3. BOWENIA Hook. f.

Hooker, J. D., Bot. Mag. 89: t. 5398 (1863) and 98: t. 6008 (1872); De Candolle, A., Prodr. 16^{2}:534 (1868); Schuster, J., Pflanzenreich 4^{1}:85-86 (1932).

Stem tuberous and subterranean, globose or subcylindric, branched, up to 1 m. long, without an armor of persistent leaf bases. Leaves relatively few, 1-2 m. long, bipinnate or occasionally tripinnate; petiole unarmed. Leaflets lanceolate or subovate, entire or toothed, with "parallel" (dichotomous) venation. Vernation of the main rachis and rachis of the primary pinnae circinate, vernation of leaflets straight.

Male cones single on branches of the main stem, ovoid-cylindric, short stalked. Microsporophylls peltate, obovate-cuneate, truncate, subsessile, the lower surface covered with microsporangia from base to middle. Female cones single on branches of the main stem, broadly ovoid, very short stalked. Megasporophylls peltate, the top thickened, truncate, hexagonal. In both cones the sporophylls seem to be arranged in vertical rows. Seeds red.

Two species, confined to northeastern Queensland, Australia. Named for Sir George T. Bowen, the first governor of Queensland. Type species: B. spectabilis Hook. f. This is the only genus of Cycadaceae in which the leaves are more than once pinnate.

Key to the Species

I. Leaves few; primary pinnae 3-5, starting together at top of petiole; with 1 or 2 pairs higher up; leaflets entire; diameter of stem much less than its length . . 1. B. spectabilis

II. Leaflets more numerous; primary pinnae more or less paired along main rachis; leaflets serrate or serrulate; diameter of stem as great or greater than its length . . . . . 2. B. serrulata

1. Bowenia spectabilis Hook. f.

Hooker, J. D., Bot. Mag. 89: t. 5398 (1863) and 98: t. 6008 (1872); Mueller, F. von, Fragm. Phytog. Austral. 5:171, 215 (1866), Gartenfl. 27:314 (1878), 37:246 (1888); Bentham, G., Flora Austral. 6:254 (1873); Bailey, F. M., Queensl. Flora 5:1507 (1902); Schuster, J., Pflanzenreich 4[1]:85-86 (1932).

Stem much longer than broad, the length exclusive of the root and up to the top of the cone often reaching 40 cm.; surface of the stem usually warty. Branches from the top of the stem usually only 1-3. Leaves 1-4 on each branch of the stem; foliage display scanty as compared with that of B. serrulata. In open places leaves about 1 m. long, but in the shade along streams often reaching 2 m. Entire leaf dark green and glabrous. Petiole long and smooth, with a spreading base, when old breaking off cleanly by an abscission layer. Rachis bipinnate, nearly terete, usually with 3-5 primary pinnae starting in a cluster at the top of the petiole, with one or two distant ones on each side higher up, each primary pinna 30 cm. or more in length, with 9-12 more or less paired leaflets. Leaflets ovate or ovate-lanceolate, acute, obliquely cuneate at the base, short-petioled; margin entire with no serration except occasionally in seedlings and very young plants; 5-10 cm. long, 1.6-4 cm. wide; veins 15-20.

Male cones [redacted] oblong-cylindric, 4-5 cm. long, 2-2.5 cm. in diameter, short stalked or subsessile, with 6-8 vertical rows of microsporophylls, 8-9 in a row. Peltate top of microsporophyll transversely hexagonal, tomentose. Female cones ovoid, up to 15 cm. long and 10 cm. in diameter, with 8-9 vertical rows of megasporophylls, 6 in a row. Megasporophylls hexagonal at the top, rugose, with a sharp transverse ridge, the largest 4.5 cm. wide and 3 cm. high; peduncle 1-3 cm. or less in length. Seeds

broadly ellipsoid, about 2.5 cm. long and 2 cm. in diameter, occasionally with a short pseudo-stalk like that of Dioon, adhering in pairs to the sporophylls and the sporophylls to the rachis; fleshy coat 0.5 mm. thick. Stony coat ~~very thin,~~ about 0.3 mm. thick, very smooth; bundles 5-8, most commonly 6, hardly recognizable except in the upper part.

Geographic distribution: Originally discovered along the Endeavor River; Rockingham Bay, associated with Macrozamia denisonii; bushy hills near McKay River; summit of Mt. McAllister. Abundant at Babinda, south of Cairns; not reported as far south as Byfield.

2. Bowenia serrulata (André) Chamberlain

André, E., Illus. Hort. 26:184 (1879); Chamberlain, C. J., Bot. Gaz. 54:419-423 (1912); Lawson, A. A., Trans. Roy. Soc. Edinburgh 54:357-394 (1926).

Stem broader than long, up to 30 cm. in width, smooth, with 1-10 or more branches which in older plants may branch again. Leaves one or more on each branch, averaging 1.3 m. in length with many up to 2 m., dark green and glossy. Petiole up to 70-90 cm. long, definitely continued as a rachis giving off 3-5 pairs of primary pinnae, each bearing 6-16 leaflets. Leaflets sharply acuminate, obliquely cuneate at the base, short-petioled, margins sharply serrate except at the base; veins 20-30, with long slender fibers resembling veins between them.

Male cones oblong-cylindric, 6-7 cm. long, 3-5 cm. in diameter, with a fleshy peduncle 2-4 cm. long, with 8-13 vertical rows of microsporophylls, 8-10 in a row. Top of microsporophyll about 1.2 cm. broad and 5 mm. high, covered with globular glandular hairs. Microsporangia about 70-100, mostly single, covering more than one-half of the lower surface and without a sterile line dividing them into two groups. Female cones broadly ovoid, 7-10 cm. long. Seeds ellipsoid, 3.2 cm. long, 2.4 cm. wide; fleshy coat 2 mm. thick at base, elsewhere 1 mm. Stony coat about 0.5 mm. thick, very smooth; bundles 6-8, most commonly 7, hardly recognizable except near the micropyle.

Geographic distribution: Abundant at Byfield and Maryvale, Queensland, about 30 kilometers from Yeppoon.

Since I strongly object to founding new species upon trivial characters and have little respect for sub-species, varieties, and forms, it may be worth while to repeat and add somewhat to the

differences which entitle the Bowenia, so abundant around Byfield, to be regarded as a distinct species.

The two species differ decidedly in general appearance. B. serrulata has such abundant foliage that it is a conspicuous part of the underbrush in the prevailing Eucalyptus forest, while B. spectabilis, even where fairly abundant, is hardly noticable. In B. serrulata the petiole is more definitely continued as a rachis, giving off 3-5 pairs of pinnae; in B. spectabilis there are often 3-5 primary pinnae clustered at the top of the petiole, with 1 or 2 distant ones on each side higher up. While both conditions may be found in both species, the distinction is a valid one.

The entire or serrate character of a leaf margin is worthless as a diagnostic character in some plants, but very reliable in others. In Stangeria a leaflet may be so deeply incised as to be almost pinnate, with a strong vein running into the lobe and giving off side veins; while on the same plant other leaflets may be nearly entire. I have wandered through the Babinda region examining hundreds of plants of B. spectabilis without finding any spinulose leaflets except on seedlings. Around Byfield, among thousands of plants of B. serrulata, I did not see any with entire leaflets.

The stem is very characteristic. In B. spectabilis the stem is elongated fusiform, much longer than broad, and with sometimes up to five branches at the top; in B. serrulata it is spherical or turnip-shaped, usually broader than long, with 1-10 or more branches bearing the leaves and cones.

When I visited Babinda, the pollen had been shed and the ovulate cones were too small for diagnosis. When I visited Byfield, the pollen was nearly ready for shedding, a good stage for taxonomic

description, but the ovulate cones were hardly breaking through the bud scales. Consequently a first-hand comparative description of the cones is not possible.

The seeds of B. serrulata are larger, 3.2 cm. long and 2.4 cm. wide, while those of B. spectabilis are 2.5 cm. long and 2 cm. wide. In B. serrulata the average number of bundles is 7 and in B. spectabilis it is 6. The fleshy coat is thin in both species, but is twice as thick in B. serrulata as in B. spectabilis. The stony coat, while very thin in both, is slightly thicker in B. serrulata.

The fact that the two species are separated geographically is an additional reason for regarding them as distinct.

The two species are doubtless related, and, if one is the ancestor of the other, B. serrulata is probably the older. The several cycads the young plants have spinulose leaflets and the older plants entire leaflets. While the theory of recapitulation should not be pushed too far, in Bowenia it would make B. serrulata the ancestor and B. spectabilis the descendant.