

9. ZAMIA L.

Linnaeus, G., Spec. Plant., 2nd ed., p. 1659 (1763); Miquel, F. A. W., Monogr. Cycad. 63-73 (1842), Prodr. Syst. Cycad. 11-15, 23-27 (1861); De Candolle, A., Prodr. 16²:538-546 (1868); Standley, P. C., Contr. U. S. Nat. Herb. 23¹:49-50 (1920); Schuster, J., Pflanzenreich 4¹:132-161 (1932).

Stem in most species small and tuberous, subterranean, generally smooth and unarmored but often with more or less conspicuous leaf scars; stem in some species aerial, up to 1 m. or more in height and with an armor of persistent leaf bases; branched or unbranched. Leaves generally few, developed singly, varying from less than 15 cm. in length (the smallest in the family) to more than 2 m. Petioles with more or less conspicuous stipules, unarmed or with scattered spines. Leaflets ovate to long linear, entire or serrate at least near the tip, jointed at the rachis, with "parallel" (dichotomous) venation. Vernation of rachis sub-circinate, of leaflets straight or slightly curved.

Male cones frequently more than 1, cylindric or ovoid, generally long stalked. Microsporophylls peltate; the exposed top thick, truncate, hexagonal, flat or slightly raised in the center, broader than tall. Microsporangia nearly always in two groups separated by a sterile line, occasionally confluent at least in the middle of the cone. Female cones usually single or occasionally several together, cylindric or ovoid, generally long stalked. Megasporophylls peltate, the exposed top thick, truncate, hexagonal, flat or slightly depressed in the center, broader than tall. Both male and female cones terminating in a small solid body composed of united sterile sporophylls. Fertile sporophylls so regular in spiral arrangement that they seem to stand in

vertical rows. Seeds generally red or orange-red, sometimes yellow or white.

About 30 species, ranging from Florida to Chili^C and Brazil; especially abundant in Central America and the West Indies.

Name used by Pliny, meaning loss or damage, and applied to barren pine cones. Type species: Z. pumila L.

Key to the Species

I. Stem subterranean and tuberous

A. Petioles unarmed

1. Leaflets not more than 7 mm. wide, with less than 10 veins, linear

a) Leaflets 4-7 mm. wide, denticulate near the apex 1. Z. floridana

b) Leaflets 3-4 mm. wide, entire 2. Z. angustifolia

c) Leaflets 1-2 mm. wide, entire 3. Z. angustissima

2. Leaflets over 7 mm. wide (see no. 5), with more than 10 veins

a) Leaves mostly less than 50 cm. long

(1) Leaflets ovate or obovate, not over 15 cm. long

(a) Leaflets 8-14 cm. long, 11-16 mm. wide; female cones 7-11 cm. long. 4. Z. pumila

(b) Leaflets 0.7-4.5 cm. long, 4-12 mm. wide; female cones 4-5 cm. long 5. Z. pygmaea

(c) Leaflets 3-8 cm. long

(i) Leaves 20-50 cm. long; leaflets 10-18 mm. wide; female cones 8-10 cm. long 6. Z. kickxii

(ii) Leaves 10-20 cm. long; leaflets 7-14 mm. wide; female cones 4-6 cm. long. 7. Z. silicea

(d) Leaflets 6-8 cm. long, 25-28 mm. wide; female cones 7-10 cm. long 8. Z. ottonis

(2) Leaflets linear-lanceolate, 20-30 cm. long, 10 mm. wide; female cones 14-18 cm. long 9. Z. boliviana

(3) Leaflets ovate-lanceolate, up to 21 cm.

long and 6 cm. wide; female cones 6 cm.

long 10. Z. cupatensis

b) Leaves more than 50 cm. long

(1) Leaflets serrate, mostly obovate,

10-45 mm. wide 11. Z. latifoliolata

(2) Leaflets entire or nearly so

(a) Leaflets linear-lanceolate, 9-16 mm.

wide 12. Z. media

(b) Leaflets linear, 10-20 mm. wide. . . 13. Z. portoricensis

B. Petioles spiny

1. Leaflets obovate-oblong, furfuraceous below,

4-6 cm. wide. 14. Z. furfuracea

2. Leaflets lanceolate, not furfuraceous

a) Leaflets not more than 30 cm. long and 3.5
cm. wide

(1) Leaflets 1.5-2.2 cm. wide, 20-25 on each

side; female cones 10-14 cm. long . . . 15. Z. sylvatica

(2) Leaflets ²~~1.5-2~~ cm. wide, 14-24 on each

side; female cones 5-6 cm. long . . . 16. Z. ~~cupatensis~~ mexicana

(3) Leaflets 2-2.5 cm. wide, 7-20 on each

side; female cones 4-7 cm. long . . . 17. Z. spartea

(4) Leaflets 3-5 cm. wide, 8-16 on each

side; female cones 8-10 cm. long . . . 18. Z. gutierrezii

b) Leaflets not more than 50 cm. long and 7

cm. wide 19. Z. ulei

II. Stem aerial, creeping. 20. Z. poeppigiana

III. Stem aerial, erect, often up to 1 m. high

A. Petioles mostly unarmed

- 1. Leaves 1.7 m. long; leaflets 18-24 cm. long, entire 21. Z. tuerckheimii
- 2. Leaves 60-90 cm. long; leaflets 10-18 cm. long, serrate 22. Z. obliqua

B. Petioles spiny

- 1. Leaflets 1-1.6 cm. wide, subentire 25. Z. chigua
- 2. Leaflets 2-4 cm. wide

a) Leaflets serrate

- (1) Leaflets 15-20 cm. long, 6-11 on each side 24. Z. muricata
- (2) Leaflets 20-25 cm. long, 14-20 on each side 25. Z. monticola
- (3) Leaflets 20-²/₅ cm. long, 40 or more on each side 26. Z. lindenii

b) Leaflets entire, 35-50 cm. long 27. Z. pseudoparasitica

- 3. Leaflets 5-10 cm. wide, serrulate 28. Z. skinneri
- 4. Leaflets 10-25 cm. wide, serrate 29. Z. wallisii

1. Zamia floridana A. DC.

De Candolle, A., Prodr. 16⁵:544 (1868); Webber, H. J., U. S. Dept. Agric., Bur. Pl. Indus. Bull 2:7-92 (1901).

Stem tuberous, subterranean, seldom more than 20 cm. long, in large unbranched specimens 8-10 cm. in diameter, in branched specimens up to 12-16 cm. in diameter, tapering below, smooth or *somewhat* warty. Leaves seldom more than 12 in a crown, but subterranean branching of the stem may make the number seem much larger; 30-60 cm. long, glabrous above but with scattered hairs below.

Petiole 10-30 cm. long, terete below but with two grooves higher up, not ~~prickly~~ *spiny*, with scattered hairs; rachis longer or shorter than the petiole, rounded below, with two grooves above. Leaflets 14-25 on each side, often opposite near the apex, subopposite or alternate below, frequently twisted, more or less erect, linear, falcate, obtuse, narrowed at the base, minutely denticulate near the apex with 2-5 obscure blunt teeth on the lower margin and 2-4 on the upper, slightly revolute; usually not more than 10 cm. long but occasionally up to 14 cm., 4-7 mm. wide, rarely 9 mm.; veins 8-10, sometimes up to 14.

Male cones usually more than 1, often 3 or 4, cylindric, attenuate above, abruptly acute, dark brown, densely tomentose with dark reddish brown hairs, about 8 cm. long, occasionally up to 13 cm., 2.5 cm. in diameter; peduncle about 5 cm. long, densely tomentose with hairs lighter in color than those on the cone. Microsporophylls in average cones in 10-12 vertical rows ^{of 12-20 each} ~~of 12-13 each~~. ~~Micro~~ Microsporangia in two groups with a sterile line between, ^{of 12 or 13 each} in sori of 2 or 3, occasionally single. Female cones usually single but 2 or 3 not rare, ovoid or cylindric, with a blunt sterile tip, densely tomentose with dark rusty-brown hairs, 12-16 cm. long,

occasionally up to 20 cm.

~~6-8 cm.~~ 6-8 cm. in diameter; peduncle 5-9 cm. long, tomentose. Megasporophylls in 6-11 vertical rows, 6-11 in a row; top 2-3 cm. wide, 1.5 cm. high, flat or somewhat depressed in the center. Seeds orange-red, 2.2-2.5 cm. long, 1.3-1.6 cm. in diameter. Fleshy coat up to 8 mm. thick at the top but much thinner elsewhere; stony coat ellipsoid, 1.6-2 cm. long, 1.3-1.5 cm. in diameter, terminating abruptly in a small point about 1 mm. high, very smooth, with 8-10 bundles scarcely distinguishable except at the corona.

Geographic distribution: Very abundant on the southeastern coast of Florida, below latitude 26° 30', with easily accessible stands at Miami and Homestead. Set out or grown from seed it thrives throughout Florida and the southern part of the Gulf States. Mature plants grown from seed also flourish in the open in southern California; in Sydney, Brisbane^e, and Rockhampton, Australia; and in Durban, Port Elizabeth, and Capetown, Union of South Africa.

This species grows in sandy soil in open places. Although often associated with palmettoes and pines, these do not make enough shade to be a factor in its distribution. In the hottest and driest places the leaves are shorter and the leaflets shorter and narrower. Plants begin to produce cones when the stems are 3-4 cm. in diameter, but coning is more frequent on stems 6-10 cm. in diameter. Branching is very common, at least one-half of the larger specimens showing one branch and sometimes 2 or 3.

2. Zamia angustifolia Jacq.

Jacquin, N. J., Coll. 3:263 (1789); Miquel, F. A. W., Prodr. Syst. Cycad. 14, 26 (1861); Marie-Victorin, Fr., and León, Fr., Contr. Inst. Bot. Univ. Montreal no. 41:67-72 (1942).

Stem tuberous, subterranean, cylindric, up to 30 cm. in length and 6 cm. in diameter in unbranched plants, sometimes with as many as five branches and a diameter of 10 cm. without any increase in length, smooth but marked transversely by leaf scars. Roots 5-10 mm. in diameter and longer than the stem. Leaves 5-10 in a crown, 50-90 cm. long, glabrous. Petiole 15-35 cm. long, terete, ~~smooth~~ unarmed; rachis 20-50 cm. long, slightly grooved above especially in the upper half. Leaflets 25-45 on each side, opposite or alternate, narrowly linear, obtuse, base not narrowed, usually entire but often with 1-3 small blunt teeth close to the apex; 10-16 cm. long, 3-4 mm. wide, rarely up to 7 mm.; veins usually 3-6, rarely up to 8.

Male cones 1-3, cylindric, light brown with very short hairs, 4-6.5 cm. long, 1.5-2 cm. in diameter; peduncle slightly longer than the cone, ^{tomentose.} Microsporophylls in 9 or 10 vertical rows ^{of} 15-17 ~~each~~ each, ~~the~~ the top 5 mm. wide and 2.5 mm. high. Female cones cylindric, with prominent sterile tip, light brown with short hairs, 6-12 cm. long, 3-5 cm. in diameter; peduncle not as long as the cone, tomentose. Megasporophylls in 6 vertical rows ^{of} 5 or 6 ~~each~~ each; top 18 mm. wide and 10-12 mm. high, with a slight transverse depression in the center. Seeds red, 12-17 mm. long, 7-12 mm. wide; stony coat very smooth, 10-15 mm. long, 8-9 mm. wide.

Geographic distribution: Cuba--southern Oriente, with good stands at Bayamo, in the Sierra Maestra, northeast of Santiago de Cuba, and west of Guantánamo. Also in the Bahama Islands.

3. Zamia angustissima Miq.

Miquel, F. A. W., Verh. Nederl. Inst. 3:4 (1851), Prodr. Syst. Cycad. 15, 27 (1861). ~~W. Schimper, Bot. Zeit.~~

Stem tuberous, subterranean, irregularly cylindric, 10-15 cm. long, 3-6 cm. in diameter, smooth. Leaves 3-10 in a crown, 25-50 cm. long. Petiole 15-25 cm. long, terete, unarmed, glabrous but pubescent at the base; rachis 10-20 cm. long, often twisted, rounded below, flattened above or elevated between the two rows of leaflets. Leaflets 15-30 or more on each side, opposite or alternate, very narrowly linear, often curved or twisted, apex pale tumid with a few hairs and occasionally notched, base also tumid and occasionally with a few hairs, entire, revolute; 8-15 cm. long, 1-2 mm. wide; veins 2 or 3. Male cones cylindric, brown, tomentose, lighter around the edges of the sporophylls, 1.5 cm. in diameter. Female cones cylindric, obtuse, brown, lighter around the edges of the sporophylls.

Geographic distribution: Cuba—southern Oriente, in the same general locality as Z. angustifolia Jacq., to which this species is closely related and with which it intergrades. Z. multifoliolata A. DC. is probably only a thrifty form of Z. angustissima.

4. Zamia pumila L.

Linnaeus, C., Spec. Plant., 2nd ed., p. 1659 (1753); Sims, J., Bot. Mag. 43: t. 1838 (1816) and 45: t. 2006 (1818); Webber, H. J., U. S. Dept. Agric., Bur. Pl. Ind. Bull. 2:7-92 (1901).

Stem tuberous, subterranean, in larger plants 20-30 cm. long and 10 cm. in diameter, in branching plants up to 15 cm. in diameter, tapering below, smooth or warty. Leaves usually not more than 10 in a crown, 30-60 cm. long, glabrous above but with reddish brown hairs below. Petiole 10-20 cm. long, rounded or almost angular below, somewhat flattened above with two shallow grooves near the rachis, not spiny, tomentose at the base. Rachis 20-40 cm. long, rounded below, flat above with two ridges at the edges, often hairy even to the top. Leaflets 10-24 on each side, occasionally opposite throughout, more frequently opposite above and becoming subopposite or alternate below, rarely twisted, not erect from the rachis, obovate, obtuse, ^{to about 2 mm.,} narrowed at base, _{entire} in broader leaflets, in longer leaflets often with 7-9 minute blunt teeth on the lower margin and 4-6 on the upper, all near the apex; 8-11 cm. long, 14-16 mm. wide, with 20-30 veins, but many leaflets longer and narrower, 9-14 cm. long, 11-14 mm. wide, with 14-18 veins.

Male cones usually more than 1, often ^{2, or even} 3 or 4; subcylindric, attenuate above, densely tomentose with deep brown hairs, about 8 cm. long and 2.5-3 cm. in diameter, occasionally up to 10 cm. long and 3.5 cm. in diameter; peduncle 5-10 cm. long, tomentose. Microsporophylls in 8-10 vertical rows ^{of 8-12 each.} ~~with 8-12 in each row.~~ Microsporangia in two groups of 15-20 each in the larger cones, in sori of 2, rarely 3, commonly single. Female cones usually single but occasionally 2 or 3, ovoid or cylindric, with an inconspicuous sterile tip, dark brown and densely tomentose, 7-11 cm. long, 5-8 cm. in diameter; peduncle about 10 cm. long, tomentose. Megasporophylls in 8-10

vertical rows ^{of 8-10 each;} ~~of 8-10 each;~~ top thinner and flatter than in Z. floridana, 2.5 cm. wide, 1.4 cm. high. Seeds orange-red, 1.3-2 cm. long, 1-1.5 cm. in diameter; stony coat obovoid, 1.3-2 cm. long, 1-1.5 cm. in diameter, with a small papilla at the top, very smooth, with 10-12 bundles almost indistinguishable.

Geographic distribution: Abundant in central Florida, particularly near the eastern coast between latitude 28° 30' and 29° 30'; at its best in dense moist woods. Probably also in Cuba and other Caribbean islands.

5. Zamia pygmaea Sims

Sims, J., Bot. Mag. 42: t. 1741 (1815); Marie-Victorin, Fr., and León, Fr., Contr. Inst. Bot. Univ. Montreal no. 41:184-186 (1942).

Stem tuberous, subterranean, cylindric, 15-25 cm. long, 2-3 cm. in diameter, smooth. Leaves usually not more than 4-6 in a crown, 10-35 cm. long, glabrous. Petiole 3-15 cm. long, triangular with upper face flat and two grooves which continue to top of rachis, unarmed, tomentose at base; rachis 5-20 cm. long, rounded below, flattened above, slightly pubescent. Leaflets 5-15 on each side, opposite in upper part of leaf, then subopposite and alternate, ovate or obovate, serrulate with 6 or 7 blunt hairy teeth on the upper margin and 9-12 on the lower; 0.7-3 cm. long, 4-10 mm. wide, some even smaller but the largest 4.5 cm. long and 12 mm. wide, upper and lower leaflets about the same size as the rest; veins 15-17.

Male cones usually single, subcylindric, 3 cm. long, 1 cm. in diameter; peduncle up to 5 cm. long. Microsporophylls in 6 or 7 vertical rows ^{of} 5 or 6 ~~in~~ ^{each,} the top 8 mm. wide and 3 mm. high. Microsporangia in two groups of 5-7 each (the lowest number in the family), single or in sori of 2. Female cones usually single, subcylindric, the sterile tip about 3 mm. long, greenish with grayish or brownish hairs, 4-5 cm. long, 2.5 cm. in diameter; peduncle 2.5-3 cm. long, tomentose. Megasporophylls in 7 or 8 vertical rows ^{of} 4 or 5 ~~in~~ ^{each;} top 12 mm. wide, 7-8 mm. high, not darker in the center. Seeds red, 13 mm. long, 8 mm. in diameter; stony coat very smooth, 10 mm. long, 7 mm. in diameter.

Geographic distribution: An endemic Cuban species, widely distributed in Pinar del Río from San Diego de los Baños to Guane and beyond; very xerophytic.

6. Zamia kickxii Miq.

Miquel, F. A. W., Monogr. Cycad., p. 71 (1842), Prodr. Syst. Cycad. 14, 26 (1861).

Stem tuberous, subterranean, smooth. Leaves not more than 6-10 in a crown, 20-50 cm. long, flexible, pale green, ^{glabrous.} Petiole 10-23 cm. long, subterete, becoming somewhat flattened higher up, unarmed; rachis rounded below, flattened above with two grooves near the edge, smooth. Leaflets 10-33 on each side, usually opposite or subopposite but sometimes alternate throughout or at base of leaf, long ovate, upper margin nearly straight and the lower convex, obtuse, often emarginate, cuneate or narrowed at the base, ^{terminal} ~~apical~~ part of leaflet finely serrate with 7-16 blunt teeth on the upper margin and 9-20 on the lower, slightly revolute; 4-8 cm. long, 1-1.8 cm. wide, the upper and lower leaflets somewhat smaller than the rest; veins 13-30.

Male cones cylindric, tapering to a blunt apex, brownish yellow, 5-7 cm. long, 1.5-2 cm. in diameter; peduncle 4-6 cm. long, tomentose. Microsporophylls in 9 or 10 vertical rows / ^{of 10 each,} ~~8-10 rows,~~ top 8 mm. wide and 5 mm. high, brownish in center and yellow or green on the margins. Microsporangia in two groups of 7-9 each, single or in sori of 2. Female cones cylindric, 8-10 cm. long, 4-5 cm. in diameter; peduncle 9 cm. long. Megasporophylls in 8 vertical rows ^{of} ~~8~~ _{each.} ⁷

Geographic distribution: Cuba—chiefly in Pinar del Río but also in Habana and Matanzas. Closely related to Z. pygmaea Sims.

7. Zamia silicea Britt.

Britton, N. L., Bull. Torrey Bot. Club 43:462 (1916); Marie-Victorin, Fr., and León, Fr., Contr. Inst. Bot. Univ. Montreal no. 41:276-277 (1942).

Stem tuberous and subterranean, fusiform, 15-20 cm. or more in length, 3-3.5 cm. in diameter at top, 4-4.5 cm. at widest part. Leaves 2-7 in a crown, 10-20 cm. long, glabrous. Petiole 3-7 cm. long, unarmed, often villous at base; rachis 3-10 cm. long. Leaflets 3-14 on each side, opposite or subopposite, thick, mostly obovate but some long oval, many nearly straight along upper margin and ^{very} convex below, obtuse, often emarginate, narrowed at base to 1-2 mm., with 15-30 minute blunt teeth confined to upper third of leaflet and more numerous on lower than on upper margin; 3-7 cm. long, 7-14 mm. wide; veins 20-35.

Male cones 1-3, ovoid or cylindrical, dark brown with short reddish brown hairs, 2-3 cm. long, 1-1.5 cm. in diameter; peduncle 1-4 cm. long, tomentose. Microsporophylls in 6 or 7 vertical rows ^{of} 5-7 ~~each,~~ the top 7 mm. wide and 2 mm. high. Microsporangia in two groups of 6-14 each, mostly in sori of 2. Female cones ellipsoid, ^{with a short sterile tip,} dark brown, densely tomentose with short reddish brown hairs, 4-6 cm. long, 3-4 cm. in diameter; peduncle 2-4 cm. long, pubescent. Megasporophylls is 6 vertical rows ^{of} 4 or 5 ~~each,~~ ^{each,} the top 15 mm. wide and 7 mm. high. Seeds red, about 12 mm. long, broadly grooved on the inner side, rounded on the back, obliquely and obtusely umbonate at the apex.

Geographic distribution: Cuba—Isle of Pines; frequent in pine lands and in white silicious sand.

8. Zamia ottonis Miq.

Miquel, F. A. W., Linnaea 17:740 (1843), Prodr. Syst. Cycad. 14, 26 (1861).

Stem tuberous, subterranean, 15 cm. long and 5-7 cm. in diameter when not branched, 8-10 cm. in diameter when branched. Leaves 2-4 in a crown on one axis, 25-⁵70 cm. long, glabrous. Petiole 10-20 cm. long, subterete below, with two grooves above which become deeper near the rachis, ~~unarmed~~, rachis slightly longer than the petiole, rounded below, deeply grooved above. Leaflets 5-7 on each side, mostly alternate, obovate; apex obtuse, irregular, or deeply notched; base cuneate; dentate above the middle with as many as 30 teeth on the lower margin and 20 on the upper; 6-⁸~~2.5~~ cm. long, 2.5-2.8 cm. wide, the upper and lower leaflets about the same size as the rest; veins 35-45.

Male cones cylindric, reddish brown, tomentose, 4-6 cm. long, peduncle 4 cm. long, tomentose. 1-1.5 cm. in diameter; ^{each,} Microsporophylls in 9 or 10 vertical rows / of 12-15 ~~each,~~ the top 5 mm. wide and 2-3 mm. high. Microsporangia in two groups of 7-9 each, single or in sori of 2. Female cones cylindric, tapering rather abruptly at the apex and base, the sterile tip small, dark brown, tomentose, 7-10 cm. long, 4.5-6 cm. in diameter. Megasporophylls in 6 vertical rows, ^{of} 4-6 ~~each;~~ ^{each;} top 2.5 cm. wide, 1.4 cm. high, with a sharply marked depression 8 mm. wide and 2 mm. high in the center with sharp lines running laterally to the border and four fainter lines running to the other four angles. Seeds red.

Geographic distribution: Cuba—Cafetal Fundador; near San Diego de los Baños and at various places in the northern part of Pinar del Río.

9. Zamia boliviana (Brongn.) A. DC.

Z. brongniartii Wedd.

Brongniart, A., Ann. Sci. Nat. sér. 3, 5:9 (1846); Weddell, H. A., Ann. Sci. Nat. sér. 3, 13:249 (1849); Eichler, A. W., in Martius' Flora Bras. 4^v:413 (1863); De Candolle, A., Prodr. 16²: 540 (1868).

Stem fleshy, subterranean, cylindric, 6-8 cm. thick, smooth. Leaves 3-5 in a crown, 40-50 cm. long, pale green, glabrous. Petiole about 30 cm. long, terete, unarmed, tomentose below; rachis slender, obtusely triangular, glabrous. Leaflets 10-18 on each side, alternate or subopposite, linear-lanceolate, straight or rarely subfalcate, acuminate, attenuate at the base, entire or denticulate above with 2-5 minute teeth on each margin, revolute, 20-30 cm. long, about 1 cm. wide, veins 10-12. Male cones single, cylindric, obtuse, tomentose, 5-7 cm. long, 10-13 mm. in diameter; peduncle 2.5-4.5 cm. long. Microsporophylls in 8 vertical rows, each with a transverse groove. Female cones single, oblong, acuminate, the sterile tip 2 cm. high, rusty green, tomentose, 14-18 cm. long, about 5 cm. in diameter; peduncle 8-10 cm. long. Megasporophylls in about 8 vertical rows of 14-18 each, the top 10-15 mm. wide, 8-10 mm. high, slightly depressed in the center. Seeds oblong-elliptic, scarlet, 12 mm. long.

Geographic distribution: Chiquitos, Bolivia, and Mato Grosso, Brazil.

10. Zamia cupatiensis Ducke

Ducke, A., Arch. Jard. Bot. Rio de Janeiro 3:20 (1922).

Stem subterranean. Leaves up to 6. Petiole up to 30 cm. long, unarmed, more or less flexuous; rachis up to 25 cm. long. Leaflets up to 9 on each side, subopposite, ovate-lanceolate, slightly falcate, acuminate, subpetiolate, entire in upper leaflets, toward the apex often unidenticulate on each side, revolute, up to 21 cm. long and 6 cm. wide; veins 34-40. Male cones yellow canescent, about 1.8 cm. in diameter. Microsporophylls in 10 vertical rows, the top about 4 mm. wide and slightly elevated. Female cones solitary, cylindric, the sterile tip conical, brownish purple tomentose, about 6 cm. long, 3.5 cm. in diameter; peduncle 4 cm. long, with dark purple hairs. Megasporophylls in 6-8 vertical rows, the top about 18 mm. wide and 8 mm. high.

Geographic distribution: Colombia, near the Brazilian border; on humus-covered rocks in the Cerro de Cupati.

11. Zamia latifoliolata PreneloupZ. integrifolia Ait.

Aiton, W. T., Hort. Kew, 1st ed., 3:478 (1789); Preneloup, L. A., Bull. Soc. Vaud. Sc. Nat. 11:278 (1872); Britton, N. L., and Wilson, P., Sci. Surv. Porto Rico and Virgin Is. 6⁵:329 (1926).

Stem tuberous and subterranean, cylindric but tapering toward apex and base, seldom more than 30 cm. long exclusive of the root, 10 cm. in diameter, simple or branched, smooth. Leaves seldom more than 6-10 in a crown but subterranean branching may make the number seem larger, 60-100 cm. long, glabrous. Petiole 30-45 cm. long, with two grooves near the rachis, ^{unarmed;} rachis about 40-55 cm. long, rounded below, with two grooves above even in living material. Leaflets, when large, 12-15 on each side, opposite or alternate, obovate, often with 1 or 2 deep notches at the tip, cuneate below; closely and finely serrulate near the apex, distantly serrulate farther back, entire in the lower half; serrulations often 30 on lower margin of broadest leaflets and about 15 on upper margin; 14-16 cm. long, 2.3-4.5 cm. wide, upper and lower leaflets not much smaller than the rest; veins 50-70. Many plants of coning age have smaller leaves with leaflets 15-25 on each side, linear-lanceolate, serrulations half as numerous as on larger leaflets, 10-20 cm. long, 1-1.2 cm. wide, and with 20-35 veins. All intermediate conditions occur between broadest and narrowest leaflets.

Male cones single or up to 60 on a much branched plant, cylindric, dark brown, tomentose, 7-10 cm. long, 1.3-2.5 cm. in diameter; peduncle 4-12 cm. long, often with several scales. Microsporophylls in 10-12 vertical rows ^{of} 15-20 ~~in~~ ^{each,} the top 4-5 mm. wide and 2-3 mm. high. Microsporangia in two groups of about 15 each, nearly all in sori of 2. Female cones single or

2-5 on a branched plant, ovoid or cylindric, with a sharp conic sterile tip about 2 cm. high, dark, short tomentose, 8-10 cm. long, 5-8 cm. in diameter; peduncle usually 6-8 cm. long. Top of megasporophylls up to 3.5 cm. wide, 2 cm. high, with a slightly depressed area in the center. Seeds dark blood red, 2-2.5 cm. long, 1.3-1.7 cm. in diameter; stony layer 1.4-1.8 cm. long, 1.2-1.8 cm. in diameter.

Geographic distribution: Most abundant in Puerto Rico, where it appears west of San Juan, through Bayamón, Vega Baja, Manatí, and Arecibo, not growing far from the coast and always in a limestone region. In Cuba, rather abundant in the extreme eastern part of Oriente at Maisí. Also in San Domingo and Jamaica. The species is so variable that, under different names, it may be widely distributed throughout the Caribbean region.

12. Zamia media Jacq. ✓

Jacquin, N. J., Hort. Schoenbr. 3:77 (1798); Miquel, F. A. W., Prodr. Syst. Cycad. 13, 25 (1861); Britton, N. L., and Wilson, P., Sci. Surv. Porto Rico and Virgin Is. 6³:530 (1926).

Stem tuberous, subterranean, subcylindric, 12-30 cm. long, 4-11 cm. in diameter, simple or branched, smooth. Leaves often only 5 or 6 on coning plants but as many as 18 on stems 50 cm. long, 0.5-1.5 m. long, glabrous. Petiole 20-80 cm. long, terete, somewhat flattened above near the rachis, unarmed; rachis 25-70 cm. long, rounded below, flattened above with two shallow grooves. Leaflets 12-35 on each side, opposite or alternate, linear-lanceolate, obtuse, seldom emarginate, narrowed at the base to 2-3 mm., sometimes entire but usually with a few blunt teeth, up to 6 on the lower margin and 4 on the upper, the lowest not more than 4 cm. from the apex; 12-18 cm. long, 9-16 mm. wide, the upper and lower leaflets not much smaller than the rest; veins 18-28.

Male cones cylindric, light brown or gray, short tomentose, 5-7 cm. long, 1.5-2 cm. in diameter; peduncle 4-5 cm. long, tomentose. Microsporophylls in 8-13 vertical rows of 8-12 each, the top 6 mm. wide and 3 mm. high. Microsporangia in two groups of 10-14 each, mostly in sori of 2. Female cones cylindric, gray, tomentose, the larger ones 8-10 cm. long, 4-5.5 cm. in diameter; peduncle 4-6 cm. long. Megasporophylls in 6 vertical rows of 6 each; the top 3 cm. wide, 1.5 cm. high, depressed and slightly darker in the center. Seeds red, 2.5 cm. long, 1.3 cm. in diameter; stony coat ovoid, 2.2 cm. long.

Geographical distribution: The most widely distributed of all Cuban species of Zamia, more or less scattered from Matanzas to Oriente, as well as on small islands north of Cuba. Abundant around Coamo Springs, Puerto Rico, and extending northward to

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13. Zamia portoricensis Urban

Urban, I., Symb. Antill. 1:291 (1899); Britton, N. L., and Wilson, P., Sci. Surv. Porto Rico and Virgin I^s. 6³:330 (1926).

Stem tuberous and subterranean, often branched in larger plants, in unbranched plants larger in the middle and tapering slightly toward both ends, 30-45 cm. long, 4.5-7.5 cm. in diameter, with sharp leaf scars. Leaves 5-7 in a crown on unbranched plants, occasionally up to 10, 0.5-1.5 m. long. Petiole 20-80 cm. long, unarmed; rachis 20-60 cm. long. Leaflets 15-35 on each side, opposite or alternate, linear, obtuse or sometimes emarginate, narrowed at the base, entire or minutely and bluntly serrulate near the apex with up to 12 teeth on the lower margin and up to 6 on the upper; 10-25 cm. long, 1-2 cm. wide; veins 20-30.

Male cones cylindrical, rounded at the apex, light brown, tomentose, 5-8 cm. long, 1.4-1.8 cm. in diameter; peduncle 5-10 cm. long. Microsporophylls is 10 vertical rows, ^{of 17-19 each;} ~~25-30 in a row,~~ top 6 mm. wide, 3 mm. high, light brown in the center with a light gray border. Microsporangia in two groups of 10-15 each, nearly all in sori of 2. Female cones, ^{cylindric,} light brown, the sterile tip slender and up to 1.5 cm. long, 6-11 cm. long, 4-5 cm. in diameter. Top of megasporophylls 3.2 cm. wide, 1.4 cm. high, slightly depressed and darker in the center. Seeds red, 2-2.3 cm. long, 1.5-1.7 cm. wide; stony coat 1.2-1.8 cm. long, 1-1.5 cm. wide, very smooth, usually with only 5 or 6 bundles distinguishable only at base and without a corona.

Geographic distribution: Probably confined to the dry southwestern part of Puerto Rico, at its best between Ponce and Penuelas and extending almost to Mayagüez²; the most xerophytic of the three Puerto Rican species of Zamia.

14 Zamia furfuracea Ait.

Aiton, W. T., Hort. Kew, 1st ed., 3:477 (1789); Sims, J., Bot. Mag. 45: t. 1969 (1818).

Stem tuberous, subterranean, cylindric, up to 75 cm. long and 20 cm. in diameter. Leaves up to 40 in a branching plant, 1.5-2 m. or more in length, furfuraceous below with reddish brown hairs. Petiole 70-100 cm. long, rounded below, flattened above and in upper half with edges elevated, spiny, very rarely smooth. Rachis 75-125 cm. long in large plants, rounded below, flat above and with edges raised in lower half, considerably elevated between the two rows of leaflets in upper half, nearly free from spines except in lower part. Leaflets 10-15 on each side, opposite or alternate, very thick and rigid, obovate-oblong, upper margin rather convex, lower rather straight, obtuse or irregular at the apex, ^{rarely acute,} _{unequally} attenuate at the base, the upper third with numerous small blunt teeth, as many as 30 teeth on the upper margin and a few less on the lower; largest leaflets 16-18 cm. long, 4-6 cm. wide, the upper and lower ones smaller; veins 60-90.

Male cones cylindric, light brown, densely tomentose, 7-10 cm. 1.8-2.2 cm. in diameter. Microsporophylls in 10-12 vertical rows / of each; 18-20 ~~each~~ the top flat, 5-7 mm. wide, 2-3 mm. high. Microsporangia in two groups of 15-19 each, single or in sori of 2.

Female cones cylindric, gray, rufous tomentose, the sterile tip about 2 cm. long, 16-23 cm. long, 5 cm. in diameter; peduncle 30-37 cm. long, densely tomentose. Megasporophylls in 10-12 vertical rows / of each; 14 or 15 ~~each~~ the top 1.5 cm. wide, 1 cm. high, the upper edge projecting and both upper and lower edges slanting inward to a narrow and usually crescentic depression.

Geographic distribution: Mexico, near Veracruz; Colombia, ^{Honduras, along Atlantic coast;} Medellín and vicinity. Introduced into cultivation in England as early as 1691

15. Zamia sylvatica Chamberlain

Chamberlain, C. J., Bot. Gaz. 81:223 (1926).

Stem subterranean, 30 cm. long, 13 cm. in diameter. Leaves 2-4 in a crown, about 1 m. long, whitish puberulent below. Petiole 30 cm. long, spiny, especially below; rachis 60-72 cm. long, with a few spines on the lower third. Leaflets 20-25 on each side, long lanceolate, somewhat convex on the upper margin and concave on the lower, tapering to a sharp tip and to a cuneate base 4 mm. wide, with 15-20 serrations on each margin mostly above the middle of the leaflet; the largest 12-29 cm. long, 1.5-2.5 cm. wide, the upper and lower leaflets almost as large as the rest; veins 25-38. Male cones not available. Female cones cylindric, obtusely tipped, light gray, pubescent, 10-14 cm. long, 4-5 cm. in diameter, the peduncle about as long as the cone. Megasporophylls in 8-12 vertical rows of 10-14 each, the top 1.4-1.7 cm. wide and 7-9 mm. high, a transverse ridge sometimes extending nearly across. Seeds not available.

Geographic distribution: About 8 kilometers south of the Papaloapan River at Tuxtepec, Mexico, State of Oaxaca. Dioon spinulosum occurs in great abundance a few kilometers beyond.

The above description differs in several particulars from my earlier description, although both were made from the type plant, the only one yet known. In the former description the petiole is smooth, there are more and larger leaflets, more veins, and the top of the megasporophylls is quadrangular and the transverse ridge quite marked. In its native habitat, a swampy place in a dense tropical rain-forest, the temperature reaches 50 degrees Centigrade in March and 55 degrees in the summer. The plant has been growing under the usual greenhouse conditions for more than 30 years.

16. Zamia mexicana Miq.

Z. loddigesii Miq. (?)

Miquel, F. A. W., Tijdsch. Nat. Gesch. 10:73 (1843) Prod.

Syst. Cycad. 12, 13, 24, 25 (1861).

Stem tuberous, subterranean, cylindric, 20-50 cm. long, 8-10 cm. in diameter in unbranched plants, greater in branched plants. Leaves 7-10 on each branch, up to 1 m. long, dark green, glabrous. Petiole 30-40 cm. long, broad at the base, rounded below, slightly depressed above near the base, higher up with two shallow grooves and a rounded elevation between them, spiny below, less spiny ~~above~~ higher up. Rachis 35-55 cm. long, rounded below, with two grooves above and an elevation between the two rows of leaflets, with a few spines in the lower half. Leaflets 14-24 on each side, mostly opposite or subopposite, at least in the upper half of leaf, lanceolate, ~~linear-lanceolate~~, straight or nearly so, acuminate, narrowed at base to 4 mm., with 10-15 teeth on each margin, generally with a few more teeth on the lower margin than on the upper and nearly all on the upper third of leaflet, slightly revolute; largest leaflets ~~25-27~~ ³⁰⁻³⁸ cm. long, ~~2-2.5~~ 2 cm. wide, and with ~~3-5~~ veins; the upper and lower leaflets shorter than the rest.

Male cones cylindric, grayish tomentose, 7-10 cm. long, 2-2.3 cm. in diameter; peduncle 5-7 cm. long, tomentose. Microsporophylls in 12 or 13 vertical rows of 18-20 each; the top 5-7 mm. wide and 3 mm. high, with a central transverse depression. Microsporangia in two groups of 15-20 each, nearly all in sori of 2. Female cones cylindric, the sterile tip about 5 mm. high, grayish tomentose, 5-6 cm. long; peduncle usually somewhat longer than the cone. Top of *megastrobilus* 8 mm. or more wide, transversely concave. Seeds red.

Geographic distribution: Introduced into cultivation from "near Veracruz, Mexico." The plant upon which most of the foregoing description is based is a male specimen in the Garfield Park Conservatory, Chicago. It is a vigorous plant and bears cones nearly every year. It has been under observation by the author for more than twenty years.

Miquel's descriptions of Zamia mexicana and Z. loddigesii are very inadequate and do not permit these species to be distinguished from each other or from certain others occurring in the same region. Z. loddigesii is described as having spiny petioles, leaflets 5-22 on each side, narrowly linear-lanceolate, straight or nearly so, acuminate, spinulose-serrulate in the upper fourth (rarely in the upper half or three-fourths), about 20 cm. long and 8-12 mm. wide. Paul C. Standley, in Contr. U. S. Nat. Herb. 23^v:49-50 (1920), regards Z. mexicana and Z. loddigesii as the same, and states that the leaflets are 15-30 mm. wide and have 18-30 or more veins. He gives the distribution as "southern Mexico and Guatemala."

The author and the editor have examined all the specimens, labeled Z. loddigesii, which are in the herbarium of the Chicago Natural History Museum. Practically all are sterile and consist of a single leaf or only part of a leaf. These represent collections from Mexico (Yucatan), British Honduras, Guatemala, and Honduras. Their range of variation is much too great for all to be included in the same species. Until more knowledge, based on careful field studies, is forthcoming, it would be futile to attempt to define Z. loddigesii or several other inadequately described species from the same region.

17. Zamia spartea A. DC.

De Candolle, A., Prodr. 16²:539 (1868).

Stem tuberous, subterranean, 12-30 cm. long, 6-8 cm. in diameter. Leaves 3-10 in a crown, 30-100 cm. long, glabrous. Petiole 20-50 cm. long, terete or sometimes slightly flattened above, spiny especially below; rachis 15-50 cm. long, rounded below, elevated between the two rows of leaflets, with a few spines on the upper side. Leaflets 7-20 on each side, opposite or rarely alternate, ^{acuminate,} narrowly lanceolate, [^] closely serrulate in upper third and with not more than 2 or 3 teeth on each margin below the middle, revolute; leaf with a small number of large leaflets or a large number of smaller ones, the largest 14-22 cm. long and 2-2.5 cm. wide, the top and bottom leaflets smaller than the rest; veins 30-40.

Male cones solitary or 2 or 3 together, cylindric, light gray, densely tomentose with short reddish yellow hairs, 6-9 cm. long, 1.5-2.3 cm. in diameter; peduncle 5-10 cm. long, tomentose, often with a few scales. Microsporophylls in 9-11 vertical rows ^{of} 12-15 ^{each;} ~~in rows~~ top 6-8 mm. wide, 3-5 mm. high, with a narrow transverse depression in the middle. Microsporangia in two groups of 10-20 each, mostly in sori of 2. Female cones usually solitary, ellipsoid, the sterile tip short and blunt or lacking, yellowish gray, densely tomentose with short hairs, 4-6 cm. long, 4-5 cm. in diameter; peduncle 4-6 cm. long, tomentose. Megasporophylls in 6-8 rows ^{of} 5 ^{each;} or 6 ~~in rows~~ top convex above and concave below, 8-15 mm. wide, 8-10 mm. high, with a transverse depression in the middle. Seeds orange-red.

Geographic distribution: Abundant at Zacuapan and Huatusco, about 100 kilometers west of Veracruz, Mexico; also farther south near Acayucan, Verapa, and Chimalapa, and at Verapaz, Guatemala.

18. Zamia gutierrezii Sauv.

Z. lucayana Britt.

- Sauvalle, F. A., Anal. Acad. Cienc. Mat. Habana 5:54 (1868);
→ Britton, N. L., Bull. New York Bot. Gard. 5:311 (1909); Britton,
N. L., and Millspaugh, C. F., Bahama Flora, p. 463 (1920).

Stem tuberous and subterranean, 20-30 cm. long, 6-10 cm. in diameter, ^{often branched.} Leaves 4-6 in a crown, about 1 m. long, glabrous.

Petiole 40-60 cm. long, subterete, spiny; rachis 30-60 cm. long, rounded below, elevated above between the two rows of leaflets, with a few spines in lower part. Leaflets 8-16 on each side, opposite in upper half, subopposite or alternate below, lanceolate, abruptly acuminate, tapering at base to 3 mm., characteristically serrate, the teeth sharp and close together toward the apex, far apart toward the base, often with a toothed shoulder about 3.5 cm. from the tip; largest leaflets 20-25 cm. long and 3-3.5 cm. wide, the upper and lower ones about as large as the rest; veins 25-40.

Male cones cylindric, greenish, 5-6 cm. long, 1.4 cm. in diameter. Top of microsporophylls 5 mm. wide and 2 mm. high. Female cones cylindric, bluntly tipped, greenish, smooth, 8-10 cm. long, 3-4 cm. in diameter; peduncle 18 cm. long, smooth. Megasporophylls in 6 vertical rows, 7 in a row, the top 18 mm. wide and 7 mm. high. ^{rugose,}

Geographic distribution: Oriente, Cuba, near Bar^acoá; also in Pinar del Río, near Viñales; reported from Jamaica and the Bahamas. This species does not occur in Puerto Rico.

19. Zamia ulei Damm.

Dammer, U., Verh. Bot. Ver. Prov. Brandenburg 48:116 (1906);
Ducke, A., Arch. Jard. Bot. Rio de Janeiro 1:9 (1915) and 3:19-20
(1922), Arch. Inst. Biol. Veget. Rio de Janeiro 2:27 (1935).

Stem tuberous. Leaves few in a crown, up to 1.5 m. long.
Petiole 1 m. or more in length, terete, armed with numerous
spines 1-4 mm. long; rachis 30-45 cm. long. Leaflets up to 18
on each side, subopposite or alternate, linear-lanceolate or
ovate-lanceolate, subfalcate, acute or acuminate, narrowed at
the base to 5 mm., with 12-15 teeth near the apical end, up to
50 cm. long and 7 cm. wide, often much narrower, veins up to 60.
Male cones several, up to 10 cm. long, 1.5 cm. in diameter;
peduncle 6-8 cm. long, with reddish brown hairs. Microsporo-
phylls in 12-16 vertical rows, strongly elevated at the top, the
dorsal face very small. Female cones single, cylindric, the
sterile tip conical and 1.2 cm. high, 20 cm. long, 6 cm. in diam-
eter; peduncle 3 cm. long. Megasporophylls in 9-15 vertical rows
of 13 or 14 each; the top transversely concave, 22 mm. wide and
12 mm. high. Seeds ovoid-oblong, nearly triangular, red, 15 mm.
long, 8 mm. in diameter.

Geographic distribution: Brazil—in western and central
Amazonas near Cachoeira on upper Jurua River, Boca de Moa near
Leticia and Jurimaguas, Tarapoto near St. Antonio with Z. lindenii
Regel, Huallaga near Shapaga.

Ducke (1915, 1922) describes two new Brazilian species from
the State of Pará—Z. lecointei, occurring among rocks in the falls
of the "Cachoeira do Inferno," of the Erepecurú River, a tributary
of the Trombetas; and Z. obidensis, growing in open woods on hills
near the Branco River, northeast of Obidos. Later (1935) he makes

Z. lecointei a subspecies of Z. ulei, pointing out that it differs only in having very narrow leaflets (1-1.5 cm. wide). At the same time, Ducke regards Z. obidensis, previously described from a young plant, as identical with subspecies lecointei, when individuals of the same age are compared.

20. Zamia poeppigiana Mart. and Eichl.

Martius, K. P. F. von, and Eichler, A. W., in Martius' Flora Bras. 4¹/_v:414 (1863).

Stem creeping, usually on fallen trees. Leaves rich green and glabrous. Petiole acutely triangular, unarmed, glabrous. Leaflets 12-14 on each side, subopposite, lanceolate, broadly falcate, acute, narrowed at base to ^{8-10 mm.} , serrate, especially in upper part and along lower margin, 15-35 cm. long, 2-4 cm. wide, veins 30-40. Male cones solitary, long cylindric, about 25 cm. long and 4 cm. in diameter; peduncle 6 cm. long, puberulous. Microsporophylls in 14 vertical rows of ^{than} 50 each, the top truncate conical. Seeds red.

Geographic distribution: Eastern Peru, on decaying tree stumps; southwestern Colombia—near Buenavista, Barbacoas, on rich humus in shady woods.

21. Zamia tuerckheimii Donn. Sm.

Smith, John Donnell, Bot. Gaz. 35:8 (1903).

Stem pendent at first, becoming erect, 1.5-3 m. long and 20 cm. in diameter, sometimes forked. Leaves about 1.7 m. long, dark green and glabrous above, paler beneath. Petiole and base of rachis sparsely and minutely spiny or unarmed; rachis triangular in transverse section, nearly 1 m. long. Leaflets about 14 on each side, subopposite, broadly oblanceolate, abruptly and shortly acuminate, narrowed at the base to 3-5 mm., entire 18-24 cm. long, 4-6 cm. wide, with about 40 veins. Male cones narrow cylindric, apiculate, pale brown, about 14 cm. long and 2.5 cm. in diameter, the peduncle half as long as the cone. Microsporophylls in about 24 vertical rows of about 36 each, the top about 4 mm. wide and 3.5 mm. high, with a truncate-pyramidal elevation square in outline. Microsporangia in two groups of 9-12 each separated by a narrow median line. Female cones cylindric, cuspidate-acuminate with a sterile tip about 3 cm. high, about 18 cm. long and 6 cm. in diameter, the peduncle about 2 cm. long. Megasporophylls in about 9 vertical rows of about 9 each, gray tomentose, about 3 cm. wide and 1.4 cm. high, with a narrow transverse groove. Seeds obovoid, scarlet, 2 cm. long, 13 mm. wide.

Geographic distribution: Alta Verapaz, Guatemala; also in British Honduras.

22. Zamia obliqua A. Braun

Braun, A., Monats. Akad. Wiss. Berlin, p. 376 (1875);

Hooker, J. D., Bot. Mag. ^{123:} t. 7542 (1897).

Stem cylindric, erect, slender, up to 2.5 m. high, 30-60 cm. in diameter. Leaves 60-90 cm. long, ^{shiny green.} Petiole long, unarmed, or with a few scattered spines, [^] tomentose at first, becoming glabrous; rachis unarmed. Leaflets about 6 on each side; ovate, ovate-oblong, or ovate-lanceolate; with a petiolule up to 12 mm. long, usually caudate-acuminate, [^] ~~usually~~ sharply subspinulose toothed from middle to apex, 10-18 cm. long, 2-7 cm. wide; veins 20-50.

Male cones not available. Female cones cylindric, the sterile tip conical and acute, pale brown, tomentose, about 15 cm. long, 6.5 cm. in diameter; peduncle up to 3 cm. long. Megasporophylls in 6 vertical rows of about 10 each, the top about 3 cm. wide and 1 cm. high, truncate or slightly concave.

Geographic distribution: Colombia—Cape Corrientes. Related to Z. furfuracea ^{Ait.} and Z. skinneri Warsz.

This is a form that is never used in taxonomic papers, and should be changed. The references should be associated with the binomials, for there are three different names and each has one reference. My suggestion in this and similar cases (if there are others) is as follows:

23. Zamia chigua Seem.

Zamia chigua Seem. Bot. Voy. Herald, pp. 201, 253 (1854).

Zamia lindleyi Warez. in Otto and Dietrich Allg. Gartenz. 19: 146. (1851)

Zamia lindleyana Warez. in Wendl. Ind. Palm., p. 35. (1854).

If this work be published with the citations confused as between the accepted names and the synonyms it will raise a storm of protest. I suspect the strange form accepted (which is utterly foreign to this

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type of botanical literature, was due to the fact that neither the author nor the editor was familiar with taxonomic usage. I feel very ~~xxxxxx~~ strongly indeed regarding this matter, for it is illogical, untrue, and utterly misleading. In this and ~~and~~ ~~xxx~~ all of the similar cases proper adjustment must be made and every taxonomist will agree with me. I suggest that you consult with Paul C. Standley at the Chicago Museum of Natural History, who could supervise the necessary changes in the manuscript or would know of someone, like Dr. Sherff, who could do so. Unless this be done I, for one, would strongly recommend that publication be deferred. This type of citation simply does not occur in taxonomic literature, and should not be fostered for it is an utterly absurd innovation.

E.D.M

- 23. Zamia chigua Seem.
- Z. lindleyi Warsz.
- Z. lindleyana Warsz.

Seemann, B., Bot. Voy. Herald, pp. 201, 253 (1854); Warszewicz, M. von, in Otto and Dietrich Allg. Gartenz. 19:146 (1851); and in Wendland's Ind. Palm., p. 53 (1854).

Stem cylindric, ~~20 cm.~~ ^{or more in height,} 13 cm. in diameter. Leaves about 10 in a crown, 80-120 cm. long, vivid green. Petiole about 20 cm. long, terete, very spiny; rachis terete but with two grooves along the upper side, spines numerous near base, fewer near apex, tomentose at first, becoming glabrous. Leaflets up to 69 on each side, alternate, ovate-lanceolate, falcate, acuminate, contracted at base, the margins bearing a few teeth so small as to be almost imperceptible; ^{10-20 cm. long, 10-15 mm. wide;} veins about 16. Male cones subcylindric, brown, tomentose, 9-13 cm. long, 2.5 cm. in diameter; peduncle 4-6 cm. long. Microsporophylls in 18-21 vertical rows of 27-32 each. Female cones not available.

Geographic distribution: Panama—islands at mouth of San Juan River, in Darien; also in western Veraguas, Colombia.

And Guadalupe: Colombia. Panama?

24. Zamia muricata Willd.

Willdenow, K. L., Spec. Plant. 4:847 (1805); Karsten, ^H ~~A.~~,
Abhandl. Akad. Wiss. Berlin 193-219 (1856).

Stem cylindrical or ovoid, low, rarely up to 15 cm. high and 12 cm. in diameter, sometimes once or twice forked at top. Leaves up to 6 in a crown, up to 2 m. long, glabrous. Petiole more than one-half as long as the rachis, nearly quadrangular, with a shallow groove along the upper surface and with small spines on the lower side, glabrous. Leaflets 6-11 on each side, alternate or subopposite, lanceolate or unequally oblong-lanceolate, acuminate, narrowed at the base, serrate in the upper half, 15-20 cm. long, 2-4 cm. wide, veins up to 50. Male cones usually 2-5 together, cylindrical, 6-10 cm. long, about 1.5 cm. in diameter; peduncle 20-30 cm. long, *tomentose*. Microsporophylls in 8-13 vertical rows; microsporangia in two groups of 10-12 each. Female cones single, cylindrical, brown, tomentose, with a sterile tip about 3 cm. high, 10-15 cm. long, 2.5-4 cm. in diameter; peduncle 6-8 cm. long, ^{tomentose.} Megasporophylls in 5-8 vertical rows; the top about 15 mm. wide and 6 mm. high, slightly depressed in the middle. Seeds ovoid, red, 3 cm. long, 2 cm. wide.

Geographic distribution: Colombia, between Santa Barbara and Puerto Cabello; Venezuela, Caracas; Mexico, Oaxaca; possibly also in Guatemala.

25. Zamia monticola Chamberlain

Chamberlain, C. J., Bot. Gaz. 81:219 (1926).

Stem an aerial, armored, branched trunk reaching a height of 80 cm. or more, 15 cm. in diameter. Leaves 20-30 in a crown, 1.3-1.7 m. long, glabrous. Petiole 50-60 cm. long, rounded below, somewhat flattened above and near the rachis depressed with ridges at the sides, very spiny near base, less spiny higher up. Rachis up to 1 m. long, rounded below near the petiole and on the upper side depressed in the center with ridges at the sides, nearer the apex becoming flattened and finally considerably elevated between the two rows of leaflets; somewhat spiny in lower half, smooth in upper half. Leaflets 14-20 on each side, mostly alternate, lanceolate, arcuate, the lower border concave and the upper convex, acuminate, narrowed at the base to 7 mm., revolute, some leaflets nearly entire but mostly with 4-10 blunt teeth on the lower margin and 2-6 on the upper; 20-25 cm. long, 3-3.5 cm. wide, the lower two or three leaflets smaller; veins 20-30.

Male cones 3-6, cylindric, tapering to a blunt top, 12-16 cm. long, occasionally up to 22 cm., 4 cm. in diameter; peduncle 10-17 cm. long. Microsporophylls in 16-18 vertical rows ^{of} 25-40 ^{each;} ~~rows~~ top 7 mm. wide, 5 mm. high, with distinct lines from the angles to an elevated central part. Microsporangia in two widely separated groups of 10-16 each, mostly in sori of 2. Female cones not available.

Geographic distribution: On mountain side near Jalapa, Mexico, opposite the extinct crater of Naolinco, associated with Ceratozamia mexicana. To date, only one specimen has been reported. It was raised from a seed picked up in 1906 in the locality mentioned. It has coned repeatedly and is now the largest plant in the University of Chicago collection of seventeen species of Zamia.

26. Zamia lindenii Regel

Regel, E. von, ex André, E., Illus. Hort. 22:23 (1875),
Gartenfl. 25:141 (1876).

Stem cylindric, 1-2 m. in height, with prominent leaf scars. Leaves 10-15 in a crown, 1.5-2.5 m. long, glabrous or somewhat puberulous. Petiole up to 2 m. long, terete, spiny, sparsely tomentose at first, becoming glabrous; rachis terete, spiny except in upper one-third. Leaflets 40 or more on each side, opposite or subopposite, long lanceolate, subfalcate, acuminate, narrowed at base to about 5 mm., sessile, dentate-serrate in upper one-third, 20-30 cm. long, 2-4 cm. wide; veins 22-30 or more, distinct above. Male cones cylindric, yellow-brown, tomentose; top of microsporophylls 4 mm. wide and 5 mm. high. Female cones reddish, tomentose, about 35 cm. long and 8 cm. in diameter; peduncle 8 cm. long. Top of megasporophylls truncate-pyramidal, flat, 12 mm. wide. Seeds obovate, orange-red, 2.5-5 cm. long, 1.5-2 cm. in diameter.

Geographic distribution: Ecuador—coastal plain, foothills of Cordillera Occidental, El Entable near Naranjal, between Puente de Chimbo and Bambacagua, Pallatanga; Brazil—Amazonas, near St. Antonio.

27. Zamia pseudoparasitica Yates

Z. roezlii Regel

Yates, J., in Seemann's Bot. Voy. Herald 202, 253 (1854);
Regel, E. von, in Linden's Cat. no 90:10 (1873), Gartenfl. 25:
141 (1876); André, E., Illus. Hort. 20:126 (1873).

Stem cylindric, robust, 1-3 m. high. Leaves up to 2 m.
long, suberect, glabrous. Petiole 50 cm. long, terete, unarmed
on young plants, later with scattered or crowded spines; rachis
semiterete, rarely with scattered spines. Leaflets 25 or more
on each side, opposite or alternate, lanceolate, sinuate-falcate,
long acuminate, cuspidate, tapering at the base, entire, 35-50
cm. long, 3-4 cm. wide, with about 18 prominent veins. Male
cones cylindric, light yellow-brown, pubescent, 18 cm. long,
3 cm. in diameter; peduncle about 10 cm. long, tomentose.
Microsporophylls in about 35 vertical rows of 40-50 each; the
top 4 mm. wide, 4 mm. high, with a truncate-conical raised
center. Female cones cylindric, obtuse, 40 cm. long, 12 cm.
in diameter. Seeds bright scarlet.

Geographic distribution: Chagres, Panama; Buenaventura,
Colombia; Ecuador; also on eastern side of Andes in Peru.
Growing epiphytically on tree trunks.

28. Zamia skinneri Warsz.

Warszewicz, M. von, in Otto and Dietrich Allg. Gartenz. 19: 146 (1851); Seemann, B., Bot. Voy. Herald 202, 252 (1854); Hooker, J. D., Bot. Mag. 87: t. 5242 (1861).

Stem ~~subterranean~~ ^{below} but often growing 60 cm. or more above the ground, usually 30-40 cm. long, 6-9 cm. in diameter, smooth but strongly marked transversely with leaf scars. Leaves 6-10 in a crown but often up to 15-17, up to 1.5-1.8 m. long, bright green and glabrous. Petiole 50-85 cm. long, subterete, grooved above, with many coarse spines; rachis less spiny than the petiole, sometimes nearly smooth in upper half. Leaflets 6-12 on each side, sometimes up to 16, opposite or subopposite, rather thin, broadly lanceolate, tapering to a slender sharp apex, narrowed at the base to 5-7 mm., sharply and distantly serrulate with 10-12 teeth on each border and not more than 1 or 2 of them below the middle of the leaflet; 20-35 cm. long, 5-10 cm. wide, veins 20-35, extremely prominent. ✓

✓ Probably no cycad has more conspicuous veins.

Male cones usually 3-5, cylindric, slightly tapering toward apex and base, light yellow-brown, tomentose, 5-9 cm. long, 1.5-2 cm. in diameter; peduncle 5-8 cm. long, somewhat angular, tomentose. Microsporophylls in 11-15 vertical rows ^{of} 22-30 ^{each} ~~in~~ the top 4 mm. wide, 2 mm. high, with a truncate-conical raised center. Microsporangia in two groups of 6-8 each, usually in sori of 2. Female cones single, cylindric, with a rounded sterile tip 1.5 cm. high, orange-brown, 15-20 cm. long, 5-7 cm. in diameter; peduncle 10-13 cm. long, tomentose. Megasporophylls in 9-11 vertical rows ^{of} 8-11 ^{each} ~~in~~ the top 2-2.5 cm. wide, 1.5-1.7 cm.

with a slight median depression and rather definite lines leading to it from the six angles. Seeds reddish with some orange, 2.5-2.8 cm. long, 1.2-1.4 cm. in diameter; stony coat 2.2-2.5 cm. long, 1-1.2 cm. in diameter, very smooth, with 4 or 5 bundles recognizable only at the chalaza.

Geographic distribution: Panama—Isthmus of Darien, ~~Proventery~~ ~~Corrientes~~, Providence Island, Boca del Toro, Santa Rita Trail.

e.c. / Costa Rica—~~Wet~~ forests of the Atlantic Coast, ascending to 900 m. at Pejivalle and to 700 m. in the mountains of Guanacaste; along the Reventazón River at Las Ánimas, near Turrialba.

See Lieberman's original figs
plates, where available!

Best picture is typical record.
see Lieberman's collection in
Chicago Natural History
Museum!

figs. see Lieberman's
earlier books!

29. Zamia wallisii A. Braun

Braun, A., Monats. Akad. Wiss. Berlin, p. 376 (1875); Hooker, J. D., Bot. Mag. 116: t. 7103 (1890). ●

Stem about 15 cm. high, cylindric, partly subterranean.

Leaves few, appearing singly, light green and glabrous. Petiole 60-90 cm. long, terete, spiny, sparsely pubescent, becoming glabrous. Leaflets 2-8 on each side, elliptic to oblanceolate, acute, cordate or acute at base, with a petiolule up to 7 cm. long, margins toothed in upper third; 30-50 cm. long, 10-25 cm. wide; veins up to 70. Male cones clustered, cylindric, 5-6 cm. long, tomentose; peduncle short. Microsporophylls with a concave top. Female cones not available.

Geographic distribution: Colombia. Related to Z. skinneri Warsz.