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## Notes on the Genus *Macrozamia*.

By CHARLES MOORE, F.L.S., Vice-President of the Royal Society of N.S.W., Director of the Botanic Gardens, Sydney.

[Read before the Royal Society of N.S.W., 5 September, 1883.]

THE object of this paper is to furnish (principally from personal knowledge) a brief general historical sketch of the species of the genus *Macrozamia*, with a description of those known to inhabit this Colony up to the present time. The plants of this remarkable genus, which is purely Australian, were, until a recent period, but very imperfectly known; of at least fourteen well-marked species discovered from time to time in various parts of the eastern side of this our island continent, only four have been fully described in that invaluable work, the *Flora Australiensis*, published in 1873. As I am perhaps better acquainted with the plants of the genus which are found in this Colony than any other person, having either discovered them myself or had them collected for the first time through my agency, the information which I shall now proceed to furnish regarding the different species may prove to be of some botanical interest. In Robert Brown's *Prodromus*, one of the first and best works so far as it went on the plants of Australia, only one species is described, and that under the name of *Zamia spiralis*, giving as habitats for this plant the very distant places of Sydney and King George's Sound in Western Australia.

It is not at all surprising that these plants found growing so far apart should have been considered to be identical, as both are very similar in every respect, but they are now regarded as perfectly distinct species, the western plant being named *Macrozamia Fraseri*, Miq., and our eastern or Sydney plant is still called by the original specific designation of *spiralis*, an absurd specific name it must be confessed now that the remarkably spiral characteristics of other species have become so well known. So far as my knowledge extends, it was not until the year 1854 that any other than the two first-mentioned species of the genus were known to exist in this part of the world. In that year, while travelling in Queensland, a narrow-leaved species was observed by me between Maryborough and Gayndah, now in cultivation here, and since sent by various persons to Europe as *M. tenuifolia* and *M. plumosa*, and published in the *Flora Australiensis* as *M. Paulo-Guilielmi*, F.M.,

and much further north, between Gayndah and Port Curtis, another new species was noticed, in general appearance and similar in size to *M. spiralis*, but with bright yellow nuts, which at once distinguished it from that plant. This species is described in the *Flora Australiensis* as *M. Miquelii*, and is very abundant in many localities in Queensland, one being well known as Zamia Creek. Subsequently to this, Mr. Hill, the late Director of Brisbane Botanic Gardens, discovered in Queensland two or three other species, to which he gave provisional names; but of these, unfortunately, no descriptions have been published, although from the specimens of the leaves of those which I saw in that gentleman's possession some years ago, I had every reason for thinking that they were all very distinct and undescribed species. One of these, named *M. Hopei*, in compliment to the Honorable Lewis Hope, which I have had here in cultivation for some years, is undoubtedly a new and noble species, approaching somewhat in appearance to, but more rigid in habit than, *M. Denisonii* or *Perouskiana* of the *Flora Australiensis*. It is to be hoped that Mr. Hill will yet furnish all the information which he can respecting these plants, and that either he or some other botanist will collect ample material of all these and furnish descriptions of them; until this is done, our knowledge of those northern species of this genus must necessarily remain very incomplete. I would add, before leaving this part of the subject, that within the last year or two Baron von Mueller has published descriptions of two previously unknown species peculiar to Queensland, one of which he named after myself, the other in compliment to the Hon. John Douglas: the former of these is found not far from Rockhampton, often with stems 6 feet high. Some fine plants of this were sent to decorate the Queensland Court at the International Exhibition held here in 1879, under the name of *M. Miquelii*, but without fruit. The following year similar sized plants were sent from the same locality to the Melbourne International Exhibition, where they produced fruit, which I procured and gave to Baron von Mueller, who soon after published a description of this plant; and I am glad to add that the plants of this sent to the Sydney Exhibition are now growing in the Botanic Gardens here, and both have good-sized stems. This genus does not occur at all in Victoria, and only one species, *M. Macdonnelli*, F.M., is known as yet in South Australia.

I shall now refer to the species of this genus which inhabit New South Wales, and these are: *M. spiralis*, R. Br., *Denisonii*, Moore and Mueller; *corallipes*, Hook; *Paulo-Guilielmi*, F.M.; *tridentata*, Lehm.; *cylindrica*, C.M.; *Fawcettii*, C.M.; *flexuosa*, C.M.; *secunda*, C.M.; and *heteromera*, C.M. Of these only the five first named have been accurately described; all the others will be described by me in this paper. The first-named has

a geographical coast range of nearly 300 miles, extending from Port Macquarie to very near the borders of Victoria, but so far as known it is not found inland, *i.e.*, beyond the coast range. It is a gregarious plant: wherever found, it is in great abundance and massed together. In many places, as in some parts of the Shoalhaven district, and further south, as at Bodalla, it almost exclusively occupies large areas, and indicates a poor, stiff, iron-stone-clay soil. In some of its southern habitats it is found with perfectly cylindrical stems, at least 6 or 7 feet high, and from 2 to 2½ feet in diameter, but about Sydney and northwards the stem is cone-shaped, and rarely rises above the ground more than from 6 to 18 inches. Burrawang is the name by which it is known to colonists. The upper part of the stem is densely covered with a fine, soft wool, which has been used in some districts for stuffing beds; and a good starch has been obtained from the seeds, which also, when washed, or sliced and steeped for some days in running water or roasted, were largely used by the aborigines for food. Without some precaution of this kind they are in a fresh state dangerously acrid. It is the larger form of this plant that is no doubt referred to in Brown's *Prodromus* as a possible second species. As has already been observed, the specific designation *spiralis* is an unfortunate one, as, although there is a spiral tendency in its abnormal state, yet usually the leaves are quite flat, and when compared in this respect with some of the species to be presently referred to, it is simply absurd, and tends to mislead. In the year 1855 a second species, that named *Denisonii*, became known, it having been sent to me from the Manning River district by a Dr. Stephenson, then in practice there, who described it as producing stems some feet high.

In 1861 I found this plant in many places on the higher grounds bordering on the Richmond River where, not far from the village of Lismore, some of them attained the height of 20 feet or more. This species is known to range over a considerable extent of country, as it has been found in many places in Queensland, and as far north as Rockingham Bay. It is described as *Lepidozamia Perowskiana*, by Von Regel; in Miquel's *Cycadaceæ* of New Holland, as *Macrozamia Perowskiana*, and by Baron von Mueller as *Eucephalartos Denisonii*, in Journal of Pharmaceutical Society of Victoria; but the name *Macrozamia Denisonii* given to it by Mueller and myself in 1856 I think should stand, as it had priority, and its specific designation, *Denisonii*, given in compliment to the late Sir William Denison, Governor of New South Wales, will always afford some indication of the period of its discovery. In a journey made by me in the year 1858 I collected leaf specimens only of what I then considered to be three new species of this genus, but no fruit of any of these could be obtained at that time, and no proper description could therefore

be given of them ; but last year one of my assistants (Mr. Betche) was fortunate enough to collect good specimens of leaves and fruit of two of these, which I have now described as *M. flexuosa* and *M. heteromera*, the last a very variable species, as three very distinct forms of it have been found. The first of these grows plentifully on both high and low situations near Limeburner's Creek, between Raymond Terrace and Stroud, and elsewhere on the Upper Hunter ; while the second, in one form or another, is found in various places over a vast tract of country in the south-western district ; the third species, to which the name of *secunda* has been given, first observed by me at Reedy Creek, not far from Mudgee, has lately been found by the Rev. J. Milne Curran, Roman Catholic clergyman, in several places near the town of Dubbo, who, at a good deal of trouble and expense to himself, forwarded to me some excellent specimens of this plant, from which I have been enabled to describe it. There can be very little doubt but that this, the most western species yet discovered, ranges still further inland, and may possibly reach to the interior of the continent. The only other species to which I have to refer is that described in Baron von Mueller's *Fragmenta*, Part XVIII, vol. iii, p. 38, as *M. Miquelii*, and in the *Census of Australian Plants*, recently published by the same learned author, as *M. tridentata*. I am glad that the specific name *Miquelii* has been abandoned for this plant, as from recollection of it there can be very little doubt that it is quite a different plant from that described from Queensland specimens as *M. Miquelii* in the *Flora Australiensis*. Although I was the first to discover *M. tridentata* in 1861, and sent specimens of it to the Baron, I regret to state that those placed at that time in my herbarium have been utterly destroyed by damp and insects. I am unable, therefore, by comparison to verify the description given of it in the *Fragmenta*, which, however, can be relied on.

The following description of the different species have either been drawn from or compared with living plants :—

*Macrozamia*, Miq., species with leaves usually not twisted or contorted.

Pinnæ flat.....	1. <i>spiralis</i>
"    ".....	2. <i>Denisonii</i>
"    ".....	3. <i>cylindrica</i>
Pinnæ nearly vertical.....	4. <i>secunda</i>

Species with leaves usually twisted or contorted.

Pinnæ simple .....	5. <i>corallipes</i>
"    ".....	6. <i>Fawcettii</i>
"    ".....	7. <i>flexuosa</i>
"    ".....	8. <i>Paulo-Guilielmi</i>
"    ".....	9. <i>tridentata</i>
Pinnæ forked .....	10. <i>heteromera</i> .

1. *Macrozamia spiralis*, Miq.—Subterranean trunk large, broadly cone-shaped, rising frequently above the ground into a cylindrical stem from a foot to 6 feet high and 12 to 20 inches in diameter. Leaves glabrous, 2 to 4 feet long; the rhachis usually more or less raised longitudinally on the upper surface between the two rows of pinnae. Pinnae numerous, flat, straight or slightly falcate, the larger ones 8 to 10 inches long and 3 to 5 lines broad, marked on the underside with longitudinal parallel veins, slightly contracted and callous at the base, inserted longitudinally and the lower margin slightly decurrent; the lower pinnae much smaller, more distant and sometimes passing into a few small teeth. Male cones 7 to 14 inches long, 2 to 3½ inches thick, the scales much flattened, about ¾ of an inch broad, tapering into an incurved point very short on the lower scales, ¾ to 1½ inch long on the upper ones. Fruiting cones varying much in size as the males, from 8 to nearly 15 inches long and 5 to 7 inches thick, the apex of the larger scales 1 to 1½ inch broad, with an incurved point short at the base and ¾ to 1½ inch long at the top.

*Habitat*.—Not found beyond the coast ranges; extending from Port Stephens in the north to nearly the southern extremity of the Colony. Very abundant near Sydney, where it seldom produces stems. In the Shoalhaven district it is not rare to find it with stems varying from 4 to 6 feet high; in this locality, and in many other places further south, it almost exclusively occupies considerable tracts of country. Native name Burrawang.

2. *Macrozamia Denisonii*, Moore and Mueller.—Trunk 18 to 20 feet high, and at least 18 inches thick. Leaves, 7 to 10 feet long; the petioles angular, glabrous or pubescent at the base. Pinnae 8 to 15 inches long in the larger leaves, ½ inch broad below the middle, very obscurely and finely marked with parallel veins, only slightly contracted at the base and inserted longitudinally along the centre of the upper surface of the rhachis, without any or only a very narrow line separating the two rows, the upper ones gradually shorter. Male cones 10 to 15 inches long, 4 to 6 inches diameter, the apex of the scales 1 to 1½ inch broad, very thick and produced into a short triangular or lanceolate almost obtuse point. Female cones 1½ to 2 feet long, conical, 1 foot in diameter at the base, 6 inches at the top, the scales shorter and broader than in the males, the apex tomentose-pubescent, often 2 inches broad, tapering into a short and very obtuse or rather longer and lanceolate recurved point. Seeds very oblique, about 2 inches long and 1 inch broad.

*Habitat*.—In various places from the Manning River district, its southern limit, into Queensland. Near Lismore, on the Richmond, it is found with stems quite 20 or more feet high; it is also very large on the upper part of the Tweed. First discovered by Dr. Stephenson, on the Manning, in 1855.

3. *Macrozamia cylindrica*, C. Moore.—Trunk not raised above the ground. Leaves glabrous, 3 to 4 feet long, slender, of a pale green colour, of a rather upright flaccid habit; the rhachis nearly flat below, and raised longitudinally on the upper surface between the two rows of pinnae. Pinnae very numerous, straight, glossy green above, paler and finely striate beneath, the larger ones 1 foot long and scarcely above 3 lines broad, tapering gradually to a sharp pungent point, lower pinnae much smaller and generally passing into a few small pungent teeth. Base of the pinnae slightly contracted, of a pale yellow colour—very callous, inserted marginal on the rhachis. Male cones, 7 to nearly 10 inches long, 1½ to 1¾ inch thick, of a strictly cylindrical shape. Scales thick, rhomboidal-truncate,

about  $\frac{1}{2}$  inch broad, tapering gradually in a very fine incurved point, scarcely exceeding 3 lines on the upper scales, very short or quite obsolete on the lower ones. Female cones not seen.

*Habitat.*—In low, flat ground between the Upper Richmond and Clarence Rivers districts, where it was discovered in 1861. This is one of the most elegant of the species, and may be readily known in a living state from all other species by its slender and graceful habit and the bright pale yellow colour of the base of the pinnæ. No fruiting cones have as yet been seen, but all the many plants of this in cultivation in the Sydney Botanic Garden produce male cones in abundance.

4. *Macrozamia secunda*, C. Moore.—Trunk not raised above the ground, ovoid in shape and slightly woolly, covered with old imbricate scales. Leaves usually quite glabrous, sometimes glaucous, from 2 to 3 feet long, sharply recurved near the point. Rhachis quite flat on the upper side and rounded below. Pinnæ numerous, very close together, rising from the rhachis in a rather erect or vertical form, about 6 inches long and not more than 3 lines broad; very distinctly marked on the under surface with from 8 to 9 parallel striae, tapering sharply to a pungent point, nearly all of the same length till towards the point where they gradually become shorter; of a dull reddish colour at the base. Fruiting cones about 6 inches long and  $3\frac{1}{2}$  inches in breadth, scales with very sharp points at the base, very gradually increasing in length upwards.

*Habitat.*—Near Reedy Creek, east of Mudgee, where it was first found in 1853, but without fruit. Again found with only one old fruiting cone not far from Dubbo, by Rev. J. Milne Curran, in 1883, who sent living plants to the Sydney Garden. This species both in habit and character more nearly approaches *M. corallipes* than any other, but its more spreading habit, the vertical character of the pinnæ, and the non-contorted recurved pointed falcate leaves at once distinguish it from all others.

5. *Macrozamia corallipes*, Hook.—Trunk not raised above the ground, about 8 inches in diameter, subspherical. Leaves 12 to 18 inches long, somewhat rigid, forming a rather contracted crown. Pinnæ 4 to 5 inches long,  $\frac{1}{2}$ -inch broad, linear-lanceolate, acute but hardly pungent, dark green above, pale below, and 8 to 10-nerved beneath, inserted obliquely in the rhachis with a bright red, rather swollen petiolule. Male cone glaucous green, 5 to 6 inches long, by nearly 2 inches broad. Scales tapering into an incurved spiny point, which is generally short and rounded on the lower scales, increasing gradually in length towards the top, or in some instances quite obsolete. Female cone glaucous green, 4 to 6 inches long, by 3 to 4 inches broad. Points short on the lower scales, longer towards the top, and very variable in length, as on the male cones, sometimes wholly absent.

*Habitat.*—First discovered between the General Cemetery and the Liverpool Road, near Sydney; plentiful north of Penrith on the Hawkesbury, and also on dry ridges between Glenbrook and Blaxland, or Wascoe's, on the Western Road. A low-growing plant, seldom more than 2 feet high, often very rigid in habit and usually with leaves very much contorted.

6. *Macrozamia Fawcetti*, C. Moore.—Trunk and base of the petioles covered with a dense tomentum. Leaves varying from 2 to 4 feet in length, of a dark glossy green colour above, paler beneath. Glabrous in an adult state, hairy when young. Pinnæ about three-quarters of an inch in breadth and from 6 to 7 inches in length, semifalcate, broader upwards, and terminating with an abrupt falcate point, which is slightly but sharply toothed. Lower part of the rhachis flat on the upper surface, rather keel-shaped below, gradually rounding in form

upwards till it becomes almost terete towards the apex. Male cones on rather long peduncles, woolly at the base, above 8 inches long and  $2\frac{1}{2}$  inches broad; scales flat, terminating abruptly with sharp points. Fruiting cones not seen.

*Habitat*.—On high ground on the upper part of the Richmond; discovered by C. Fawcett, Esq., P.M. Very little is known of the habit of this species. Only freshly-gathered leaves and old male cones have as yet been seen, but this proves that it is very different from any species hitherto described.

7. *Macrozamia flexuosa*, C. Moore.—Trunk never raised above the ground; about 8 inches in length and 5 inches in breadth, closely imbricated at the base by the old petioles, and slightly woolly. Leaves usually spirally twisted, of a flexuous habit, about 2 feet long. Pinnæ linear, tapering into an acute point, flexible, 6 to 8 inches long, and one quarter of an inch in breadth. Rhachis glabrous, raised on the upper surface between the rows of pinnæ, smooth and round below. Fruiting cones about 6 inches long, 3 inches in breadth, ovate in shape, on short, smooth peduncles. Scales broadly rhomboidal, with points short at the base, which increase in size upwards, and are nearly an inch in length towards the top. Male cones from 6 to 7 inches long, and about 2 inches in breadth. Scales quite pointless at the base, but with rather long and sharp points towards the apex.

This plant, which grows plentifully between Raymond Terrace and Stroud, is in character and habit of growth very different from any other species known to me, and is, in my opinion, entitled to be considered as a distinct species.

8. *Macrozamia Paulo-Guilielmi*, F. v. M.—Trunk scarcely raised from the ground, covered with the woolly imbricate base of the old petioles. Leaves glabrous, 1 to 3 feet long, the rhachis narrow but often flat on the top. Pinnæ numerous, very narrow and often almost terete, contracted and sometimes callous at the base, the longer ones 6 to 8 inches long and 1 to  $1\frac{1}{2}$  line broad, thick and obscurely veined. Cones on woolly peduncles of 1 to 3 inches, the males oblong-cylindrical, scarcely above 3 inches long, the scales about 4 lines broad, somewhat thickened at the apex, with a short point. Fruiting cones about 4 inches long and fully 2 inches thick, the larger scales about 1 inch broad and rather thick, those of the lower part of the cone narrower and thicker, the apex almost rhomboidal, with a very short point.

The only habitat given for this plant in New South Wales is a place in New England, where it was collected, according to the *Flora Australiensis*, by a Mr. C. Stuart. Plentiful in many places in Queensland.

9. *Macrozamia tridentata*, Lehm.—Base of the petiole covered with a woolly tomentum. Leaves upwards spirally twisted, sometimes slightly hairy. Pinnæ numerous, inserted marginal on the rhachis, three-quarters of a foot to  $1\frac{1}{2}$  ft. long, reduced at the base to spiny teeth, upper pinnæ with 2 or 3 short and sharp teeth at the apex. Male cones 6 to 10 inches long, 1 inch to  $1\frac{3}{4}$  of an inch broad. Scales rhomboidal-cuniat, with spiny points about half an inch long.

*Habitat*.—Found near the mouth of the Richmond River in 1861. The specimens, then collected and placed in the herbarium of the Sydney Botanic Gardens, have since been destroyed by damp and insects; but the description given of this species by Baron von Müller, in vol. iii, p. 38, of his *Fragmenta*, under the name of *M. Miquelii*, may be relied on.



10. *Macrozamia heteromera*, C. Moore.—Trunk small, from 6 to 8 inches long, and about half as broad, covered with a reddish-coloured wool, never rising above the ground. Leaves seldom more than 2 feet long, of an erect habit, never spreading; often, but not always, spirally twisted, sometimes glaucous, but usually of a light green colour; glabrous, or with a few tufts of hairs at the base of the pinnæ. In a young state, sparingly covered with rather long hairs, which disappear towards maturity. Pinnæ simple or variously forked, variable in length, usually about 6 inches long and  $\frac{1}{4}$  of an inch in breadth, gradually tapering towards the base and to a sharp point at the top; when divided the segments become very narrow. Rhachis smooth on the upper surface, rounded below, bearing the pinnæ rather far apart at the base, but becoming closer upwards. Male cones, on an average, 10 inches in length and  $2\frac{1}{2}$  inches in breadth. Scales tapering into a short acute point. Fruiting cones when bearing seed, above 7 inches in length and at least  $4\frac{1}{2}$  inches in breadth, smaller when in an infertile state. Scales broad, tapering into a short point, much depressed as in the male cones below the point. Peduncles short, covered with a fine wool at the base.

*Habitat*.—Among the Warrenbungle ranges and on the Castlereagh River country. Discovered in 1858; since collected near Rocky Glen, between Coonabarabran and Gunnedah. Very variable in habit and appearance, but always with the same characteristics as furnished in this description.

- a. *Macrozamia heteromera*, var. *glauca*.—Very different from the typical form. Leaves longer, less rigid, always glaucous and quite glabrous, bearing a few simple pinnæ at the base of the rhachis, all the others are at least once forked, seldom more. Upper side of the rhachis towards the base marked by a slightly raised edge midway between the rows of pinnæ. Fruiting cones about 9 inches in length and  $5\frac{1}{2}$  inches in breadth.

This remarkable variety has only been collected near Narrabri, where it was found by Mr. Betcher sparingly on sandy ridges; it is said, however, to be abundant in the Nandewar ranges, about 20 miles distant.

- b. *Macrozamia heteromera*, var. *tenuifolia*.—More rigid and of a neater habit than either of the preceding forms. Leaves usually glabrous, and of a dark green colour. Pinnæ narrow, usually twice forked, and bright red at the base.

*Habitat*.—In mountainous districts near Tamworth; collected by Mr. Betcher.