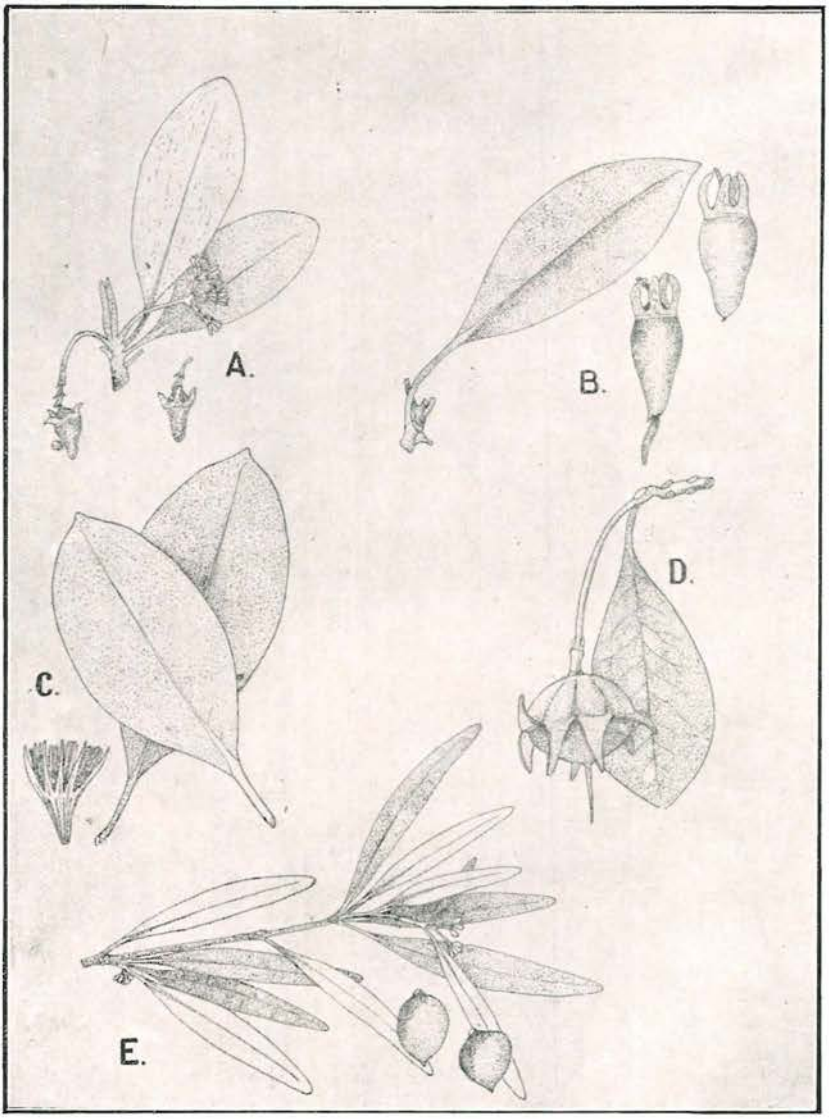
The bark is commercially valuable, yielding 35 to 41 per cent. of tannin.

Rhizophora mucronata, Lam. B. Fl. ii. 493.

"Black Mangrove." A shrub or small tree of 10-20 feet, or occasionally 30 feet high, with dense intricate spreading branches, emitting adventitious roots from the trunk and lower branches. Trunk to 8 feet and 9-12ins. diameter, the bark dark grey or almost black, and smooth, but not shining.

Flowers not seen.

Fruit inverted pear-shaped, about 2 cm. long and 1 cm. diameter, almost black when ripe, the persistent calyx-lobes reflexed under the ripe fruit and



MANGROVES.

A. Red Mangrove (*Ceriops Candolleana*, Arm.). B. Black Mangrove (*Rhizophora mucronata*, Lam.). C. Black Mangrove (*Bruguiera gymnorrhiza*, Lam.). D. Mangrove (*Sonneratia alba*, Smith). E. White Mangrove (*Avicennia officinalis*, Linn.).

of a reddish-brown colour. Vivapary is very marked in this species, and the seedlings attain a length of up to six inches, while the fruit is still attached to the tree.

The bark contains up to 40 per cent. of tannin, and is, therefore, valuable.

Besides the prop—or stilt-like roots which arise from the trunk and branches, the species has numerous respiratory roots or pneumatophores, which arise from the lateral roots and protrude above the mud for several inches.

Pender Bay (C. E. Lane-Poole), Camden Sound, Prince Regent River, Vansittart and Napier Broome Bays. The species occurs chiefly in the estuaries of rivers and creeks, in muddy black soil, but is also found along the more open coasts. The prop-like roots are covered up to the crown of the tree at high tide, but the whole tree is exposed at low tide.

Bruguiera gymnorrhiza, Lam. B. Fl. ii. 493.

Similar in habit to *Rhizophora,* but without the stilt-like roots of the branches. The base of the trunk is buttressed. The species is also taller, attaining a height of 40 feet.

Calyx prominently ribbed and lobed. Flowers brown-white.

Pender Bay (C. E. Lane-Poole), Derby, Camden Sound, Prince Regent River, Admiralty Gulf, Vansittart and Napier Broome Bays. A common species, flowering in June to September, and by far the most prevalent of the *Rhizophoraceae* in the Mangrove formation.

The bark contains 36 per cent. of tannin.

Carallia integerrima, D. C. B. Fl. ii. 495.

A tree of 20-35 feet, with a stout erect trunk and numerous widely-spreading, horizontal branches. Bark dark grey or almost black, smooth or slightly rugose. Timber pale, but darker in the centre, dense but fairly soft.

Leaves thick, dark green and shining above, horizontally spreading. Flowers white in rigid cymes.

The description given in the "Flora Australiensis" is short and inadequate.

The calyx is 9-lobed in the specimens examined, and the lobes are erect even in the expanded flower. The stigma, which is prominently 5-lobed, is rigid and arises from a central depression in the ovary.

The main difference is in the leaves; those are described by Bentham as sessile, whereas the Kimberley specimens show a decided petiole, and attain 5 inches in length and 3 inches in breadth. The petiole is slightly flattened.

Basalt Creeks near the Lawley River, in sandy, gravelly soil, in river forest formation. Flowering m. July (C.A.G.).

In sandstone gorges, near Mount Agnes, in the headwaters of the Prince Regent River, in shady valleys. Fl. m. June (O. T. Siddins).

Also observed along the Mitchell, Moran, and King Edward Rivers.

COMBRETACEÆ.

Terminalia volucris, R. Br. B. Fl. ii. 498.

Deciduous. A small tree of 15 to 25 feet, erect with numerous slender widely spreading branches. Trunk to 9 feet, and 8 inches in diameter; bark grey, persistent and rough, more or less longitudinally fissured and thick; timber light brown.

Flowers light yellow. Spikes crowded at the ends of the branches, slender. Calyx-limb much shorter than the ovary. Filaments and style silky-

hairy at the base. Fruits green. Drupe conspicuously angled or winged, the wings proceeding from two of the angles.

Near Mount Marmion, in sandy loam, among rocks. Flowering and fruiting m. September and October.

Terminalia circumalata, F. v. M. B. Fl. ii. 499.

"Ironwood." Usually a small shrub or tree of 10 to 18 feet, but occasionally a tree of 35 feet, erect, with dense, erect or slightly spreading branches. Bark thick, purple-brown in colour, flaky and rough, and deeply fissured longitudinally. Trunk to 15 feet, and 10ins. diameter; timber dark brown exceedingly hard and dense.

Leaves dull greyish-green, hoary or almost glabrous. Flowers yellowish-white, in small crowded spikes. Fruits almond-shaped, 1¼ins. long, including the annular wing.

Near Derby, Goody Goody, Native Well and Mount Marmion, Lennard and Barker Rivers, and Northwards to the limits of the State. The species is common on the basaltic and sandstone rises to the North and East of the King Leopold Range, and on the flats of the Drysdale and King Edward Rivers. The largest specimens seen (35 feet high), were on the sandstones of the Edkins Range.

Fl. m. April, fruiting June to September.

Terminalia bursarina, F. v. M. B. Fl. ii. 499.

From a tall shrub to a tree of 20-30 feet with numerous dense, erect branches. Trunk to 10 feet and 9ins. diameter; bark dark grey to almost black, rough and fissured; timber dark brown, hard and dense.

Leaves glabrous, flowers yellow.

Lennard, Barker, Isdell, Charnley, Calder, Glenelg and Lower King Edward Rivers. In the stony (usually basaltic) beds of rivers in wet soil. The trees usually lean considerably as a result of floods. Fl. m. August-September.

Terminalia melanocarpa, F. v. M. B. Fl. ii. 500.

A stout tree of 15-25 feet, with spreading branches. Trunk to 15 feet and 12ins. diameter; bark grey and almost smooth, or with small flakes of a reddish, deciduous bark. Timber red, hard and tough.

Leaves quite glabrous, thin, coriaceous, the reticulations very conspicuous. Flowers not seen. Fruits ovate-acuminate, with a flattened curved beak, yellow when ripe.

Camden Sound, Prince Regent River, Glenelg River and Macdonald Ranges. Fruiting m. June.

Terminalia discolor, F. v. M. B. Fl. ii. 501.

An erect tree, with widely spreading, bushy branches, 15 to 20 feet high; trunk to 12 feet and 10ins. diameter, the bark red-grey, almost smooth, shedding in thin grey flakes.

Leaves to 3½ins. long, softly and shortly tomentose on both surfaces, of a dull green, deciduous, or partially so.

Flowers not seen. Fruits ovoid globular, with a short, straight obtuse beak, reddish-yellow, edible, with a pleasant, but somewhat acidulous flavour.

King Edward, Carson, Mitchell, Prince Regent and Calder Rivers, Edkins Range, in sandy soil, on sandstone elevations or ranges. Fruiting m. June-July.

Terminalia Fitzgeraldi, Gardner n. sp.

Partially or completely deciduous. A bushy tree of 15-25 feet, with a short, stout, erect trunk, and widely spreading branches; branchlets slender and along with the leaves closely invested with a short appressed, silky pubescence.

Leaves alternate, rather distant, broadly ovate, the apex rounded or obtuse, the base broad and abruptly narrowed, with the lamina, shortly decurrent along the petiole, or in some leaves decurrent almost to the base of the petiole, thinly coriaceous, the veins pinnate, roughly parallel and reticulate between. Petioles slender, somewhat flattened and slightly expanded at the base.

Spikes shorter than the leaves, axillary, solitary, simple, the rhachis softly pubescent, but shortly silky-hairy at the nodes, the flowers loosely arranged. Calyx on a short glabrous pedicel, glabrous without, globular in the bud, densely woolly within. Stamens and style glabrous, the filaments slender. Anthers ovoid. Fruit fleshy, dark purple, ovoid-globular, not angular, with a short prominent beak, glabrous and smooth.

Height 5-7.5 metres. Trunk to 5 metres, diameter 30 cm. Bark almost corky, rough and much fissured, dark brownish-grey. Timber dense and hard, dark brown, contrasting with a light yellow sapwood. Leaves 8-9 cm. long and 5-6.5 cm. broad on petioles of 3-4 cm. Spikes 4-6 cm. long. Flowers yellow, pedicels 1-2 mm. Calyx 5 mm. diameter, the lobes 2.5 mm. long. Stamens 4 mm. long. Fruit 2 cm. long, and 1.5 cm. diameter.

Calder River, Walcott Inlet and Admiralty Gulf, on the basaltic plains or undulations forming a common shrub in the open forests of *Eucalyptus Spenceriana.* Locally known as "Nutwood." The fruits are edible, with a pleasant but acidulous flavour. Fl. m. September-October.

The species is named in honour of William Vincent Fitzgerald, who did such valuable work while acting as botanist to the Crossland Expedition in 1905.

Affinity to *T. Hadleyana,* W. V. Fitzg.

Terminalia platyphylla, F. v. M. B. Fl. ii. 502.

A tree of 35-45 feet; trunk to 20 feet and 20ins. diameter; branches dense, widely spreading or drooping. Bark dark grey, rough and persistent, longitudinally fissured, thick; timber brown, dense, but not very hard. Flowers not seen. Fruits purple when ripe, 1 inch long.

"Native Chestnut" or "Pear Tree." Occurs along the banks of the larger creeks and rivers northwards to the Carson River, in black soil. Fruiting m. September-October.

The fruits are used for tanning purposes.

Terminalia petiolaris, A. Cunn. B. Fl. ii. 502.

Tree up to 30 feet. Native name Kabing. Pender Bay, 16th October, 1919. (C. E. Lane-Poole).

Leaves 4-5½ins. long. The rhachis of the spike is quite glabrous in the solitary specimen seen, The calyx-limb cupular and glabrous without, the lobes more or less undulate in the expanded flower.

Terminalia Cunninghamii, Gardner n. sp.

A bushy tree of 10-20 feet with a stout, erect trunk and horizontally spreading branches, partially deciduous.

Leaves crowded towards the ends of the branches, pale green, rigid, glabrous, clustered at the nodes, oblanceolate, tapering into a short petiole, obtuse, rigid and flat, the veins prominent.

Spikes in the uppermost axils, as long, or longer than the leaves, the rhachis and pedicels quite glabrous. Flowers not numerous. Calyx glabrous

without, the lobes ovate-triangular, acute, sparingly pubescent within; ovary and style silky-villous; filaments slender, glabrous. Fruit not seen. Seed large and globular.

Height 3-6 metres; trunk to 2.5 m. and 20 cm. (about 8 in.) diameter. Bark thick and corky, light brown in colour, moderately rough. Timber brown, but fairly soft. Leaves 8-9 cm. long, including the petiole, and 2-2.3 cm. wide. Flowers yellowish-green; calyx under 3 mm. long, the limb 4 mm. diamter; stamens 4 mm. long; seed 3 cm. diameter.

Vansittart and Napier Broome Bays, in sandy soil, among sandstone rocks, in open spaces in low-lying situations. Fl. August-September.

Terminalia grandiflora, Bentham. Fl. ii. 503.

Deciduous. A slender, erect tree of 20-40 feet, the branches erect or scarcely spreading, and slender but rigid. Trunk to 25 feet and 8-12 ins. in diameter: bark thick and corky, purple-grey or almost black in colour, deeply fissured longitudinally. Timber dark brown, dense and exceedingly hard, the sapwood pale yellow. Flowers greenish-yellow.

Basaltic flats of the Carson River, Couchman Range, Drysdale River, near Mount Hann and Calder River.

Fl. m. August-September.

Gyrocarpus Jacquini, Roxb. B. Fl. ii. 505

Deciduous. A small bushy tree with spreading branches, and a stout trunk, 15-30 feet high. Trunk to 10 feet, diameter 18ins., the bark yellowish-green or almost grey, streaky, thick and disagreeably scented. Timber soft and white, but fairly dense.

"Stinkwood," "Yellow-wood," or "Meta," the latter being the native name. Flowers yellowish-white. Drupes much wrinkled, dark grey when ripe.

The timber is used by the natives for making "coolimans," in which they carry their small articles. It is soft and easily worked, and very light when seasoned, but not very strong.

Derby, May and Lennard Rivers, Mount Marmion and southwards to the Fitzroy River, in sandy soil with *Bauhinia Cunninghamii* and *Adansonia Gregorii.* Fl. m. April.

MYRTACEÆ.

Verticordia Cunninghamii, Schauer. B. Fl. iii. 29.

A shrub or small tree of 10-25 feet, with slender spreading branches. Trunk to 9 feet, and 8 ins. diameter; bark fibrous, rough and fissured, light grey. Timber brown, hard and dense. Flowers white or yellowish-white on pedicels of about 2 lines. Calyx 5-ribbed. Style slender, slightly exceeding the petals but shorter than the calyx-lobes. Petals more or less 2-lobed.

Sandstone hills and ranges, descending to the littoral forest formation in lateriate overlying sandstone at Vansittart Bay, often occurring in scanty soil on the summits of hills among rocks. Fl. June-August.

Verticordia Cunninghamii, Schau., var. *longistyla,* Gardner, n. var.

A tree of 15-25 feet with spreading branches. Trunk to 12 feet and 8 ins. diameter, the bark purple-brown, or almost black, very flaky and thick.

Leaves not crowded, longer than in *V. Cunninghamii.* Flowers white with a prominent yellow disk, on pedicels of ½in. Bracts orbicular, brown and scarious with a small recurved point. Petals tri-lobed, the lobes deeply fringed.

Style about 1 cm. long, twice as long as the petals, thick, bearded at the end.

Sandy swamps near Mount Hann, Mount Agnes, and Edkins Range. Fl. September-October. Flowers sweetly scented, and slightly larger than those of *V. Cunninghamii.*

This may turn out to be a distinct species.

Calythrix microphylla, A. Cunn. B. Fl. iii. 49.

An elegant shrub of 10 to 15 feet, with rigid branches; bark light brown, fibrous and rough. Flowers deep pink, the filaments purple.

Rocky hills, in rock crevices and scanty soil among sandstone rocks. Synnott, Edkins, and Whatley Ranges, Glenelg, Prince Regent, Moran, Mitchell, Lawley and King Edward Rivers, Mount Agnes and Mount Marmion. Fl. April to July.

Calythrix achaeta, F. v. M. B. Fl. iii. 52.

A shrub of 5-8 feet, with erect stems and rigid spreading intricate branches, leafy only at the ends and moss-like. Leaves erect and imbricate. Flowers yellowish-white, petals linear, filaments slightly flattened, shorter than the petals.

King Leopold Range to Glenelg and Calder Rivers, Camden Sound, Prince Regent, Upper Moran, and King Edward Rivers. The species is common on the sandstone plateaux around Mount Agnes. Fl. June-July.

Calythrix brachychaeta, F. v. M. B. Fl. iii. 52.

A shrub of 6-12 feet with numerous erect slender virgate branches. Flowers yellowish-white, sparingly pubescent.

Stony beds of creeks among sandstone or basalt rocks. Fl. m. May-June. Camden Sound, Prince Regent River, Mount Agnes, Moran, Mitchell, King Edward, Lawley, Carson, and Drysdale Rivers, Edkins Range.

Melaleuca alsophila, A. Cunn. B. Fl. iii. 137.

A shrub of 8 feet to a tree of 25 feet; trunk to 10 feet and 12 ins. diameter, bark dirty white, papery, decorticating in large flakes. Timber pale red, hard. Fl. not seen.

Goody Goody, Derby, in sandy sub-saline soil. The timber is not attacked by termites.

Melaleuca Crosslandiana, W. V. Fitzg. Journ. Roy. Soc. W.A. iii. 186.

A shrub of 6-10 feet to a tree of 25 feet, with a rough grey persistent bark. Trunk to 15 feet and 14 inches diameter, deeply fissured.

Derby, head of Calder and Charnley Rivers, in sandy swampy soil.

Melaleuca leucadendron, Linn. B. Fl. iii. 142.

The species attains its greatest proportions along the Prince Regent and King Edward Rivers. A tree of 60 to 120 feet. Trunk to 60 feet and 3 feet diameter. Bark white, thick and papery, peeling off in large pieces. Timber tough, dense, hard and durable, not attacked by termites, and standing well in water. An ideal timber for construction work. The natives use the bark for making buckets, roofs, beds, etc. The timber is largely used for building purposes.

The lower branches are remarkably pendulous, often 40 or 50 feet long. Leaves to 10 inches long, pendulous. Flowering spikes to 6 inches long, the petals green and pink, the filaments white.

This species, known as "Cadjuput," occurs along the larger creeks and rivers, forming a kind of rain-forest, with a dense undergrowth of two or more storeys. The trees are shallow-rooted, and often uprooted by the heavy floods of the narrower valleys. Fl. June-August.

A yellow-flowered form, with a fibrous persistent bark, occurs in the swampy highlands. It is difficult to separate from the typical form except in habit. It may prove to be a variety. I observed this form on the central plateau around Mount Agnes, Admiralty Gulf, and Vansittart Bay, also along the Lennard and Isdell Rivers. Known as "Hill Cadjuput."

Melaleuca argentea, W. V. Fitzg. Journ. Roy. Soc. W.A. iii. 187.

A tree of 40 to 70 feet, with spreading but not pendulous branches. Trunk to 30ft. and 2ft diameter; bark white, decorticating in large thin sheets. Leaves silvery-glaucous, minutely hoary or pubescent, 4-6 inches long. Flowers yellowish-white, sweetly scented.

Barker, Isdell, Charnley, Calder, Glenelg, Prince Regent, Moran, King Edward, Lawley, Carson, and Drysdale Rivers, in stony sandy soil fringing the courses of rivers intermixed with *M. leucadendron.* Fl. August-October.

A shrubby form, forming thickets, was met with on the stony creeks of the Mitchell River.

"Silver Cadjuput." The tree is at once distinguished from *M. leucadendron* by its silvery leaves and more spreading habit.

Melaleuca minutifolia, F. v. M. B. Fl. iii. 162.

A shrub to a spreading tree of 25 feet. Trunk to 8 feet, and 8 inches diameter. Flowers small, white.

Isdell River and King Leopold Range.

Tristania suaveolens, Smith. B. Fl. iii. 261.

A tree of 30 to 50 feet, with widely spreading branches. Trunk to 25 feet and 20 inches diameter; bark grey, rough and fibrous, hard. Timber dark brown, very hard and dense, resisting the attacks of termites. Flowers not seen.

Basalt creeks between the Lennard and Drysdale Rivers, extending to the Northern limits of the State. The species is always found in proximity to water, and seldom, if ever, on the sandstone formations. "Fresh Water Mangrove." The bark contains 4.5 per cent. of tannin.

Eucalyptus oligantha, Schau. B. Fl. iii. Maiden Crit. Rev. ii. 160.

In transit I collected a fragmentary specimen of this species (in fruit) on the Artesian Range.

A small tree of 10-20 feet with a short stout trunk and widely spreading branches. The bark is moderately smooth, flaky with purple patches, decorticating in small pieces leaving a yellowish-white bark underneath.

The specimen collected had newly fallen flowers.

Eucalyptus melanophloia, F. v. M. Maiden Crit. Rev. ii. 71.

A small tree of 20-25 feet with rigid spreading branches. Very similar in habit to *E. Spenceriana.* Trunk to 10 feet and 12 inches diameter, the bark rough and flaky, whitish-grey, persistent. Timber dense, reddish, very hard. Leaves in my specimens not exceeding 5 cm. in length and 1.1 cm. broad, very glaucous. Flowers not seen. Fruits urceolate, 3-4 cm. diameter.

Plains of the Isdell River near Grace's Knob. (April, 1921.)

Eucalyptus brachyandra, F. v. M. Maiden Crit. Rev. iii. 219.

A dwarf tree of 10-20 feet of spreading habit with a short stout trunk of 6-8 feet, the branches rigid and widely spreading. Bark dark grey, rough and persistent, fibrous, more or less fissured on the trunk, that of the branchlets smooth, of a grey-brown colour. Timber red, rather soft. Leaves

when young of a pale glaucous green. The tree is scantily foliaged in the winter months, and when I collected the species, at the end of September, it was putting out a wealth of delicate foliage. Flowers not seen.

An inhabitant of rocky sandstone hills, usually found in scanty soil between masses of sandstone or in rock crevices, frequently in inaccessible situations. Probably flowering in October-November.

Artesian Range, Edkins Range, hills near the Glenelg, Prince Regent, Moran, King Edward and Carson Rivers and Vansittart Bay. Rocky gorges to the immediate south of Napier Broome Bay.

Eucalyptus Mooreana (W. V. Fitzg.) Maiden, Crit. Rev. v. 93.

I collected this species on the summits of the King Leopold Range near Mount Hart.

A small deformed tree of 10-18 feet long with a smooth whitish bark. Leaves ovate, obtuse, about 4 inches long, mealy-glaucous, the intramarginal vein removed from the edge. Flowers yellowish-white. Fl. m. April.

In sandy soil among sandstone rocks.

Eucalyptus pallidifolia, F. v. M. Maiden, Crit. Rev. iii. 29.

"Micum" or "Migum." A small stunted tree of 10-20 feet with a short stout trunk and yellowish-white bark, which is smooth, but thick and brown in fracture when dried.

The specimens are in an immature fruiting stage.

Mount Florence, near Roebourne, on ridges, sometimes known as "Ridge Gum." (D. McVicar.)

Mr. F. Lawson Whitlock informs me that the species is common along the Fortescue River and around Millstream Station.

The species has not been previously reported from the North-West. Mueller reported it from Sturt's Creek near the border of the Kimberleys and the Northern Territory.

Eucalyptus rostrata, Schlecht. Maiden, Crit. Rev. iv. 65.

The Kimberley examples are erect trees of 40 to 70 feet, with trunks of 30-35 feet and 20 inches diameter, the bark not very thick, smooth and white or slightly pink, yellow in fracture; timber reddish, rather dense and hard. "White Gum" or "River Gum" of Kimberley. Peduncles and pedicels slender, acutely angular, filaments lemon-yellow.

Isdell, Barker, Lennard and May rivers, in sandy soil lining the courses of streams. Fl. September-October.

The species is not found to the north of the Isdell River. It seems to prefer a sandy soil, which is scarce in the rivers to the north, most of which are gorged out of solid rock. The Drysdale is an exception, but the place of *E. rostrata* is here taken by *E. alba*.

Eucalyptus microtheca, F. v. M. Maiden, Crit. Rev. ii. 51.

A tree of 20 to 35 feet, with a short stout trunk and widely-spreading branches. Trunk 8-16 feet, often crooked, attaining a diameter of over 2 feet. Bark persistent, thick, fibrous or flaky, tessellated, of a dirty greyish-brown colour, that of the branchlets smooth, light grey and decorticating in flakes. Timber exceedingly dense, dark reddish-brown, with scattered white fibres, the sapwood almost white.

Leaves very variable in size, either linear-falcate 7-8 inches long and half an inch wide, or 3-5 inches long and over 1 inch wide, the intramarginal fairly close to the edge. The leaves are a glaucous green, hanging vertically. The tree is not very densely foliaged. In the Kimberley specimens the oper-

culum is very obtuse and short, and the fruits are thin and papery, the rim very narrow, and the valves scarcely exserted.

Flowers yellowish-white, small.

Lennard, May and Barker Rivers (C.A.G., Wyndham and Ord River (D. McVicar). The species is stated to occur along the lower Fitzroy River. Fl. February-March. The fruits dehisce soon after flowering, and then fall.

"Coolibah." One of the hardest timbers of the State, if not the hardest. It is not attacked by termites, and is widely used by the settlers of the Lennard River for building and fencing, etc.

The trees are common in a clay soil near billabongs and depressions that are subject to periodic inundation. The natives obtain water from the roots by cutting and digging them up, then draining them into a receptacle. The natives of the Lennard River use the bark of this species for fish poisoning.

"Coolibah" is highly prized as a substitute for Lignum vitæ, and has proved quite satisfactory for all the purposes for which Lignum vitæ is used.

Eucalyptus Spenceriana, Maiden. Crit. Rev. iv. 206.

"Grey Box," sometimes known as "Coolibah."

A tree of 20-35 feet, of similar habit to *Eucalyptus microtheca*, the bark similar, but perhaps slightly lighter in colour and the external layers more powdery. Timber dark reddish-brown, the white fibres (so prominent in *E. microtheca*) scarcely evident, hard and dense, exceedingly tough, with an interlocked grain. The matured leaves are a glaucous green and attain a length of 16 cms., but are frequently much shorter, 2 cm. broad, the conspicuous intramarginal vein close to the edge. Peduncles expanded towards the summit. Flowers not seen.

Fruits urceolate, papery, very deciduous.

A common species, and frequently the sole Eucalypt of the basaltic areas, or associated with *E. clavigera*, confined to the basaltic formation, and forming extensive savannah forests on plains and hills with a prolific undergrowth of grass.

Fl. m. November.

The species is occasionally found on granite hills between the King Leopold and Napier Ranges. It extends northwards from the Lennard River to Napier Broome Bay, and its dull glaucous foliage renders it conspicuous from a distance and an indication of the best pasture lands.

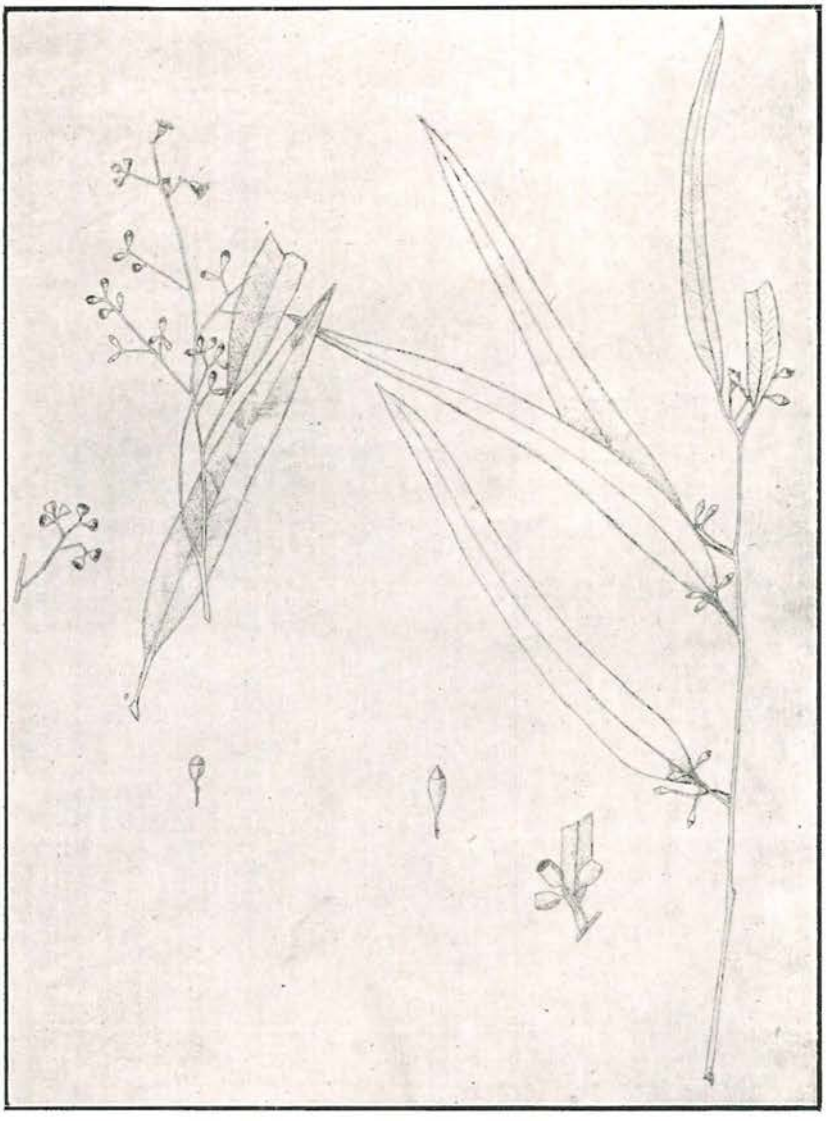
The timber burns well, and is one of the best—if not the best—firewood of Kimberley. Possessing most of the qualities of Coolibah it is also termite resistant.

The resemblance to true Coolibah is so great that it is in many cases impossible to separate the species from habit alone. The branchlets, however, are not smooth, the persistent bark of the trunk extending to the ultimate branchlets.

Eucalyptus clavigera, A. Cunn. Maiden Crit. Rev. iv. 179.

An erect tree of 20-35 feet, with widely spreading branches and horizontally expanded leaves. Trunk to 18 feet and 20 inches diameter, the bark of the lower part of the trunk flaky, persistent, and dark grey, that of the upper portions and branches decorticating in large greyish plates, leaving the new bark smooth and of a greyish-pink colour. The bark of the base of the tree extends to a height of 5 feet.

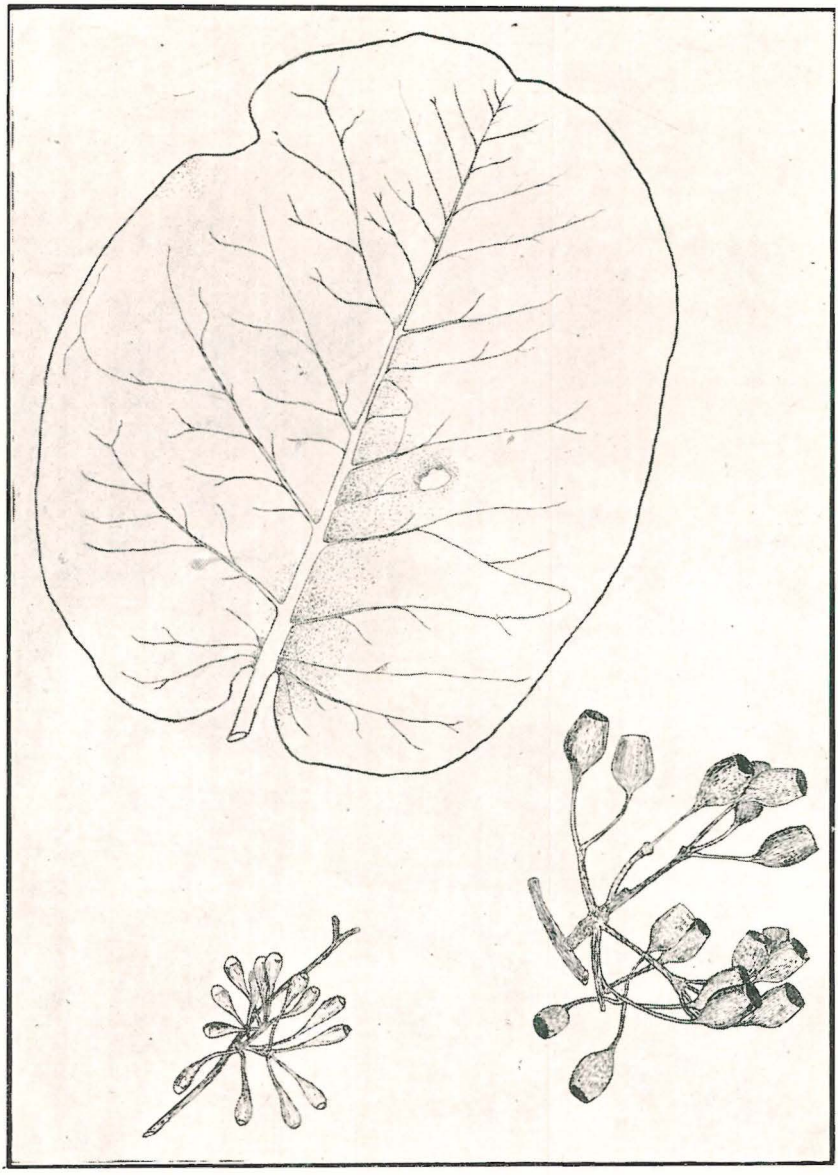
Mature leaves light green, scabrous with short hairs, especially on the midrib and more prominent veins. The intramarginal vein is not evident in this species. Margins undulate.



COOLIBAH and GREY BOX (*E. microtheca*, and *E. Spenceriana*).

Right: *Eucalyptus Spenceriana*, Maiden. Twig with buds. Flower bud. Fruits. Walcott Inlet, Kimberley.

Left: *Eucalyptus microtheca*, F.v.M. Twig with buds and flowers. Fruits. Bud. Lennard River, Kimberley.



EUCALYPTUS clavigera, A. Cunn.
Leaf, Buds, and Fruits.

Flowers not seen, in small lateral panicles, the peduncles and pedicels angular, the former much dilated, the summit of the calyx-tube much contracted, the distinct operculum almost discoid.

The fruits are of a thin papery texture, easily crushed. They are distinctly urceolate and prominently striate, the capsule deeply sunk and usually 3-valved.

Common over the sandy soil of the sandstone ranges and frequently observed on the basaltic hills intermixed with *Eucalyptus Spenceriana.*

Edkins Range, Artesian Range, Elizabeth-Catherine Range, Couchman Range, Macdonald Ranges, Isdell, Lennard, Barker, Charnley, Calder, Sale, Glenelg, Prince Regent, Moran, and King Edward Rivers. The species extends to the centre of Kimberley in the vicinity of Mount Agnes. Fl. m. November-December.

Eucalyptus papuana, F. v. M. Maiden Crit. Rev. iv. 192.

This species varies considerably in habit. The low inland form is known as "Desert Gum," while the much larger coastal form is a typical "White Gum."

"Desert Gum." An inhabitant of sandstone elevations and ranges in the interior from the Glenelg River to Vansittart Bay, where it descends to the coastal Eucalyptus forest.

A tree of 20-30 feet with spreading, almost pendulous, branches and scanty foliage. Trunk to 15 feet and 12 inches diameter, the bark varying from almost white to a pinkish-buff colour, mottled with small numerous flakes of a reddish-brown colour. The leaves are a deep shining green, the reticulations inconspicuous, the intramarginal vein close to, but distinct from, the edge.

Vansittart Bay, in laterite soil among sandstone rocks.

"White Gum." An erect tree of 35-50 feet or more. Trunk to 25 feet and 2 feet diameter, the branches gracefully drooping or quite pendulous. Bark white, rather thin, usually smooth to the ground, or occasionally with a rough butt, shedding in small thin grey flakes. Timber pink, rather dense and hard, attacked by termites.

The bark if this species is of no use for tanning.

Barker River, near Napier Range, Lennard River and Derby. Fl. November-January.

The Lennard and Barker River trees are in good black soil, those near Derby are in poor sandy soil.

C. E. Lane-Poole collected this species near Pender Bay as a White Gum of 35 feet. The timber is of no commercial use.

Eucalyptus alba, Reinw. Maiden Crit. Rev. iii. 90.

A tree of 25-40 feet, with an erect trunk and widely spreading branches. Trunk 10-25 feet in height and 16 inches diameter, the bark thick, smooth, white, or almost pink, the outer bark shedding in large grey flakes. Timber yellowish-pink, very moist.

Leaves triangular-ovate, 3-4 inches, light grey, coriaceous and shining, the reticulations prominent.

The leaves do not hang vertically, but are more or less spreading. The petioles attain a length of nearly 2 inches. Filaments white.

Banks of the Upper Drysdale River near Mount Hann, sandy plains near Mount Agnes and Upper Charnley River, in sandy soil forming open forest with *Eucalyptus Spenceriana,* or *E. miniata.* Fl. m. August-September.

The branches of this species frequently fuse where they become crossed.

Eucalyptus confluens (W. V. Fitzg.), Maiden Crit. Rev. iv. 174.

A tree of 20-30 feet in height, with few spreading branches. Trunk to 15 feet and 10 inches diameter. Bark pinkish-white, decorticating in small flakes unevenly, giving the trunk a mottled appearance.

Leaves 4-6 inches long on long slender petioles, lanceolate, the intramarginal veing very close to the edge, the midrib conspicuous, the whole leaf coriaceous and shining.

Flowers white, in axillary or lateral umbels, the peduncles more or less expanded towards the summit. Filaments inflected in the bud. Operculum broadly conical. Fruits not seen.

Collected not far from the Isdell River near Grace's Knob on rising ground among sandstone rocks. Fl. m. April.

The specimens of this species were destroyed by fire, but the notes and a sketch were saved.

Eucalyptus Herbertiana, Maiden. Crit. Rev. vi. 429.

This appears to be the only Eucalyptus of the Mallee type in Kimberley, and even then is very robust for a Mallee.

It is of interest in exhibiting a thin external operculum which is early deciduous. The filaments, in a most advanced buds seen, are of an orange-red colour. The long pendulous leaves are a bright green colour, and the more robust specimens have somewhat the appearance of the smaller forms of *Eucalyptus papuana*, F. v. M.

This species is an inhabitant of rocky gorges and valleys, in scanty soil among sandstone rocks. It has only been recorded from the type locality, viz., Gorges near the Mitchell River, lat. 15° South long. 160° E.

Eucalyptus Houseana (W. V. Fitz.) Maiden. Crit. Rev. v. 291.

A tree of 30-60 feet, with numerous erect or spreading, occasionally almost pendulous, branches. Bark quite white, smooth, decorticating in large thin plates. Trunk to 30 feet and 30 inches diameter, swollen at the base into a kind of pedestal. Timber pink to red in colour, fairly hard and dense, with large kino ducts.

The leaves vary in shape from ovate to lanceolate. The venation is prominent, the intramarginal vein distant from the edge. They are always glaucous and hang vertically. Filaments white.

The fruits have not been seen in a mature state. I have one solitary fruit with opened valves which is here described:—

Fruit broadly turbinate or obconical, slightly 3-angled, the rim rather narrow but prominent, the capsule slightly sunk, 3 or 4-valved, the obtuse points of the valves not protruding.

Sessile, 5 mm. long and 5 mm. diameter.

Ashton Creek, Upper Charnley River, lat. 16 deg. 5 min.

The species is confined to moist valleys and flats from the Charnley River to north of the Couchman Range.

Following are some localities in which the species was observed:— Glenelg River, Whatley Range, Prince Regent, Moran, Mitchell, Upper King Edward, Carson, and Drysdale Rivers, creeks north of the Couchman Range. Fl. July-August.

"White Gum." The timber is of good quality and not attacked by termites. The trees were always selected by the late F. S. Brockman in 1901 for marking camps, positions, etc.

Eucalyptus miniata, A. Cunn. Maiden Crit. Rev. iii. 37.

"Woolly-Butt."

A common tree of the sandstone valleys and tablelands, never found on basaltic country. Flowers orange-yellow, anthers bright yellow, style green. The flowers contrast well with the glaucous calyces and branchlets.

Timber red, rough, and not very dense nor strong, easily attacked by termites. The trunk attains a diameter of 30 inches.

Common throughout Kimberley as far south as Goody Goody near Derby, where an islated forest of small trees occurs; but its habitat must be regarded as north of the King Leopold Range to Napier Broome Bay. Fl. April-July.

Eucalyptus ptychocarpa, F. v. M. Maiden, Crit. Rev. v. 105.

An erect tree of 30-50 feet with spreading drooping branches. Trunk to 30 feet and over 30 inches diameter; bark persistent throughout, thick, and longitudinally fissured, dark reddish-grey. Timber red, soft but fibrous, sound in all the trees inspected.

Leaves usually opposite, broadly lanceolate, acuminate, attaining 12 inches in length and 3 inches diameter, the secondary veins nearly parallel, the margins thickened and nerve-like.

Flowers not seen. Peduncles terete, bearing an umbel of 2-4 flowers. Operculum depressed-conical, ribbed like the calyx.

Fruit two inches long and 1¼ inches diameter, prominently 8-ribbed, the capsule deeply sunk, the valves obtuse, not protruding.

In moist sandy boggy places, Hann's Pass, King Leopold Range, Edkins Range, Upper Charnley River, Mount Agnes, Prince Regent River, Carson and Mitchell rivers.

Eucalyptus perfoliata, R. Br. Maiden, Crit. Rev. v. 103.

A small crooked tree of 10-20 feet with a stout trunk of 6-10 feet and widely-spreading rigid branches. Bark fibrous, persistent, brown or brownish-grey, fairly thick and more or less longitudinally fissured. Timber deep red, fairly dense and hard. Trunk to 10 inches diameter.

Leaves opposite, connate, attaining a length of 8 inches and a width of 4 inches, erect or spreading. Flowers large, white to pale yellow. Calyx fleshy, the bud soft and fig-like, contracted towards the summit, operculum almost discoid in the advanced bud, the line of separation not visible, the calyx rupturing as the flower opens. Occasionally the upper adult leaves are free, but in the specimens seen by me closely sessile.

Fruits woody, urceolate-cylindrical, 1½ inches long, the rim thick and concave, the capsule very deeply sunk.

Lennard and May Rivers, Charnley, Prince Regent Rivers, Edkins Range, Mount Marmion and near Mount Agnes, on rocky hills in sandy soil among sandstone. Fl. April-August. Also Artesian and King Leopold Ranges, not in flower.

Eucalyptus setosa, Schauer. Maiden, Crit. Rev. iv. 210.

I have received a small specimen from V. Edwards, collected in the vicinity of the Lennard River, probably close to Mount Marmion. There are no notes on the habit of the tree.

Eucalyptus terminalis, F. v. M. Maiden, Crit. Rev. iv. 305.

"Ironbark." An erect tree of 40-60 feet. Trunk to 35 feet, and 18 inches to 2 feet diameter. Bark persistent throughout, rough, longitudinally

fissured, light or dark grey in colour, very fibrous. Timber dense, of a deep red colour.

Branches and leaves spreading, the leaves firm and shining. Flowers in woody corymbs, the calyx very glaucous, obconical, shortly pedicellate, operculum almost flat, separating irregularly.

Fruits 1¼ inches long, cylindrical, tapering towards the orifice, woody and glaucous, smooth, the rim not broad, the capsule deeply sunk.

Flowers yellowish-white.

A common tree of the sandstone areas to the east and north of the Glenelg and Calder rivers, extending to Napier Broome Bay. The largest trees occur on sandy moist flats in the sandstone ranges, forming open forests of some extent with *E. miniata*.

It is more rare in the northern portions of the Kimberleys, where its place is taken by *E. tetrodonta*. It is never found on basaltic soil to the north of the Edkins Range.

A small stunted form was observed along the Barker River, but specimens were not collected. It is probable that this is *E. pyrophora*.

The timber exudes quantities of a deep red astringent kino.

Fl. m. May-June, fruiting in September-October.

Eucalyptus pyrophora, Benth. Maiden, Crit. Rev. iv. 320.

A tree of 20-35 feet with an erect or leaning trunk and spreading drooping branches. Trunk to 15 or 20 feet and 12 inches diameter, the bark persistent, grey and rough, longitudinally fissured.

Derby, in sandy soil in the "Pindan" with *Adansonia Gregorii*, *Eucalyptus papuana*, and *Acacia impressa*.

So far as I have seen the species it is confined to the plains south of the King Leopold Range.

Eucalyptus Foelscheana, F. v. M. Maiden, Crit. Rev. v. 4.

A Bloodwood. A robust tree of 10-35 feet with few widely spreading branches. Trunk to 15 feet and 15 inches diameter. Bark of a light buff colour, or whiter, with purple blotches of decorticating bark, otherwise quite smooth. Timber red, dense and hard.

Leaves varying from ovate to lanceolate-falcate, 3 by 2 inches to 7 inches by 1¾ inches, thick, pale green, rigid but drooping, the secondary veins roughly parallel.

I have not seen the flowers, but in specimens which had just finished flowering the calyx was broadly turbinate, somewhat fleshy with an expanded rim 1.5 cm. in diameter. Fruits smooth, urceolate, contracted into a short neck, 3 cm. long.

North-west Kimberly, to the south of Admiralty Gulf, occurring both on basaltic and sandstone formations. Somewhat difficult to distinguish in habit from *E. latifolia*, but the leaves are very different.

Basalt hills, Admiralty Gulf, Mitchell River, Lower King Edward River, and near Vansittart Bay. A few smaller trees (10-15 feet) were observed along the Carson River.

The trunk exudes large quantities of an extremely astringent kino, and the species is a prominent host-plant of *Loranthus ferruginiflorus*, W. V. F.

Fl. m. June-July.

Not previously recorded from Western Australia, except a doubtful specimen of Ostenfeld's, which I do not consider to be this species.

Eucalyptus latifolia, F. v. M. Maiden, Crit. Rev. v. 1.

A Bloodwood. A robust tree of 30-50 feet, with an erect trunk and widely spreading drooping branches. Trunk to 25 feet, and up to 20 inches diameter, the bark yellowish-pink in colour, or almost white, spotted with small purple-grey flakes of deciduous bark which give the trunk a mottled appearance.

Timber pink, dense and rather hard.

Leaves drooping, broadly ovate to ovate-lanceolate, 3-4 inches long. Flowers arranged in large terminal panicles.

Fruits ovoid, contracted towards the orifice with a prominent rim, the capsule deeply sunk, 6-7 lines long, and 5 lines diameter.

Some trees have longer leaves but narrower.

Upper Moran River, near Mount Hann, extending to the Lower King Edward and Carson Rivers, Drysdale River and valleys near Mount Agnes. Basalt undulations with *Eucalyptus Spenceriana,* or sandstone valleys in sandy soil forming open forests with *E. miniata.*

The fruits closely resemble those of *E. dichromophloia,* F. v. M.

Not previously recorded from Western Australia.

Eucalyptus dichromophloia, F. v. M. Maiden, Crit. Rev. iv. 313.

A tree of 20-30 feet with gracefully drooping almost pendulous branches. Trunk 15-20 feet and 20 inches diameter, the bark persistent throughout, rough and flaky on the trunk, slightly longitudinally fissured, reddish-black or dark grey in colour, red in fracture.

Leaves a pale glaucous green, not shining, the midrib conspicuous, the intramarginal vein very close to the edge.

The branchlets are very angular, and the fruits vary in length from 4 to 7 lines.

Plateau between Mitchell and King Edward Rivers, 12 miles south of Mount Connor, gorges near King Edward River, Vansittart Bay, and sandstone hills near Napier Broome Bay, Derby and Broome.

The species occurs in sandy soil, among sandstone rocks. The Vansittart Bay form has larger fruits than those seen elsewhere.

In all the specimens seen in Northern Kimberley, the bark was rough and persistent throughout.

Eucalyptus tetrodonta, F. v. M. Maiden Crit. Rev. v. 139.

"Messmate" or "Stringybark."

A tree of 35-50 feet; trunk to 35 feet and 20 inches or 2 feet diameter. Bark grey, rough, fibrous and persistent throughout, the fibres interwoven, thick and longitudinally fissured. Timber pale red, dense, the sapwood yellowish-white.

The leaves are glaucous and hang vertically. The veins are prominent, and the intramarginal one distant from the edge.

In the specimens collected, the operculum is quite smooth. Filaments white to almost yellowish-white.

This, one of the commonest of the Kimberley timber trees, occasionally attains a height of 65 feet. It extends northwards from the Phillips Range (near Packhorse Range), in a northerly direction to Mount Shadforth, in the Edkins Range, thence to the Elizabeth-Catherine Range, along the summits of the Prince Regent-Glenelg divide, thereafter its western boundary extends along the Prince Regent River. The localities stated form the western boundary to the species. It extends northwards to Napier Bay, gradually becoming predominant, until to the north of the Couchman Range it is the

principal tree of the forests. The range of the species extends indefinitely in an easterly direction, but I have not seen it recorded from Wyndham or adjacent localities.

Isolated trees have an average height of 45 feet, but when they form dense patches, which is not unusual, they are of much lower stature. The timber appears to be free from the ravages of termites, and is very strong.

E. tetrodonta is restricted to the sandstone formations, but is common in laterite overlying sandstone. Fl. m. June-July.

Xanthostemon paradoxus, F. v. M. Benth. F. iii. 269.

A tree of 25-30 feet, with numerous spreading branches, the lower ones drooping; trunk to 15 feet and 1½ feet diameter, the bark thick, rough and dark grey, persistent; timber dark brown, hard and dense.

Flowers yellow.

Near the Charnley River Gorge, Edkins and Synnott Ranges. Mount Agnes and Prince Regent River, in sandy loam among quartzite rocks. Fl. m. April.

Eugenia grandis, Wight. B. Fl. iii. 285.

Partially deciduous. An erect tree of 20-35 feet, with a stout trunk and spreading branches. Trunk to 10 feet and 16 inches diameter; bark light grey, smooth or scarcely rough. Timber dark brown, dense and fairly hard.

Leaves rigid, horizontally spreading, orbicular, thick, tough, and shining, 6 inches long, and as much in diameter, the venation prominent.

Flowers white.

The fruits are eaten by the natives of the Drysdale River.

An inhabitant of sandy loams, among sandstone and quartzite rocks, never very far from the coast, on tablelands, or more frequently in valleys. Fl. m. September.

Artesian and Edkins Range, Walcott Inlet, Upper Calder River, Glenelg, Prince Regent and Moran Rivers. Vansittart and Napier Broome Bays.

Eugenia eucalyptoides, F. v. M. B. Fl. iii. 285.

A slender tree of 12-20 feet, or a tall shrub with willow-like branches, the lower branches pendulous. Trunk to 8 feet and 6 inches diameter; bark light grey, almost smooth.

Flowers white, the base of the petals pink.

Calder River, near Walcott Inlet, Upper Calder River, Prince Regent River, Moran, Mitchell and Lawley Rivers, in the stony beds of creeks and rivers.

Eugenia Armstrongii, Benth. Fl. iii. 286.

A tree of 15-20 feet with a stout erect trunk of 8 feet and dense spreading branches. Bark greenish-grey, almost smooth. Timber brown. Flowers white, suffused with pink.

Edkins Range, in sandy soil, among sandstone rocks; also near Mount Agnes.

MELASTOMACEÆ.

Osbeckia australiana, Naudin. B. Fl. iii. 291.

A shrub of 4-6 feet, with erect, dense branches. Calyx yellow, densely bristly-hairy; corolla purple, the stamens large and deep yellow; the style purple.

Isdell, Calder, Glenelg, Prince Regent, Mitchell, Moran, King Edward and Drysdale Rivers, in black soil along the banks of streams and rivers, in humid spots in the sandstone formation. Fl. June-September. Fruiting in October.

ÆNOTHERACEÆ.

Jussieua suffruticosa, Linn. B. Fl. iii. 307.

A shrub of 2-3 feet with erect, loosely branched stems. Flowers pale yellow, with few purple striations.

Capsule hirsute. Seeds small, oblong, light brown and glabrous.

Near source of the Moran River and headwaters of the Drysdale and King Edward Rivers, in deep, black soil on the banks of creeks. Fl. June-July.

UMBELLIFLORAE.

UMBELLIFERAE.

Trachymene hemicarpa, Benth. *var. major*, Benth. Fl. iii. 351.

Stems usually simple, succulent, erect 4-8 feet high, strongly scented. Leaves on long petioles at or near the base of the stem. Flowers yellowish-white.

In moist, sandy soil, among quartzite rocks in open forests of *Eucalyptus miniata*. Fl. April-June.

Synnott, Edkins and Macdonald Ranges, hills near Prince Regent and Glenelg Rivers.

SYMPETALEAE.

PRIMULALES.

MYRSINACEÆ.

Ægiceras majus, Gaertner. B. Fl. iv. 277.

A shrub of 12 feet, bushy, with erect branches. Bark light grey, smooth. Leaves dark green, drying pale. Flowers white, petals twisted and imbricate in the bud. Anthers white, the pits of the cells conspicuous.

In sandy soil on open beaches, usually on the higher parts of the beach inside the Mangrove fringe, the roots washed by the equinoctial tides only. Sometimes found lower in tidal waters.

Camden Sound, Admiralty Gulf, Vansittart and Napier Broome Bays, a Mangrove, with sweetly scented flowers. Fl. August-September.

EBENALES.

EBENACEÆ.

Diospyros nitens, W. V. Fitzg. Journ. Roy. Soc. W.A. iii. 192.

Quite glabrous. A shrubby tree of 10-15 feet in height, with many spreading or drooping branches. Trunk to 5ins. diameter, the bark green-grey or almost black and smooth.

Leaves rigid, but thin, spreading. Fruits depressed-globular or almost globular, smooth and shining, about 1in. diameter, orange-yellow when ripe, the seeds reniform, brown, 5-7, immersed in pulp.

Basaltic creeks, near Mount Connolly, Carson River in loam, among boulders with *Bombax malabaricum* and *Albizzia*.

Fruiting m. August-September.

Maba humilis, R. Br. B. Fl. iv. 291.

This apparently common coastal species extends to the central mountains. A densely branched tree of 10-20 feet, pyramidal in outline. Trunk to 8 feet and 6ins. diameter, the bark smooth, leaden-grey in colour, sapwood yellowish-white. Heartwood deep black. Fruits deep yellow, smooth, ovoid. the 3-lobed calyx embracing the base of the fruit. Dissepiments membraneous; seeds 9 mm. long semiovoid, flattened on one side to form two angles, dark brown and rugose.

Sandstone elevations, Mount Agnes, in scanty sandy soil among rocks. Fruiting m. September.

Ebony. A tree of 20 feet and 8ins. diameter, with a black heartwood, similar in every way to the West African Ebony. Pender Bay and Chile Creek. Native name "Brembre" (C. E. Lane-Poole).

SAPOTACEÆ.

Siderozylon Arnhemicum, Benth. et Hook. Benth. Fl. iv. 280.

This species is described in the Flora Australiensis under the name of *Achras Arnhemica*, F. v. M.

A tree of 15-25 feet, with a stout trunk and spreading branches, partially deciduous. Trunk to 10 feet, and 10 inches diameter, the bark dark grey and rough.

Leaves to 5 inches long, and nearly 3 inches broad, hoary-pubescent on both sides, on petioles of nearly 1½ inches. Fruits globular, pubescent, 1 inch diameter.

"Native orange." Edkins and Synnott Ranges, Mount Agnes, Prince Regent and Drysdale Rivers, in sandstone or basaltic valleys, with *Erythrina vespertilio* and *Cochlospermum*. Fruiting m. June.

CONTORTAE.

LOGANIACEÆ.

Mitrasacme foliosa, Gardner n. sp.

A glabrous annual, or herbaceous perennial. Stems ascending from a leafy base, 4-9 inches high, very leafy in the lower parts.

Leaves oblanceolate, obtuse, narrowed towards the sheathing base, prominently 3-nerved, the uppermost leaves numerous in false whorls. Flowers in large dichotomous panicles, the bracts broadly obovate, minutely glandular-papillose on the lower margins.

Pedicels filiform. Calyx-tube turbinate, with four prominent dark-coloured ribs, terminating in broad truncated lobes, the spaces between the ribs covered with small white scarious scales. Corolla white, yellow near the throat, the lobes spreading, oblong, obtuse, and shorter than the narrow cylindrical tube. Filaments attached above the middle; anthers oblong-linear, conspicuously exserted; style shorty exserted, with two short stigmatic lobes. Capsule much longer than the calyx, ovoid-acute; seeds not seen.

Plant 10-25 cm. high, spreading to as much, or more, in diameter. Leaves 2-3 cm. long, 4-5 mm, wide. Bracts 3-4 mm. long, 1.5 mm. wide. Calyx 2-3 mm. long. Corolla-tube 7 mm. long, the lobes 4 mm. long. Capsule 3 mm. long.

Moist grassy spots around the sources of the Calder, Charnley, Mitchell, Moran, and King Edward rivers, in the sandstone country, in sandy loam. Fl. m. May-July.

Affinity to *M. lepidocalyx*, W.V.F., differing chiefly in the leafy stems, trinerved leaves, and much larger flowers.

Strychnos luciaa, R. Br. B. Fl. iv. 369.

An erect shrub of 6-15 feet, with numerous spreading branches. Leaves yellowish green, glabrous and shining, prominently 3-nerved. Fruits orange-yellow, about 1 inch diameter, ovoid-globular; seeds numerous, orbicular, grey and shining with a silky lustre, immersed in pulp.

The pulp of the seeds, of a milky-white, is extremely bitter, and not eaten by the natives.

Common in Central Kimberley, in sandy loam among rocks, fruiting in June.

Mount Agnes (O. T. Siddins), Mitchell River (C. A. G.).

APOCYNACEÆ.

Carissa lanceolata, R. Br. B. Fl. iv. 305.

An intricately branched shrub of 4-8 feet in height and spreading from the base into as much in diameter, quite glabrous, armed with slender spines on the branchlets. Flowers small, white, with expanded corolla lobes. Fruits purple, ovoid.

A common shrub of the South-West Kimberley on the plains of the May and Lennard rivers, Isdell and Barker rivers, Grace's Knob.

Fl. m. October, fruiting in March-April. "Konkerberrie." The palatable edible fruits are eaten by natives and birds.

Alstonia verticillosa, F. v. M. B. Fl. iv. 313.

A fragmentary specimen without notes has been collected by O. T. Siddins in the Edkins Range.

Wrightia saligna, F. v. M. B. Fl. iv. 316.

An erect shrub or small tree of 10-15 feet, with slender supple drooping branches. Flowers not seen; leaves with copious latex.

"Milk bush." Pindan country between Meda and Derby. Native Well, Goody Goody. A favourite top-feed plant with cattle.

ASCLEPIADACEÆ.

Marsdenia Brockmaniana, W. V. Fitzgerald. Journ. Roy. Soc. W.A. iii. 197.

Spreading to a diameter of 2 or 3 feet. Flowers white, striated in the tube with purple lines. Fl. m. April.

Napier Range.

Gymnanthera nitida, R. Br. B. Fl. iv. 326.

Stems woody, twining to a height of 30 feet.

Flowers greenish-yellow, in dense cymes, sweetly scented. Fruits not seen.

Barker River, King Leopold Range, Lennard River, and Calder River, in sandy soil along the banks of rivers. Fl. m. September-October.

TUBIFLORAE.

CONVOLVULACEÆ.

Ipomoea Pes-caprae, Roth. B. Fl. iv. 419.

Stems prostrate, rooting in sand and spreading to several yards in diameter. Leaves rigid, brown-green. Peduncles much shorter than the leaves. Flowers purple-red.

Sandy shores of Admiralty Gulf and Vansittart Bay, Napier Broome Bay and Camden Sound, on sandy beaches, flowering May-August.

The species is of economic importance as a sand-binder. The tubers are eaten by natives.

Ipomoea angustifolia, Jacq. B. Fl. iv. 425.

Stems numerous, slender, prostrate, spreading to several feet in diameter. Flowers yellowish-white.

Mount Marmion, among rocks and *Triodia,* in sandy soil, fl. m. October.

Ipomoea erecta, R. Br. B. Fl. iv. 426.

Stems ascending, flexuose. Flowers pale pink, rather large. Mount Marmion, in sandy soil among rocks on the summit.

Breweria pannosa, R. Br. B. Fl. iv. 436.

Stems prostrate, radiating from the rootstock 2-3 feet in length, densely sericeous. Leaves silky-hairy, glaucous above, paler underneath. Flowers blue, the base of the tube yellow. Stamens 4 or 5, one or two being abortive. Stigmas globular.

Gravelly spots, Mount Marmion with *E. perfoliata,* fl. m. April-October.

Evolvulus alsinoides, Linn. B. Fl. iv. 437.

Stems ascending or erect, rarely prostrate, 1-2 feet high. Flowers pale blue.

Edkins Range, Prince Regent River and near Camden Sound, in sandy soil or trailing over rocks. Fl. m. May-September.

BORAGINACEÆ.

Ehretia urceolata, W. V. Fitzg. Journ. Roy. Soc. W.A. iii. 199.

A shrubby tree of 10-20 feeet, with pendulous branches Trunk to 8 feet and 6-8 inches diameter, the bark persistent, fairly rough, light grey in colour. Timber pale yellow, hard and dense.

Branchlets angular, purple-brown. Leaves light green, straight or obliquely-falcate prominently veined. Flowers small, white, in axillary or lateral cymes. Calyx-lobes lanceolate, acute. Corolla-lobes half as long as the tube.

Mount Marmion, on elevations, in crevices of rocks. Fl. m. October.

The species is known as "Steelwood" a name more correctly applied to *Ventilago viminalis,* with which it is assocated in this district.

Trichodesma zeylanicum, R.Br. Benth. Fl. iv. 404.

Stems erect, branching from a perennial stock, 4-5 feet high, flattened at the nodes. Flowers pale blue or almost white.

Isdell, Calder, Carson, and Drysdale Rivers, Wade Creek, and Napier Broome Bay. Fl. June-September.

VERBENACEÆ.

Avicennia officinalis, Linn. Fl. v. 69.

"White Mangrove." A tree of 10-30 feet with erect trunk, diameter 10 inches. Bark grey and smooth.

Derby, Camden Sound and Prince Regent River (C.A.G.); Broome, Pender Bay (C. E. Lane-Poole); Wyndham (D. McVicar).

I have seen the species as far south as Onslow at the estuary of the Ashburton River.

The timber is of little practical use for building, as it is subject to the ravages of termites.

LABIATÆ.

Coleus scutellarioides, Benth. Fl. v. 79.

An aromatic herb or undershrub of 1-3 feet, erect and slender. Leaves almost sessile, at least the upper ones, green above, purple underneath, with prominently crenate margins. Flowers blue.

Artesian Range, Glenelg and Prince Regent Rivers, in moist black loam in humid spots on the banks of creeks. Fl. June-September.

Dysophylla verticillata, Benth. Fl. v. 81.

Stems erect from creeping stolons rooting in mud, 12-18 inches high, the lower portions of the stem submerged. Leaves entire or minutely toothed. Flowers pink or lilac, strongly scented.

Drysdale, Carson, Mitchell, Lawley, King Edward, Calder and Charnley Rivers in still pools or on the muddy banks. Fl. June-August.

SOLANACEÆ.

Solanum quadriloculatum, F. v. M. B. iv. 464.

A spreading undershrub with the habit of *S. ellipticum*, 12-18 inches high. Leaves 5 inches long, oblique at the base. Flowers purple. Fruiting calyx, not seen ripe 1 inch in diameter.

Lennard River, in sandy soil among rocks.

Solanum cataphractum, A. Cunn. B. Fl. iv. 459.

An erect shrub of 2-3 feet. Flowers large, purple.

Prince Regent River, in sandy soil among rocks on elevations. Fl. June-July.

Solanum echinatum, R. Br. B. Fl. iv. 463.

Specimens with but few flowers collected on sandstone ranges near the Prince Regent River are doubtfully referable to this species. The prickles are few on the calyces, or none. Flowers purple-blue, small.

In scanty soil in rock crevices. Fl. m. May-June.

Solanum dioecium, W. V. Fitzgerald. Journ. Roy. Soc. W.A. iii. 203.

Mr. Fitzgerald has described this species in his "Botany of the Kimberleys" under the name of *S. Cunninghamii*, W.V.F. The name is a synonym, but is probably due to a slip of the pen, as his type specimens bear the label "*S. dioecium*, W.V.F."

Solanum Vansittartensis, Gardner, n. sp.

Dioecious. Stems erect, branching at the base, almost simple, 5-9 feet high, clothed throughout with a soft but dense tomentum, and unarmed except for the prickly fruiting calyces, and a few prickles on the younger parts of the male plants.

Leaves few at the ends of the branches, not crowded, narrow-lanceolate, tapering into an obtuse apex, the base narrow, shortly tapering into a short petiole, the lamina shortly decurrent, the margins entire but undulate, the leaves often folded longitudinally, softly but densely stallate-tomentose on both surfaces and unarmed except for one or two sharp spines on the midribs of a few leaves.

Flowers (only the male flowers seen) in compact racemes on short thick pedicles shorter than the calyx, but lengthening as the flower expands; calyx campanulate, the lobes broadly ovate much shorter than the tube which ruptures as the flower opens, the midribs prominent. Corolla large, densely tomentose where exposed in the bud, the lobes short and broad, obtuse, much longer than the calyx; anthers on very short slender filaments, linear, tapering, the ovary rudimentary.

Fruiting calyx large and globular completely enclosing the fruit, with linear lobes, on long lateral peduncles, solitary, very brittle and shell-like, the capsule membranous. Seeds numerous, orbicular.

Height 1.5-2.7 metres. Leaves 8-10 cm. long, petioles 5 mm. Flowers purple. Pedicels 4-5 mm. Calyx 6 mm. long. Corolla 1.5 cm. long, expanding to 2.5 cm. diameter. Anthers 1 cm. long, filaments scarcely 1 mm. long.

Fruiting calyx 1.5 to nearly 2 cm. diameter.

Four to eight miles south of Vansittart Bay, on sandstone elevations in sandy soil among rocks. Fl. m. June-August.

Affinity to *S. dioecium*, W. V. Fitzg. and *S. Cunninghamii*, Benth, differing from the former in the almost sessile leaves, linear anthers, and unarmed stems, and from *S. Cunninghamii* in the racemose inflorescence, much shorter pedicels, and comparative absence of prickles except on the fruiting calyx where they are fewer and much stouter.

SCROPHULARIACEÆ.

Hemiarrhena plantaginea, Benth. Fl. iv. 518.

Stems erect, simple or branched at the base or close to the base, 10-20 inches high, rather succulent. Leaves to 2 inches long. Flowers pale blue.

Common in the sandy swampy localities of the sandstone formations. Calder, Glenelg, Prince Regent, Mitchell, and King Edward Rivers, and in the swampy valleys of the sandstone ranges. Fl. m. May-August.

Buchnera urticifolia, R. Brown. B. Fl. iv. 514.

Stems slender, simple or branched, 8-12 inches high.

Flowers delicate, the corolla white with spreading lobes, purple pink on the under side.

Creeks near Mount Agnes, Prince Regent and Glenelg Rivers, in moist sandy soil. Fl. May-June.

Buchnera multiflora, Benth. Fl. iv. 517.

Stems erect, branching at the base, 18 inches to over 2 feet in height, slender. Flowers in long terminal rather dense spikes, white, drying black.

Prince Regent River, Mount Agnes, Charnley, Calder, Glenelg, Moran and King Edward Rivers, Edkins, Whatley, and Macdonald Ranges, in sandy soil among sandstone rocks on hills. Fl. May-July.

Buchnera ramosissima, R. Brown. B. Fl. iv. 515.

A low spreading dense shrub of 9-20 inches in height. Flowers white. Synnott Range, Edkins and Artesian Ranges, Calder, Sale, Prince Regent, Moran Mitchell, Carson, and Drysdale Rivers, in sandy loam among sandstone or basalt rocks. Fl. April-July.

The species is a favourite fodder-plant with horses and mules.

LENTIBULARIACEÆ.

Utricularia Kimberleyensis, Gardner n. sp.

Scapes erect, slender, 6-14ins. in height, glabrous, simple. Leaves radical, few, obovate-spathulate, small and thin, on long petioles. Bracts 5, verti-

cillate, lanceolate, produced below their insertion into a connate spur, acute; bracteoles none. Flowers purple, large, either solitary, or two together, one on a much longer pedicel than the other. Calyx-lobes broad and obtuse. Upper lip of the corolla oblong, narrowed at the middle, emarginate or 2-lobed at the apex, flat and straight; lower lip flabelliform, much longer than the upper one, entire, recurved, the lateral margins slightly incurved; spur horizontal, long and slightly tapering, but very obtuse. Capsule not seen.

Plant 15-40 cm. high. Leaves 3-4 mm. long and 1 mm. wide. Bracts 2 mm. long, including the projection. Pedicels 1-2 cm. long. Calyx-lobes not 2 mm. long. Corolla upper lip 6-7 mm. long, lower lip 1.3 cm. long, spur 7 mm. long.

Ashton Creek, Headwaters of the Charnley River, near Mount Agnes, in sandy swampy places, among grass. Fl. m. June.

Affinity to *U. dichotoma*, Labill.

Utricularia chrysantha, R. Br. B. Fl. iv. 527.

Scapes erect, to 1 foot in height. Flowers deep yellow. Commonly distributed throughout the Northern Kimberleys, in moist, sandy or swampy places with *Droseraceae*. Fl. June-July.

Collected near source of Calder and Prince Regent Rivers.

ACANTHACEÆ.

Hypoestes suaveolens, Gardner. n. sp.

A dense shrub of about 3 feet in height, the stems erect, clustered, and branching from the base, strongly scented, the branches hoary-tomentose.

Leaves opposite, ovate-lanceolate, petiolate, acute, abruptly narrowed at the base, the midrib and secondary pinnate veins, and also the reticulations, prominent, hoary-tomentose on both sides, of a soft pale green.

Spikes axillary and terminal, and when terminal paniculately branched, the rhachis covered with silky spreading hairs. Involucres tubular, each within two small linear bracts, viscid, and silky-hairy, the two outer lobes connate to the middle, lanceolate, acute, the two inner ones free, adnate only near the base to the outer ones, shorter and linear, rigid and much narrower. Flowers in pairs within the involucre. Calyx not half as long as the involucre, divided almost to the base into narrow linear lobes acute, and shortly tomentose. Corolla white with a purple blotch on the upper lip. Lobes shorter than the tube, the upper one narrow. Anthers purple, the filaments white.

Capsule narrow-oblong, shortly hispid at the apex, otherwise glabrous, shortly beaked, seeds oblong, yellow, granular.

Shrub 1 metre high. Leaves 4-7 cm. long. Involucre 2 cm. long. Calyx about 8 mm. long. Corolla about 3 cm. long. Capsule 1.3 cm. long.

Rocky elevations near Vansittart Bay, in sandy soil, among quartzite rocks. Fl. July-August; also near Mount Agnes, Prince Regent, and Moran Rivers, in similar situations.

The new species has affinity both to the Indian *H. lanata*, and *H. floribunda*, differing from the first in the tomentose leaves and connate bracts, almost glabrous capsule and larger flowers, and from *H. floribunda* in the much larger involucres, dense tomentum of the leaves, long hairs of the inflorescence and more rigid habit.

MYOPORACEÆ.

Myoporum acuminatum, R. Br. B. Fl. v. 3.

A bushy shrub or small tree of 6-15 feet, with erect branches. Bark light yellowish-brown; timber pale.

Flowers white, fruits purple.

Vansittart Bay, Napier Broome Bay, Wade Creek, Camden Sound, Derby and Point Sampson, in sandy saline soil on the coast, among the inner Mangroves, notably *Ceriops Candolleana,* or on sand dunes, near the sea. Fl. April-August.

The species is a reputed poison plant, and known as "pituri." Brown's name has been adopted for the species, since in all the specimens examined I find four stamens.

RUBIALES.

RUBIACEÆ.

Sarcocephalus cordatus, Miquel. B. Fl. iii. 402.

"Leichhardt tree," or "Canary Wood."

A densely branched pyramidal tree of 30-65 feet, with numerous horizontally spreading branches, either forming a short trunk, or branched to near the base, with the stem straight and tapering to the summit of the tree. Trunk to 2 feet diameter; bark yellowish-grey, smooth or moderately rough; timber light, straight grained, soft, and a rich yellow in colour. Leaves thin, horizontally spreading. Fruit clusters globular, over 1in. in diameter.

May, Lennard, Barker, Isdell, Charnley, Calder, Sale, Glenelg, Prince Regent, Moran, Mitchell, King Edward, Carson and Drysdale Rivers, in sandy or black loam on the banks of the streams. The species requires a great depth of moist, free soil, and is seldom seen in rocky localities.

This species, often referred to locally as "Leichhardt Pine," yields a beautiful timber, which is valuable as a cabinet wood, and appears to resist the attacks of termites. The largest trees were seen on the Moran and Mitchell Rivers, where the growth is prolific and dense, forming a class of rain forest. The name "Leichhardt Pine" was probably suggested by the soft timber of the tree, or the straight tapering trunk and general pyramidal outline of the species.

Gardenia megasperma, F. v. M. B. Fl. iii. 409.

A small tree of 8-20 feet, with thick spreading branches, partially deciduous. Trunk to 9 feet, and 6-8 ins. diameter, together with the young shoots yielding a thin gum. Bark smooth, thin, and yellowish-grey in colour. Young shoots very viscid. Leaves from 2-5ins. long and nearly 3ins. broad in the larger specimens, sparingly hispid on the midribs and secondary nerves. Flowers white. Fruits ovoid-globular, crowned by the large calyx-lobes, 1½in. long, without the calyx, and 1¼ins. diameter, smooth and inconspicuously 8-angled, yellow when ripe.

Glenelg, Prince Regent, Moran, Mitchell, King Edward and Carson Rivers, Edkins, Artesian, King Leopold and Macdonald Ranges, Mount Agnes, Wade Creek, Vansittart and Napier Broome Bays, Camden Sound. Common on sandstone hills and ranges, or in rocky gorges, in scanty sandy soil, among sandstone and quartzite rocks.

Gardenia Pantoni, F. v. M.

A tree of 20 feet of spreading habit. Bark grey, moderately rough. Broome, in sandy soil.

Randia densiflora, Benth. Fl. iii. 412.

A handsome shady tree of 20-30 feet, the branches widely spreading, and densely foliaged. Trunk to 15 feet and 10ins. diameter; timber white; bark grey and smooth.

Fruits globular, red when ripe, 4 lines diameter, 3-celled.

Upper Moran River, Mitchell River and Camden Sound, among basalt rocks in shady valleys, along the banks of watercourses in sandy loam. Fruiting July-August.

Timonius Rumphii, D. C. B. Fl. ii. 417.

A handsome tree of 20-40 feet, with numerous spreading leafy branches, evergreen. Trunk to 20 feet and 15 inches diameter; bark dark grey, smooth or moderately rough, longitudinally fissured; timber white, fairly soft.

Dioecious; flowers white. Calyx globular in the lower part, cylindrical above, sericeous, the lobes very irregular.

Upper Drysdale River, Mitchell and Moran Rivers, Lower King Edward River, Carson and Calder Rivers, in sandy loam, forming a second storey in, or intermixed with Eucalyptus trees in the Savannah. Fl. m. June-September.

Canthium attenuatum, R. Br. B. Fl. iii. 421.

Usually a slender shrub of 4-10 feet, but occasionally a small tree of 10-20 feet; trunk to 10 feet and 6ins. diameter; bark dark grey, almost black, rough and deeply fissured; timber yellowish-brown. Leaves coriaceous, yellowish-green. Flowers greenish-white, small and sweetly-scented.

Freely distributed throughout the Northern Kimberleys to the North of the Couchman Range, in sandy soil in forests of *Eucalyptus tetrodonta* and *E. miniata*, a slender species with erect or pendulous branches. Flowering in August.

Spermacoce auriculata, F. v. M. B. Fl. iii. 442.

A diffuse herb, with spreading or creeping stems. Flowers blue-purple, sweetly scented.

Plains of the Lennard River and up to the summits of the King Leopold Range, near Mount Hart, in damp sandy soil. Flowering in April.

CUCURBITALES.

CUCURBITACEÆ.

Luffa graveolens, Roxb. B. Fl. iii. 316.

Stems twining to a height of 15 feet or more. Leaves palmately, 5-lobed, the central lobe the longest. Fruits ovoid-globular, about 1in. long, yellowish-green striped with white lines, when ripe scarlet striped with white.

Limestone rocks Napier Range, fruiting in April. The species is infested with green ants.

Cucmis trigonus, Roxb. B. Fl. iii. 317.

"Wild Cucumber." Stems prostrate, spreading for many feet; fruits yellowish.

Plains of the Pindan and Lennard River, fruiting m. March-April. Mount Marmion (Vivian Edwards).

CAMPANULATAE.

CAMPANULACEÆ.

Wahlenbergia gracilis, D. C. B. Fl. iv. 137.

Stems slender, erect or ascending, 18ins. to above 2 feet high, quite glabrous or the lower parts sparingly hispid.

Flowers pale blue or almost white, 5-merous in all the specimens seen. Capsule 3-celled, enclosed within the persistent calyx.

In moist, sandy places on the banks of creeks, among grass, or in sandy swamps, among grass, with Droseraceae. Fl. June-September.

The Kimberley plant is much more slender and flexuose, and has smaller flowers than the South Western form.

GOODENIACÆ.

Velleia panduriformis, A. Cunn. B. Fl. iv. 46.

Stems clustered, erect and rigid, 18ins. to 3 feet high, with very glaucous leaves. Flowers orange-yellow, in dense upright rigid cymes, seeds light yellowish-brown, the wing of the same colour.

Derby, Native Well, and Meda, in sandy loam on the "Pindan." Flowering and fruiting September and October. A reputed poison plant.

Goodenia paniculata, Smith. B. Fl. iv. 78.

Erect and paniculately branched. Stems branching from the base, 12-18 ins. high, the whole plant hirsute with soft hairs. Radical leaves 3-4ins. long, entire or minutely toothed, the upper smaller with serrated margins.

Flowers yellow, the corolla striate with fine brown lines.

Mount Agnes, in moist, sandy soil on the banks of creeks, in the sandstone country. Fl. m. June-July.

Scaevola Koenigii, Vahl. B. Fl. iv. 86.

A shrub of 4-5 feet, growing on the drift sand dunes along the coast to the North of Broome. It spreads by means of stolons, and makes a good sand-binder. The leaves are used by the turtle to line its nest. Native name "Nulul." (C. E. Lane-Poole).

Stems very succulent. Leaves 2½ins. long, glabrous with silky hairs in the axils, the flowers apparently white. Calyx-lobes oblong. Flowering and fruiting in October.

I have not seen this species along the coast further North, and the above is the first record of its having been found in Western Australia. The species is a common seaside plant in the tropics of the Old World.

Scaevola sericophylla, F. v. M. B. Fl. iv. 102.

An erect, bushy shrub of 6-8 feet, with erect rigid branches, the branchlets and leaves densely silky-tomentose. Flowers small, white with purple striations.

Point Sampson, on sand dunes, near the sea. Flowering in October.

The species extends into the temperate South-West.

CANDOLLEACEÆ.

Stylidium pachyrhizum, F. v. M. B. Fl. iv. 28.

Stems erect, clustered and paniculately branched, 8-10ins. high. Leaves rosulate, oblong-spathulate. Flowers pink.

Mount Hann, Central Kimberley, in sandy swampy soil among grass with *Grevillea chrysodendron*. Fl. m. September.

COMPOSITÆ.

Blumea integrifolia, D.C. B. Fl. iii. 525.

Stems clustered, 4-8ins. high. Leaves ovate-lanceolate, acute, stem-clasping.

Flower-heads terminal on rather long peduncles. Involucral bracts narrow-lanceolate, green with scarious margins. florets yellow.

Near Mount Hann, on sandy flats. Flowering in September.

Pterigeron odorus, Benth. Fl. iii. 532.

Apparently erect, densely corymbosely branched and over 12 inches in height, strongly scented.

Upper leaves linear-lanceolate, hirsute, obtuse. Involucres rigid, the bracts ovate-lanceolate, erect, acute, slightly coloured. Disk-florets purple pink.

Carnot Bay, near Broome. Fl. m. September. (H. W. Townsend).

The species is sent as a reputed poison plant.

Pterocaulon sphacelatus, Benth. et Hook. Fl. iii. 523.

Stems much branched near the base, tufted, erect, 10-30 inches high, the whole plant densely woolly-tomentose.

Leaves lanceolate, obtuse, the margins remarkably decurrent, the lamina undulate.

Flower-heads globular, 1.5 cm. diameter, the florets pale coloured.

Walcott Inlet, mouth of the Calder River, in sandy loam. Flowering m. July-September.

Helichrysum apiculatum, D.C. B. Fl. iii. 624.

A narrow-leaved form occurs between Mount Hann and the Charnley River. Stems tufted from a perennial stock. Involucres golden-yellow.

Near Mount Hann, on the banks of the Drysdale River, in sandy loam, gorges near the Charnley River, in moist sandy soil. Flowering August-September.

Moonia ecliptoides, Benth. Fl. iii. 540.

Stems erect, slender, 3-4 feet high, with widely spreading branches invested with coarse appressed hairs. Leaves sessile, broadly lanceolate, attaining a length of 10 cms., the upper ones much smaller, all coarsely toothed or almost pinnatifid.

Flowers few, in lax penicles, the disc florets yellow, few, the ray-florets large.

Prince Regent River, occurring in gorges or on stony hills in scanty soil, among sandstone rocks. Fl. m. June,

Also observed on the Glenelg River. Fl. m. April.

APPENDIX.

REPORTS CONCERNING MARKETABLE TIMBERS AND FOREST PRODUCTS OF SEVERAL REGIONS OF THE NORTH-WEST PART OF THE STATE, SUBMITTED BY HEAD FORESTER D. McVICAR.

I.—*An investigation of the alleged Cypress Pine Forests of the East Kimberley region (31st May to 4th August, 1922).*

Introduction.

Head Forester McVicar reports:—A start was made from Fremantle on the s.s. "Boonah" on the 31st May for Wyndham, which was reached on the 7th June. Arrangements had been made for the provision of transport and guide with Mr. A. Haly, Stock Manager of the Wyndham Meat Works, and he secured the services of Mr. C. Nelson and a blackboy, "Toby," who, it was stated, knew every patch of Cypress in the district. On the 13th, the pack and saddle horses were sent from Wyndham, *via* Ning Bing, where Toby was picked up, to Elephant Hill, from which point Mr. McVicar left in motor launch with Captain Harris and Mr. Haly.

Harbour Facilities.

Captain Harris, who is Harbour Master and Pilot at Wyndham, took soundings on the way up the arm of the Ord River. As a result of the information obtained he said that he would have no hesitation in taking a steamer as large as the "Boonah" (6,147 tons, draught about 30ft.) up to, and swing her facing Elephant Hill, as the depth of the water in to the foot of the hill would be adequate for a harbour, and there was also a good waterway.

Timber for construction of Jetty.

On arrival, Mr. Nelson, two black boys, and 11 horses were found in camp. Under Mr. Haly's guidance an inspection was made on the following morning of several small patches of Cypress Pine lying two or three miles from the waterway. Mr. Haly thought that these would provide enough timber to build a jetty. The patches were of small area, but numerous, and should supply sufficient timber for the purpose. One group, half an acre in extent, contained 18 trees with an average girth of 30in. b.h., and an average height of 40ft. The largest tree of the group was felled and measured, with the following results:—

Total length	50ft.
Length to main fork	28ft. 8in.
Girth b.h.	44in.
Girth at butt with bark on	55in.
" with bark off	46in.
Girth 10ft. from butt—bark on	37½in.
" " bark off	33in.
Girth 19ft. from butt—bark on	33in.
" " bark off	29in.
Girth 28½ft. from butt—bark on	28½in.
" " bark off	25in.

This tree was solid and free from pipe.

District inspected.

On the 23rd June a course was taken around the salt water arm, then south and east through Cypreston. On this journey of 22 miles only one patch of pines was found. Natural regeneration around one isolated tree was very good. 149 seedlings of this year, 1in. to 8in. high, and 12 of last year's seedlings, 3ft. to 4ft. high, were counted. The country is flat and would be covered with water in the wet season. Cypreston was chosen as the starting point, as being likely to contain the heaviest stands of timber, because Mr. John Boxall, who was sent by an English Company to exploit the forests about 1912, started operations there.



KIMBERLEY CYPRESS PINE (*Callitris intratropica*).
Near source of King Edward River.

The guide first indicated the direction of various lines of timber, and when they were reached the loadage was estimated by traversing the length and, if the patch was of any width, it was traversed at right angles. The average distance travelled each day was 20 to 25 miles, one horse being used from 7 a.m. to 12 a.m., and a fresh one from 1 to 5 p.m. In this way a large area of country was traversed. The distances shown on the plan represent the main courses travelled and are exclusive of side travelling, which would amount to many miles. On the main lines a distance of 230 miles was traversed by land and 80 by motor launch. Several hundred miles were also travelled by motor car with Mr. Haly.

General Description of Country.

Generally speaking, the country is a flat tableland with a rich black soil to a light sandy one. It is well watered with rivers, creeks, lagoons and springs. The country is very fertile and carries a luxuriant growth of indigenous grasses, some of them attaining a height of 15ft. In this respect it contrasts strongly with the South-West of the State. In the open messmate country, for instance, the sugar grass grows like a heavy crop of wheat to a height of from 10 to 15 ft. If cut green when it is in flower, and has reached the height of from 8 to 9 ft., it is said to make splendid ensilage, being very rich in sugar. The yield is estimated to be about three tons to the acre. At the present time this crop ripens and dries off, and, as the catttle will not eat it in its dry condition, it is burnt like a farmer's stubble to clear the ground for next season's crop. No ploughing, sowing, or harrowing, however, is required. Within three weeks of a burn, fresh green grass from six to eight inches long shoots from the roots. The same result would follow if the crop were cut and stored at the proper time. Some grass which had been cut for hay two years ago was seen to be perfectly sweet. On the river and creek flats are found various other finer grasses, *e.g.*, rice grass, kangaroo grass, species of Flinders grass, Kimberley couch, etc., all of which are suitable for hay and ensilage. The black and red loamy country is lightly timbered, principally with messmate, woollybutt, bloodwood, ironbark, etc., while on the light sandy rises are found belts of Cypress Pine. In the past these belts were continuous, but none of them were many chains wide, and they were bounded on either side by the messmate country carrying tall grass. This grass is fired every year and gaps have been burnt through the belts. Where hitherto there had been a clean forest floor under a dense canopy, the entrance of light allows the tall grasses to become established. This grass in turn is burned, and more pines are killed, so that their number is rapidly decreasing. Ten to twelve dead or dying trees were seen to every living one amongst those still standing. There is a vigorous growth of seedlings wherever the area has not been burned, but as these are growing amongst the tall grass it is only a matter of time before they will be killed. In many places where the fire has not got in for several years, groves of young trees have reached a height of 12 to 15 ft. only to be burned by this year's fires. A few years ago there were probably five or six times as many pines as there are to-day.

Conclusions.

After going carefully over every area known to the guide, and also over those marked on the plan by Mr. Weaber on whose stock run the pine is located, there is estimated to be not more than 10,000 loads of marketable Cypress Pine inside of the boundaries of the area traversed. Most of it was found at Cypreston to Surprise Spring, through to Ning Bing, and on to Paddy's Creek, as shown hatched in blue on the plan.

The small quantity of timber and its distance from a port render the possibilities of economic exploitation remote. Twelve miles of railway or some other form of transport would be required to deliver the timber to Elephant Hill where a jetty would have to be built. As the country is almost flat, the rise to Ning Bing being only 150ft., there are no engineering difficulties to prevent the laying of a light line, but the amount of timber available would hardly warrant the expenditure. If, however, anyone would be willing to take up the area and had a market at a good price, a low royalty is recommended, as it would be better to encourage the exploitation of the timber than to let it be gradually destroyed by fires.

Three one-acre sample plots were laid out, and measurements are attached. Several trees were felled, and the data obtained is also attached. Sections of one tree were brought to Head Office. Two full presses of botanical specimens were collected, and a report will be furnished when they are classified.

Sample Plots—1 acre each.

No. 1.		No. 2.		No. 3.	
Girth.	No. of trees.	Girth.	No. of trees.	Girth.	No. of trees.
inches.		inches.		inches.	
15	1	36	1	18	1
16	3	39	1	22	2
17	2	41	1	30	2
18	4	43	2	37	2
19	3	45	2	44	1
20	4	47	1	47	1
21	5	48	1	48	1
22	5	51	2	51	2
23	8	52	3	52	3
24	4	54	1	54	1
25	2	56	2	56	2
26	2	60	2	60	2
27	1	62	1	62	1
28	1	67	1	67	1
31	1				
32	2				
33	3				
34	2				
35	1				
40	1				
42	1				
43	2				
57	1				
	59		21		22

Sample Trees Felled and Measured.

	Height.	Girth B.H.	Volume, cubic ft.
No. 1	50ft. ..	46in. ..	17
2	44ft. ..	28in. ..	6
3	33ft. ..	21in. ..	3
4	56ft. ..	37in. ..	24

All of these trees, with the exception of No. 4, were solid. No. 4 had a small pipe, to be seen in the ground specimen which was taken at 20in. from the ground.

Three other trees were tested, with the following results:—

	Height.	Girth B.H.	
No. 1	64ft. ..	49in. ..	Piped
2	58ft. ..	46½in. ..	do.
3	61ft. ..	47in. ..	do.

II.—*An investigation into the supplies of Micum in the vicinity of Roebourne (..... to 28th August, 1922).*

Introduction.

Head Forester McVicar reports:—An inspection was made of an area covering some 300 miles as shown on the route marked on the attached litho. The Department of Forests had wired the name of Mr. A. Hall as a suitable guide. Unfortunately, this man was about to take over the duties of manager of a station and was therefore unable to act as guide. He was, however, kind enough to lay out the line of route and gave much valuable information. He had lived in the district nearly all his life, and had acted as Government Appraiser of the stations in this country, so that he had a very extensive knowledge of the locality.

Habitat.

The first Micums that are met with are over 60 miles from Roebourne on the tablelands. These tablelands are reached by mounting 1,200ft. over Mt. Herbert; the whole of the rise occuring in the last seven miles. A small patch is found at the break at Mt. Herbert, and then on the way to Mill Road none is seen for 10 miles. From Millstream to South Road, through Cherewondina P., to where the two roads meet, no Micum is seen as all the soil on this line is rich red loam. Near the junction of the roads a different class of country is met. Here are low hills of poor rubble loosely held together, many of them bare even of spinifex, while others have a sparse covering of this growth on the slopes. This barren and almost unproductive country is the habitat of the Micum. The results of erosion caused by the heavy tropical rains can be seen where ridges of hills have been washed flat, and where miles of country producing nothing, are covered with loose stones from the size of marbles to that of large boulders.

Conclusions.

The road from Tambrey follows along one of these ridges. Other ridges are seen in the distance towards Mt. Florence, and from Mt. Florence to the south-east, all of them having a few Micums growing on their tops and sides. This timber is not found on the north and east.

To destroy, even for profit, on a wholesale manner, any timber or shrub that has taken root in these barren places would be an act of vandalism.

The road back was made *via* the north arm, and here, as had been heard, the largest and best belt of this timber was found. Even here it could only be termed very light savannah forest, and should, it is considered, be reserved for settlers' purposes.

III.— *Notes on Coastal Mangroves.*

Head Forester McVicar reports:—In considering the exploitation of mangrove bark for tanning purposes, the peculiarities of the tree and its habitat from Broome to Wyndham deserve attention. On this part of the coast the rise and fall of the tide is from 30 to 35 ft. The outgoing tide washes away large quantities of soil from the banks of the bays and creeks. This is particularly noticeable in the Cambridge Gulf where for 50 or 60 miles the water is very thick indeed. An inspection of the banks of the Gulf impresses one with the important part that the mangroves play in the economy of nature. The mangrove consists of a main stem, and the limbs drop downward to the ground at the water's edge, and take root. The network thus formed at various vantage places along the coast collects and binds the soil which is washed out from the far reaches of the rivers, bays and creeks. The trees gradually work outward into the stream and other vegetation becomes established on the land thus reclaimed.

In issuing permits to strip mangrove bark, adequate regulations should be framed so that only a proportion of the trees are killed, otherwise great damage to the foreshore will result.

INDEX OF GENERA AND SPECIES.

E denotes evergreen tree. P.D. denotes partially deciduous tree. D. denotes deciduous tree. H. denotes Herb.

Name.	Vernacular Name.	Height.	Page.
Abrus precatorius, Linn.	Lucky Bean	E.	58
Abutilon Andrewsianum, W. V. Fitzg. ...	... ...	H.	63
,, crispum, G. Don.	... ...	H.	63
Acacia Bidwilli, Benth.	Mimosa	E. 15ft.	52
,, coriacea, D.C.	... ...	E.	50
,, Farnesiana, Willd.	Mimosa	P.D. 20ft.	52
,, hemignosta, F. v. M.	... ...	E.	50
,, holsericea	... ...	E.	52
,, impressa, Benth.	... ...	E.	50
,, Kelleri, F.v.M.	... ...	E.	50
,, latifolia, Benth.	... ...	E.	52
,, linarioides, Benth.	... ...	E.	51
,, Luehmanni, F.v.M.	... ...	E.	49
,, lysiphloea, F.v.M.	... ...	E.	51
,, sericata, A. Cunn.	... ...	E.	50
,, stigmatophylla, A. Cunn. ...	... ...	E.	51
,, suberosa, A. Cunn.	Mimosa	E. 30ft.	52
,, tanumbirinense, Maiden	... ...	E. 25ft.	51
,, translucens, Benth....	... ...	E.	50
,, tumida, F.v.M.	Pindan Wattle ...	E.	51
,, sp.	... ...	E.	51
Acrostichum scandens, J. Smith	... ...	H.	29
Adansonia Gregorii, F.v.M.	" Baobab "	D. 45ft.	66
Adiantum lunulatum, Burm.	Maidenhair Fern ...	H.	29
Ægiceras majus, Gaertner	" Mangrove " ...	D. 12ft.	85
Albizzia lebbek, Benth.	... ...	E. 25ft.	53
Alstonia verticillosa, F.v.M.	... ...	E.	87
Alysicarpus Cheeli, Gardner	... ...	H.	57
Andropogon affinis, R.Br.	" Spear Grass " ...	H. 8ft.	33
,, exaltatus, R.Br.	... ...	H.	34
,, procerus, R.Br.	Lemon-scented Grass	H. 5ft.	33
,, sericeus, R.Br.	... ...	H.	34
Anthistiria avenacea, F.v.M.	" Kangaroo Grass " ...	H.	34
,, imberbis, Retz.	" Bundle Bundle " ...	H.	34
,, membranacea, Lindl. ...	" Flinder's Grass " ...	H.	34
Asparagus racemosus, Willd.	... ...	S.	38
Aspidium unitum, Swartz	... ...	H.	29
Atalaya hemiglauca, F.v.M.	... ...	E. 15ft.	61
,, salicifolia, F.v.M.	... ...	E. 10ft.	61
Atylosia lanceolata, W. V. Fitzg. ...	... ...	S.	58
Avicennia officinalis, Linn.	" White Mangrove "	E.2 ft.	88
Barringtonia sphaerocarpa, Gardner ...	... ...	E. 50ft.	69
Bauhinia Cunninghamii, Benth.	" Bohemia Tree " ...	E. 30ft.	53
Blechnum orientale, Linn.	... ...	H. 6ft.	29
Blumea imtegrifolia, D.C.	... ...	H.	94
Bombax malabaricum, D.C.	" Kapok Tree " ...	D. 55ft.	66
Boronia artemisiaefolia, F.v.M.	... ...	H.	58
Borya subulata, Gardner	... ...	H.	38
Bossiaea phylloclada, F.v.M.	... ...	S.	54
Breweria pannosa, R.Br.	... ...	H.	88
Bruguiera gymnorrhiza, Lam.	... ...	E. 35ft.	71

INDEX—*continued.*

Name.	Vernacular Name.	Height.	Page.
Buchanania latifolia, Roxb.	... ...	E. 30ft.	60
,, lucida, Blume.	... ...	E. 25ft.	60
,, oblongifolia, W. V. Fitzg. ...	... ...	E. 30ft.	60
Buchnera multiflora, Benth.	... ...	H.	90
,, ramosissima, R. Br.	... ...	S.	90
,, urticifolia, R. Br.	... ...	H.	90
Burmannia disticha, Linn.	... ...	H.	39
Byblis liniflora, Salisb.	... ...	H.	49
Callitris intratropica, F.v.M.	" Cypress "	E. 80ft.	32
Calocasia antiquorum, Schott.	... ...	H.	37
Calythrix achaeta, F.v.M.	... ...	S.	75
,, brachychaeta, F.v.M.	... ...	S.	75
,, microphylla	... ...	S. 15ft.	75
Canavalia obtusifolia, D.C.	... ...	...	58
Canthium attenuatum, R. Br.	... ...	S. 20ft.	93
Capparis lasiantha, R. Br.	... ...	S.	49
,, mummularia, D.C.	... ...	S.	49
Carallia integerrima, D.C.	... ...	E. 35ft.	71
Carapa obovata	... ...	E. 30ft.	59
Careya australis, F.v.M.	Mangaloo	E. 25ft.	69
Carissa lanceolata, R. Br.	" Konkerberri " ...	S.	87
Cassia neurophylla, W. V. Fitzg. ...	... ...	S.	54
,, oligophylla, F.v.M.	... ...	S.	54
,, venusta, F.v.M.	... ...	S.	53
Casuarina equisetifolia, Forst.	... ...	E.	40
Celastrus Muelleri, Benth.	... ...	D. 18ft.	60
Celtis philippinensis, Blanco.	... ...	E. 20ft.	40
Ceratopteris thalictroides, Brong. ...	... ...	H.	29
Ceriops Candolleana, Arnott	" Red Mangrove " ...	E. 15ft.	70
Cheilanthes tenuifolia, Swartz.	... ...	H.	29
Cissus acetosa, F.v.M.	... ...	S.	62
Cleome viscosa, Linn.	... ...	H.	48
Cochlospermum heteronemum, F.v.M. ...	" Cotton Tree " ...	D. 25ft.	68
Coleus scutellarioides, Benth.	... ...	H.	89
Commelina lanceolata, R. Br.	... ...	H.	38
Corchorus sidoides, F.v.M.	... ...	S.	62
,, Walcottii, F.v.M.	... ...	S.	62
Crinum asiaticum, Linn.	... ...	H.	39
Crosslandia setifolia, W. V. Fitzg. ...	... ...	H.	35
Crotalaria crassipes, Hooker	... ...	H.	55
,, Cunninghamii, R. Br.	" Bird Plant " ...	S. 8ft.	55
,, laburnifolia, Linn.	... ...	S. 6ft.	55
,, trifoliastrum, Willd.	... ...	H.	55
Cucumis trigonus, Roxb.	" Wild Cucumber " ...	H.	93
Cycas basaltica, Gardner	... ...	E. 8ft.	31
,, furfuracea, W. V. Fitzg.	... ...	E. 10ft.	30
,, Lane-Poolei, Gardner	... ...	E. 12ft.	30
,, media, R. Br.	... ...	E. 10ft.	31
Cymbidium canaliculatum, R. Br. ...	" Tree Orchid " ...	H.	40
Cynodon tenellus, R. Br.	" Couch Grass " ...	H.	35
Dendrobium dicuphum, F.v.M.	... ...	H.	40
Denhamia obscura, Meissn.	... ...	E 20ft.	61
Dichrostachys Muelleri, Benth.	... ...	W. 20ft.	53
Diospyros nitens, W. V. Fitzg.	" Small Ebony " ...	E 15ft.	85
Distichostemon phyllopterus, F.v.M. ...	... ...	S.	62
Dodonaea lanceolata, F.v.M.	... ...	S.	61
,, physocarpa, F.v.M.	... ...	S.	62
Drosera indica, Linn.	" Sundew "	H.	49
,, petiolaris, R. Br.	... ...	H.	49
Dysophylla verticillata, Benth.	" Wild Mint " ...	H.	89

INDEX—*continued.*

Name.	Vernacular Name.	Height.	Page.
Ectrosia Schultzii, Benth.	... ...	H.	35
Ehretia urceolata, W. V. Fitzg.	... ...	E. 20ft.	88
Elusine Aegyptiaca, Pers.	" Button Grass " ...	H.	35
Eragrostis chætophylla, Steud.	... ...	H.	35
Erythrina vespertilio, Benth.	" Coral Tree " ...	D. 40ft.	57
Erythrophloeum Laboucheri, F.v.M. ...	" Camel Poison " ...	E. 40ft.	53
Eucalyptus alba, Reinw.	" Ridge Gum " ...	E. 40ft.	79
,, brachyandra, F.v.M.	... ...	P.D. 20ft.	76
,, clavigera, A. Cunn.	... ...	E. 30ft.	78
,, confluens, (W. V. F.) Maiden	... ...	E. 30ft.	80
,, dichromophloia, F. v. M. ...	... ...	E. 30ft.	83
,, Foelscheana, F. v. M. ...	" Bloodwood " ...	E. 35ft.	82
,, Herbertiana, Maiden	" Mallee " ...	E. 20ft.	80
,, Houseana, (W. V. F.) Maiden	" White Gum " ...	E. 60ft.	80
,, latifolia, F. v. M.	" B'oodwood " ...	E. 40ft.	83
,, melanophloia, F. v. M. ...	" Box "	E. 25ft.	76
,, microtheca, F. v. M.	" Coolibah "	E. 35ft.	77
,, miniata, A. Cunn.	" Woolly-butt " ...	E. 40ft.	81
,, Mooreana, (W. V. F.) Maiden	... ...	E. 18ft.	77
,, oligantha, Schau.	... ...	E. 20ft.	76
,, pallidifolia, F. v. M.	" Micum "	E. 20ft.	77
,, papuana, F. v. M.	" Cabbage Gum " ...	E. 40ft.	79
,, perfoliata, R. Br.	" Bloodwood " ...	E. 20ft.	81
,, ptychocarpa, F. v. M. ...	" Red Gum " ...	E. 50ft.	81
,, pyrophora, Benth.	" Bloodwood " ...	E. 35ft.	82
,, rostrata, Schlecht	" River Gum " ...	E. 60ft.	77
,, setosa, Schau.	... ...	E.	81
,, Spenceriana, Maiden	" Grey Box " ...	E. 35ft.	78
,, terminalis, F. v. M.	" Ironbark "	E. 50ft.	81
,, tetrodonta, F. v. M.	" Messmate " ...	E. 50ft.	83
Eugenia Armstrongii, Benth.	... ...	E. 20ft.	84
,, eucalyptoides, F. v. M.	... ...	E. 20ft.	84
,, grandis, Wight.	... ...	E. 25ft.	84
Eulophia venosa, Reichb. f.	" Orchid "	H. 3ft.	40
Euphorbia chrysochaeta, W. V. Fitzg. ...	... ...	H.	59
,, pilulifera, Linn.	" Asthma Plant " ...	H.	59
Evolvulus alsinoides, Linn.	... ...	H	88
Excæcaria parviflora, J. Müll.	" Gutta-percha Tree "	E. 30ft.	60
Exocarpus latifolia, R. Br.	" Native Cherry " ...	E. 20ft.	45
Ficus coronulata, F. v. M.	" Rubber Tree " ...	E. 50ft.	41
,, glomerata, Willd.	" Wild Fig "	E. 60ft.	41
,, leucotricha, Miq.	... ...	E. 20ft.	41
,, nesophila, Miq.	" Rock Fig " ...	E. 35ft.	41
,, orbicularis, A. Cunn.	... ...	E. 35ft.	41
,, puberula, A. Cunn.	... ...	E. 40ft.	41
,, scabra, Forst.	" Kired "	E.	41
Flagellaria indica, Linn.	" Bamboo "	S.	37
Fugosia latifolia, Benth.	... ...	S.	64
,, populifolia, Benth.	... ...	S.	64
,, pulchella, Gardner	... ...	S.	63
Fuirena umbellata, Rottb.	... ...	H.	35
Gardenia megasperma, F. v. M.	... ...	P.D. 20ft.	92
,, Pantoni, F. v. M.	... ...	E.	92
Gleichenia dichotoma, Hook	... ...	H.	30
Gomphrena brachystylis, F. v. M. ...	... ...	H.	48
,, canescens, R. Br.	... ...	H.	47
,, leptoclada, Benth.	... ...	H.	48
Goodenia paniculata, Sm.	... ...	H.	94
Grevillea agrifolia, A. Cunn.	... ...	E. 25ft.	42
,, chrysodendron, R. Br.	" Silky Oak " ...	E. 45ft.	42

INDEX—*continued.*

Name.	Vernacular Name.	Height.	Page.
Grevillea heliosperma, R. Br.	" Beefwood " ...	E. 20ft.	43
„ heteroneura, W. V. Fitzg. ...	... ...	E. 30ft.	44
„ latifolia, Gardner	... ...	E. 8ft.	43
„ mimosoides, R. Br.	... ...	E. 15ft.	44
„ refracta, R. Br.	... ...	E. 20ft.	43
„ viscidula, Gardner	... ...	E. 25ft.	44
„ Wickhami, Meissn.	... ...	S.	42
Grewia polygama, Roxb	... ...	S.	62
Gymnanthera nitida, R. Br.	... ...	E.	87
Gyrocarpus Jacquini, Roxb.	" Stinkwood " ...	D. 30ft.	74
Haemodorum flaviflorum, W. V. Fitzg.	... ...	H.	39
„ longifolium, W. V. Fitzg. ...	... ...	H.	39
„ parviflorum, Benth. ...	... ...	H.	39
Hakea Cunninghamii, R. Br.	" Beefwood " ...	E. 20ft.	45
Helichrysum apiculatum, D.C.	... ...	H.	95
Hemiarrhena plantaginea, Benth.... ...	... ...	H.	90
Hibbertia Kimberleyensis, Gardner ...	... ...	S.	68
Hibiscus cannabinus, Linn.	... ...	S.	64
„ ficulneus, Linn.	... ...	S.	64
„ geranioides, A. Cunn.	... ...	S.	65
„ microchlaenus, F. v. M.... ...	... ...	S	64
„ panduriformis, Burm.	... ...	S.	65
„ pinonianus, Gaud.	... ...	S.	64
„ superbus, Gardner	... ...	S.	64
„ vitifolius, Linn.	... ...	S.	65
„ zonatus, F. v. M.	... ...	S.	65
Hypoestes suaveolens, Gardner	... ...	S.	91
Imperata arundinacea, Cyrillo	... ...	H.	34
Indigofera hirsuta, Linn.	... ...	S.	55
Ionidium suffruticosum, Ging.	... ...	H.	69
Ipomoea angustifolia, Jacq.	... ...	H.	88
„ erecta, R. Br.	... ...	H.	88
„ Pes-caprae, Roth.	... ...	H.	87
Ischæmum laxum, R. Br.	... ...	H.	34
Jacksonia argentea, Gardner	... ...	S.	54
„ thesioides, A. Cunn.	... ...	S.	54
Jussiaea suffruticosa, Linn.	... ...	S.	85
Lindsaea ensifolia, Swartz.	... ...	H.	29
Livistona Alfredi, F. v. M.	" Cabbage Palm " ...	E. 40ft.	36
„ Eastoni, Gardner	" Fan Palm " ...	E. 70ft.	36
„ Mariae, F. v. M.	" Fan Palm " ...	E.	36
Loranthus acacioides, A. Cunn.	... ...	E.	47
„ amplexans, van Tiegh. ...	... ...	E.	46
„ Benthami, Blakely	... ...	E.	47
„ Exocarpi, Behr.	... ...	E.	46
„ ferruginiflorus, W. V. Fitzg. ...	... ...	E.	47
„ Kimberleyensis, Gardner ...	... ...	E.	46
„ longiflorus, Desr.	... ...	E.	46
„ maritima, Gardner	... ...	E.	46
„ Miquelii, Lehm.	... ...	E.	46
„ signatus, F. v. M.	... ...	E.	46
Luffa graveolens, Roxb.	... ...	E.	93
Lygodium scandens, Swartz	... ...	H.	30
Maba humilis, R. Br.	" Ebony "	E. 20ft.	86
Mallotus Derbyensis, W. V. Fitzg. ...	... ...	S.	59
Marsdenia Brockmaniana, W. V. Fitzg. ...	... ...	H.	87

INDEX—*continued.*

Name.	Vernacular Name.	Height.	Page.
Marsilea angustifolia, R. Br.	... ...	H.	30
„ Brownii, A. Br.	... ...	H.	30
„ hirsuta, R. Br.	... ...	H.	30
Melaleuca alsophila, A. Cunn.	" Paperbark " ...	E. 25ft.	75
„ argentea, W. V. Fitzg. ...	" Silver Cadjuput " ...	E. 70ft.	76
„ Crosslandiana, W. V. Fitzg. ...	... ...	E. 25ft.	75
„ leucadendron, Linn.	" Cadjuput "	E. 100ft.	75
„ minutifolia, F. v. M.	" Tea Tree "	E. 25ft.	76
Melia composita, Cav.	" White Cedar " ...	E. 40ft.	58
Melochia pyramidata, Linn.	... ...	S.	67
Mitrasacme foliosa, Gardner	... ...	H	86
Moonia ecliptoides, Benth	... ...	H.	95
Myoporum acuminatum, R. Br.	" Pituri "	E. 15ft.	91
Neptunia gracilis, Benth.	... ...	H.	53
„ monosperma, F. v. M.	... ...	H.	53
Notholaena vellea, R. Br.	... ...	H.	29
Nymphaea stellata, Willd.	" Water Lily " ...	H.	48
Opilia amentacea, Roxb.	... ...	E.	45
Oryza sativa, L.	Wild Rice	H.	35
Osbeckia australiana, Naudin	... ...	S.	84
Owenia vernicosa, F. v. M.	... ...	E. 30ft.	59
Pandanus aquaticus, F. v. M.	" River Pandanus "...	E. 20ft.	33
„ odoratissimus, L.	" Screw Palm " ...	E. 30ft.	33
Passiflora foetida, L.	" Passion Fruit " ...	S.	69
Persoonia falcata, R. Br.	" Emu Bush " ...	E. 20ft.	42
Petalostigma quadriloculare, F. v. M. ...	" Quinine Tree " ...	E. 16ft.	59
Philydrum lanuginosum, Banks.	... ...	H.	38
Phragmites communis, Trin.	" Reed "	H. 15ft.	35
Phyllanthus maderaspatensis, L.	... ...	S.	59
Pimelea punicea, R. Br.	... ...	H	69
Platyzoma microphyllum, R. Br. ...	... ...	H.	29
Polycarpaea longiflora, F. v. M.	... ...	H.	48
Polygonum barbatum, L.	... ...	H.	47
Polypodium phymatodes, L.	... ...	H.	29
Psoralea badocana, Benth.	... ...	S.	55
„ cuneata, W. V. Fitzg.	... ...	S.	55
„ virens, W. V. Fitzg.	... ...	S.	55
Pterigeron odorus, Benth.	... ...	H.	95
Pterocaulon sphacelatus, Benth. et Hook.	... ...	H.	95
Randia densiflora, Benth.	... ...	E. 30ft.	92
Rhizophora mucronata, Lam.	" Black Mangrove "	E. 30ft.	70
Rhynchosia rhomboidea, F. v. M. ...	... ...	H.	58
Rottboellia ophiuroides, Benth.	" Cane Grass " ...	H. 12ft.	34
Santalum lanceolatum, R. Br.	" Sandalwood " ...	E. 20ft.	45
Sarcocephalus cordatus, Miq.	" Leichhardt Tree "	P.D. 65ft.	92
Scaevola Koenigii, Vahl.	... ...	S.	94
„ sericophylla, F. v. M.	... ...	S.	94
Sesbania aculeata, Pers.	... ...	S.	56
„ grandiflora, Pers.	" Cork Tree " ...	E. 55ft.	56
Sideroxylon Arnhemicum, Bth. et Hook.	... ...	P.D. 25ft.	86
Solanum cataphractum, A. C.	... ...	H.	89
„ dicœcium, W. V. Fitzg. ...	... ...	H.	89
„ echinatum, R. Br.	... ...	H.	89
„ quadriloculatum, F. v. M. ...	... ...	H.	89
„ Vansittartensis, Gardner ...	... ...	H.	89
Sonneratia alba, Smith.	" Mangrove " ...	E. 25ft.	70

INDEX—*continued.*

Name.	Vernacular Name.	Height.	Page.
Spermacoce auriculata, F. v. M.	... ...	H.	93
Spinifex longifolius, R. Br.	... ...	H.	34
Sterculia caudata, Heward	"Kurrajong" ...	P.D. 45ft.	67
,, quadrifida, R. Br.	... ...	D. 30ft.	67
Sterculia ramiflora, Benth.	"Flame Tree" ...	D. 35ft.	67
,, viscidula, W. V. Fitzg. ...	"Flame Tree" ...	D. 30ft.	67
Strychnos lucida, R. Br.	"Strychnine Tree"	E. 10ft.	87
Stylidium pachyrhizum, F. v. M. ...	... ...	H.	94
Tephrosia conspicua, W. V. Fitzg. ...	... ...	H.	55
,, flammea, F. v. M.	... ...	S.	56
,, phaeosperma, F. v. M. ...	... ...	S.	56
,, purpurea, Pers.	... ...	H.	56
,, remotiflora, F. v. M.	... ...	H.	56
,, rosea, F. v. M.	... ...	...	56
Terminalia bursarina, F. v. M. ...	... ...	E. 30ft.	72
,, circumalata, F. v. M. ...	"Ironwood" ...	E. 35ft.	72
,, Cunninghamii, Gardner ...	"Wild Almond" ...	E. 20ft.	73
,, discolor, F. v. M.	... ...	P.D. 20ft.	72
,, Fitzgeraldi, Gardner	"Nutwood"	D. 25ft.	73
,, grandiflora, Benth.	... ...	D. 40ft.	74
,, melanocarpa, F. v. M. ...	... ...	E. 25ft.	72
,, petiolaris, A. C.	"Kabing"	30ft.	73
,, platyphylla, F. v. M. ...	"Chestnut"	E. 45ft.	73
,, volucris, R. Br.	... ...	D. 25ft.	71
Thespesia lampas, Dalz et Giles	... ...	S.	66
,, populnea, Corr.	"Tulip Tree" ...	E. 20ft.	66
Thysanotus chrysantherus, F. v. M. ...	... ...	H.	38
Timonius, Rumphii D. C.	... ...	E. 40ft.	93
Tinospora smilacina, Benth.	... ...	E.	48
Trachymene hemicarpa, Benth.	... ...	H.	85
Tribulus occidentalis, R. Br.	... ...	H.	58
Trichinium axillare, F. v. M.	... ...	H.	47
,, exaltatum, Benth.	... ...	H.	47
Trichodesma zeylanicum, R. Br.	... ...	H.	88
Triodia Cunninghamii, Benth.	"Spinifex"	H.	35
,, pungens, R. Br.	"Spinifex"	H.	35
Tristania suaveolens, Sm.	"Fresh Water Mangrove"	E. 50ft.	76
Triumfetta appendiculata, F. v. M. ...	... ...	S.	63
,, plumigera, F. v. M.	... ...	H.	63
Typha angustifolia, L.	"Bullrush"	H.	33
Utricularia chrysantha, R. Br.	... ...	H.	91
,, Kimberleyensis, Gardner ...	... ...	H.	90
Vellcia panduriformis, A. C.	... ...	H.	94
Ventilago viminalis, Hook	"Steelwood" ...	E. 25ft.	62
Verticordia Cunninghamii, Schau. ...	... ...	E. 25ft.	74
Viscum articulatum, Burm.	"Mistletoe"	E.	47
Wahlenbergia gracilis, D. C.	... ...	H.	93
Waltheria indica, L.	... ...	S.	67
Wrightia saligna, F. v. M.	"Milkbush"	E. 17ft.	87
Xanthostemon paradoxus, F. v. M. ...	... ...	E. 30ft.	84
Xerochloa imberbis, R. Br.	... ...	H.	34
Xyris complanata, R. Br.	... ...	H.	37

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MAP OF KIMBERLEY DIVN WESTERN AUSTRALIA

Showing Principal Types of Country

REFERENCE

- River Forest
- Boundary of formations
- Routes
- Basaltic Areas coloured in Red

