

'Eungella': 'The leaves of similar light green colouration on both surfaces, the broad central area of fused segments in the lamina'; 'Paluma': 'The leaf has a circular profile with a distinct sector at the base of the circle lacking segments; the lowest segments near the petiole are compound; the flowers are distinct with blunt petals which are held flat'. I have not as yet seen any convincing evidence that these populations differ in any significant respect from *L. australis*, but better flowering and fruiting collections may show characters by which they can be separated. The foliage features noted by Jones may be associated with highly mesic or shady environments.

5. Orscheg and Parsons (1996a & b), in an account of this species at its southern limit, present one of the most comprehensive ecological and phenological studies hitherto published of an Australian palm species. They point out, *inter alia*, the large disjunction of about 180 km between the only known Victorian stand (Cabbage Tree Creek near Orbost) and the next most southern stand a little north of Bega, N.S.W. and its very sparse occurrence from there north to Batemans Bay. A noteworthy observation was that fruiting trees flower at intervals of at least 2 years, with fruit ripening in the intervening year. The Victorian stand occurs in riparian forest dominated by *Eucalyptus botryoides*, a vicariant of the *E. saligna* and *E. grandis* that often accompany this palm further north.

6. Burret (1941) tentatively identified a palm collected by him in 1937 in the botanical garden at Rio de Janeiro as a hybrid between *L. australis* and *L. chinensis* var. *subglobosa*, but the evidence he presents for this conclusion is rather slender.

7. See '7. Evidence of dioecy (or androdioecy)' in the section 'Morphology and Terminology' (p. 70), for observations of sexual behaviour in this species.

6. *L. nitida* A.N. Rodd, sp. nov.

Palma magna *L. australis* affinis sed folia petiolis latoribus, partibus apicalibus vaginarum longioribus truncatioribusque, hastulis planioribus ad laminam appressioribusque; fructus magnitudines similes sed atro-nitidissimi, fibris mesocarpii densioribus crassioribusque, pagina interiore endocarpii ordinatione reticulata.

Type: Queensland: Junction of Dawson River and Delusion Creek, NW of Cracow, 25° 11'S, 150°11'E, A.N. Rodd 3055 & S. Jacobs, 9 May 1976; holo NSW; iso BRI, K, BH.

[*Livistona* sp. 'Carnarvon' (Jones 1984)]

Trunk solitary, to 25 or possibly 30 m tall, c. 30–35 cm diameter at 1.5 m above ground, gradually narrowing upward to c. 20 cm near crown on old plants, broadening below to a conical base c. 45–50 cm diameter. Surface ringed with sheath scars, obscure toward base but prominent and stepped higher up; vertical fissures numerous, regularly spaced, long and deep.

Crown globose, moderately dense, consisting of 35–50 strongly ascending to horizontally spreading to deflexed leaves with segment-lobes arching smoothly to abruptly with vertically pendulous tips. Ligules moderately prominent, pale straw-coloured, their margins patchily fimbriate with closely crowded, soft, hairlike brownish scales 10–15 mm long.

Petiole 170–190 cm long, 20–26 mm wide; flattened-triangular with smoothly rounded keel to almost semicircular in t.s, slightly convex to slightly concave above, usually with slight median keel. Margins virtually unarmed for most of their length, minutely crenulate with closely spaced, slightly raised brown calli and at wider intervals obscure blunt pricklets; at very base armed with ± conical dark brown pungent prickles to 2 mm long, most antrorsely or retrorsely curved. Surfaces green, finely but shallowly striate; upper virtually glabrous, obscurely and sparsely pitted, with few appressed scales or scale remnants close to lamina; lower with scattered shallow, somewhat elongated pits, deeper and more crowded close to margins, bearing

appressed, flat, \pm oval white scales under 1 mm long, their margins irregular but not fimbriate, soon deciduous leaving small but moderately conspicuous orange-brown basal-masses flush with petiole surface. *Hastula* base \pm truncate, shallowly 3-lobed, the central lobe shorter and narrower, acute; rim flattish, up to 6 cm long, \pm appressed to lamina, short- to long-triangular with broad, \pm entire necrotic margin

Lamina 160–190 cm long, 0.20–0.30 (mostly 0.25–0.28) mm thick, moderately costapalmate, truncate at base, coriaceous, moderately tough but fairly easily split, slightly to moderately contorted with 1 adaxial undulation either side of the slightly decurved costa, base on either side involute with lowermost few segments resupinate, or involute and then shortly revolute (S-shaped in l.s., sometimes only on one side).

Segments 34–38 either side of costa; largest segments 30–42 mm wide, narrowing slightly towards both point of bifurcation and basal sinuses, free for 63–70% of their length, bifurcated for 60–73% of free length, the lobes slightly diverging, evenly tapering, gradually attenuated into fine, soft but not threadlike, aristate apices, early-necrotic for final 10–20 cm but mostly remaining entire. Intersegmental appendages up to 60 cm long, \pm persistent, pale brown, glabrous, threadlike. Ribs: abaxial ribs in t.s. trapeziform (narrowing to lamina), sharply square-edged, 1.0–1.2 mm thick, 2.0–3.0 mm deep; adaxial ribs obliquely trapeziform, with one sharp edge, 0.7–0.9 mm thick, 1.2–2.0 mm deep. Venation: major longitudinal veins 7–9 either side of abaxial rib, moderately prominent above, slightly more prominent beneath; transverse veins evident above, very prominent beneath, closely crowded, moderately to steeply angled, most strongly arcuate and/or sinuous, mostly continuous across whole half-segment and dendritically branched and/or anastomosing. Surfaces glossy bright green, somewhat yellowish above, beneath with suggestion of glaucousness on dried leaves (but waxiness not readily rubbed off), glabrous except for scattered whitish scales on ribs.

Inflorescences equalling or slightly exceeding petioles, strongly arching. Partial inflorescences 8–12, subequal, the longest slightly under half total inflorescence length, each branched to 4 further orders; rachillae 5–20 cm long, c. 0.8 mm thick, glabrous but whitish granular-papillose with age, obscurely wrinkled-striate; larger axes more prominently striate. Rachis bracts flattened-cylindrical, to 5–6 cm in diameter, tightly to rather loosely sheathing, frequently wrinkled, warped and torn, rich red-brown, shallowly striate with raised veins at regular intervals, sparsely to densely lanuginose-scaly with dirty-white tangled scales to 4 mm long, these stellately branched to somewhat plumose, the branches hairlike, contorted and twisted, each scale borne on a minute, forward-pointing, prickle-like stalk protruding from bract surface; bract apices rather narrow-triangular, acute to moderately acuminate, frequently split. *Flower-clusters* 0.8–3 mm apart, 2–4(–5)-flowered; cluster axis 0.5–1.5(–2.5) mm long, rather slender, longer ones with flowers scattered over their apical two-thirds. Cluster-bract c. 0.7 mm long, appressed to cluster axis, concave, oblong-ovate, acute, base persistent. Bracteoles 1 per flower with sometimes 1 empty one in addition, broad-ovate, concave, \pm fleshy, persistent at least as narrow rim.

Flowers (only 1 collection seen: *Rodd 3055*, with dead, semi-decayed flowers in advanced bud) c. 2.2 mm long, shape at anthesis not known. Anthopodium c. 0.5 mm long, 0.6–0.8 mm diameter, somewhat trigonous with 3 prominent downward bulges around the recessed base, usually constricted at junction with sepals. Sepals loosely appressed to petals, strongly concave, inflated, \pm membranous except along median line, c. 1.5 mm long, connate for $\frac{1}{3}$ to almost $\frac{1}{2}$ their length with very broad rounded sinuses, triangular-ovate, subacute., Petals thick-textured and leathery, strongly concave, 2.0–2.2 mm long, connate for c. $\frac{1}{3}$ their length, broadly obovate with bluntly acute, slightly mucronate apex, auriculate at base with small(?), rounded(?) auricles; inner faces with 3 large, distinct cavities. Stamens c. $\frac{1}{2}$ as long as petals, connate for c. $\frac{1}{2}$ (?) their length; filaments rather thin(?) and flat, ovate, not shouldered, smoothly tapering into a relatively long, slenderly aristate apex; anthers 0.42 mm long.

Carpels c. $\frac{3}{4}$ as long as stamens; ovaries obovoid-cylindrical, strongly gibbous apically, very abruptly constricted into rather thick, straight styles c. 0.25 mm long.

Fruit spherical, to c. 17 mm diameter, often with slight basal protrusion, on stalk to 5 mm long consisting of greatly thickened cluster axis topped by swollen anthopodium to 2 mm long and almost 2.5 mm diameter. Epicarp jet-black, very smooth and glossy when fresh, drying to irregularly wrinkled with bluish waxy bloom. Mesocarp c. 2.5 mm thick fresh, greenish, fleshy, drying to c. 1 mm thick, containing numerous fairly crowded, moderately thick longitudinal fibres, concentrated mainly toward endocarp. Endocarp 0.20–0.25 mm thick, straw-coloured, rather hard and brittle, adhering closely to mesocarp in dried ripe fruit, its inner surface with a distinct regular pattern appearing reticulate to the naked eye, when magnified seen as small circles of radiating fine striations or minute, loosely attached fibres. Seed 10–12 mm in diameter, not flattened ventrally, pale brown finely speckled whitish except for deeper brown hilum. Intrusion penetrating \pm diagonally from well below median position for c. $\frac{2}{3}$ seed diameter, in l.s. half-dumbbell shaped, occupying less than $\frac{1}{2}$ seed length, in t.s. very similar. Embryo at or slightly above median position (2 to 3 o'clock relative to stalk). (Fig. 2a–b, 3h, 8d, 9b–c)

Distribution: subcoastal southeast Queensland, confined to the upper Dawson River basin and the uppermost Comet River basin, within an area bounded approximately by Moura and Rolleston to the north, Wandoan and Injune to the south, the Great Dividing Range to the west, and Auburn Range to the east. This region is approximately 350 km WNW of Brisbane and covers approximately 2 degrees of latitude and 2 of longitude; the downstream limit on the Dawson is not known to me with certainty. The species is abundant at Theodore but is not evident where the Dawson Highway crosses the river west of Moura. I am informed by Peter Hind that there is a population of *Livistona* in Cania Gorge, about 30 km NW of Monto, which may be this species and which would extend its range into the Burnett River catchment.

Ecology: confined to banks and channels of larger, semi-permanent streams, in sandy, silty or gravelly alluvium; also at cliff-bases and on cliff-ledges in sheltered sandstone gorges, most notably in Carnarvon Gorge. In the eastern part of its range it is mostly found associated with *Eucalyptus tereticornis* and *E. microtheca* s. lat., but to the west (Carnarvon Range, Great Dividing Range) it is frequently associated with *E. tereticornis*, *E. melanophloia*, *Corymbia maculata*, *C. citriodora*, *Angophora floribunda* and *Macrozamia moorei*.

Conservation status: 2RC– (Briggs & Leigh 1996, as *Livistona* sp. 3: Carnarvon & Taroom)

Specimens examined: Queensland: Leichhardt: Cracow–Theodore road on Delusion Creek about 12 miles [19 km] N of Cracow, *Johnson 847*, 28 June 1959 (BRI); Junction of Dawson River and Delusion Creek, NW of Cracow, *Rodd 3051, 3052, 3054, 3055 & Jacobs*, 9 May 1976 (NSW, BRI, K, BH); Palm Tree Creek 19 km N of Taroom, *Telford 5648*, 7 June 1977 (CBG, NSW); Palm Tree Creek c. 12 km from Taroom on Taroom–Theodore road, *Moriarty 1280*, 15 May 1973 (BRI); Robinson Creek and Palm Tree Creek, Taroom, *Stiller s.n.*, 16 Sep 1960 (BRI); Robinson Creek 10 miles [16 km] NW of Taroom, Leichhardt District, *Speck 1986*, 3 May 1964 (CANB, BRI); Carnarvon Creek, near entrance to Carnarvon Gorge National Park, *Rodd 1112*, 12 Aug 1970 (NSW).

Notes

1. This species is distinguished from *L. australis* on rather slight characters, but these appear to be fairly constant and reliable over the whole area of its occurrence.
2. The specific epithet, meaning 'shiny', refers to its most distinctive feature, viz. the highly glossy surface of the ripe fruits, in contrast to the dull, minutely rugulose fruits of *L. australis*. Internal features of the fruit also serve to distinguish it: the mesocarp has more numerous, thicker fibres, and the endocarp is thicker, its inner face displaying an unusual reticulate pattern. In vegetative characters the only striking differences from

L. australis are the shape and length of the ligules; good specimens of these organs, however, are represented in only one collection each of these two species, both obtained by felling an adult tree and dissecting the crown. Other foliar differences are more subtle, the most apparent being the slightly wider petiole and flatter, more appressed hastula in *L. nitida*; the undulation of the lamina is possibly also less pronounced than in *L. australis*.

3. Growth-habit is strikingly similar to that of *L. australis*, also trunk dimensions and surface characters. It is possible, though, that *L. nitida* attains a greater height than any other Australian species: the magnificent stand at the junction of Delusion Creek and the Dawson River includes individuals which, by a visual estimate, possibly exceed 30 metres.

4. For approximately the last 30–40 years this has been recognised as a distinct but unnamed species in the Queensland Herbarium; the late Dr S.T. Blake was the first to treat it as such. Previously its populations were doubtless treated as *L. australis* (just as were those of the far more distinctive *L. decipiens*), though I have not come across any record even of the existence of palms in the Dawson River basin from earlier than the 1960s.

7. *L. decipiens* Becc.

Beccari (1910: 301, fig. 1, t. II; 1921: 18; 1931: 81, t.6II); Moore (1963: 150); Johnson (1980: 13); Blombery & Rodd (1982: 123); Jones (1984: 131).

Lectotype (chosen here): [cultivated] *A. Robertson-Proschowsky s.n.*, May 1908 (sheet with older inflorescence) (FI, photo NSW). Syntypes: cultivated Nice, France, *A. Robertson-Proschowsky s.n.*, Sep 1908 (leaf) (FI, photo NSW); *A. Robertson - Proschowsky s.n.*, Sep 1907 (fruits) (FI, photos NSW).

L. decipiens var. *polyantha* Becc.

Beccari (1921: 15,18; 1931: 82).

Type: cultivated Bot. Garden Buitenzorg (now Bogor), Java; holo FI (two sheets), photo NSW; ?iso BO.

Trunk to c. 10 m tall, c. 25 cm diameter at 1 m above ground, reducing to c. 20 cm diameter toward top, widening below (from c. 0.5 m above ground) into a gently flared cone up to c. 35 cm diameter at base. Surface moderately smooth but with prominent annular sheath scars; vertical fissures numerous, fine, scattered; petiole-stubs frequently present on lower 1–2 m of trunk, closely appressed, to c. 10 cm long.

Crown globose or frequently broader than deep, moderately dense, consisting of 30–60 leaves with fairly straight, rigid petioles, the leaf-blades spreading rigidly to the point of bifurcation of their segments but with lobes vertically pendulous producing a curtain-like effect. Ligules not very prominent, pale reddish-brown aging to dirty white; shredding into fibres at early stage leaving only remnants of unshredded apex, its margin sparsely fimbriate with long slender white scales, its outer surface with close network of strongly raised fibre-bundles and scattered, inconspicuous, contorted, appressed translucent scales.

Petiole 160–280 cm long, 18–24 mm wide; flattened-triangular in t.s. with bluntly angular to rounded keel, slightly convex to slightly concave above sometimes with slight median ridge. Margins virtually unarmed over most of petiole length or with scattered, small, mostly antrorsely curved, pungent prickles; toward base with closely and rather evenly spaced, slender, shiny dark brown pungent prickles c. 4 mm long, retrorse or patent or mixed antrorse-retrorse. Surfaces finely rugulose-striate, upper with sparse, shallow pits, in 2 rows either side of centre, containing inconspicuous, early-deciduous scales; lower with more numerous, poorly defined, often confluent