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DESCRIPTIVE NOTES ON FIBRES,

PREPARED FOR THE

GREATER BRITAIN AND PARIS EXHIBITIONS,

FROM

PLANTS (INDIGENOUS AND EXOTIC)

CULTIVATED IN THE

MELBOURNE BOTANIC GARDENS

BY

WILLIAM ROBERT GUILFOYLE, DIRECTOR.

MARCH, 1899.

By Authority:

ROBT. S. BRAIN, GOVERNMENT PRINTER, MELBOURNE.

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MUSEUM OF VICTORIA



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PREFATORY NOTE.

HAVING been requested by the Government of Victoria to supply, as speedily as possible, a collection of fibres for the Greater Britain and Paris Exhibitions, also to submit a descriptive list of the plants yielding them, giving also particulars regarding the methods adopted or initiated by me for preparing the samples, I have to state that, although a liberal sum of money was allowed me for the purpose, time was so much restricted that, although the collection comprises 119 distinct specimens, I regret it is not so extensive as I should have desired.

While the Australasian colonies are rich in regard to indigenous plants that yield various fibres of a most useful character, it will be also interesting to culturists to know that both the climate and soil of Victoria are well adapted for successfully growing nearly all of the well-known fibre plants of the Old World, as well as those of temperate America and the Cape—or rather, South African colonies. The whole of the specimens enumerated in the subsequent pages (and fully described also on the labels attached to each in the large show-case) were obtained from such indigenous and introduced plants as were grown in our Melbourne Botanic Gardens, where they are used, in the various groupings, for either scenic effect or for educational purposes.

Experts in Europe, America, and elsewhere will probably determine the various uses to which this collection can be put; indeed Professor Charles Richards Dodge, special agent of the U.S. Department of Agriculture, Washington,* and Sir Fredk. Abel, director of the Imperial Institute, London, have already commented extensively and most favorably on many of the kinds now enumerated. I have had the honour of supplying similar collections of fibres to many Exhibitions, notably the Centennial of Philadelphia, 1876 (and the preparatory one here in 1875); the Paris Universal, 1878; Melbourne International of 1880; that of Amsterdam, 1883; New Orleans, 1884-5; the Colonial and Indian, 1886; Jubilee International, Adelaide, 1887; Melbourne Centennial, 1888-9; the New Zealand Exhibition of the same year; and last, not least, to the Imperial Institute, London.

W. R. GUILFOYLE,
Director Botanic Gardens, Melbourne.

March, 1899.

* *Vide* his most interesting volume of 861 pages, entitled *Useful Fibre Plants of the World*, published by the American Government during last year.

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I.—*ABUTILON BEDFORDIANUM* (St. Hilaire). “Duke of
Bedford’s Lantern Flower.” Order *Malvaceæ*. Brazil.

This splendid shrub grows very freely in Victoria, New South Wales, and Queensland, and may be profitably cultivated, especially with irrigation. The fibre is of good quality, and very simply prepared by macerating the shoots in the same way as “jute” (*Corchorus capsularis*), &c. For young branches, thirteen days’ soakage are sufficient; older bark requires several days longer. Fibre suitable for whipcord, fine matting, paper, and perhaps textile fabrics.

II.—*ABUTILON COCCINEUM* (Hort). “The Red Lantern Flower.”
Order *Malvaceæ*. Garden origin.

Prepared by maceration for seventeen days, but stems from which present sample was prepared were old. If cultivated as a fibre plant would no doubt equal *A. striatum*.

III.—*ABUTILON MOLLE* (Sweet) syn. *Sida mollis* (Ortega).
“Soft-leaved Lantern Flower.” Order *Malvaceæ*. Pern.

Like most of the other species of the genus, this plant, which is an ornamental yellow-flowered shrub, is of quick growth, and yields both a valuable bast and fibre. These are of a strong, soft, and beautiful quality, and are easily prepared by the simple process of maceration for twelve days. Suitable for matting, paper, &c.

IV.—*ABUTILON STRIATUM* (Dickson). “Streaked Lantern
Flower.” Order *Malvaceæ*. Brazil.

A handsome quick-growing shrub of slender habit, readily available for cultivation in the colonies, and, like the foregoing species, yields a valuable fibre by maceration for seventeen days.

V.—*ABUTILON THOMPSONII*. “Thompson’s Variegated Lantern Flower.” Order *Malvaceæ*. Garden origin.

Twelve days’ maceration, stripped, and then scraped. Fibre supposed to be superior to *A. molle* and *A. striatum*.

VI.—*ABUTILON VENOSUM* (Lemaire). “Veined Lantern Flower.” Order *Malvaceæ*. Mexico.

A very ornamental species, of robust habit, and yields a superior fibre. Two crops of “canes” may be readily obtained in a year in fairly good soil by proper management. Twelve days’ maceration, stripped, and then scraped. Suitable for fishing lines, textile fabrics, &c.

VII.—*AGAVE AMERICANA* (Linnæus). “American Aloe,” “Toddy Lily,” or “Pita Hemp Plant.” Order *Amaryllidaceæ*. Tropical America.

Agave Americana, under the various names of “Century Plant,” “Mexican Aloe,” “Spanish Aloe,” “Carata,” or “Pita,” is the most common and best known of the genus in this country. The drought-enduring character of the plant is extraordinary, and it will thrive in any soil, rich or poor. Barren waste lands in arid regions might be planted with profitable results. After, say, from six or seven years, the *Agave* will go on yielding annual crops of huge fleshy leaves, 4 to 6 feet in length, for a term possibly of eight or ten years longer. Spon observes that—“The culture of the plant is being extended in America, but not to the extent it deserves.” The product is often known commercially as “*Agave thread*,” and is exported for admixture sometimes with *Manilla* hemp. The fibre may be separated by bruising the leaves, macerating, or by a boiling or steaming process. Most effective machinery for the preparation of it has been used of late years in Mexico and other parts of America, by the aid of which it can be made ready for cleaning a few hours after the leaves have been cut, or in the same way that “*Agave sisalina*” and other species or varieties are prepared at the Bahamas and Yucatan. Professor C. R. Dodge says that—“In Mexico the common kind is utilized in the manufacture of ropes for use in the mines, and, in some cases, for the rigging of ships.” In South America it has been used for large cables. Humboldt mentions a bridge in Quito, with a span of 130 feet, constructed of ropes made of this fibre, some of them 4 inches in diameter. The name “Pita” follows it to Spain and Sicily, where it is used for cordage and mats.” Dr. Forbes Royle says—“That it has been found superior in strength to either coir, jute, or sunn-hemp. In a trial of strength, near Calcutta, the

tests were made with ropes 1 fathom long and 3 inches in circumference, with the following results:—The Agave or “Pita” broke in a strain of 2,519½lbs.; coir, 2,175lbs.; jute, 2,456½lbs.; and sunn-hemp, 2,269½lbs. In an experiment with Russian hemp and “Pita” (stout cords), the first-named broke with 160lbs. weight, and the latter with 270lbs.” “These experiments,” Professor C. R. Dodge adds, “show the great strength of the fibre, which is worthy of more extended cultivation and employment in the arts.” Fibre prepared by boiling for six hours, put through rollers, and then scraped.

VIII.—AGAVE AMERICANA (Linnaeus) variety Longifolia. “Long-leaved Variegated American Aloe.” Order *Amaryllidaceæ*.

Fibre prepared by boiling for six hours, put through the rollers, and scraped. It is longer in staple than *A. Americana*, and quite equal to it in strength.

IX.—AGAVE AMERICANA (Linnaeus) variegata. “Variegated American Aloe,” “Toddy Lily,” or “Pita Hemp Plant.” Order *Amaryllidaceæ*. Tropical America.

Yields same quantity of fibre as the normal green-leaved form, and is more easily prepared. As in the case of the New Zealand Flax Plant (*Phormium tenax*), the variegated-leaved variety produces stronger and softer fibre. Prepared by boiling for six hours, put through rollers, and then scraped with blunt knives.

X.—AGAVE ANGUSTIFOLIA (Haworth). “Narrow-leaved Agave.” Order *Amaryllidaceæ*. St. Helena.

A narrow-leaved species of the genus, producing a very strong fibre, which is readily prepared by boiling for six hours, leaves placed through the rollers, and then scraped.

XI.—AGAVE ATROVIRENS (Karwinski) syns. *A. Jacobiana* (Salm Dyck). *A. Salmiana* (Otto). The “Maguey Blando” of Mexico. Order *Amaryllidaceæ*. Mexico.

Fibre prepared by boiling for six hours, put through the rollers, and then scraped.

“Specimens shown in the Mexican exhibit at the Paris Exposition of 1878 closely resembled the fibre of *A. Americana*, white, wavy, of medium strength. Fibre from a plant of *A. Salmiana*, growing in the United States Botanic Garden, extracted by the Department, was coarse, harsh, and wiry, without any of the characteristics of the Mexican samples.” (*Useful Fibre Plants of the World*, Professor C. R. Dodge.)

XII.—*AGAVE DENSIFLORA* (Hooker). “Dense-flowered Agave.”
Order *Amaryllidaceæ*. Mexico.

A valuable species, of moderately quick growth, furnishes a useful fibre. Prepared by boiling for six hours, forced through the rollers, and scraped.

XIII.—*AGAVE GEMINIFLORA* (Ker) syn. *Littæa geminiflora* (Tagliabue). “Twin-flowered Agave.” Order *Amaryllidaceæ*.
Peru.

Fibre of strong quality. Prepared by simply scraping the leaves in the raw green state.

XIV.—*AGAVE GHIESBRECHTII* (C. Koch). “Ghiesbrecht’s Agave.” Order *Amaryllidaceæ*. Mexico.

Leaves boiled for six hours, placed through the rollers, and then scraped. Equal in texture, and not unlike *A. Rumphii*.

XV.—*AGAVE IXTLI* (Karwinski). “Istle Hemp Plant.” Order *Amaryllidaceæ*. Mexico.

Prepared by boiling for six hours, leaves drawn through the rollers, and scraped.

XVI.—*AGAVE KARATTO* (Miller). “Karatto.” Order *Amaryllidaceæ*. Mexico.

The fibre strong. Prepared in the same way as other species of the genus, by boiling for six hours, and then the usual rolling and scraping process.

XVII.—*AGAVE LOPANTHA* (Scheide) var. *cœrulescens*. Syn. *A. cœrulescens* (Salm Dyck). “Bluish-leaved Crest-flowered Agave.” Order *Amaryllidaceæ*. Mexico.

Leaves boiled for four hours, and then scraped, easily prepared. Sample obtained from fifteen leaves. Fibre not so fine as other Agaves, but very strong and wiry.

XVIII.—*AGAVE MEXICANA* (Lamarck). “Mexican Agave.”
Order *Amaryllidaceæ*. Mexico.

This species affords a very good fibre, in texture like that of the “American Aloe” (*Agave Americana*). Preparation same as *A. Karatto*.

XIX.—*AGAVE RIGIDA* (Miller). The “Chelem” of the
Mexicans. Order *Amaryllidaceæ*. Mexico.

Preparation same as *A. Karatto*.

XX.—*AGAVE RUMPHII* (Hasskarl). “Rumph’s Agave.” Order *Amaryllidaceæ*. Mexico.

Preparation same as *A. Karatto*.

XXI.—*ALPINIA CÆRULEA* (Bentham) syn. *Hellenia cœrulea* (R. Brown). “Blue Shell Flower” or “Queensland Ginger.” Order *Scitamineæ*. New South Wales and Queensland.

Fibre prepared by boiling for twelve hours, and then scraped. Similar in texture to that of *A. nutans*, somewhat finer, and not so long.

XXII.—*ALPINIA NUTANS* (Roscoe). “Indian Shell Flower.” Order *Scitamineæ*. East Indies.

A hardy perennial belonging to the same order as the Ginger plant of commerce. The flowers are remarkably beautiful. It yields a fine fibre, which is easily prepared by boiling for twelve hours, and then scraping.

XXIII.—*ALTHÆA NARBONNENSIS* (Pourret). “Narbonne Mallow.” Order *Malvaceæ*. Europe.

The mode of preparation is by maceration for ten days, and then scraping. Fibre similar to that of *Lavatera maritima*.

XXIV.—*ANIGOZANTHOS FLAVIDA* (Redoute). “Yellow Sword Lily” or “Kangaroo-foot Flower.” Order *Hæmodoraceæ*. Western Australia.

This hardy perennial—not unlike some of the *Irideæ* in habit—sends up a number of thick sword-shaped leaves, about an inch wide, and from 18 inches to 2½ feet in height. The fibre obtained is of a chocolate-brown colour, of fair strength and texture. The mode of preparation is by boiling for two hours, or until the outer fleshy coating of the leaves is sufficiently digested to admit of easy removal by scraping with a blunt knife. The plant thrives in a sandy loam, and may be propagated in unlimited quantities by division of the roots, and from seeds. The fibre appears to be similar in texture to *Musa Ensete*.

XXV.—*ANIGOZANTHOS RUFA* (Labillardiere). “Reddish Sword Lily” or “Kangaroo-foot Flower.” Order *Hæmodoraceæ*. Western Australia.

The same remarks apply to this as to the preceding species.

XXVI.—*ASTELIA BANKSII*. (A. Cunningham). “Otago Cotton Plant” or “Kowhara-whara.” Order *Liliaceæ*. New Zealand.

A coarse tufted perennial, leaves from 3 to 5 feet long, $\frac{1}{2}$ to 1 inch broad, covered with a silky down. It is usually found growing on the branches of trees at their junction with the trunk, or on old stumps, &c., but will grow freely when planted in the ground. The leaves are traversed longitudinally by stout nerves, which furnish a coarse fibre of considerable strength. Prepared by boiling or steaming for about ten hours. “It is rich in fibre suitable for ropes, paper,” &c. “The fibre is of a dirty yellow colour, the ‘filaments’ exceedingly coarse and wiry, rather brittle when bent sharply, but of considerable strength when tested with a lateral strain.” The specimen in the collection of the Department of Agriculture, Washington, was also prepared by me. (*Useful Fibre Plants of the World*, Professor C. R. Dodge.)

XXVII.—*BEAUCARNEA GLAUCA*. (Lehmann). “Sea-green-leaved Beaucarnea.” Order *Liliaceæ*. South America.

Produces a fibre of good quality. Prepared by boiling for six hours, and then scraping.

XXVIII.—*BÆHMERIA NIVEA* (Gaudichaud). “Chinese Grass-cloth Plant.” Order *Urticaceæ*. Tropical Asia.

From this is produced that beautiful creamy white fabric, known as “China Grass-cloth,” which is frequently mistaken for silk, indeed the better qualities of it are often sold as such in England and many parts of the Continent.

The *Key Bulletin*, treating of the “*Ramie*” (said to be a variety of the above) industry, says:—“Few practical problems have consumed so much time and energy as the attempt to bring ‘China-grass’ and ‘Ramie’ into use for manufacturing purposes.

“Notwithstanding all the expenditure of mechanical skill and inventive ability, the conclusion cannot be evaded that we are still as far off as ever from being able to place upon the market a finished product which will effectually compete with silk, flax, and the better qualities of cotton.

“The plants can be grown with the greatest ease. But when the problem of treatment is solved, the supply of the raw material will be limited to warm countries. The cultivation of ‘China-grass’ in temperate regions will never be able to compete successfully with that of ‘Ramie’ (or perhaps of China-grass) in the tropics. It is known that when ribbons can be produced sufficiently cheaply, these can be degummed and turned into

filasse at a small cost. The whole question then still turns, as in 1888, on the production of ribbons. We are still waiting for a deeoricator which will not merely turn out ribbons fit for further manufacturing processes, that has been accomplished, but will turn out, say, half-a-ton a day at a small cost. Till this has been found, the planter cannot profitably deal with his crop, and the degumming processes, now almost entirely dependent on hand-clean fibre from China, are paralyzed for want of a supply which will allow the finished product to compete with other fibres.

“The ribbons must be susceptible of being delivered to the degumming factories at a cost not exceeding £7 to £9 per ton. This would pay the planter if he had a deeoricator which would leave a profit. At present he cannot produce ribbons under £12 to £15 a ton.

“Then the degumming processes should turn out filasse at a total cost of £36 to £40 per ton. At this price the demand would be considerable, and a large and prosperous industry would result. To put the position in other words, filasse must be put upon the market at about 4d. per lb. To use the words of one of the speakers in the discussion at the Society of Arts, ‘Unless it could be brought down to something like the price of cotton or flax, it was impossible to make any profit out of it.’” *The Produce World* says:—

“The time for planters in India and the East, generally, to seriously take in hand the production of ‘Rhea’ fibre has now fully arrived, and we hope, in the very near future, to receive more numerous inquiries from our readers as to the best means of disposing of prepared filasse. For some time several factories in England and America have been engaged exclusively in manufacturing all kinds of textile fabrics from the fibre, and there are unmistakable signs that a fine future awaits the new industry. In addition to a profit obtainable from the preparation of the fibre, however, there are several other good points about ‘Ramie’ cultivation. Besides being perennial, the plant requires absolutely no cultivation beyond thinning out, and the thinned-out plants may be at once replanted in new ground. The original root survives for 30 to 40 years; the leaves are greedily eaten by cattle, and are highly nutritious; and the best means of propagation are from root cuttings. Planters need lay out but little capital on this product, as the stalks are marketable without degumming, or additional profits may be realized by doing the degumming and fibre extraction on the estate. Thus, on the lowest computation, a return of £18 per acre is certain, with the expenditure of the minimum of labour and capital.

“If actual results are required, here they are. Upon an estate in Mexico the out-turn of cleaned fibre, in 1896, was 1,936 tons,

and the price obtainable in New York was 250 dollars (£25) per ton. The total cost of cultivation and laying down in New York, including £5,550 (nearly £3 per ton) for carriage and insurance, amounted to 203,007 dollars (Mexican), and the working capital was increased to 233,007 dollars, by 30,000 dollars expended on machinery. After deducting 27,830 dollars for commissions, the net profit reached 326,692 dollars, or 145 per cent. on the working capital. Such results leave ample margin for repayment of interest upon cost of land, and actually make it possible to repay the purchase money within a very short time, and still have left an estate bringing in a handsome profit, especially in countries where land is cheap."

The simple method adopted in preparing the present sample was as follows:—Bark stripped off the "canes," scraped at once, and soaked for 24 hours in water, with a fair quantity of *Sapo mollis* well dissolved in it. I have found this treatment most effective in quickly getting rid of the gummy matter. This mode is worthy of further experiment.

XXIX.—*BEHMERIA MACROPHYLLA* (D. Don). "Large-leaved Grass-cloth Plant." Order *Urticaceæ*. Himalayas and Burmah.

The plant is of far more robust habit than the preceding, and has frequently reached a height of 6 to 7 feet in our gardens.

Preparation same as above.

XXX.—*CAREX PANICULATA* (Linnaeus) syn. *C. adpressa* (R. Brown). "Close-spiked Sedge Grass" or "Hassock Grass." Order *Cyperaceæ*. Australia, New Zealand, Europe, and Asia.

This species of Sedge is very common throughout Victoria in low-lying swampy grounds, and along river and creek courses. It yields a strong fibre, which is prepared by boiling for twelve hours, and afterwards scraping the leaves.

XXXI.—*CAREX TERETICAULIS* (F. v. Mueller). "Round-stemmed Sedge Grass." Order *Cyperaceæ*. Victoria, New South Wales, South and West Australia, and Tasmania.

Produces a very strong fibre, which is easily prepared, like the preceding species.

XXXII.—*COMMERSIONIA FRASERI* (J. Gay). "Blackfellow's Hemp" or "Tie Plant" of Australia. Order *Sterculiaceæ*. Victoria, New South Wales, and Queensland.

A good fibre when properly prepared. The blacks of northern New South Wales and Queensland prepare fishing lines and nets from the bast of this shrub, which is torn from the young branches in a green state, and scraped with sea shells.

“It yields a fine fibre suitable for matting and cordage, and a good quality of paper could doubtless be made from it. The museum specimen was obtained from the Victorian collection, Phil. Int. Exh., 1876, and was prepared by Mr. W. R. Guilfoyle. The fibre is quite dark, due probably to insufficient bleaching, but is strong and not very brittle; and, although the filaments are stiff, they exhibit under the magnifying glass a very fibrous nature, some of them being fine and lustrous; is inferior to Hibiscus fibre. It measures between 2 and 5 feet in length.” (*Useful Fibre Plants of the World*, Professor C. R. Dodge.)

XXXIII.—*CORDYLINE AUSTRALIS* (Hooker, fil.) syn. *C. Forsteri* (F. v. Mueller). “Forster’s Palm Lily.” Order *Liliaceæ*. New Zealand.

This noble plant attains an ultimate height of 40 feet under favorable circumstances. Its leaves afford a large percentage of excellent fibre, of finer texture than that of *C. Banksii*, though supposed to be not quite so strong. It is prepared in a similar manner, but the weight of fibre to the acre would be very much greater on account of the more robust habit of the species. Under good cultivation the plants would begin to yield a profitable return after the third year, which would go on increasing annually for a considerable time. As the *Cordylines* produce seed in enormous quantities, and can be increased also by offshoots struck in the open ground, there is no limit to the numbers which may be propagated, so that a young plantation could be always coming on to take the place of the old when the latter became unprofitable. It must be remembered, too, that a great extent of land comparatively useless, on account of partial inundation, could be profitably planted with *Cordylines* and kindred plants.

Prepared by boiling for six hours, then scraping.

XXXIV.—*CORDYLINE AUSTRALIS* var. *Cookii* (?). “Captain Cook’s Palm Lily.” Order *Liliaceæ*. New Zealand.

The fibre from the leaves of this variety is very strong, and easily prepared by boiling for six hours, and then scraping.

XXXV.—*CORDYLINE AUSTRALIS* var. *lineata* (?). “Line-leaved Palm Lily.” Order *Liliaceæ*. New Zealand.

This, like many other kinds, yields a very strong fibre, prepared readily by boiling for six hours, and the usual scraping process.

XXXVI.—CORDYLINE BANKSII (Hooker, fil.). “Sir Joseph Banks’ Palm Lily.” Order *Liliaceae*. New Zealand.

The leaves of this plant sometimes attain, when cultivated, a length of 3 feet. The fibre is of superior quality to most of the New Zealand species on account of its long staple and great strength. In addition to being available for ropes, matting, &c., the stout midrib of the leaf might be used in brush-making.

Professor C. R. Dodge, of New York City, in his report to the Commissioner of Agriculture, The Hon. Wm. G. Le Due, on the fibres exhibited at the Philadelphia Exhibition, 1876, thus speaks of the sample of *Cordyline Banksii** fibre sent from these gardens:—“It is convertible into a good quality of paper. The fibre is from $2\frac{1}{2}$ to 3 feet in length, straight, white, and glossy, but very stiff, resembling fibre of *Yucca* or *Agave*. It is fully as strong as *Yucca* fibre, and would make excellent rope of great tenacity.”

This plant would pay well for cultivation, especially on irrigated land; under these conditions two or even three strippings of the outer leaves might be gathered in a year. The preparation of the fibre is very easy by boiling, nine hours being sufficient to digest the fleshy coating of the leaves, which require scraping and very little heckling to separate the filaments.

XXXVII.—CORDYLINE BAUERI (Hooker) syn. *C. nutans*. (A. Cunningham). “Bauer’s Palm Lily.” Order *Liliaceae*. Norfolk Island.

A fine broad-leaved species which yields a fibre of fair quality. Preparation, simply boiling for three hours and afterwards scraping. The leaves attain a length of 2 feet or more, and are often 3 inches in width.

XXXVIII.—CORDYLINE INDIVISA (Kunth) syn. *Dracena indivisa* (Kunth). The “Toi,” “Ti-plant,” “Tikapu,” or “Towai.” Order *Liliaceae*. New Zealand.

A tall-growing species, with broad rigid leaves. It yields a good fibre. Prepared by boiling for six hours, &c., &c.

XXXIX.—CORDYLINE STURMI (T. Kirk). “Sturm’s Palm Lily.” Order *Liliaceae*. New Zealand.

Leaves of sample boiled for three hours, and scraped.

XL.—CORDYLINE TERMINALIS (Kunth). “Terminal Palm Lily” or “Ti Plant.” Order *Liliaceae*. Common in New South Wales, Queensland, Polynesia, &c.

A fine silky fibre, easily prepared by boiling for six hours, &c., &c.

* Erroneously labelled *C. pumilio* in the collection sent to Philadelphia, 1876.

XLI.—*CORDYLINA TERMINALIS* (Kunth) var. *cannæfolia* (Bentham). Syn *C. cannæfolia* (R. Brown). “Canna-leaved Palm Lily.” Order *Liliaceæ*. New South Wales and Queensland.

A handsome very broad-leaved variety of the species, attaining a height of 8 or 10 feet. The leaves were boiled for twelve hours, and then scraped.

XLII.—*CYPERUS LUCIDUS* (R. Brown). “Shining Galingale Rush.” Order *Cyperaceæ*. Victoria, New South Wales, Queensland, North and South Australia, and Tasmania.

This tufted bog plant is found all over Australia and Tasmania, with the exception of the western portion.

The fibre was prepared by a boiling process.

XLIII.—*DASYLIRION GLAUCOPHYLLUM* (Hooker). “Glaucous Dasylyrion.” Order *Liliaceæ*. Mexico.

The fibre obtained from this hardy-evergreen plant is strong and fine. Prepared by boiling for six hours, and then scraping. Two crops of leaves per year could be obtained in Victoria.

XLIV.—*DIANELLA CÆRULEA* (Sims). “Paroo Lily.” Order *Liliaceæ*. New South Wales and Queensland.

Fibre similar to that of *D. revoluta*, and as easily prepared by boiling for three hours.

XLV.—*DIANELLA ELEGANS* (Kunth). “Elegant Native Flax Lily.” Order *Liliaceæ*. Victoria and Tasmania.

Sample of fibre produced is not nearly so strong, I think, as those obtained from other species. It is, however, very fine in texture, and is easily prepared by simply placing the leaves in hot water for one hour, and then scraping.

XLVI.—*DIANELLA LEVIS* (R. Brown) syn. *D. longifolia* (R. Brown). “Smooth-leaved Flax Lily.” Order *Liliaceæ*. Victoria, New South Wales, Queensland, South Australia, and Tasmania.

A pretty tufted herbaceous perennial, which bears large panicles of cœrulean-blue flowers, succeeded by large globular shining blue berries, which render the plant far more attractive than when in flower. The fibre is prepared by boiling the fully developed leaves for two or three hours, or until they are sufficiently softened to admit of the easy removal of the cuticle by scraping. Very young leaves only require boiling for an hour. It is of a

fine silky texture, and might be made into twine, fishing lines, &c. The Aborigines formerly plaited the leaves of this and other species into baskets, and also prepared fishing nets and lines from them.

XLVII.—*DIANELLA ODORATA* (Blume). “Japanese Flax Lily.” Order *Liliaceæ*. Japan.

Prepared by boiling for fourteen hours, and scraping. Fibre evidently not as strong as that of the Australian *Dianellas*.

XLVIII.—*DIANELLA REVOLUTA* (R. Brown). “Recurved-leaved Flax Lily.” Order *Liliaceæ*. Victoria, New South Wales, Queensland, South and West Australia.

Very plentifully distributed throughout Victoria, and thrives in loose sandy soils. The present sample, although short, is, compared with some other species, very strong. Process of preparation, boiling for three hours, and scraping.

XLIX.—*DIANELLA TASMANICA* (Hooker, fil.). “Broad-leaved Native Flax Lily.” Order *Liliaceæ*. Victoria, New South Wales, and Tasmania.

This species is of robust habit, the leaves often attaining a length of more than 5 feet. In its wild state it is generally found in moist and densely-shaded fern gullies and ravines in the sub-alpine districts of Victoria and Tasmania, frequently on the overhanging banks of mountain streams, its leaves trailing in the water, and sometimes completely hidden by the dense brushwood. It is evidently a good fibre plant, and furnishes excellent paper-stock.

Professor C. R. Dodge, in his *Economic Classification of the Fibres* in the collection of the Department of Agriculture, Washington (U.S.)—written some years ago—places the fibre of *Dianella Tasmanica* in the fourth class; and, after quoting from the description accompanying the specimens sent from these gardens to the Philadelphia Exhibition, says:—“Some of the filaments are white and brilliant, it is quite strong, a few twisted together requiring quite an effort to break them. Its name does not appear in the list of useful textile fibres, from which it is to be inferred it has not hitherto been known as a fibre-producing plant of any value.”

This plant can be multiplied to any extent from the root-stock as well as from seed. Two crops of leaves per year may be obtained with ease; it thrives in any fairly good soil, but attains its greatest perfection in rich alluvial deposits, such as is usually met with on river flats, &c. Fibre prepared by boiling for eight hours, and then scraping. Easily heckled.

L.—*DIERAMA PULCHERRIMA* (Baker) syn. *Sparaxis pulcherrima* (Hooker, fil.). "Pride of Katberry" or "Wand-flower." Order *Iridaceæ*. South Africa.

Fibre easily prepared by boiling for two hours, and like *Iris ochroleuca*. May be valuable for cordage, &c. The corms increase very rapidly, and after two years from the time of planting large tufts of leafage are produced. Two crops can be obtained per year.

LI.—*DOMBEYA NATALENSIS* (Sonder). "Cape Wedding Flower." Order *Sterculiaceæ*. South Africa.

A beautiful flowering shrub or small tree, hardy, and of quick growth in the Australian colonies. The bark furnishes by maceration a very good fibre, suitable for ropes, cordage, sacking, &c. Fibre prepared by maceration—*young* branches, five weeks; *old* branches, six to eight weeks.

LII.—*DORYANTHES EXCELSA* (Correa de Serra). "New South Wales Spear Lily." Order *Amaryllidaceæ*. New South Wales and Queensland.

This plant closely resembles the *Furcraea* (*Fourcroya*) *gigantea* of Tropical America in appearance, and is often mistaken for it by the uninitiated when not in flower. Like the *Furcraea*, the leaves are rich in fibre, of great strength, but somewhat coarser. With proper appliances, however, it might possibly be utilized for cloth, ropes, &c., whilst the refuse could be converted into paper or used for stuffing mattresses, &c. The present sample was prepared by boiling for a period of eight hours, and afterwards the usual scraping process. The plant can be propagated by division of the roots or from seed, which is produced in great abundance.

LIII.—*DORYANTHES PALMERI* (Hill). "Palmer's Spear Lily" or "Queensland Rock Lily." Order *Amaryllidaceæ*. Queensland.

The principal difference between this and *D. excelsa* is in the inflorescence, which in *D. excelsa* is borne in a dense terminal corymbose panicle, whilst in *D. Palmeri* the panicle is elongated to 4 feet or more, the weight of the inflorescence often causing the flower stem to assume a drooping almost horizontal position. The same remarks apply to the quality of the fibre, cultivation, &c., as to the other species here described.

Fibre prepared by boiling for twelve hours, placed through the rollers, and then scraped.

LIV.—DORYANTHES GUILFOYLEI (Bailey). “The Giant Queensland Spear Lily.” Order *Amaryllidaceæ*. Queensland.

Doryanthes Palmeri was hitherto considered to be the most gigantic and showy Amaryllid discovered in Australia, but it is eclipsed in size and beauty by this later discovery. The leaves and flower spikes are of huge proportions. Leaves 9 feet long, over 8 inches in width, and of a brilliant green. From the base of the flower stalk (which is $15\frac{1}{2}$ inches in circumference) to the apex of the inflorescence is 16ft. 2in. Of this, no less than 7ft. 8in. forms a compound spike of rich crimson Amaryllis-like florets, each 4 inches in length, $2\frac{1}{2}$ inches broad (numbering 100 or more), supported by 8ft. 6in. of stalk. Fibre prepared by boiling for twelve hours, then seraping after being placed through the rollers to squeeze out the gummy substance.

LV.—DORYANTHES LARKINI (C. Moore). “Larkin’s Spear Lily.” Order *Amaryllidaceæ*. Northern New South Wales and Queensland.

A very fine ornamental species. Quality of fibre, cultivation, &c., same as the three preceding.

LVI.—DRACÆNA DRACO (Linnæus). “Dragon’s Blood Tree” of Teneriffe. Order *Liliaceæ*. Canary Islands.

The stem, like the closely-allied Australasian Cordylines, becomes ramified by age into many leafy heads. It attains to enormous proportions in its native habitat, as Humboldt tells us, but in our colonies is very slow of growth. The fibre from the leaves assimilates closely to Yucca fibre, and is prepared in a similar manner.

LVII.—ELÆAGNUS JAPONICA. “Japanese Oleaster.” Order *Elæagnaceæ*. Japan.

This, like several other new fibres mentioned in the list, was prepared by simply stripping the bark off the branches, and seraping the raw material. It furnishes a bast not unlike that of Dombeya Natalensis.

LVIII.—FURCRAEA (FOURCROYA) GIGANTEA (Ventenat) syn. Agave foetida (Linnæus). “Giant Fibre Lily” or “Mauritius Hemp.” Order *Amaryllidaceæ*. Tropical America.

This magnificent Amaryllid attains to great perfection in Australia, although in our own colony—Victoria—severe frosts damage the leaves to some extent. This, however, is no detriment to the fibre contained in them. It is extracted in a similar

manner to *Agave* or "Pita" fibre, which it closely resembles. The present sample has been prepared by a boiling process which extended over a period of ten hours, placed through the rollers, then scraped and heckled. Several experts say "that the fibre of *F. gigantea* is very like the sisal hemp of commerce, and doubtless is often so called."

Dr. Ernst, in the catalogue of the Venezuelan Department (Phil. Int. Exh., 1876), states that—"The fibre is very strong, and is used for cordage and gunny bags. It is prepared in the same manner as sisal hemp. Samples of the Venezuelan specimens are dyed in aniline to show that it will take colour."

Professor C. R. Dodge, in his valuable work, *Useful Fibre Plants of the World*, says:—"The plant is grown largely for fibre at St. Helena and Mauritius, and in the London market the product is known as Mauritius hemp. *F. gigantea* is supposed to have been introduced from South America to Mauritius about 1790. It has evidently found a congenial home there, for, without any effort on the part of man, it has covered waste lands and abandoned sugar estates to such an extent as to lay the foundation of a considerable fibre industry. The leaves are often 8 feet in length, and from 6 to 7 inches in breadth. The pulp of the leaves when crushed gives off a strong pungent odour, and hence this species is sometimes called the fœtid aloë. The juice is strongly corrosive and soon acts upon wrought iron; it is said to produce less effect on cast iron, while it is practically inoperative on brass and copper. The plant grows in all soils and up to an elevation of 1,800 feet above the level of the sea. It has, however, more generally disseminated itself on the lowlands near the coast, and on a few abandoned sugar estates that have become too dry for cane cultivation."

LIX.—*FURCRÆA* (*FOURCROYA*) *BEDINGHAUSII* (C. Koeh). "Bedinghansen's Giant Lily." Order *Amaryllidææ*. Mexico.

Prepared by boiling for two hours, rolled, and then scraped. Easily prepared. Fibre very elastic when wet.

LX. — *GAHNIA PSITTACORUM* (Labillardiere) syn. *Cladium psittacorum* (F. v. Mueller). "Victorian Giant Grass" or "Parrot Rush." Order *Cyperacææ*. Victoria, New South Wales, Queensland, South Australia, and Tasmania.

Usually found in the uplands and on banks of creeks, &c. It closely resembles *G. Radula* in appearance, and the remarks in the description of that species apply equally to this as a fibre plant.

Leaves boiled for 24 hours, and then scraped.

LXI.—*GAHNIA RADULA* (Bentham) syn. *Cladium Radula* (R. Brown). “Cutting Grass,” “Black Reed,” or “Brickmaker’s Grass.” Order *Cyperaceæ*. Victoria, South Australia, and Tasmania.

A coarse tufted perennial, very plentiful on poor rather wet land, especially near the coast. It is chiefly valued by the settlers as a thatching material, for which purpose it is well adapted, lasting for several years. As a fibre-plant it may be of no value, the filaments being harsh and brittle; but as a paper-stock it may prove of commercial importance, even as an admixture with other material. It can be obtained in almost unlimited quantity in our colony. Prepared by boiling for 24 hours, and then scraping.

LXII.—*GREWIA OCCIDENTALIS* (Linnæus). “African Star Bush” or “Kaffir Hemp Bush.” Order *Tiliaceæ*. Africa.

A quick-growing evergreen shrub, which bears a profusion of bright purple aster-like flowers of great beauty. The bark of the young branches furnishes by maceration a strong fibrous bast, which might be manufactured into ropes, cordage, &c. The plant thrives in Australia, and is easily propagated both by seed and from cuttings, the latter rooting freely out of doors, if put in during the autumn season. The young branches take 18 days, and the older 27 days, to macerate.

“A white fibre of great strength extracted by retting, and much used by the Kaffirs.” (Spon.)

LXIII.—*HIBISCUS HERBACEUS*. (Vell). “Herbaceous Rose Mallow.” Order *Malvaceæ*. Brazil.

Prepared by maceration for a period of 20 days, sample obtained from inferior material. May yet prove a good fibre plant if cultivated for that purpose. Like the *Bœhmerias* it increases rapidly during our summer, and dies partly down in winter. Two crops of “canes” per year can be relied upon, first crop 3 feet, second crop 2 feet, stems.

LXIV.—*HIBISCUS HETEROPHYLLUS* (Ventenat.) “Queensland Sorrel Tree” or “Batham.” Order *Malvaceæ*. New South Wales and Queensland.

A tall stout-branched shrub or small tree. Flowers large, white, with crimson centre. The bark affords a fibre very similar in quality and appearance to that prepared from *H. splendens*. Prepared by maceration—young branches, 16 days; old branches, 6 days longer. The present sample was obtained from very unsuitable wood.

LXV.—*HIBISCUS SYRIACUS* (Linnæus) syn. *Althæa Frutex* (Hort). “Syrian Rose Mallow.” Order *Malvaceæ*. Syria.

This well-known shrub, it must be admitted, affords a beautiful white fibre of considerable strength, and could be worked into a very useful fine-cord material. The plant succeeds well in most parts of Australia, and is readily propagated by cuttings, which root freely out of doors in sandy soil. Fibre prepared by maceration for a period of 35 days, and then scraped with blunt knives.

LXVI.—*HOHERIA POPULNEA* (A. Cunningham). “Ribbon-wood of Otago.” Order *Malvaceæ*. New Zealand.

A graceful tree, not unlike the “Aspen” (*Populus tremula*, Linnæus), attaining a height of 60 to 70 feet in favorable situations. The bast furnished from the branches and from young trees is very beautiful, being of a delicate lace-like texture, very strong and glossy. It is suitable for weaving into textile fabrics, and can be also utilized for matting, ropes, cordage, &c. The mode of preparation adopted was maceration, which occupied from 12 to 15 days.

LXVII.—*HYPOXIS LONGIFOLIA* (Baker). “Long-leaved Hypoxis.” Order *Amaryllidææ*. South Africa.

Fibre prepared by boiling for two hours. Very little trouble as regards preparation. Fibre not unlike that of *Dianella elegans*.

LXVIII.—*IRIS OCHROLEUCA* (Linnæus) syn. *Iris gigantea* (Carriere). “Yellowish-white Iris.” Order *Iridææ*. Asia Minor.

Fibre produced for the first time. Prepared by simply placing the leaves in boiling water for one hour, and then scraping. Well worthy of cultivation and trial as a fibre plant.

LXIX.—*JUNCUS COMMUNIS* (E. Meyer). “Common or Candle Rush.” Order *Juncaceæ*. Australia, Tasmania, New Zealand, Europe, &c.

This cosmopolitan species of rush may be obtained in enormous quantities in Australia. It makes excellent paper material. The fibre was prepared by boiling for eight hours, and then scraped.

LXX.—*JUNCUS MARITIMUS* (Lamarck). “Sea Rush” or “Common Coast Rush.” Order *Juncaceæ*. Australia, Tasmania, &c.

This, like *J. communis* (E. Meyer), has a very wide geographical range, “being common in maritime marshes and moist sandy tracts in temperate regions.” It forms a good paper-stock,

and can be obtained here in large quantities. Fibre prepared by boiling for sixteen hours, then simply run through the rollers, dried, and heckled. No scraping required.

LXXI.—*JUNCUS PALLIDUS* (R. Brown) syn. *J. vaginatus* (E. Meyer). “Pale-green Rush” or “Toolim.” Order *Juncaceæ*. Australia, Tasmania, and New Zealand.

A tall-growing and stout rush, which may be obtained in large quantities in almost any part of our continent. It is supposed to be an excellent paper material, and it furnishes also a fibre of considerable strength. Baskets and other useful household things, such as picture-frames, &c., are sometimes made of the leaves by settlers, both in a peeled and unpeeled state. The preparation of the present sample was by boiling for some hours, or until the cuticle came away easily by scraping.

LXXII.—*KNIPHOFIA ALOIDES* (Mœnch) syn. *Tritoma Uvaria* (Ker). “Aloe-like Torch Lily” or “Flame Flower.” Order *Liliaceæ*. South Africa.

The fibre from this species is readily obtained, and shows a sample of good quality. Prepared by boiling for two hours, and then scraping.

LXXIII.—*KNIPHOFIA ALOIDES* (Mœnch) var. *glaucescens*. “Glaucous-leaved Torch Lily” or “Flame Flower.” Order *Liliaceæ*. South Africa.

Preparation the same. Fibre similar to *K. grandiflora*.

LXXIV.—*KNIPHOFIA AUREA* syn. *Tritoma aurea*. “Golden-tinted Torch Lily” or “Flame Flower.” Order *Liliaceæ*. South Africa.

This species is rich in fibre material. Easily grown, and produces a wealth of long foliage. The fibre is easily prepared after boiling for two hours, then lightly scraped with blunt knife.

LXXV.—*KNIPHOFIA GRANDIFLORA* syn. *Tritoma grandiflora*. “Large-flowered Torch Lily” or “Flame Flower.” Order *Liliaceæ*. South Africa.

Sample prepared from the matured leaves of the plant. Probable yield $1\frac{1}{2}$ tons per acre, two crops per year equal, say, 3 tons. The commercial value quoted to me from England at from £17 to £17 10s. per ton.

Method of preparation, boiling the leaves for two hours, &c., same as above.

LXXVI.—*KNIPHOFIA ROOPERI* (Lemaire) syn. *Tritoma Rooperi* (T. Moore). “Rooper’s Torch Lily” or “Flame Flower.” Order *Liliaceæ*. South Africa.

Prepared in the same way. Fibre equal to *K. recurvata*.

LXXVII.—*KNIPHOFIA RECURVATA* (Moore) syn. *Tritoma recurvata* (Ker). “Recurved-leaved Torch Lily” or “Flame Flower.” Order *Liliaceæ*. South Africa.

This quick-growing perennial succeeds admirably in the colonies. Its long recurved leaves are very rich in fibre, of fair strength and quality, and is very easily prepared by boiling the leaves for, say, two hours, and then scraping. The writer lays claim to being the first to bring the *Kniphofias* under notice as fibre-producing plants. In 1874-5 samples were prepared for the first time in his laboratory, as also the first example of *Sparmannia* fibre and others, and forwarded to several exhibitions. The fibre of any of the *Kniphofias* can be made ready for market in a few hours from the time the leaves are cut from the plant. They are readily multiplied by root division, and would yield at least two crops of leaves in a year with fairly good cultivation.

LXXVIII.—*LAGUNARIA PATERSONII* (G. Don). “Norfolk Island Cow-itch Tree.” Order *Malvaceæ*. New South Wales, Queensland, and Norfolk Island.

A very beautiful leafy tree, of pyramidal habit of growth. It bears pretty rose-coloured Hibiscus-like flowers in great profusion. The fibre obtained from the bark by maceration is of a fine texture, strong and glossy; it might be converted into the finer kinds of cordage, textile fabrics, matting, &c. *Lagunaria* fibre is placed in the third division by Professor C. R. Dodge in his Economic Classification, that is—“Fibres capable of employment in the arts, or used by natives chiefly in the manufacture of cordage, twine, nets, &c., sometimes woven into fabrics or beaten into cloth or ‘tappa.’”

Bark stripped off the branches, steeped for ten days, and then scraped. If left longer the fibre seems to deteriorate.

LXXIX.—*LAVATERA ARBOREA* (Linnæus). “Common Tree Mallow.” Order *Malvaceæ*. Western Europe and North Africa.

Like most of the order the plant is of quick growth. The ribbon-like bast is produced in greater abundance than most malvaceous plants, and has been highly recommended for paper material. Prepared by the usual process of maceration for a period of ten to fifteen days, according to age of wood.

Spon says :—" The inner bark yields a strong fibre, somewhat coarse, but capable of manufacture into cords, ropes, and mats."

LXXX.—*LAVATERA MARITIMA* (Gouan). "Sea Mallow."
Order *Malvaceæ*. West Mediterranean Region.

A hardy evergreen shrub of quick growth. The fibre which is obtained by maceration for seven days is fine and silky, 3 to 4 feet long, and easily prepared by scraping and heckling.

Of its value Thomas Christy says :—" Worthy of cultivation on a large scale for the very beautiful and excellent quality of its fibre."

"Savorgnan states that it is spontaneous in the environs of Nisee, in western Liguria, in Sardinia, &c. Cortical fibre, tenacious, used for cordage. Abundant, and does not deteriorate in salt water. Adapted to coarse hemp cables and marine uses." (*Useful Fibre Plants of the World*, Professor C. R. Dodge.)

LXXXI.—*LAVATERA OLIA* (Linnæus). "Velvet Mallow."
Order *Malvaceæ*. South Europe.

A quick-growing perennial. The stalks yield a beautiful fibre by macerating for a period of five to ten days. A well-prepared sample resembles white horsehair. Two, or even three, crops could be obtained in a year by good cultivation and liberal manuring. The second crop of stalks is fit for gathering ten weeks after the first cutting, when plants have become properly established.

LXXXII.—*LAVATERA TRILOBA* (Linnæus). "Three-lobed Tree Mallow." Order *Malvaceæ*. Spain.

Time for maceration, ten days. The sample is a very poor one, as healthy branches were not obtainable. Fibre very easy to prepare, and not unlike that of *L. maritima*.

LXXXIII.—*LEPIDOSPERMA ELATIUS* (Labillardiere). "Tall Sword Rush." Order *Cyperaceæ*. Victoria, South Australia, and Tasmania.

A tall species, very plentiful in mountainous districts, sometimes attaining a length of 7 or 8 feet. Possibly a good paper plant. The fibre is not so strong as that of *L. gladiatum*, the "Coast Sword Rush." It is difficult of preparation, a remark which applies to most of the genera comprising the Orders *Cyperaceæ* and *Juncaceæ*, by reason of the large amount of silicea contained in the cuticle of the leaves and stems. Process, boiling for 24 hours, then scraped, dried, and heckled.

LXXXIV.—*LEPIDOSPERMA GLADIATUM* (Labillardiere). “Coast Sword Rush.” Order *Cyperaceae*. Victoria, New South Wales, South and West Australia, and Tasmania.

This rigid smooth-stemmed Sword Rush is undoubtedly one of our best paper plants. The fibre is strong, but the leaves require boiling for 24 hours.

“Spon says it is used by the natives for baskets and fishing lines, and suggests that its only industrial use will probably be paper-making, for which purpose it is considered equal to Esparto.” (*Useful Fibre Plants of the World*, Professor C. R. Dodge.)

LXXXV.—*LEPIDOSPERMA LONGITUDINALE* (Labillardiere). “Long-leaved Sword Rush.” Order *Cyperaceae*. Victoria, New South Wales, South and West Australia, and Tasmania.

One of the tall sword rushes, very plentifully distributed over the south-east portion of Victoria, on marshy land, extending from the coast to the hills. Like most of the genus it yields a good paper pulp. Same treatment as *L. gladiatum*.

LXXXVI.—*MALVASTRUM CAPENSE* (Garcke) syn. *Malva Capensis* (Linnaeus). “Cape False Mallow.” Order *Malvaceae*. South Africa.

A handsome shrub of quick growth. Fibre obtained by maceration for fourteen days. Similar to that of *Lavatera arborea*.

LXXXVII.—*MAOUTIA PUYA* (Weddell) syn. *Bœhmeria Puya* (Hooker). “Nepaul Grass-cloth Plant,” “Puya-fibre-plant,” “Wild Hemp,” or “Pua Hemp.” Order *Urticaceae*. Himalayas and Burmah.

Prepared in the same way as *Bœhmeria nivea* and *B. macrophylla*.

LXXXVIII.—*MORÆA BICOLOR* (Steudel) syn. *Dietes bicolor* (Sweet). *Iris bicolor* (Lindley). “Two-coloured Moræa” or “Butterfly Flag Iris.” Order *Irideae*. South Africa.

Fibre obtained by boiling for three hours, and then scraping. Similar to that of *M. Robinsoniana*.

LXXXIX.—*MORÆA EDULIS* (Ker) var. *longifolia* (Baker). Syn. *M. longifolia* (Sweet). “Long-leaved Moræa.” Order *Irideae*. South Africa.

Prepared by boiling for three hours, and then scraping. Fibre coarse, like *Astelia Banksii*. Sample exhibited for the first time.

XC. — *MORÆA (IRIS) ROBINSONIANA.* (F. v. Mueller)
 "Wedding Flower." Order *Iridaceæ.* Of Lord Howe's Island,
 S. Pacific.

This magnificent perennial grows to a height of more than 6 feet. The leaves are rich in fibre, especially the stout midrib, and probably it would prove valuable for paper-stock. It is the largest known species of the genus, and in habit of growth resembles the nearly allied *Pardanthus Chinensis*. Fibre obtained by boiling for nine hours, and then seraping.

XCI.—*MUSA ENSETE* (J. F. Gmelin). "Bruce's Great Abyssinian Banana." Order *Scitamineæ.* Tropical Africa.

Fibre prepared by boiling for fourteen hours, and then seraping. "A sample prepared by Mr. Morris, at Jamaica, yielded at the rate of 1.16 per cent. of the gross weight. The fibre was somewhat weak and dull looking; it had none of the lustre of the best plantain fibre, and it was valued in London at £12 to £14 per ton." (*Useful Fibre Plants of the World*, Professor C. R. Dodge.)

XCII.—*PANDANUS FORSTERI* (C. Moore and Mueller). "Tent Tree," of Lord Howe's Island. Order *Pandanaceæ.*

The sample of fibre prepared from this species was obtained by boiling for twelve hours.

XCIII.—*PHORMIUM COOKIANUM* (Le Jolis) syn. *P. Colensoi* (Hooker, fil.). "Cook's Flax Lily" or "Wharaeki." Order *Liliaceæ.* New Zealand.

Leaves boiled for twelve hours, and then seraped. Fibre much finer than *P. tenax*, not nearly so long in staple, but easily prepared.

X CIV.—*PHORMIUM COOKIANUM VARIEGATUM* syn. *P. Colensoi variegatum.* "Cook's Variegated Flax Lily." Order *Liliaceæ.* New Zealand.

Prepared by boiling for ten hours, and then seraping. Sample represents 62 leaves so treated.

XCV. — *PHORMIUM TENAX* (Forster). "Common Phormium Fibre" or "New Zealand Flax Plant." Order *Liliaceæ.* New Zealand.

Process, boiling the leaves for fourteen hours, and then seraping. Sample represents the product of 100 leaves. (See also *Useful Fibre Plants of the World*, Professor C. R. Dodge.)

XCVI.—*PHORMIUM TENAX VARIEGATUM*. “Variegated Phormium Fibre” or “New Zealand Flax Plant.” Order *Liliaceae*. New Zealand.

See note in the description relating to *Agave Americana variegata* in reference to this variety.

Fibre prepared by boiling for ten hours, and then scraping.
Sample represents the product of 77 leaves.*

XCVII.—*PIMELEA CLAVATA* (Labillardiere). “Club-flowered Tough Bark.” Order *Thymelaeaceae*. Western Australia.

Yields a very fine bast. The fibre is obtained by stripping the bark from stems of trunk and branches, and scraping them when in the natural green state. The shrub grows to 10 or 12 feet.

XCVIII.—*PLAGIANTHUS BETULINUS* (A. Cunningham). “Ribbon Tree” or “New Zealand Lace-bark Tree.” Order *Malvaceae*. New Zealand.

A hardy evergreen birch-like tree, growing to an ultimate height of 80 feet. From the bark a beautiful lace-like bast is obtained by maceration, closely assimilating to that furnished by *Hoheria populnea*, the “Otago Ribbonwood”; in fact, it is almost impossible to distinguish between the two when placed side by side. Like the latter, the *Plagianthus* is sometimes called “Ribbon Tree” from its similarity of bark.

Sample No. 1, ten days’ maceration.

No. 2, fifteen days’, taken from older wood than sample No. 1, bark stripped from branches and soaked in water.

No. 3 was obtained from dead branches.

XCIX.—*PLAGIANTHUS PULCHELLUS* (A. Gray) syn. *Sida pulchella* (Bonpland). “Victorian Hemp Bush.” Order *Malvaceae*. Victoria, New South Wales, and Tasmania.

A pretty shrub or small slender tree. It is almost invariably found growing on the banks of rivers, creeks, &c.

Prepared in a similar way to “Jute-fibre,” and requires about the same time for steeping. Supposed to be equal to “Queensland Hemp” (*Sida rhombifolia*), and possesses the advantage of being much longer in staple. It can be obtained 8 feet in length if necessary. The plant, which is of quick growth, is usually propagated by seed. On marshy land, subject to partial inundation, it should pay for cultivation. Fibre adapted for weaving

* For full and complete information regarding New Zealand Flax, see Sir James Hector’s instructive pamphlet, *Phormium tenax as a Fibrous Plant*, 2nd edition, 1889: Published by the New Zealand Government.

into cloth, and may also be converted into ropes, cordage, twine, &c. The present sample was obtained by maceration for nine days.

Professor C. R. Dodge, in his *Useful Fibre Plants of the World*, refers to it thus:—"The bark is of a beautiful lace-like texture, tearing into shreds with greatest ease, but flexible and strong. According to the *Treasury of Botany* the tree is called Akaroa by the New Zealanders, who extract a fibrous material from the young branches, known as New Zealand cotton, which is not only fine, but exceedingly strong, though resembling flax or hemp rather than cotton. The fibre of the ribbon tree is utilized in the manufacture of fishing lines and nets, and to some extent for cordage and paper."

C.—*POA CÆSPITOSA* (Forster) syn. *P. australis* (R. Brown). "Australian Meadow-Grass" or "Wiry Grass." Order *Gramineæ*. Victoria, New South Wales, Queensland, &c.

A coarse perennial grass, which affords a fibre of fair quality by boiling for a period of six to eight hours. It is an excellent paper-stock, and with proper appliances might rival the "Esparto" or "Atocha Grass" (*Stipa tenacissima*) of the Spanish Peninsula. It is very plentiful on the rich alluvial flats bordering on rivers, creeks, and tea-tree (*Melaleuca*) swamps, where it grows in large tussocks, and, when not eaten down by stock, attains a height of nearly 4 feet.

CI.—*SCHÆGENUS BREVIFOLIUS* (R. Brown). "Cord Rush of Victoria." Order *Cyperaceæ*. Victoria, New South Wales, Queensland, South and West Australia.

A wiry tufted rush-like perennial, very plentiful along the coast and for some distance inland, especially in the south-east portions of our colony. It furnishes a fine fibre of considerable strength, not unlike that obtained from several species of *Sansevieria*, known as "Bowstring Hemp," and is also a valuable paper-plant. The mode of preparation is by boiling for about nine hours, after which the pulpy matter may be separated from the filaments either by washing or by pressure.

CII.—*SCIRPUS NODOSUS* (Rottboell) syn. *Isolepis nodosa* (R. Brown). "Knotted Club Rush" or "Wiwi." Order *Cyperaceæ*. Australia, Tasmania, New Zealand, &c.

A rush-like tufted perennial, plentifully distributed throughout Australia, usually along the coast-line, and adjacent to water on rather poor sandy soils. It forms a good paper-stock, but as a fibre-plant for other purposes is comparatively useless. Prepared by boiling for twelve hours, then scraped, dried, and heckled.

CIII.—SPARMANNIA AFRICANA (Linnæus, fl.). “Common African Hemp Bush.” Order *Tiliaceæ*. South Africa.

This handsome quick-growing shrub attains a height of 10 to 12 feet. It delights in a rich sandy loam; and is quite at home in Victoria. By good cultivation and a liberal water supply during the hot season, it grows so rapidly here that two crops of “canes” at least can be obtained in a year. The bark, more especially that of the young branches or shoots, is very rich in fibre of fine texture. For many purposes it is considered by some experts equal, if not superior, to “Ramie” or “Chinese Grass-cloth” fibre. In appearance it resembles jute-fibre, but is supposed to be superior in some respects. Professor C. R. Dodge, in speaking of the sample of Sparmannia fibre (the first of its kind ever prepared), which was forwarded from these gardens by me to the Philadelphia Exhibition (1876), says:—“The fibre is of a beautiful silvery-grey colour, when it has been properly prepared. Some of the filaments of this sample are brilliant and lustrous, and it possesses considerable strength; in fact, seems almost equal to China grass in tenacity. He places it in the second division in his Economic Classification of Fibres.”

In his *Useful Fibre Plants of the World*, he also says:—“The advantages which Sparmannia has over all other fibre plants, and which elevates it to the highest rank of agricultural products, are, that it is perennial, it is one of the very best forage plants in existence, its enormous yield, both of fodder and fibre, the great strength and dazzling whiteness of the fibre, the facility with which it takes dyes, and the extremely low prices at which it can be produced making it accessible even to the paper manufacturer.” (Jean Roth.)

Commercial value of this fibre quoted to me at from £17 to £17 10s. per ton in London.

Prepared by maceration, young branches fifteen days, older branches 21 days.

CIV. — SPARMANNIA AFRICANA, FLORE-PLENO. “Double-flowered African Hemp Bush.” Order *Tiliaceæ*. South Africa.

Probable yield of fibre about 4 tons per acre. Commercial value same as the preceding.

Sample No. 1, young wood, three weeks’ maceration.

Sample No. 2, older wood, four weeks’ maceration.

Sample No. 3, much older wood, six weeks’ maceration.*

* The use of Sparmannia Africana as a fibre plant was first discovered by the writer in 1873, and the first sample ever exhibited was, as stated, sent from the Melbourne Botanic Gardens to the Centennial Exhibition of Philadelphia, 1876.

CV.—*SPHÆRALCEA UMBELLATA* (G. Don). “Umbel-flowered Globe Mallow.” Order *Malvaceæ*. Mexico.

A beautiful and ornamental flowering shrub of quick growth, attaining a height of 10 feet. Fibre prepared by maceration for seventeen days.

CVI.—*STERCULIA ACERIFOLIA* (A. Cunningham) syn. *Brachychiton acerifolius* (F. v. Mueller). “Flame Tree” or “Lace Bark-tree” of New South Wales. Order *Sterculiaceæ*. New South Wales and Queensland.

A lofty ornamental tree, bearing a profusion of brilliant scarlet flowers, from which fact it derives its common name “Flame Tree.” The bark is very thick, and is composed of numerous layers of beautiful lace-like ribbons, which are easily separated by maceration for a period of 20 to 27 days. The young bark is more readily prepared than that of the stem and large branches. It is supposed to be equal, if not superior, to Cuba bast, which is composed of the inner bark of the “Mountain Mahoe,” *Hibiscus elatus* (Swartz). It can be woven into coarse cloth, plaited into hats and bonnets, converted into ropes, cordage, and matting, &c. It should make good ships’ hawsers on account of its elasticity, and as water does not appear to have an injurious effect upon it. The refuse after heckling would form no mean substitute for horsehair in stuffing mattresses, saddles, &c. It can also be utilized as admixture in paper-making. From the seed-pods a rich brown dye is obtained.

CVII.—*STERCULIA DIVERSIFOLIA* (G. Don) syn. *Brachychiton populneus* (R. Brown). “Victoria Bottle Tree” or “Currijong Tree” of New South Wales. Order *Sterculiaceæ*. Victoria, New South Wales, and Queensland.

A handsome leafy tree of pyramidal habit, attaining a height of 50 feet or more. Having a thick swollen trunk, it is called “Bottle Tree” by some of the settlers. The Aborigines name it “Currijong,” which word would seem to imply “tough,” as it is applied to various *Pimelcas* and other plants having tough barks, which are used by them for making fishing lines, baskets, &c. The fibre of the inner bark of this species is similar to that of the preceding, but coarser in texture, and of a darker colour. It would make strong ropes, matting, &c. This bark takes much longer in retting than that of the “Flame Tree.”

CVIII.—*STERCULIA LURIDA* (F. v. Mueller) syn. *Brachychiton luridus* (C. Moore). “Sycamore of Australia” or “Hat Tree.” Order *Sterculiaceæ*. New South Wales and Queensland.

A tall handsome tree, with dark-green deeply-lobed leaves, somewhat like those of the “Flame Tree.” The bark affords a

good fibre suitable for ropes, cordage, &c. The process of maceration extends sometimes to five or six weeks.

CIX.—*TYPHA ANGUSTIFOLIA* (Linnæus). "Native Bullrush" or "Cat's-tail." Order *Typhaceæ*. Australia, Tasmania, New Zealand, Europe, &c.

This cosmopolitan aquatic perennial is too well known to need description. It is very plentiful in Victoria and the other Australian colonies, on the banks of streams and fresh-water lagoons. Furnishes a first-class material for paper-making, and a fibre of fair strength and fineness may be manufactured from the leaves. †

Prepared by a boiling process, which occupies four hours; afterwards it is scraped and heckled.

Sample prepared from 100 leaves.

CX.—*XEROTES LONGIFOLIA* (R. Brown). "Native Tussock Grass" or "Mat Rush." Order *Juncaceæ*. Victoria, New South Wales, Queensland, &c.

A tufted perennial, widely dispersed throughout the colonies, especially on plains and open country subject to floods, or in the neighbourhood of water. The leaves attain a length of 3 or 4 feet; they furnish a valuable paper-pulp. As a fibre-plant for any other purpose, however, it may be considered of little value. Prepared by boiling for twelve hours, and the usual scraping. †

"It is reckoned as the best indigenous substitute for 'Esparto' for paper-making." (Spon). The culms are used by the Yarra tribe of south-eastern Australia for manufacturing baskets. (*Useful Fibre Plants of the World*, Professor C. R. Dodge.)

CXI.—*YUCCA ALOIFOLIA* (Linnæus). "Aloe-leaved Adam's Needle" or "Dagger-leaf." Order *Liliaceæ*. North America and West Indies.

A plant well known in Australian gardens of any pretensions, being extensively planted for scenic effect, in conjunction with *Cordylines*, *Doryanthes*, *Agaves*, *Dasyliroids*, and such like. It is a good fibre-plant, and, like many other species of the genus, succeeds on the poorest soils, and is of moderately quick growth. The fibre is suitable for ropes, cordage, and coarse cloth, and possesses great strength. In appearance and texture it resembles *Agave* fibre. It is very simply prepared, either by maceration, by crushing the leaves between fluted rollers, or by boiling; the latter operation takes four hours, after which the cuticle comes away readily by scraping. The sample is the product of 360 leaves so treated.

CXII.—*YUCCA ALOIFOLIA* (Linnæus) variegata. “Variegated Dagger-leaf.” Order *Liliaceæ*. Mexico.

Fibre prepared by boiling for six hours, and then scraping. Sample produced from 227 leaves.

CXIII.—*YUCCA FILAMENTOSA* (Linnæus). “Thread-bearing Mound Lily,” or “Bear Grass.” Order *Liliaceæ*. North America.

A good fibre-plant of easy cultivation. Prepared by boiling for three hours, and scraping. Professor C. R. Dodge, in his *Useful Fibre Plants of the World*, gives a lengthy and interesting account of this *Yucca* as a fibre-plant.

CXIV.—*YUCCA FLEXILIS* (Carriere) syn. *Y. stenophylla* (Hort). “Flexible *Yucca*.” Order *Liliaceæ*. Mexico.

Fibre produced by boiling the leafage for four hours, and then scraping. The sample is the product of 350 leaves so treated.

CXV.—*YUCCA GLORIOSA* (Linnæus). “Common Mound Lily” or “Petre Hemp.” Order *Liliaceæ*. North America.

This magnificent plant furnishes the “Petre Hemp” of Mexico, where it is manufactured into ropes, cordage, packing cloth, &c., and is extremely durable. “Undoubtedly one of the best of the American fibre plants.” Fibre prepared by boiling for six hours, and then scraping. Sample the product of 262 leaves.

CXVI.—*YUCCA GLORIOSA* variety *superba* (Baker). Syn. *Y. superba* (Haworth). “Superb Mound Lily.” Order *Liliaceæ*. North America.

A variety of the preceding. The fibre is of a similar quality, and is prepared in the same manner.

CXVII.—*YUCCA GUATEMALENSIS* (Baker) syn. *Y. Ghiesbrechtii* (Hort). “The Large Broad-leaved Mound Lily.” Order *Liliaceæ*. Mexico and Guatemala.

The fibre exhibited was obtained by boiling for twelve hours, and then scraping.

CXVIII.—*YUCCA TRECULIANA* (Carriere) syn. *Y. agavoides* (Hort). “Trecul’s Dagger-leaf.” Order *Liliaceæ* Mexico.

Fibre prepared by boiling for six hours, and scraped. Not so easily prepared as *Y. aloifolia* or *Y. gloriosa*. Similar in quality to *Y. Guatemalensis*.

CXIX.—YUCCA WHIPPLEI (Torrey) syn. Y. Californica (Lemaire). “Whipple’s Yucca” or “Mound Lily.” Order *Liliaceæ*. California.

The fibre of this species is exceedingly fine, and very easily prepared after boiling for six hours, then scraping with a blunt knife. Sample the product of 250 leaves. Professor C. R. Dodge says of this plant in *Useful Fibre Plants of the World*—“Another Californian species of Yucca, samples of fibre and cordage of which have been received, collected by Dr. E. Palmer, who states that the leaves yield a very soft white fibre, which is capable of being made into very nice thread. Indians use this fibre to form a padding for their horse blankets, the outer part of which, being made of the fibre from the Yucca baccata, is very rough. A wooden needle is threaded with twine made from the same fibre, and the lining is firmly quilted to the saddle blanket, forming a soft covering, without which it would injure the animal’s back.”

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