

## 5. MACROZAMIA Miq.

Miquel, F. A. W., Monogr. Cycad. 35-38 (1842), Prodr. Syst. Cycad. 8, 10, 18, 22 (1861); De Candolle, A., Prodr. 16<sup>2</sup>:554-537 (1868); Bentham, G., Flora Austral. 6:250-254 (1873); Moore, C., Jour. Roy. Soc. N. S. Wales 17:115-122 (1883), Handb. Flora N. S. Wales 378-380 (1893); Bailey, F. M., Queensl. Flora 5:1503-1507 (1902); Schuster, J., Pflanzenreich 4<sup>1</sup>:86-103 (1932).

Stem in some species columnar and tall, occasionally up to 18 m. (in *M. hopei*), but generally tuberous and subterranean or, if aerial, less than 1 m. high; rarely branched; covered with an armor of persistent leaf bases. Leaves appearing singly or simultaneously, in some species often up to 100 in a crown; from less than 1 m. up to 3 m. in length; petiole unarmed or rarely spinescent. Leaflets narrowly lanceolate, entire (often with a few spines at ~~the~~ tip in *M. fawcettii*, *M. flexuosa*, *M. pauli-guilielmi*, and seedlings), generally with a callus-like swelling at the base, with "parallel" (dichotomous) venation. Vernation straight.

Male cones usually more than one, ovoid or cylindrical, mostly long stalked. Microsporophylls peltate, broadly to narrowly triangular; the top broadened, flattened or broadly rhombic, with a median terminal spine. Microsporangia covering the entire lower surface or separated into two groups by a median sterile line. Female cones single or frequently 2 or more together, ovoid or cylindrical, short stalked. Megasporophylls peltate, with a broad top which is either flat or tapering and rhombic, with a median terminal spine. Seeds in most species some shade of red; in a few species orange or brownish.

The genus, with about 16 species (the number depending largely on the diagnosis of *M. spiralis*), is confined to Australia, most

of the species occurring near the eastern coast. Name from μακρος  
(long) and Zamia. Type species: M. spiralis (Salisb.) Miq.

The occurrence of a terminal spine on the sporophylls is a distinctive feature of the genus. Macrozamia is frequently confused with the African genus, Encephalartos, but in Macrozamia the leaves are not so rigid, the margins of the leaflets have no spines (except rarely), while the sporophylls of Encephalartos are obtuse or truncate and lack a terminal spine.

Key to the Species

- I. Stems tall, 1-18 m. high; leaves not spirally twisted
  - A. Leaflets inserted along middle of upper surface of rachis, falcate, without a basal callus, lowest not much smaller than rest; seeds brownish
    - 1. Leaflets 10-12 mm. wide, pungent; male cones 25-40 cm. long; microsporophylls pointed at apex . 1. M. denisonii
    - 2. Leaflets 12-20 mm. wide, acuminate; male cones 20 cm. long; microsporophylls rounded at apex . 2. M. hopei
  - B. Leaflets inserted along sides of rachis, straight, lowest reduced but not spine-like; seeds reddish
    - 1. Leaflets 9-10 mm. wide, callus nearly white; female cones 70-90 cm. long . . . . . 3. M. moorei
    - 2. Leaflets 7-9 mm. wide, callus reddish; female cones up to 50 cm. long . . . . . 4. M. reidli<sup>e</sup>
- II. Stems subterranean, occasionally up to 1 m. or more
  - A. Rachis of leaves straight or nearly so.
    - 1. Leaflets flat, not erect, lowest reduced
      - a) Leaves 1-1.5 m. long; leaflets 25-30 cm. long, lowest reduced but not spine-like
        - (1) Callus white
          - (a) Leaflets 11-12 mm. wide; seeds scarlet. . . . . 5. M. spiralis
          - (b) Leaflets 8 mm. wide; seeds orange . 6. M. mountparriensis
        - (2) Callus pale yellow, leaflets 8-10 mm. wide . . . . . 7. M. cylindrica

- b) Leaves up to 2 m. long; leaflets up to 40 cm.  
 long, lowest reduced to spines, callus white  
 or reddish . . . . . 8. M. miquelii
2. Leaflets erect, lowest not much smaller than  
 rest
- a) Rachis narrow; leaflets up to 15 cm. long,  
 6 mm. wide, callus dull red . . . . . 9. M. secunda
- b) Rachis up to 12 mm. wide; leaflets up to 38  
 mm. long, 19 mm. wide, callus lacking . . .10. M. platyrachis
- B. Rachis of leaves twisted
1. All leaflets simple
- a) Leaflets without spines at tip
- (1) Leaves not over 0.5 m. long; leaflets  
 15-22 cm. long, callus bright red . . .11. M. corallipes
- (2) Leaves more than 2 m. long; leaflets  
 30-40 cm. long, callus white . . . . .12. M. douglasii
- b) Leaflets with a few spines at tip
- (1) Leaflets about 18 mm. wide, with 5-6  
 spines at tip . . . . .13. M. fawcettii
- (2) Leaflets less than 6 mm. wide, with  
 2-3 spines at tip
- (a) Leaflets flexible; male cones 15-  
 18 cm. long; seeds orange red . . .14. M. flexuosa
- (b) Leaflets rigid; male cones 8-10  
 cm. long; seeds golden yellow . . .15. M. paulo-guilelmi<sup>i i</sup>
2. Some leaflets forked . . . . .16. M. heteromera<sup>^</sup>

1. Macrozamia denisonii C. Moore and F. Muell.

M. peroffskviana (Regel) Miq.

Regel, E. von, Bull. Soc. Nat. Moscow 20:184 (1857), Gartenfl. 25:3-6 (1876); Mueller, F. von, Fragm. Phytog. Austral. 1:41, 243 (1858), 8:173 (1874); Miquel, F. A. T., Arch. Néerl., 3:252 (1868); Bentham, G., Flora Austral. 6:253 (1875); Moore, C., Handb. Flora N. S. Wales, p. 379 (1893); Bailey, F. M., Queensl. Flora 5:1506 (1902).

Stem tall, the larger ones 3-7.5 m. high and 25-45 cm. in diameter, sometimes with 1, 2, or 3 branches. Leaves 12-25 in a crown and often appearing to be twice as many because crown remains green after next one is fully grown, 2-3 m. long, <sup>dark glossy green,</sup> retaining a purplish tinge for several months, not spirally twisted. Petiole 20-40 cm. long, rounded tetragonal, smooth, woolly at base. Leaflets about 100 on each side, inserted longitudinally along the middle of the upper surface of the rachis, alternate or opposite, linear-lanceolate, <sup>flexible,</sup> falcate, pungent, only slightly contracted at base, the lower border decurrent; callus wanting; largest leaflets 20-40 cm. long, 10-12 mm. wide, the lowest not much smaller than the rest; veins 8-14, obscure. Leaflets of seedlings without spines.

Male cones ovoid, 25-40 cm. long, 10-15 cm. in diameter. Microsporophylls 2.5-3.5 cm. wide, very thick, the apex a short triangular or lanceolate reflexed point. Microsporangia covering most of the under surface, not separated into groups. Female cones long ovoid, <sup>tomentose,</sup> 40-60 cm. or occasionally up to 1 m. in length, 30 cm. in diameter at the base, and up to 38 kilos in weight. Megasporephylls 5 cm. wide, tapering to an obtuse or lanceolate reflexed point, swollen on the upper side above the seeds, with a median lobe on the under side partly covering the seeds. Seeds brownish; stony coat 6 cm. long, 3 cm. in diameter, very oblique at base, with 12 <sup>bundles.</sup> ~~veins.~~

Geographic distribution: Along the Burnett River, Moreton Bay, forests near Durango<sup>d</sup>, Rockingham Bay, abundant on Tambourine Mountain near Brisbane, and in other parts of southern Queensland. Near Lismore and at Dorrigo in New South Wales, and along the Manning River.

2. Macrozamia hopei W. Hill

Hill, W., ex Moore, C., Jour. Roy. Soc. N. S. Wales 17:116  
(1884), ex Bailey, F. M., Syn. Queensl. Flora Suppl. 1, p. <sup>52</sup>50 (1886),  
Queensl. Flora 5:1506 (1902).

Stem the tallest of all cycads, up to 18 m. high and 40 cm. in diameter, erect even in the tallest plants, distinctly ribbed. Leaves 40 or more in a crown, about 2.1 m. long, glossy above, not spirally twisted. Petiole 60 cm. long, enlarged and woolly<sup>1</sup> at the base. Leaflets about 80 on each side, inserted longitudinally along the middle of the upper surface of the rachis, linear-lanceolate, falcate, thick, very acuminate <sup>but</sup> ~~and~~ not pungent, the base slightly contracted and decurrent; callus wanting; 20-30 cm. long, 12-20 mm. wide, the lowest leaflets not much smaller than the rest; veins 12-17, rather obscure.

Male cones very characteristic, sufficient to identify the species; 20 cm. long, 12 cm. in diameter, with 10 vertical "rows" of sporophylls, 7 in a row; apex of microsporophyll represented by a spine in other species, 2 cm. wide at the base and rather broad throughout, thin at the sides, 2.5-3.2 cm. long, rounded at the top, strongly incurved. Microsporangia covering the entire under surface without any sterile notch at the top. Female cones tomentose, about 60 cm. long, 20-25 cm. in diameter. Megasporophylls 5-6 cm. wide, 2.5 cm. in vertical thickness, with thin and wavy edges, terminating in a blunt or more or less lobed reflexed apex. Seeds brownish, 5-6 cm. long, 2.5-3.5 cm. in diameter.

Geographic distribution: Daintree and Johnstone Rivers in northern Queensland; fine specimens about 30 kilometers from Cairns.

Journal of the F. V. Hartley, Darwin and Darwin =  
the Hawaiian Subcontinent (Serial, only) 4 (35): 84 (1881)\*

... were collected through the assistance of Mr. A. W. Jessen,  
... and prominent Botanist, Melbourne Botanic Garden  
... National Herbarium, South Yarra, S.E.I., Victoria

... dated Feb. 8th, 1949.



3. Macrozamia moorei F. Muell.

Mueller, F. von, Pharm. Jour. Victoria (1881); Mueller, F. von, ex Moore, C., Handb. Flora N. S. Wales, p. 379 (1893); Bailey, F. M., Queensl. Flora 5:1506 (1902); Chamberlain, C. J., Bot. Gaz. 55:141-154 (1913).

Stem tall, the most massive in the family, many 3-4 m. high and 60 cm. in diameter, the tallest 7 m. high and 70 cm. in diameter, covered with a heavy armor of leaf bases which are woolly on the under side. Among hundreds of plants, not a single branching specimen was seen. Leaves 50-100 in a crown, 2-5 m. long, grayish, glabrous, not spirally twisted. Petiole and rachis somewhat flattened above, rounded triangular below, with leaflets extending almost to the base; 4 cm. wide at level of lowest leaflets, 5-7 cm. wide farther down at broadest part. Leaflets 50-70 on each side, attached along the edges of the flattened upper side of the rachis, mostly opposite below, opposite or alternate above, linear-lanceolate, pungent, very rigid; callus nearly white; 20-30 cm. long, 9-10 mm. wide, the lowest 5-8 cm. or sometimes only 1 cm. long, but the smallest like small leaflets and not like spines; veins 10-12. Leaflets of seedlings entire.

Male cones axillary and very numerous, often more than 20 and sometimes up to 100, cylindric, glabrous, about 35 cm. long, 5-8 cm. in diameter; peduncle smooth, 6 cm. long. Microsporophylls thin, 3 cm. long, 1.5 cm. wide, the central spine about 1 cm. long in upper part of cone and much shorter below. Microsporangia about 200, mostly in sori of 3, separated into two groups at the top by a pointed sterile region but covering the entire lower surface. Female cones axillary, 2-4, less frequently 1, occasionally up to 8, cylindric, glabrous, 70-90 cm. long, 30 cm. in diameter,

up to 16 kilos in weight. Megasporophylls smooth, fleshy, 7.5 cm. long, 3.5 cm. high, outer surface with a thin crest across the middle, the central spine 3 cm. long in middle of cone but longer above and shorter below, with two lateral lobes partly covering the seeds. Seeds with fleshy coat thick and irregular from pressure in the cone, reddish, 5.5 cm. long, 3.5 cm. wide. Stony coat thick, 4.5 cm. long, 3.3 cm. wide, oblique at the base, with 10-12 bundles.

Geographic distribution: Very abundant at Springsure, Queensland, about 320 kilometers west of Rockhampton, where in 1911, the government was destroying it because cattle, eating the poisonous leaves, were dying in great numbers. Also reported near the Clarence River.

4. Macrozamia reidleyi (Gaud.) C. A. Gardn.

M. fraseri Miq., M. preisii Miq., M. macdonnelli F. Muell.,  
Gaudichaud, C., in Freycinet's Voy. Bot., p. 434 (1826);  
Miquel, F. A. W., Monogr. Cycad., p. 37 (1842), Prodr. Syst. Cycad.  
8, 18 (1861); Bentham, G., Flora Austral. 6:252 (1873); Baird, A.  
M., Jour. Roy. Soc. W. Austral. 25:153-175 (1938-39).

Stem stout, very variable, perhaps with age and locality;  
near Perth, subterranean or 30-60 cm. high; at Gingin, north of  
Perth, 1.2-1.5 m. high; on the coast south of Perth, 3-4.5 m.  
high<sup>↓</sup>; with a strong armor of leaf bases, even when subterranean.

---

<sup>↓</sup>The tall plants have been called M. dyeri F. Muell., but  
since the cones and leaves are the same size and there are all  
intergrades in size of stem, there should be no separate species.

---

Leaves 20 or more in a crown, up to 2 m. in length, not spirally  
twisted. Petiole 30 cm. or more long, petiole and rachis smooth,  
somewhat flattened, triangular below. Leaflets 50-70 on each side,  
inserted somewhat obliquely on upper edges of rachis, crowded above  
but separated below, mostly opposite, linear-lanceolate, pungent,  
with a reddish callus at base, 25-30 cm. long, 7-9 mm. wide, the  
lower leaflets reduced but leaf-like; veins 9-or.10. Leaflets of  
seedlings with 1-3 spines or lobes on lower border and 1 on upper  
border.

Male cones usually 2-5, frequently 6 or 7, cylindric, 25-30  
cm. long, 10-15 cm. in diameter just before elongation for shedding  
pollen, when they may reach 48 cm. in length, woolly when young,  
smooth when mature. Microsporophylls flat, cuneate, 7.5 cm. long,  
2.7 cm. wide, thin, with a spine up to 7 cm. long terminating the  
upper sporophylls, about 3.5 cm. long in the middle of the cone,

and 1.5 cm. long at the base. Microsporangia in upper part of cone in two groups with a sterile portion between, lower down continuous but with a sterile notch at the top and bottom; microsporangia about 750, mostly in sori of 5. Female cones single, sometimes 2 or 3, rarely 7, ovoid, the largest 50 cm. long, 25 cm. in diameter and 15 kilos in weight; most cones smaller, woolly when young, smooth when mature; peduncle long and covered with tomentum which easily

---

↓ On bracts covering young cones the tomentum is so abundant that it can be used to stuff pillows.

---

rubs off. Megasporophylls 5-7 cm. broad, 2-2.5 cm. in vertical thickness, longest spines in upper part of cone 11-14 cm. long, at base of cone 3 cm. long. Seeds reddish, 4.5-5.5 cm. long, 3.5-4 cm. in diameter, very smooth, with 12-14 bundles easily seen at top.

Geographic distribution: Confined to Western Australia. At Donnybrook near Lowden, in the Tarrah Forests of the Darling Range near Preston Valley, and at Noggerup on the Preston River, Kalamunda, at Crawley and Wembley on the coastal plain several kilometers from Perth. Northern limit apparently at the Greenough River, just south of Geraldton, from where it extends to Esperance on the southern coast. Confined to a narrow coastal strip, seldom getting as far as 130 kilometers inland.

In Schuster's monograph, this species, together with Macrozamia dyeri F. Muell., M. macdonnelli F. Muell., and possibly others, is included under M. preisii Lehm. emend. Schuster. It is nearly equivalent to M. fraseri Miq. M. dyeri includes only the larger specimens of M. reidleyi; there is no difference in leaves or cones.

5. Macrozamia spiralis (Salisb.) Miq.

M. tridentata (Willd.) Regel

Salisbury, R. A., Prodr. stirp., p. 401 (1796); Willdenow, K. L., Spec. Plant. 4:845 (1799); Brown, R., Prodr. Fl. Nov. Holl. 1:348 (1810); Miquel, F. A. W., Monogr. Cycad., p. 36 (1842), Prodr. Syst. Cycad. 8, 18 (1861); Bentham, G., Flora Austral. 6: 251 (1873); Regel, E. von, Gartenfl. 25:229 (1876); Moore, C., Handb. Flora N. S. Wales, p. 379 (1893); Bailey, F. M., Queensl. Flora 5:1504 (1902); Brough, P., and Taylor, M. H., Proc. Linn. Soc. N. S. Wales 65:494-524 (1940).

Stem subterranean, long, seldom rising above the ground in its northern range but sometimes 1 m. or more high at its southern limit; when growing on rocks or thin soils up to 60 cm. in diameter, with an armor of leaf bases even when subterranean. Roots often reaching 1 m. in length. Leaves on old plants in favored localities up to 50 in a crown, up to 1-1.5 m. in length, entirely straight or somewhat spirally twisted in the upper part, woolly when young, becoming glabrous. Petiole 30-45 cm. long, smooth, rounded triangular below, somewhat flattened above, the expanded base very woolly; rachis somewhat elevated between the leaflets. Leaflets 30-50 on each side, inserted longitudinally and obliquely on the edges of the rachis, approximately opposite, linear-lanceolate, straight or slightly falcate, flat, pungent, with a pale callus at the contracted base; largest leaflets 25-30 cm. long, 11-12 mm. wide, lowest leaflets 3-7 cm. long, seldom any more reduced; veins 8-10, very prominent on the under side. In seedlings leaflets with 1 or 2 spines at tip on lower margin and 1 on upper margin.

Male cones averaging 3 or 4, up to 7-10, cylindrical; average length at shedding of pollen 38 cm., 10 cm. in diameter; peduncle up to 16 cm. long. Microsporophylls flat, rhomboid-ovate, about 18 mm. wide, the lower ones with only a pungent spine, lengthening to 15 mm. on upper ones. Microsporangia in two groups separated by a sterile line at the top and bottom of the cone but more or less confluent in the middle. Average number of microsporophylls per cone 345, average number of microsporangia per sporophyll 342, with as many as 400 on larger ones; in sori of 3, 4, or 5, with 3 the most frequent number. Female cones averaging 2 or 3, up to 5 or 6, cylindrical, more or less woolly, average length 35 cm., maximum 45 cm., average diameter 19 cm., diameter of largest cones only 18 cm., average weight 3.6 kilos, maximum 5.7 kilos; peduncle 10-11 cm. long. About 100 megasporophylls, the spiral arrangement prominent with no suggestion of vertical "rows." Exposed portion of megasporophylls smooth, rhomboid<sup>ly</sup>, 2.5-4 cm. wide, the spine in lower part of cone 2 cm. long, toward the top 6 cm. long, incurved. Average number of viable seeds per cone 126. Seeds scarlet, 3.5 cm. long, 2.7 cm. in diameter; stony coat 3 cm. long, 2.3 cm. in diameter, smooth, with 10-12 bundles prominent at top but scarcely distinguishable below.

Geographic distribution: Southern Queensland almost to southern limit of New South Wales, typically in open Eucalyptus forest, extending from the coast inland several hundred meters, occasionally in isolated groups up to 15-25 kilometers. There are probably more individuals of this species than of any other in the family.

6. Macrozamia mountperriensis F. M. Bailey

Bailey, F. M., Syn. Queensl. Flora, Suppl. 1, p. 50 (1886),  
Queensl. Flora 5:1505 (1902), Compreh. Cat. Queensl. Plants, 2nd  
ed., 516-517 (1909).

Stem subterranean, sometimes slightly above the ground, ovoid,  
covered by an armor of leaf bases, 50 cm. long, 35 cm. in diameter.  
Leaves as many as 80 in a crown, about 1.5 m. long, deep green, not  
twisted. Petiole 40-45 cm. long, somewhat angular, with a swollen  
base covered by dense mouse-colored wool; rachis with a raised ridge  
between the two rows of leaflets. Leaflets about 50 on each side,  
mostly opposite, long linear, pungent, with a rather prominent white  
callus at the base, the larger ones about 25 cm. long and 8 mm. wide,  
the lower ones only slightly shorter than the rest; veins 8-12.

Male cones cylindrical, tapering slightly toward the top, about  
30 cm. long and 4 cm. in diameter; peduncle about 30 cm. long, sur-  
rounded by numerous densely woolly scales about 12 cm. long and 4-8  
mm. wide. Microsporophylls with a very short spine except at top of  
cone; microsporangia covering the under surface. Female cones cylin-  
dric<sup>peduncle about 30 cm. long.</sup>, 20-40 cm. long, 8-10 cm. in diameter; Megasporophylls fleshy,  
about 3.5 cm. wide, 3 cm. high, with a very prominent, sharp, trans-  
verse ridge prolonged in the center into an erect, flat, linear-lanceo-  
late spine 2.5-5 cm. long. Seeds deep orange, about 2.7 cm. long and  
1.7 cm. in diameter; stony coat smooth, with 9 bundles distinguishable.

Geographic distribution: Mount Perry, Queensland. Abundant at  
Rockhampton, Berserker Range.

7. Macrozamia cylindrica C. Moore

Moore, C., Jour. Roy. Soc. N. S. Wales 17:119 (1883), Handb. Flora N. S. Wales, p. 379 (1893).

Stem tuberous and subterranean. Leaves 90-120 cm. long, slender, pale green, glabrous, not spirally twisted. Petiole smooth; 35 cm. or more in length, flat above, rounded below, rachis nearly flat below, with two widely separated grooves above, somewhat elevated between the grooves. Leaflets about 60 on each side, arising obliquely from the edges of the rachis, linear-lanceolate, straight, <sup>flexible,</sup> pungent, slightly contracted at the base, inserted obliquely but twisted so that the leaf is flat; callus pale yellow, prominent; larger leaflets 25-30 cm. long, 8-10 mm. wide, with 5-8 veins; the lowest leaflets 8-12 cm. long, 5-8 mm. wide, with 5 or 6 veins; occasionally with a few small pungent teeth below the lowest leaflets but without a gradual reduction from leaflets to spines.

Male cones strictly cylindrical, 17-25 cm. long, 3.5-4.5 cm. in diameter. Peltate part of microsporophylls thick, rhomboid-truncate, about 12 mm. wide, tapering to a fine incurved point scarcely recognizable in the lower part of the cone but increasing to about 6 mm. at the top. Female cones not available.

Geographic distribution: Southeastern Australia—low flat ground between Richmond and Clarence Rivers, New England Plateau, Moona Plains, East Cunderang, Mount Danar Gunggal.

This species, one of the most elegant of the genus, is characterized by its slender graceful habit and its bright pale yellow callus. Although many plants were seen in the field and Sydney Botanic Gardens, no female plants were found.



8. Macrozamia miquelii (F. Muell.) A. DC.

Mueller, F. von, *Fragm. Phytogr. Austral.* 3:38 (1862-63);

Bentham, G., *Flora Austral.* 6:255 (1873); Bailey, F. M., *Queensl. Flora* 5:1504 (1902).

Stem subterranean, occasionally slightly above ground, massive ovoid, about 40 cm. in diameter at the base, completely covered with an armor of leaf bases but appearing quite smooth, the lower flattened end bearing numerous fleshy roots. Leaves as many as 80-100 in a crown, up to 2 m. in length, nearly straight. Rachis somewhat triangular in cross section, flattened above or somewhat elevated between the two rows of leaflets; expanded base of petiole more woolly than in M. spiralis. Leaflets 35-50 on each side, all arising obliquely from the margins of the rachis, many more opposite or subopposite than alternate, long linear, straight or falcate, pungent, the narrowed base with a large white or reddish callus; largest leaflets 40 cm. long, 7-9 mm. wide, with 8 or 9 veins; gradually smaller toward the top but even the uppermost 15-20 cm. long, 3 mm. wide, and with 4 or 5 veins; lower leaflets reduced to short stiff spines.

Male cones cylindric, 15-25 cm. long, up to 4.5 cm. in diameter and with about 500 sporophylls spirally arranged with no appearance of vertical rows. Microsporophylls thick, cuneate, 2 cm. long and 1.5 cm. wide in the larger cones, the apex rhomboid, the upper ones with a spine 6-12 mm. long, the lower ones almost spineless. Microsporangia 140-160, more or less separated into two groups but often confluent; in sori of 3-5, with 3 the commonest number. Female cones cylindric, 15-25 cm. long, 8-12 cm. in diameter, outer peltate part of sporophyll fleshy, rhomboid, 3.5 cm. wide, 2.5 cm. high, with a very thin transverse ridge prolonged

in the center into a spine which is very short at the base of the cone but reaches a length of 3-5 cm. above. Seeds red, 3.2 cm. long, 2 cm. in diameter. Stony coat 2.9 cm. long, 1.8 cm. in diameter, very smooth but with an average of 11 bundles throughout the entire length, their insertion very oblique; bundles in corona very prominent with an average of 11.

Geographic distribution: Taylor's Range, near Brisbane, to Rockhampton, Queensland. Fairly abundant at Byfield, a few hours walk south of Yeppoon.

9. Macrozamia secunda C. Moore

Moore, C., Jour. Roy. Soc. N. S. Wales 17:120 (1883), Handb. Flora N. S. Wales, p. 379 (1893).

Stem subterranean, tuberous, ovoid, covered by a slightly woolly armor of leaf bases. Leaves 60-90 cm. long, usually glabrous, sometimes glaucous, sharply recurved near the top, not twisted. Petiole and rachis flat above, rounded below. Leaflets 40 or more on each side, close together, mostly opposite or nearly so, arising rather vertically from the edges of the rachis, linear-lanceolate, falcate, *rigid*, tapering gradually to a somewhat pungent apex and tapering more abruptly to the base; callus dull red; 10-15 cm. long, 6 mm. wide, the lower leaflets about as long as the rest; veins 6-9.

Male cones not available. Female cones about 15 cm. long and 9 cm. in diameter. Megasporophylls with sharp points at the base of the cone, increasing to spines at the top. Seeds not available.

Geographic distribution: New South Wales near Reedy Creek, east of Mudgee; near <sup>u</sup>D~~u~~bbu. Dr. Charles Moore, for many years the Director of the Sydney Botanic Gardens, who was familiar with practically all the New South Wales species in the field, states that while this species is more nearly like M. corallipes than any other, its more spreading habit, the vertical character of the leaflets, and the non-cortorted, recurved, pointed, falcate leaves at once distinguish it from all others.

10. Macrozamia platyrachis F. M. Bailey

Bailey, F. M., Queensl. Agric. Jour. 5:356 (1898), Queensl. Flora 5:1503 (1902), Compreh. Cat. Queensl. Plants, 2nd ed., 514-515 (1909).

Stem subterranean, turnip-shaped, about 30 cm. long, 20 cm. in diameter, smooth but completely covered by an armor of thin leaf bases. Leaves about 12 in a crown, about 1 m. long, glabrous or when young very thinly pulverulent, not spirally twisted. Petiole 12-20 cm. long, not woolly at the base; petiole and rachis flat on upper surface, convex below, broadest part of rachis reaching 12 mm. (suggesting the specific name). Leaflets about 23 on each side, inserted along the thin edges of the rachis, broadly linear, falcate, erect, obtusely acuminate, very coriaceous, without a callus at the base, the largest 38 cm. long and 19 mm. wide, the lowest about as long as the rest; veins 15-17, prominent.

Male cones cylindric, 8-10 cm. long, 2.5 cm. in diameter; peduncle about same length as cone. Exposed ends of microsporophylls triangular and terminating in an erect slender spine about 10 mm. long. Female cones oblong, about 16 cm. long, 3-7 cm. in diameter. Transverse ridges of megasporophylls acute and very prominent, prolonged in the center into a flat, erect, sharp-pointed spine 7-10 mm. long. Seeds oblong, reddish brown, 2.5 cm. long.

Geographic distribution: Near Planet Downs, Queensland.

11. Macrozamia corallipes Hook. f.

Hooker, J. D., Bot. Mag. 98: t. 5943 (1872); Moore, C., Jour. Roy. Soc. N. S. Wales 17:120 (1883), Handb. Flora N. S. Wales, p. 379 (1893).

Stem subterranean, subspherical, about 20 cm. in diameter or elongated to nearly 60 cm. without much change in diameter, smooth or woolly. Leaves 30-45 cm. long, somewhat rigid, forming a rather contracted crown, dark green above, paler below. Petiole 25 cm. long, terete, 3-4 mm. in diameter but at base gradually widened to 1.5 cm., the sides and back of the widened part densely woolly, elsewhere smooth. Rachis much twisted, rounded below, with two grooves above and a raised ridge between the two rows of leaflets. Leaflets 25-50 on each side, mostly opposite, inserted obliquely on the margins of the rachis, linear-lanceolate, narrowed above to a red pungent apex, narrowed and decurrent at the base; callus bright red; 15-22 cm. long, 7-10 mm. wide, the lower leaflets not much shorter than the rest but sometimes a few reduced to short spines; veins 6-12.

Male cones glaucous green, smooth, cylindrical, 13-18 cm. long, 5 cm. in diameter; peduncle stout, smooth, 8 cm. long. Microsporophylls 18 mm. wide, ridge tapering to an incurved spiny point which is short or obsolete in the lower part of the cone and gradually increasing to 12-15 mm. at the top. Microsporangia covering the under surface. Female cones glaucous green, 10-15 cm. long, 8-10 cm. in diameter, peltate part of megasporophylls much thickened, the transverse ridge in the lower sporophylls merely acute in the middle, increasing to a spine 3-6 mm. long at the top of the cone. Seeds red, 2.6 cm. long, 2.2 cm. in diameter.

Geographic distribution: New South Wales—near Sydney, north of Penrith on the Hawkesbury, dry ridges between Glenbrook and Blaxland, at Wascoe's on Western Road, Port Jackson to Blue Mountains, Mulgoa.

12. Macrozamia douglasii W. Hill ex F. Muell.

Hill, W., ex Mueller, F. von, Census Austral. Plants 1:110 (1882); Mueller, F. von, Melbourne Chemist and Druggist (1883); Bailey, F. M., Queensl. Flora 5:1505 (1902).

Stem generally tuberous and buried in sand but sometimes up to nearly 1 m. high, 30 cm. in diameter. Leaves 50 or more in a crown, 2-2.4 m. long, deep green, spirally twisted. Petiole about 60 cm. long, the base wide and densely woolly; rachis somewhat triangular in cross section, rounded angular below, flattened above with leaflets inserted along two grooves with an elevated ridge between them. Leaflets about 160 on each side, arising obliquely from the rachis, mostly opposite, linear, thin, acute, contracted at the base, with a small white callus; central leaflets 30-42 cm. long, 10 mm. wide, the lower ones much shortened; veins 8-11.

Male cones ellipsoid~~al~~, 17 cm. long, 6 cm. in diameter; peduncle glabrous, 30-40 cm. long; terminal spine almost lacking in the lower microsporophylls but reaching a length of 5-6 cm. in the upper ones. Female cones 20-40 cm. long, 10-12 cm. in diameter. Megasporophylls 5-6.5 cm. wide, 2.5-3 cm. high, the transverse ridge often developed into a thin wing with only a small central point in the lower part of the cone but increasing to 18 mm. at the top, with a conspicuous depression at the base of the spine. Seeds red, 2.5-3.5 cm. long, 1.8-2.5 cm. in diameter; stony coat smooth.

Geographic distribution: Fraser Island, Queensland.

13. Macrozamia fawcetti C. Moore

Moore, C., Jour. Roy. Soc. N. S. Wales 17:120 (1883), Handb. Flora N. S. Wales, p. 380 (1893).

Stem usually subterranean, ovoid, with an armor of densely tomentose leaf bases. Leaves 4-6 in a crown, 0.6-1.2 m. long, dark glossy green above, paler beneath, hairy when young, becoming glabrous. Petiole about one-third the length of the leaf, very smooth, very woolly at the base; rachis flat above, rounded or keel-shaped below, becoming subterete toward the apex of the leaf, much twisted. Leaflets 20-25 on each side, broadly linear-lanceolate, subfalcate, rounded or obtuse at the apex or tapering abruptly to a sharp point; callus red; many leaves with leaflets having 5 or 6 sharp spines at the tip or seldom more than 1 cm. from the tip; some leaves with leaflets having only 1 or 2 spines or none; leaflets 15-25 cm. long, 18 mm. wide with the broadest part above the middle; veins 10-12.

Male cones 20 cm. long, 6.5 cm. in diameter; peduncle long, woolly at base. Microsporophylls flat, with small sharp spines. Female cones 17 cm. long, 9 cm. in diameter; peduncle 7 cm. long. Megasporophylls 4.5 cm. wide, 1.2-2.5 cm. high, transverse ridge sharp, prolonged abruptly into a narrow spine 12-17 mm. long, which on both kinds of sporophylls ~~is~~<sup>is</sup> finer and narrower than in any other species. Seeds nearly globose, red, 2.8 cm. in diameter.

Geographic distribution: New South Wales along Richmond River, Acacia Creek, Crawford River, Limeburners Creek, Hunter River, Murrundi, Morriset, Tenterfield, Grafton. The presence of spines at the tips of some of the leaflets is very distinctive.

14. Macrozamia flexuosa C. Moore

Moore, C., Jour. Roy. Soc. N. S. Wales 17:121 (1883), Handb. Flora N. S. Wales, p. 380 (1893), ~~Proc. Linn. Soc. N. S. Wales 4, 1887 (1888)~~.

Stem subterranean, about 20 cm. long, 12 cm. in diameter, covered by an armor of slightly woolly<sup>1</sup> leaf bases. Leaves 60-90 cm. long, considerably spirally twisted, flexuous. Petiole 16 cm. or more long, flat above, rounded below, smooth, woolly<sup>1</sup> at base. Rachis flat above but somewhat raised between the two rows of leaflets, flattened or rounded angular below, glabrous. Leaflets erect, flexible, long linear-lanceolate, tapering rather abruptly to a pungent point, the apex with sometimes 2 or 3 small spines even in adult plants; largest leaflets 20-25 cm. long, 5-7 mm. wide, the lowest not much shorter than the rest; veins 7-9.

Male cones 15-18 cm. long, 5 cm. in diameter. Microsporophylls pointless at base of cone but with rather long sharp points at the top. Female cones ovoid, about 15 cm. long, 8 cm. in diameter, with a short smooth peduncle. Peltate part of megasporophylls broadly rhomboid<sup>1</sup>, with a short spine at the base of <sup>the</sup> cone, increasing to 5 cm. at the top. Seeds orange-red, 2-2.5 cm. long, 1.7 cm. in diameter; micropyle excentric; stony coat smooth, corona 6-radiate.

Geographic distribution: New South Wales between Raymond Terrace and Stroud, Limeburners Creek, Stewart's Brook, Murrurandi, Acacia Creek, Crawford River at Bullahdelah. Charles Moore remarks that this species is very different in character and habit of growth from any other known to him.



15. Macrozamia pauli-guilielmi W. Hill and F. Muell.

Mueller, F. von, Fragm. Phytog. Austral. 1:86, 243 (1858);  
Bentham, G., Flora Austral. 6:251 (1873); Moore, G., Handb. Flora  
N. S. Wales, p. 380 (1895); Bailey, F. M., Queensl. Flora 5:1504 (1907).

Stem subterranean, ovoid, covered by an armor of densely woolly  
leaf bases. Leaves 16-20 in a crown, about 60 cm. or occasionally  
up to 1 m. in length, glabrous, more or less twisted. Petiole 10-  
12 cm. long, 6-8 mm. wide, the base broad and woolly and with thin  
scarious edges, the upper surface of the petiole and rachis very  
flat, rounded below, in dried specimens flat above and below. Leaf-  
lets up to 100 on each side, narrowly linear, falcate, revolute,  
pungent, the base contracted and bearing a prominent white callus,  
the tip with 1-3 small spines even in adult plants; 15-25 cm. long,  
2-4 mm. wide; veins 2-4, prominent.

Male cones conical, 8-10 cm. long, 4 cm. in diameter; peduncle  
tomentose, 2.5-7 cm. long, Microsporophylls 12 mm. wide, 6 mm. high,  
the lower ones with a very small spine, the upper ones with a spine  
4-6 mm. long, slightly recurved and pungent. Microsporangia small,  
covering the entire under surface. Female cones conical, glabrous,  
up to 13 cm. long, 8 cm. in diameter at the base; peduncle 4 cm.  
long, densely tomentose. Megasporophylls 2.5-3.5 cm. wide, 1.2-2 cm.  
high, with a very prominent transverse ridge prolonged in the center  
into an erect spine about 2.5 cm. long and not more than 2 mm. wide.  
Seeds angular, golden yellow, 2.5 cm. long; stony coat smooth, 11  
bundles distinguishable.

Geographic distribution: Southeastern Queensland and into New  
South Wales. Near Stanthorpe and at Tinana Creek, Maryborough. The  
leaflets of the Maryborough plants are narrower than those at Stan-  
thorpe. Maranoa River, Wide Bay, Mackenzie River, Moreton Bay,  
Maitland, Expeditionary Range.

16. Macrozamia heteromera C. Moore

Moore, C., Jour. Roy. Soc. N. S. Wales 17:122 (1883), Handb. Flora N. S. Wales, p. 380 (1893).

Stem subterranean, 15-20 cm. long, 8-10 cm. in diameter, with an armor of leaf bases covered by a reddish wool. Leaves 5-10 in a crown, seldom more than 60 cm. long, erect, sometimes glaucous but usually light green and glabrous, hairy when young, usually spirally twisted. Petiole 10 cm. long, the lower half densely and permanently woolly on the under side and edges but smooth on the upper surface; both petiole and rachis flat above and rounded below. Leaflets about 50 on each side, inserted on the edges of the rachis, cuspidate, tapering at the base; callus <sup>often red;</sup> small, 10-15 cm. long, some <sup>or three-times</sup> or most of the leaflets once, ~~or~~ twice, <sup>^</sup>forked; when not forked, up to 7 mm. wide with 10 veins; when twice forked the terminal segments 1-3 mm. wide with 1-3 veins.

Male cones oblong-cylindric, about 25 cm. long and 6.5 cm. in diameter. Microsporophylls tapering to a short acute point. Female <sup>ovoid,</sup> cones 15-20 cm. long, 10-12 cm. in diameter; peduncle short, woolly at base. Megasporophylls few and large, 6 cm. wide, 3 cm. high, the lower ones with a transverse ridge merely acute in the middle, the upper ones with a narrow spine 10-15 mm. long and with a depression below it.

Geographic distribution: New South Wales—<sup>sum</sup>Warraabungle Ranges, Castlereagh River country, Rocky Glen between Coonabarabran and Gunnedah, Narrabri, Tamworth. Plants at Narrabri are more robust, with glaucous leaflets seldom more than once forked (var. glauca C. Moore). Plants at Tamworth have very narrow glabrous leaflets usually twice forked (var. tenuifolia C. Moore).