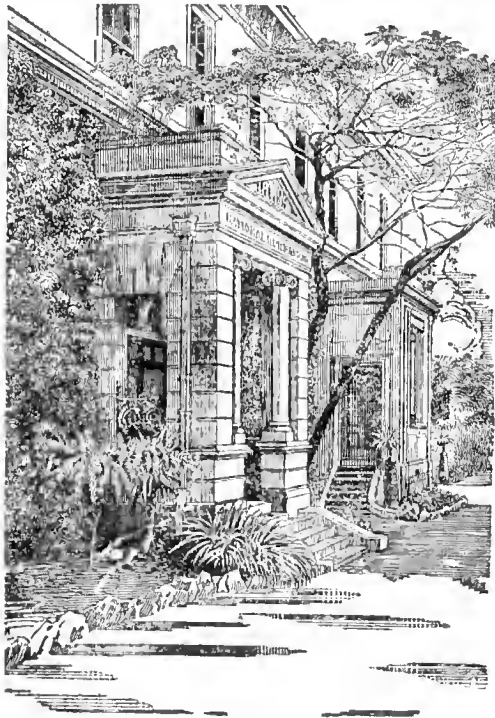


NEW SOUTH WALES  
DEPARTMENT OF AGRICULTURE

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CONTRIBUTIONS  
FROM THE  
NEW SOUTH WALES  
NATIONAL HERBARIUM



*Flora Series: No. 34*

1966

G 9277

# CONSPECTUS OF FAMILIES OF VASCULAR PLANTS REPRESENTED IN THE FLORA OF NEW SOUTH WALES

(The account of each family, or consecutive group of families as issued, will appear with separate pagination; the names of those families that have been published to date are in italics.)

## GYMNOSPERMAE

- |                        |                       |
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| 2 <i>Podocarpaceae</i> | 5 <i>Cupressaceae</i> |
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- |                            |   |
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| 7 <i>Sparganiaceae</i>     | 29 Commelinaceae                            |
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| 26 Centrolepidaceae        | 48 <i>Orchidaceae. See H.M.R. Rupp: The</i> |
| 27 Xyridaceae              | <i>Orchids of New South Wales. 1943.</i>    |

## ANGIOSPERMAE—DICOTYLEDONES

- |                     |                     |
|---------------------|---------------------|
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| 61 Aristolochiaceae | 83 Trimeniaceae     |
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(Continued on inside back cover)

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# FLORA OF NEW SOUTH WALES

by

VARIOUS BOTANISTS

Produced under the Direction of

**K. MAIR**

Director and Chief Botanist,  
National Herbarium of New South Wales

No. 34    XANTHORRHOACEAE

EDITOR: JOYCE W. VICKERY

Formerly produced under the direction of R. H. Anderson, 1961-1964



## 34. XANTHORRHOACEAE

(By Alma T. Lee)

Perennial and usually xeromorphic plants, the stems often condensed, more or less woody, and at least partly underground, decumbent, oblique or erect, with roots from the lowest nodes and leaves tufted at the apex; less commonly the stems extensive and leafy above ground, decumbent or erect. Leaves linear, often very long, few or numerous in each shoot. Flowers hermaphrodite or dioecious, usually small in the New South Wales genera, separate in spikes, racemes or panicles, or more often crowded in small clusters or compound elongate or globular heads. Perianth often dry and glumaceous or partly so, but in the New South Wales species at least the inner whorl obscurely petaloid, white or yellow, sometimes with purplish markings or rarely dark red or purple, all free or partly connate. Stamens 6, the inner 3 often attached to the lower half of the inner perianth segments, the outer 3 free and hypogynous; anthers 2-celled, basifixed or versatile, opening inwards or at the sides by longitudinal slits. Ovary superior, 3-celled with axile placentas, or 1-celled with erect, centrally attached ovules; style 3-lobed or subentire. Fruit a loculicidal capsule or rarely a 1-seeded nut, often surrounded by the persistent perianth. Seeds with a rather hard endosperm and straight embryo.

The genera of this family as defined by Hutchinson have previously been included in the Tribes Xeroteae and Calectasieae of the family Juncaceae (Bentham and Hooker), or in the Tribes Dasypogoneae, Lomandreae and Calectasieae of the family Liliaceae (Engler and Prantl). Hutchinson regards them as very advanced representatives of the Liliaceous stock, paralleling some of the Agavaceae but tending to the habit and unisexualism of the Palmae. It is of interest in this connection that stomata with two subsidiary cells occur in all species of *Xanthorrhoea* so far examined (G. L. Stebbins and G. S. Khush in Amer. Journ. Bot. XLVIII (1961) 51-59; also L. A. S. Johnson and B. G. Briggs unpublished) while *Lomandra* and all the other genera of the Xanthorrhoeaceae agree with the Liliaceae in lacking subsidiary cells. This suggests that *Xanthorrhoea* is not in fact closely related to *Lomandra* etc., and also that the "clusters", "cluster bracts" and "bracts" may not be homologous structures in *Xanthorrhoea* and *Lomandra*.

A family of 8 genera and about 60 species, all endemic in Australia except a few species of *Lomandra* in New Caledonia and New Guinea. Only two of the genera occur in New South Wales, and these two are represented in Queensland, Victoria, Tasmania and the Northern Territory; they, with one other, occur in South Australia and all eight are present in Western Australia. Anatomical features of the family are described by Fahn, in Journ. Linn. Soc., Bot. LV (1954) 159.

1. Flowers hermaphrodite, in a dense compound spike-like inflorescence. Leaves tufted, very numerous in the shoot, with a single acute point; leaf bases thickened, the margins not membranous ..... *Xanthorrhoea* 1.
- 1.\* Flowers dioecious, variously arranged in spikes, panicles, clusters or heads, rarely in a dense compound spike-like inflorescence and then often broken up into short cylindrical segments. Leaves often tufted but fewer in the shoot and with a toothed or obtuse apex (rarely a single acuminate tip), or sometimes the stems extensive with alternate, acute leaves; leaf bases with sheathing membranous margins .. *Lomandra* 2.

### 1. XANTHORRHOEA Sm.

Slow-growing, stout, perennial plants with a thick woody stem (*caudex* in the following descriptions) often so condensed as not to appear above ground (*acauline*), or more or less arborescent to about 7 m. high. Leaves at first erect, then curved-spreading or recurved, in a dense tuft at the top of the caudex, long-linear, more or less brittle, often angular in section with expanded and thickened bases forming a long-persistent imbricate covering to the caudex. Flowers in a

dense, compound spike-like inflorescence (the *spike*), terminating a long bare peduncle (the *scape*), hermaphrodite, sessile, surrounded by crowded *bracts* (floral bracts), in obscure clusters (usually condensed cymes) which are spirally arranged in the spike and subtended by more or less prominent *cluster bracts*. Perianth of two nearly similar whorls each of three free segments, the outer three partly scarious and similar to the surrounding bracts in texture but broader at the base, concave; inner a little longer, white to yellowish and petaloid with an expanded apex often recurved over the bract surface. Stamens 6, exerted, finally recurved over the bract surface. Ovary superior, syncarpous, 3-celled, tapering into an undivided style; ovules few, often only one in each loculus maturing in the fruit. Capsule hard and shining, loculicidal, protruding from the hardened persistent perianth, with the style base forming a more or less elongate point. Seeds flattened, with a dull black testa, the straight embryo transverse, at least in the one species germinated (*X. australis*).

An endemic Australian genus of about 15 species, of which 7 occur in New South Wales. These species, however, to some extent fall short of the standards of discreteness generally required of a species, and there are strong field indications of hybridism. In New South Wales they occur mostly in the eastern half of the State often in poor situations in scrub, heath or open forest; two species occur on the Western Slopes, but the genus is not known from the Western or Far Western Plains, except near Narrabri.

In using the text, the following points should be noted:

(1) "Arborescent" signifies a caudex over 0.7 m. in height; trunks up to about this height are sometimes formed in species described as acauline.

(2) Scape growth is usually completed before much increase occurs in spike length; spikes continue to grow as the flowers open over a considerable period.

(3) Leaf shape in section is given as at about the middle of the leaf; for terms in italics see Taxon XI (1962) 145; "triangular", "quadrangular" are used in their loose, literal sense: "three-angled", "four-angled".

(4) Scape diameter is measured just below the spike, spike diameter at the widest part, from bract-tip to bract-tip.

(5) Shape of bracts refers only to that of the broadest bracts.

The diagnostic features are illustrated in the figures on p. 3.

The stems and leaf bases, and sometimes the spikes, exude a resin which tends to seal adjoining parts together; it was used by the aborigines to aid attachment of tips to shafts of their spears, the scape of *Xanthorrhoea* being frequently used for this shaft; the early colonists used it as a varnish and it has had some commercial applications since, but these have been short-lived, being usually not economic and by their nature destructive of the source plant.

The spikes and scapes of *Xanthorrhoea* are frequently infested by the larvae of certain moths and a bee; these, and others found in the plant parts are named and described by Froggatt in Proc. Linn. Soc. N.S.W. XXI (1896) 74 and by Common in *Australian Moths* (Jacaranda Press, 1963, p. 32).

Some of the species of *Xanthorrhoea* are suspected or proved to be toxic to cattle which feed heavily on the spikes, inducing a locomotory disturbance (known in south-eastern Queensland as "Wamps") which causes them to collapse; complete recovery is possible. The taxa which have been implicated are *X. johnsonii* (as *X. sp. aff. media*) and *X. resinosa* ssp. *fulva* (as *X. hastile*).

1. Leaves triangular in section, about 3 or 4 mm. broad, the upper surface flat or concave with several unequal ribs and grooves, the lower with one strong subcentral and usually a few shallower ribs, drying thin and glossy, the margins minutely toothed and distinctly rough to the touch. Flowers large, the petals exceeding the bracts by 4-5 mm., and filaments of the stamens straight, exceeding the petals by about 1 cm. at anthesis; petals recurved over the bracts and filaments loosely tangled, but only at a late flowering stage; capsules with fine points 4-10 mm. long. Spikes 3-12 cm. long, about 2 cm. in diameter, or up to 5 cm. from tip to tip of the spreading stamens; scapes very slender, 3-4.5 mm. in diameter, smooth, glaucous at anthesis, 50-100 cm. long; cluster bracts not prominent at anthesis though somewhat long-acute; largest floral bracts short-acute but sometimes with a short fine point. Caudex not evident above ground ..... *X. macronema* 7.



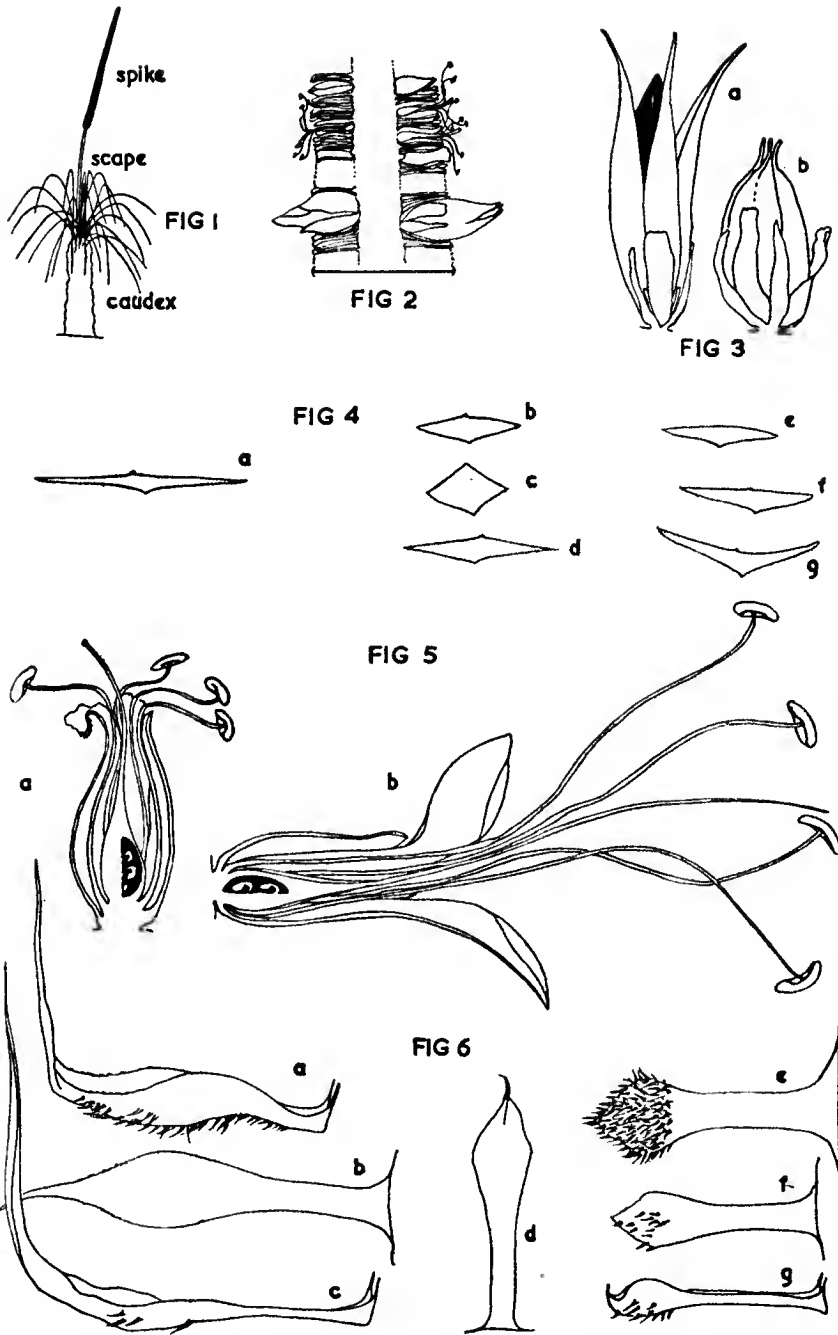
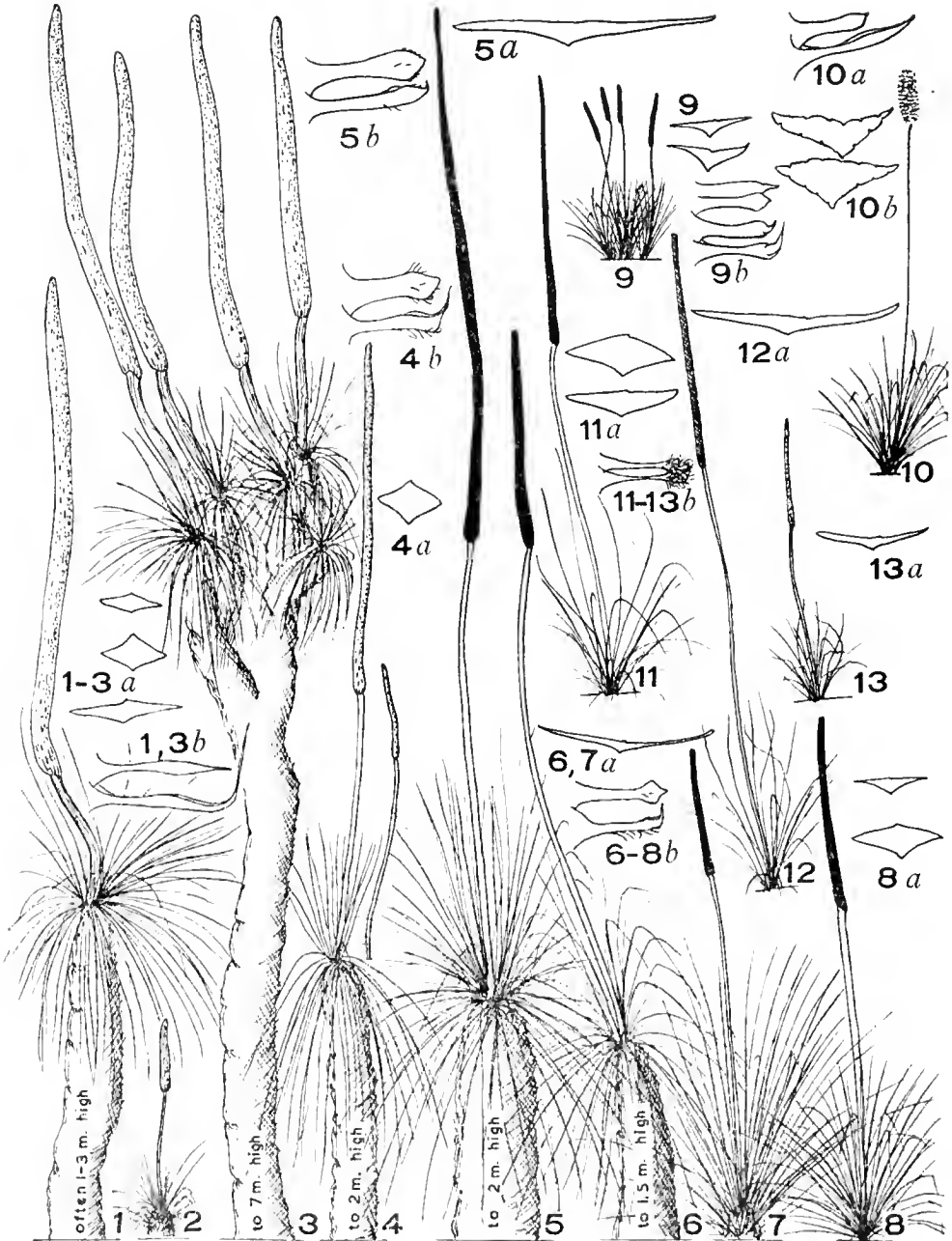


Fig. 1.—Habit (arborescent). Fig. 2.—L. S. Spike, diagrammatic; diameter indicated. Fig. 3.—Fruit: *a*. acute; *b*. obtuse. Fig. 4.—Leaf shape in section: *a*. flat; *b*. *c*. *d*. quadrangular; *e*. *f*. *g*. triangular. Fig. 5.—Half flower ( $\times 6$ ): *a*. *X. media*; *b*. *X. macronema*. Fig. 6.—Bract form: *a*. *c*. Prominent cluster bracts and *b*. long-acute bract (*X. australis*); *d*. intermediate; *e*. short acute, tomentose bract (*X. resinosa*); *f*. short-acute, subglabrous bract and *g*. obscure cluster bract (*X. media*).

- 1.\* Leaves various in section but with only one or two ribs above, thick or thin, drying glossy or dull, the margins more or less rough. Flowers smaller, the petals and stamens not projecting noticeably beyond the bracts but soon recurved closely over the bract surface; points of the capsules not exceeding 2 mm. long. Plants acauline to arborescent.
2. Broadest floral bracts long-acute (but intermediate in hybrid derivatives and usually short-acute to intermediate in *X. minor* under 2\*); cluster bracts prominent over the whole of the spike at and even after anthesis (but only slightly prominent to almost obscure in hybrid derivatives), their upturned ends of considerable length, often 1 cm. or more, rarely not upturned but still long-acute like the floral bracts (but this condition common only in Tasmanian plants perhaps of hybrid origin). Plants acauline to strongly arborescent, the caudex commonly branched, sometimes with many shoots. Leaves quadrangular but sometimes thin, up to 4 mm. broad (or even broader in Queensland hybrid derivatives and then flatter) but often narrower, scarcely greyish-green to quite silvery. Inflorescence stout and the scape shorter than the spike and coarsely wrinkled longitudinally (except in ssp. *acaulis* and some hybrid derivatives), the bracts gingery or mid-brown but quite dark brown in hybrids from *X. media* ssp. *latifolia* ..... *X. australis* 1.
- 2.\* Broadest floral bracts short-acute or intermediate in form, the cluster bracts usually prominent only in the bud stage and then the upturned ends only about 5 mm. long, or if prominent till later stages then only in the lower part of the spike. Plants acauline to arborescent. Leaves flattish, triangular or quadrangular, usually pure green or with a dull bluish tint, but perhaps sometimes greyish. Inflorescence slender to moderately stout, the scape about equal to or longer than the spike (shorter in some *X. johnsonii* and in a few hybrid derivatives from that species and from *X. australis*), smooth or with fine or shallow longitudinal wrinkles (coarse in a few hybrid derivatives from *X. australis*).
3. Broadest floral bracts densely tomentose at the expanded apex, the cluster bracts prominent only in the young bud stages. Plants acauline or rarely with caudex to 70 cm. high. Scape often more or less glaucous, usually about 1.5–2 m. long. Spike about as long or shorter, often 60–120 cm. long and 2–4.5 cm. in diameter, or shorter and more slender in ssp. *fulva*. Leaves quadrangular or triangular, 2–3.5 mm. broad, or thinner, concave-triangular and 3–6 mm. broad, often with a bluish-green tint and rather sparse in the shoot ..... *X. resinosa* 5.
- 3.\* Broadest floral bracts glabrous, ciliate or with usually few hairs on the expanded ends; cluster bracts prominent only in the young stages, or with the upturned ends only about 5 mm. long, but if persistent and longer then only in the lower part of the spike. Spike and scape sizes various. Leaves green or slightly bluish green, triangular, quadrangular or almost flat in section, usually abundant in the shoot.
4. Plants arborescent, the caudex often 1–2.5 m. high or less commonly to 3.5 m. high, usually unbranched or with few branches. Leaves broad (about 4–7 mm.) and nearly flat, or narrow (about 1–2.5 mm.) and quadrangular (nearly square in section).
5. Leaves broad and nearly flat, rather thick and tough. Spike a little shorter than or equal to the scape with rather dark brown bracts and obscure cluster bracts ..... *X. arborea* 3.
- 5.\* Leaves narrower, strongly quadrangular. Spike short, slender and shorter than the scape to long, stout and longer than the scape, the bracts green for some time, drying straw-coloured, light brown or pinkish in colour, the cluster bracts almost obscure or often more or less prominent only near the base of the spike *X. johnsonii* 2.
- 4.\* Plants acauline (or if arborescent then rarely more than 1 m. high and the leaves thin and flat, 3–12 mm. broad, bright green and the spike much shorter than the scape: *X. media* ssp. *latifolia*), with one to numerous shoots. Leaves often flat and thin, or triangular, or sometimes quadrangular in section.
6. Spikes about 1–3 cm. in diameter, usually at least 30 cm. long, often one or few on each plant. Scapes usually at least 1 m. long and 7 mm. in diameter. Leaves triangular to quadrangular in section and 1.5–2.5 mm. broad, or 3–12 mm. broad and nearly flat, often bright green, and glossy at least when dried ..... *X. media* 4.
- 6.\* Spikes short and slender, often several or many on each plant, 2 to about 20 cm. long. Scapes often about 20–70 cm. long and 5 mm. in diameter. Leaves triangular in section, often concave above, 1–2.5 mm. broad, usually not glossy when dried .... *X. minor* 6.



Typical habit, with inflorescence, common forms of leaf in section (a), and broadest floral bract and cluster bract (b), are shown for each species. Heights indicated on the drawings are of the caudex only. 1-3 *X. australis*; 1, 3 ssp. *australis*; 2 ssp. *acaulis*. 4 *X. johnsonii*. 5 *X. arborea*. 6-8 *X. media*: 6, 7 ssp. *latifolia*; 8 ssp. *media*. 9 *X. minor*. 10 *X. macronema*. 11-13 *X. resinosa*; 11 ssp. *resinosa*; 12 ssp. *concava*; 13 ssp. *fulva*. Habit drawings  $\times 1/20$ , leaf sections  $\times 5$ , bracts  $\times 2$ .

1. *X. australis* R. Br., Prodr. (1810) 288; Maiden & Betche, Census N.S.W. Pl. (1916) 42; Lee in Contrib. N.S.W. Nat. Herb. IV (1966) 39, 51; see also under ssp. *australis*. Plants from acauline to strongly arborescent with caudex up to 7 m. high, often with several branches. Leaves often greyish green, or silvery in extreme forms, but scarcely greyish in populations east of the Great Dividing Range as in Victoria and Tasmania, and often glossy green in hybrid derivatives from ssp. *australis* and *X. media* ssp. *latifolia*; leaves quadrangular in section (*quadrate-rhombic* to *very depressed-obtrullate* or *-rhombic*), thin to thick. Spike stout and longer than its scape (except shorter in ssp. *acaulis* and about equal in many hybrid derivatives), the scape usually coarsely wrinkled at least when young (but not in the hybrid populations). Bracts light coloured, long-acute, the cluster bracts prominent at anthesis and often with very long points, glabrous or with slight abaxial tomentum (but in hybrid derivatives from ssp. *australis* and *X. media* ssp. *latifolia* the bracts often dark brown, short-acute to intermediate, and the cluster bracts obscure or scarcely prominent; in those from ssp. *australis* and *X. resinosa* ssp. *resinosa*, the bracts darker, short-acute, tomentose). Sepals and petals about equal in length, the petals slightly shorter in the Topotype, the sepals slightly shorter in most New South Wales material. Fruits obtuse, abruptly narrowed into the briefly persistent short style-base (but acute in the hybrid derivatives from *X. media* ssp. *latifolia*).

Chiefly in the Tablelands and Western Slopes, and occasionally in Coastal Divisions, with hybrid derivatives in ranges of the Coastal Divisions from Wyong to Queensland, and others from near Rylstone to Victoria (see ssp. *australis*). Also in Victoria, South Australia and Tasmania.

*X. australis* may be divided into two subspecies which show a considerable number of intergradants as far as the often poorly documented specimens indicate.

1. Plants arborescent, the caudex exceeding 75 cm. and often more than 1.5 m. high. Spike stout, 3-6 cm. in diameter, or rarely less, longer than or about equal to the stout scape. Scape with longitudinal wrinkles or almost smooth ..... ssp. *australis*.
- 1.\* Plants acauline or weakly arborescent, the caudex up to about 75 cm. high. Spike usually less than 3 cm. in diameter, equal to or shorter than the slender scape. Scape usually with strong longitudinal wrinkles ..... ssp. *acaulis*.

ssp. *australis* (see also under *X. australis* for distinguishing characters of hybrid derivatives from this subspecies with *X. media* ssp. *latifolia* and with *X. resinosa* ssp. *resinosa*). Arborescent plants, commonly branched, up to 7 m. high; caudex often 1.5-3.0 m. high, or up to 7 m. in high Tableland localities and in the hybrid populations, often candelabrum-like with several branches and their spikes. Leaves usually more or less greyish green, but often scarcely greyish in populations east of the Great Dividing Range as in Victoria and Tasmania, quadrangular in section (*quadrate-rhombic* to *very depressed-rhombic* or *-obtrullate*), 1-4, often 1-2, mm. broad and up to 2.5 mm. thick. Scape stout, 1.1-4, usually 1.5-3, cm. in diameter, often coarsely wrinkled longitudinally, 35-150 cm. long and shorter than its spike. Spike stout and sometimes very large, often 3-6 cm. in diameter, 50-350, usually 90-200, cm. long. Bracts light brown to tan in colour, the tips becoming dark with age, long-acute, with very long-pointed cluster bracts upturned as much as 2 cm. over the bract surface or sometimes scarcely prominent among very long-acute bracts. Chromosome number:  $2n = 22$  (Briggs, Contrib. N.S.W. Nat. Herb. IV (1966) 27). *X. australis* R. Br., Prodr. (1810) 288; Smith in Rees, Cycl. XXXIX (1818); Kunth, Enum. IV (1843) 649; F. Muell., Fragm. IV (1864) 110; Benth., Fl. Austral. VII (1878) 116; Maiden, Useful Native Plants (1889) 233; Moore & Betche, Handb. Fl. N.S.W. (1893) 425; Rodway, Tas. Fl. (1903) 220; Beuhne in Journ. Dept. Agric. Vic. XV (1917) 114, Fig. 62; Ewart, Handb. For.

Trees for Vic. Foresters (1925) 52, Plate XI; Williamson in Vic. Nat. XLV (1928) 39, Fig. 1; Krause in Engl., Nat. Pflanzenfam. XVa (1930) 315; Ewart, Fl. Vic. (1931) 274; Black, Fl. S. Austral. ed. 2 (1943) 195; Willis, Handb. Pl. Vic. I (1962) 296 (cites other illustrations); see also notes below on some applications of *X. australis* in these references.

Tablelands from Queensland to Victoria, also Western Slopes, North Coast and South Coast, often on soils of limestone or igneous origin, with extensive populations of presumed hybrid derivatives from *X. australis* ssp. *australis* and *X. media* ssp. *latifolia* in ranges of the Coastal Divisions from Wyong to Queensland (in Queensland these are probably the only representatives of *X. australis*); those clearly showing characters of *X. media* ssp. *latifolia* are marked\* below. In two southern localities where *X. australis* ssp. *australis* occurs in proximity to *X. resinosa* ssp. *resinosa* presumed hybrid derivatives from these taxa have recently been found and may prove to represent extensive populations††; they are marked †. Another hybrid population apparently derived from *X. australis* ssp. *australis* and *X. media* ssp. *media* occurs in the region south of the Hunter and Goulburn Rivers towards Putty, but these plants are closer to *X. media* ssp. *media* and are classified with that taxon. In Tasmania, and perhaps from the Sydney basin before extensive settlement occurred, specimens suggestive of hybridism between *X. australis* and *X. minor* are known (see Lee, loc. cit. pp. 46, 52. South of Byron Bay, Johnson and Constable 6.1957 (56562)\*; Mt. Spirabo, Constable 5.1961 (56738); Coal Ridge, 10 miles N of Ramornie, Blakely & Shiress 7.1922 (56758)\*; Rockview near Jackadgery, Brooks 7.1964 (65655); Wells Crossing, SE of Grafton, Constable 10.1961 (57783); Barcoongere State Forest, Floyd 9.1959 (56563)\*; Barcoongere State Forest, Constable 10.1961 (57784) and 5.1962 (66138, 77838); Mt. Coramba, Floyd 10.1959 (56565)\*; Mt. Coramba, Constable 5.1964 (64599)\*; Coryah Gap, Nandewar Ra., Constable 12.1961 (61338); Mt. Kaputar, Nandewar Ra., Dyce 12.1963 (67358); between Wollomombi and Ebor, Floyd 10.1959 (56701); Carrai State Forest, Constable 6.1958 (61194)\*; Mt. Boss State Forest, NW of Wauchope, Cousins 1957 (56762)\*; Newell Highway 20 miles N of Coonabarabran, Vickery 10.1964 (72394); 5 miles NW of Coonabarabran, Constable 12.1961 (61353); Gunneemooroo Station, 6 miles NNE of Tooraweenah, Constable 12.1961 (61352, 77837); Tondurine Creek, Tooraweenah, Constable 12.1961 (61339); Hastings R., 8 miles W of Yarras, Johnson 10.1953 (56702)\*; Queen's Lake State Forest, 5 miles NNE of Kew, Constable 5.1964 (64594)\*; Camden Haven, Cleland 9.1918 (56760\*, 56761\*); Middle Brother State Forest, 5 miles SSW of Kendall, Constable 5.1964 (65651)\*; 18 miles ENE of Murrurundi, Story No. 7494, 10.1960 (56568); 3 miles N of Curricabark Creek, Johnson 10.1953 (56703); 3 miles W of Curricabark Creek, Johnson 10.1953 (56704); Curricabark Creek, Hyem 5.1964 (65656, 65657, 65654); between Wharton Mill and Ellerston, Salasoo No. 1791, 10.1959 (56569); Black Cutting, Tomalla road via Moonan Flat, Earp 9.1958 (56570); NW slope of Tomalla Tableland, Johnson 12.1954 (56571); near Cobark, ca. 15 miles NW of Gloucester, Briggs 8.1964 (65650); Goonoo State Forest, Constable 12.1961 (61196); 6½ miles W of Dubbo, Constable 12.1961 (61345); 2 miles E of Wollar, Constable 8.1962 (61679); ridge 2 miles N of Dripstone, Constable 12.1961 (61351); near Dungog on Paterson road, McDonald 1955 (56764)\*; Bulahdelah Mt., Cleland 8.1919 (56763)\*; Alum Mt., Constable 7.1963 (66557\*, 66558\*, 66559\*); Wattagan, Constable 5.1961 (61195)\*; The Forge, Macquarie R., Constable 1.1958 (61350); Winburndale Creek on Eglinton-Bruinbun road, Constable 1.1958 (63506); Bumberry, Boorman 6.1914 (56710); Bumberry, Cleland 10.1916 (56709); Abercrombie Caves, Constable 10.1958 (56730); Weddin Mt., Constable 4.1963 (63501, 63502); Wombeyan Caves, Constable 1.1961 (53930); Pomcroy, 16 miles WNW of Goulburn, Holford 1.1956 (56727); Carrington Falls, Constable 7.1964 (65686)†; Nowra-Turpentine road, 3 miles W of aerodrome, Constable 1.1962 (61364); Badgery's Crossing, Shoalhaven R., Rodway 10.1945 (61362); Bungonia Lookdown, Constable 1.1956 (39898); 12 miles S of Bookham, Dyce 1.1964 (64597); Mt. McDonald, Burbidge 11.1960 (64333; CANB 6713); Uriarra Crossing, McKee No. 964, 4.1954 (56724); near Cotter R., Blakely 3.1938 (56726); near W end of Alpine Way, Khancoban district, Vickery 4.1958 (56725); Deua R. (Moruya R.), Buckeridge 1.1963 (63546); Mt. Carlyle, Howe Ra., Constable 8.1963 (63662)†. Also in Victoria, South Australia and Tasmania.

The description under *X. australis* by Bentham (loc. cit.) suggests that his concept was based chiefly on some of the smaller, less typical plants (perhaps hybrid derivatives from *X. minor*) found in Victoria and Tasmania (see Lee in Contrib. N.S.W. Nat. Herb. IV (1966) pp. 46, 52).

Similarly Black (loc. cit.) gives a description under *X. australis* which is derived from plants of both that species and *X. minor*. Cleland, in S. Austral. Nat. XL (1965) 27, has recently distinguished both of these species on the Victorian side of the Murray River, but intergradants may occur, as they do in Tasmania.

In a description under *X. hastile* in Fl. Tasm. II (1860) 59, J. D. Hooker is almost certainly describing *X. australis* ssp. *australis*.

†† To these must now be added a very recent collection from the Central Tablelands, east of Rylstone: Barc Rock, near Kekcelbon Mts., Lee 2.1966 (90445).

ssp. *acaulis* Lee in Contrib. N.S.W. Nat. Herb. IV (1966) 53. Plants acauline or weakly arborescent, sometimes branched. Spike shorter and more slender than in ssp. *australis*, 12–35 cm. long, 1.7–3 cm. in diameter; scape longer than the spike, 20–100, usually 30–35, cm. long, 7–12 mm. in diameter, usually strongly wrinkled longitudinally. Bracts and leaves as in ssp. *australis*.

North and Central Tablelands, chiefly on their western parts, North and Central Western Slopes, and Western Plains near Narrabri. Torington, Constable 5.1961 (56734); 11 miles N of Glen Innes, Constable 4.1962 (57581); Narrabri, Maiden 11.1899 (56690); Narrabri, Maiden 1899 (56692); Narrabri, Boorman 6.1914 (56691, towards ssp. *australis*); Gunnedah district, Forsyth 11.1899 (56719); Timor Rock, Coonabarabran, Boorman 9.1908 (56721); 3–4 miles SSE of Coonabarabran, Salasoo No. 2328, 1.1962 (57556); Goonoo State Forest, Constable 12.1961 (61197); 6½ miles W of Dubbo, Constable 12.1961 (61344, 61346); Dubbo district, Boorman 8.1903 (56706); near Mr. Dangar, Gungal, Boorman 9.1904 (56723); northern slopes of Weddin Mt., Constable No. 4176, 4.1963 (63505); southern slopes of Weddin Mt., Constable No. 4193, 4.1963 (63503, towards ssp. *australis*).

2. *X. johnsonii* Lee in Contrib. N.S.W. Nat. Herb. IV (1966) 39, 49. An arborescent species with narrow quadrangular leaves, the scape longer or shorter than the spike (but usually shorter in the New South Wales specimens), the bracts short-acute, light coloured, the cluster bracts obscure, or prominent only in the lower part of the spike. Caudex up to 2.5 m. high, or more perhaps only in hybrid derivatives. Leaves often *quadrate-rhombic* in section, 1–2 mm. broad, the bases of the old leaves strongly recurved to form a close, narrow “skirt” around the trunk often distinct from the younger more upright leaves. Inflorescence slender in the Type (from northern Queensland) but moderately to very stout in the southern part of the range. Scape smooth or finely wrinkled, rarely strongly as in *X. australis* and then perhaps due to hybridism, 30–200 cm. long, 5–23 mm. in diameter, the spike longer or shorter, 4.5–225 cm. long, 15–40 mm. in diameter; in New South Wales the scape often 50–100 cm. long, 10–15 mm. in diameter and the spike a little shorter or considerably longer, mostly 20–30 mm. in diameter; spike a characteristic pale colour when dried, green to straw-coloured at first, then light brown or pinkish, the outside sometimes darkening with age. Bracts shortly ciliate, glabrous or with considerable pubescence (tomentose in some hybrid derivatives from *X. johnsonii* and *X. resinosa* ssp. *fulva*), short-acute or occasionally intermediate in form, the cluster bracts obscure or often more or less prominent only in the lower part of the spike, pubescent to tomentose on the abaxial surface. Fruits various but not yet well known.

North Coast and Tablelands and North Western Slopes usually on hillsides in Eucalypt forest. In the North Coast from Kempsey to Stradbroke Island (Qld.) there are several communities of hybrid derivatives from *X. johnsonii* and *X. resinosa* ssp. *fulva* which have the stout spike longer than its scape and often the arborescence and quadrangular leaves of *X. johnsonii* but the leaves are flatter than in that species and the bracts more hairy, being sometimes tomentose as in *X. resinosa* (a hybrid swarm occurs near Hat Head, *file* L. A. S. Johnson); these are marked \* in the citations below; it is probable that hybrid derivatives from *X. johnsonii* and *X. media* ssp. *latifolia*, q.v., are quite common in the North Coast also, as well as in Queensland where a few have been seen. Some of the specimens from the North West Slopes, marked † below, have strongly wrinkled scapes suggesting hybridism with *X. australis*, and where the spikes are small, with its ssp. *acaulis*. Cudgen–Bogangah, Constable 5.1962 (61343); Warialda, Boorman 10.1914 (56732); Warialda, Boorman 7.1905 (56733)†; N of Wardell, Constable 10.1961 (61294); 22 miles N of Glen Innes, Constable 4.1962 (57575); Bingara, Boorman 9.1907 (56735)†; Chambigne Ck., Grafton–Dalmorton road, Constable 10.1952 (59826); Halfway Creek, Constable 10.1961 (61295); Narrabri, Cleland 11.1916 (56693); Robertson’s Mtn., near Boggabri, Cambage 10.1912 (56737)†; Mt. Lindsay Station, Nandewar Mts., Cambage 11.1909 (56736); Coryah Gap road, Nandewar Ra., Constable 12.1961 (61347)†; Hat Head–Kinchela Creek, Johnson 10.1953 (56767, from a hybrid swarm between *X. johnsonii* and *X. resinosa* ssp. *fulva* but the bracts scarcely tomentose)\*; Hat Head–Kinchela Creek, Johnson 1.1962 (61335, from another community of intergradants but the bracts tomentose and the plants acauline)\*; Hat Head, Johnson 10.1953 (56566) and (59794)\*; Gungal, Boorman 11.1914 (56722)†; 22 miles NE of Mudgee on the Wollar road, Constable 8.1962 (61680); above Old Darkey Creek, Howes Valley, Constable 10.1961 (61287). Also in Queensland.

The name *X. quadrangulata* was applied to this species by F. M. Bailey (Qld. Fl. V (1902) 1666) and by J. Keys in Proc. Roy. Soc. Qld. II (1885) 43, 51; Domin's use of *X. quadrangulata* in Bibl. Bot. XX, Heft 85<sup>1</sup> (1915) 527 is mixed, including both the Type from South Australia and by inference the Queensland citations of Bailey and Keys; Domin's own Queensland collection from False Cape has not been seen. Bailey's citation (loc. cit. p. 1664) under *X. minor*: "hills about Cairns" (specimen not seen) may also refer to the small representatives of this species which occur in that area.

Under *X. bracteata*, Benth. (Fl. Austral. VII (1878) 116) and Bailey (Qld. Fl. V (1902) 1665) cite specimens from Springsure, Queensland. These specimens have not been recognised with certainty among the collections studied, but the characters described are those of some plants of *X. johnsonii* from that locality.

3. *X. arborea* R. Br. Prodr. (1810) 288; Smith in Rees, Cycl. XXXIX (1818); Kunth, Enum. IV (1843) 648; F. Muell., Fragm. IV (1864) 111; Benth., Fl. Austral. VII (1878) 115; F. M. Bail., Qld. Fl. V (1902) 1665, and Compr. Cat. Qld. Pl. (1913) 566; Domin in Bibl. Bot. XX Heft 85<sup>1</sup> (1915) 527; Lee in Contrib. N.S.W. Nat. Herb. IV (1966) 42, 49. An arborescent species characterised by a trunk of medium height, long and often stout spike and scape about equal in length, short-acute usually ciliate bracts and obscure cluster bracts, and relatively broad leaves with thick, dark red, shining bases. Caudex usually 1–2 m. high. Leaves abundant in the shoot, often over 1 m. long, 4.5–9, usually 5–7, mm. broad, green or dull green, almost flat with the upper surface often drying slightly concave and the lower angled, very depressed *obtriangular* in section, with very thick, dark red or purplish red, shining bases. Scape 7–27, usually 13–20, mm. in diameter and often 1.5–2 m. long, smooth; spike a little shorter or about equal in length, 2–5.4, often 2.5–3.5, cm. in diameter, the bract surface usually dark brown at anthesis. Floral bracts short-acute or occasionally intermediate, glabrous or commonly with a few hairs on the margins and surface; cluster bracts not prominent. Fruits prolific, acute in the young stages. Chromosome number:  $2n = 22$  (Briggs, Contrib. N.S.W. Nat. Herb. IV (1966) 27).

Central Coast and eastern part of Central Tablelands, chiefly on acid soils; in the Type area (Port Jackson of Robert Brown) this species usually occupies the lower or south-facing slopes and more sheltered habitats while *X. media* occurs on the ridges and more exposed north-facing slopes, and the two populations are satisfactorily discrete. In the coastal strip north of the Hawkesbury River†† their place is taken by a population in which their features are merged without satisfactory correlation of the diagnostic characters (i.e. *X. media* ssp. *latifolia*). Currant Mtn. Gap, 15 miles E of Rylstone, McKee No. 931, 4.1954 (61356) and No. 919, 4.1954 (61354); western foot of Mt. Coricudgy, 25 miles E of Rylstone, Johnson 3.1954 (61355); 1 mile W of Higher Macdonald, Johnson 5.1960 (56681); Grassy Hill (Putty road), Constable No. 2090, 4.1962 (57582) and No. 2091, 4.1962 (57573); Grassy Hill, Constable 4.1963 (63542); 5 miles N of Ten Mile Hollow, McKee No. 764, 10.1953 (56683); Maroota, McKee No. 723, 10.1953 (56686); near Gunderman, Hawkesbury R., McKee No. 740, 10.1953 (56684); Brooklyn, Lee 1.1962 (61372); E of Parsley Bay, Brooklyn, Johnson 10.1953 (56685); Hawkesbury R. near top of Peat's Ferry hill, N side, Lee 9.1961 (56682); 3½ miles NE of Mr. Irvine, Constable 4.1963 (63544); head of Linden Creek, Constable 1.1954 (61368); Linden, Constable 5.1956 (39982); Glenbrook, near the railway tunnel, Constable 11.1961 (61367); above St. Helena, Constable 1.1962 (56901); Manly, Cheel 1.1900 (56675); Cremorne, Cleland 1918 (56676); Rose Bay, Camfield 7.1897 (56677); La Perouse, Boorman 5.1914 (56678); Kurnell, Boorman 10.1915

†† Further west, but still between the same river systems (in the triangle bordered by Singleton, Rylstone and the Blue Mountains), living plants of previous collections have recently been observed; they have the characters of *X. arborea* but present a different aspect from the coastal plant due to noticeably bright green leaf colour (61354, 61355, 61356, in citations below). At Grassy Hill (57582, 57573) plants from a single colony showed inflorescences varying from the size and proportions of *X. media* ssp. *latifolia* to those of *X. arborea*, all with the broad leaves seen only in *X. arborea* further south. This western group of specimens seems, therefore, also to be grading into *X. media* ssp. *latifolia*, arborescent forms of which further north differ from *X. arborea* only in their smaller spike to scape ratio and bright green leaf colour. In the dried condition the original leaf colour is not distinguishable, but there are indications that it may be related to soil type.

(26664); Kurnell, Constable 2.1962 (61373); Loftus, Camfield 1.1894 (61371); Heathcote, Cheel 12.1914 (61370); Heathcote, Sprague 2.1963 (66324); Waterfall, Camfield 1.1896 (59843) and 1.1897 (61369).

Mueller's concept of *X. arborea*, on which he based the note on distribution, probably included some *X. media*; similarly the narrow-leaved specimens mentioned by Bentham under *X. arborea* are probably *X. media*. The description given by Bailey for *X. arborea* was derived from plants considered to be hybrid derivatives from *X. australis* and the broad-leaved, sometimes arborescent *X. media* ssp. *latifolia*. These plants, described above under *X. australis*, tend to be broader-leaved, i.e. like the *X. media* parent, in Queensland than in most New South Wales localities. The localities cited by Bailey (Compr. Cat.) and those given by Domin are not represented by specimens in eastern Australian herbaria (see references above).

Moore & Betche, (Handb. Fl. N.S.W. (1893) 425) and Maiden & Betche (Census N.S.W. Pl. (1916) 42), described or referred to this species (*X. arborea*) as *X. resinosa* giving *X. arborea* as a synonym (see Lee, loc. cit. p. 43, footnote).

In a few instances, distinction between *X. arborea* and *X. media* becomes arbitrary, as in Heathcote, Sprague 2.1963 (66324), Waterfall, Camfield, 1.1896 (59843) classified as *X. arborea* but with leaves only 3-3.5 mm. broad, and in Grassy Hill, Constable No. 2091, 4.1962 (57573) cited as *X. arborea* but with spikes only 2 cm. in diameter.

4. *X. media* R. Br., Prodr. (1810) 288; Smith in Rees, Cycl. XXXIV (1818); Kunth, Enum. IV (1843) 649; Lee in Contrib. N.S.W. Nat. Herb. IV (1966) 42-3, 47. A species of wide extent and varied form, characterised by its acauline or occasionally weakly arborescent habit, narrow triangular to quadrangular or broad flat leaves, short-acute to intermediate bracts and obscure cluster bracts, and by its spike distinctly shorter than the scape (often one-half or less).

North Coast and Central Coast, and eastern part of Central Tablelands south-west of Picton, New South Wales; also in coastal Queensland. Presumed hybridism with *X. minor*, q.v., occurs in the Central Coast Division, with *X. johnsonii* in the North Coast and in Queensland (see *X. media* ssp. *latifolia*), and with *X. australis* ssp. *australis*, q.v., in ranges of the North Coast, and also with *X. australis* ssp. *australis* in a considerable area around the Goulburn, middle Hunter and Macdonald Rivers (see *X. media* ssp. *media*).

Since its original description, *X. media* is rarely named in the literature though it is a common plant in the areas treated by Bentham, Muellcr, Bailey and Moore & Betche. Its similarities to *X. resinosa*, *X. johnsonii* and *X. arborea* may have led to confusion with these species but available cited specimens leave the interpretations of these botanists largely speculative.

*X. media* may be divided into two subspecies which show intergradation in the area between the Hunter and Hawkesbury Rivers.

1. Plants acauline, or occasionally arborescent perhaps only in hybrid derivatives. Leaves narrow, often 1.5-2.5 mm. broad and rather thick, triangular or quadrangular in section, sometimes glossy. Chiefly south of the Hawkesbury River .. ssp. *media*.
- 1.\* Plants acauline or arborescent to about 1.5 m. Leaves thin, almost flat, often 3-4 mm. but up to 12 mm. broad, distinctly glossy, bright green. Chiefly north of the Hunter River ..... ssp. *latifolia*.

ssp. *media*. Caudex subterranean or rarely up to about 30 cm. high but sometimes higher in hybrid derivatives from *X. australis* ssp. *australis*, sometimes branched especially in areas affected by bush-fires, but often with one or few shoots. Leaves triangular or quadrangular or rarely rather flat (*depressed-* to *very depressed-obtrullate* or *-obtriangular*) in section, often glossy at least when dried; in the hybrid derivatives sometimes quite strongly quadrangular, less glossy but not greyish as in *X. australis*. Inflorescence very varied in size, ranging from the dimensions seen in *X. minor* to those of *X. arborea*, generally larger in the southern occurrences bordering on the Central Tablelands. Spike usually shorter than, or equal to its scape, but the ratio sometimes reversed in hybrid derivatives from *X. australis*, green at first then dark brown at about anthesis; in the Type locality (Port Jackson of Robert Brown) often 40-80 cm. long and 2.5-3 cm. in diameter, others up to 140 cm. long



and 2–4.5 cm. in diameter. Scape usually smooth, occasionally with some fine wrinkling, or coarser in a few hybrid derivatives, often 90–100 cm. long and 8–12, but up to 27, mm. in diameter. Bracts short-acute to intermediate in form, glabrous or often shortly ciliate and with a few hairs on the back, green at first, then dark brown towards the tip; cluster bracts not prominent after the young bud stage except in hybrid derivatives from *X. australis*. Young fruits somewhat obtuse but apparently variable. Chromosome number:  $2n = 22$  (Darlington and Wylie, Chromosome Atlas of Fl. Pl. (1955) 393).

Central Coast from about Wyong, to adjacent Central Tablelands south-west of Picton, often in dry, rocky or sandy habitats, with a considerable population of presumed hybrid derivatives from this subspecies and *X. australis* ssp. *australis* on the ridges and rocky slopes above the Goulburn, middle Hunter (Central Western Slopes) and Macdonald Rivcrs (these specimens are marked \* in the citations). Summit of Cabre Bald E of Aberdeen, Story No. 7565, 10.1960 (CANB)\*; 3 miles N of Sandy Hollow, Constable 8.1962 (63247)\*; ca. 10 miles E of Howes Valley, Constable 4.1963 (66542)\*; Walker's turnoff, Mt. Wareng-Wollombi road, Constable 4.1963 (66539\*, 66541\*); Rcedy Creek South of Howes Valley, Johnson & Constable, 10.1954 (36608)\*; Mt. Wareng-Wollombi road, Constable 4.1963 (66544)\*; E side of Mt. Wareng on Wollombi road, Constable 4.1963 (66543)\*; head of Colo Swamp, Howes Valley, Constable 7.1963 (64329)\*; Mt. Clandulla, Rylstonc-Glen Alice, McKee 4.1954 (59850)\*; near Putty, Johnson & Constable 9.1959 (48297)\*; between Grassy Hill & Putty, Constable 4.1962 (57576)\*; Grassy Hill on Putty road, Constable 4.1963 (66540)\*; Central Mangrove, Constable 4.1963 (63536)\*; Wyong, Boorman 3.1899 (59852) and 7.1905 (59853); Bateau Bay near The Entrance, Lee 3.1962 (61297); Central Mangrove, Constable 4.1963 (63538); Colo Heights, Constable 4.1963 (71663); 2 miles S of Colo Heights, Constable 7.1963 (64323); 5 miles N of Kulnura, McKee No. 757, 10.1953 (59854); Penang, Gosford, Maidcn & Boorman 10.1902 (59856); Upper Mangrove, McKee No. 753, 10.1953 (59855); Kariong, Constable 2.1958 (46228); near Hawkesbury R., S bank, Lee 2.1962 (61291); Blaxland's Ridge, 10 miles NE of Kurrajong, Constable 4.1963 (63539, 63540, 63541); Yarramundi, Constable 1.1964 (67642); Evans Lookout, Blackheath, Constable 2.1962 (61288); Warrimoo, Constable 2.1954 (59862); Glenbrook to Woodford fire trail, Constable 7.1962 (61675); Hornsby Heights, McDougall 8.1961 (59858); Hornsby Heights, Lee 12.1961 (61284); head of Parramatta R., Betche & Camfield 10.1897 (59864); Tabletop, Wahroonga, Staer 11.1913 (59859); Chcltenham, Johnson 10.1945 (59860); Middle Harbour, Camfield 7.1897 (59861); Port Jackson, Camfield 2.1899 (59865); Como, Camfield 8.1897 (59867); The Oaks, S of Glenbrook, Constable 1.1962 (61289); Heathcote, Constable, 1.1962 (61285); Balmoral, near Hilltop, Lee 4.1962 (57577, 57578); Hilltop, Cheel, 5.1914 (59844); Hilltop, Lee 4.1962 (57579).

ssp. *latifolia* Lee in Contrib. N.S.W. Nat. Herb. IV (1966) 48, 39, 42–3. Caudex subterranean or arborescent usually less than 1 m. high, occasionally taller but perhaps only in plants of hybrid derivation from *X. australis* or *X. johnsonii*. Leaves thin and flexible, nearly flat or the upper surface slightly concave, often 3–7 mm. broad but up to 12 mm., glossy in the fresh or dried state. Inflorescence slender to moderately stout, the scape usually at least twice as long as the spike. Spike often 30–60, or up to 100, cm. long and 15–30 mm. in diameter; scape often 1–2 m. long and 7–20 mm. in diameter, usually smooth. Bracts as in the Type subspecies. Chromosome number:  $2n = 22$  (Briggs, Contrib. N.S.W. Nat. Herb. IV (1966) 27).

North Coast and northern part of Central Coast from Queensland to near Wyong, mostly in coastal flats, "wallum", and low hills. Occasional putative hybrids between *X. media* ssp. *latifolia* and *X. johnsonii* have been observed in coastal Queensland and probably occur on the North Coast of New South Wales (e.g. specimens marked \* below); these tend to show some of the characters of *X. johnsonii* such as a longer spike, perhaps exceeding the scape, or narrower, sometimes very narrow, quadrangular leaves. Large populations apparently derived from hybrids between *X. australis* ssp. *australis* and *X. media* ssp. *latifolia* occur in ranges of the North Coast; they have the habit of *X. australis* ssp. *australis* and are classified with that taxon. Mt. Warning, Rodway 10.1939 (63777); summit of Mt. Warning, Constable 6.1962 (61357); Minyon Falls, Whian Whian State Forest, 15 miles N of Lismore, Constable 10.1961 (61360) and 5.1964 (71648, 71649); Minyon Falls, Johnson & Hayes 6.1957 (61358); 2 miles N of Wardell, Constable 10.1961 (63537)\*; Mt. Mullengen, 4 miles E of Ramornic, Blakely & Shiress 7.1922 (56759); Grafton to Dalmorton, Maiden & Boorman 11.1903 (59827)\*; opposite entrance to Barcoongere State Forest, Constable 5.1962 (61664); Bulahdelah, Cleland 8.1919 (59829); 1 mile W of Monkey-jacket, NW of Tea Gardens, Johnson 10.1957 (59819, in a community grading to *X. minor*);

2 miles W of Karuah, Johnson 10.1953 (59820); 2 miles W of Karuah, Constable 10.1961 (61282); 1 mile E of Karuah, Constable 5.1964 (64593); 2 miles E of Karuah, Constable 5.1964 (64596, 72159); Toronto, Filmer 4.1926 (59821); near Dora Creek, Constable 7.1963 (64322); Morisset, Boorman 9.1899 (59822) and 11.1914 (59823); ca. 2 miles W of Doyalson, Tindale 8.1961 (34429); ca. 10 miles NE of Wyong, Constable 7.1963 (64330); Kanwal, Johnson 10.1953 (59224). Also in Queensland.

5. *X. resinosa* Pers., Syn. 1 (1805) 370; Lec, Contrib. N.S.W. Nat. Hrb. IV (1966) 42-5; see also under the subspecies. A species characterised by its condensed stem (acauline), its spike shorter than the scape and sometimes very short, short-acute bracts tomentose on the lamina, often sparse leaves, and obtuse fruits. Caudex rarely reaching 0.6 m. in height but usually not seen above a few centimetres, except in hybrid derivatives.

Coastal localities from Queensland (ssp. *fulva*) to Victoria (ssp. *resinosa*), and also Blue Mountains (ssp. *resinosa*) and Southern Tablelands (ssp. *concava*) in New South Wales, with hybrid derivatives in the South Coast (see *X. australis*) and in the North Coast (see *X. johnsonii*).

The species described by Moore & Betche, Handb. Fl. N.S.W. (1893) 425, as *X. resinosa* is *X. arborea* R. Br., a quite distinct species though cited there as a synonym for *X. resinosa*: for source of this error see Lee (loc. cit., p. 43, footnote).

*X. resinosa* falls into three subspecies, in the south-east, south-west and northern parts of the specific range respectively.

1. Leaves quadrangular, less commonly triangular in section, 2.5-4.0 mm. broad, rather thick; spikes dark brown from a very early stage. Central and South Coast of New South Wales, and eastern Victoria ..... ssp. *resinosa*.
- 1.\* Leaves usually flattish or triangular in section; young spikes often pale in aspect (greyish to light brown).
  2. Leaves nearly flat but slightly concave above (*very depressed-obtriangular*), 3.5-6.5 mm. broad, very firm in texture; spikes usually about 20 mm. in diameter, soon becoming dark brown. Near Sydney (on higher ground) to Southern Tablelands ..... ssp. *concava*.
  - 2.\* Leaves less firm, usually triangular in section but narrower (2-4 mm.); spikes usually under 20 mm. in diameter, remaining light brown. North Coast of New South Wales to Queensland ..... ssp. *fulva*.

ssp. *resinosa*. Caudex usually showing only a few centimetres above ground, rarely up to 0.6 m., sometimes, but not markedly, branched; in hybrid derivatives from this subspecies and *X. australis* ssp. *australis*, q.v., the caudex attains 1.5 m. Leaves usually quadrangular in section or, if triangular, the upper surface often slightly convex (*depressed-* to *very depressed-obtrullate* or *-obtriangular*), 2.5-4.0, usually 3-3.5, mm. broad and 1-2 mm. thick, green or with a bluish green, not silvery, tint. Spike dark brown from an early stage, shorter than or equal to the scape (except in a few specimens from the Blue Mountains in which the flowering spike markedly exceeds the scape but perhaps only in hybrid derivatives), 17.5-180, mostly 60-120, cm. long, and 2-4.5, usually 2-3.5, cm. in diameter. Scape smooth or with some fine, rarely somewhat coarse and strong, longitudinal wrinkling, 40-212, mostly 70-150, cm. long, 8-29, mostly 10-20, mm. in diameter. Bracts short-acute, the expanded tip usually very short and almost *quadrate-rhombic* in outline, densely tomentose with mid- or dark-brown hairs on the dark bract-tip tissue, the stalk part pale; cluster bracts with similarly short-acute tips, the upturned end very short and obscured at a very early stage of spike growth. Perianth segments white to greenish, the sepals and often the petals tomentose like the bracts. Young fruits obtuse. Chromosome number:  $2n = 22$  (Darlington and Wylie, (as *X. hostile*), Chromosome Atlas of Fl. Pl. (1955) 393; no voucher specimen kept, but

locality of collection on coast near Sydney (p.e. J. T. Waterhouse) confirms identity as *X. resinosa* ssp. *resinosa*);  $2n = 22$  (Briggs, Contrib. N.S.W. Nat. Herb. IV (1966) 27). *X. resinosa* Pers., Syn. I (1805) 370; Bullock, Kew Bull. XIV (1960) 45; Lee, Contrib. N.S.W. Nat. Herb. IV (1966) 42-44. *X. hastile* R. Br., Prodr. (1810) 288; Aiton, Hort. Kew. II (1811) 271; Smith in Rees, Cycl. XXXIX (1818); Kunth, Enum. IV (1843) 649 as "*hastilis*"; W. J. Hooker in Curtis's Bot. Mag. LXXIX (1853) t. 4722; F. Muell., Fragm. IV (1864) 113 as "*hastilis*"; Benth., Fl. Austral. VII (1878) 115 as "*hastilis*"; Moore & Betehe, Handb. Fl. N.S.W. (1893) 425 as "*hastilis*"; Maiden & Betehe, Census N.S.W. Pl. (1916) 42 as "*hastilis*"; Ewart, Handb. For. Trees for Vic. Foresters (1925) 54 and Plate 12 as "*hastilis*"; Williamson in Vic. Nat. XLV (1928) 38 and Fig. 2 as "*hastilis*"; Krause in Engl., Nat. Pflanzenfam. XVa (1930) 315 and t. 121; Ewart, Fl. Vie. (1931) 274 as "*hastilis*"; Willis, Handb. Pl. in Vie. I (1962) 297 as "*hastilis*" (cites other illustrations); see notes below on some applications of the synonym *X. hastile*.

Central Coast and South Coast and eastern part of Central Tablelands, often in coastal hind-dune habitats but also more tolerant of swamp conditions than most of the species. Tesselat Hill, Mt. Irvine, Constable 4.1963 (63545); Blackheath aerodrome, Constable 11.1961 (61332); Blackheath, Staer 11.1913 (59793); Megalong Valley, Constable 4.1963 (63533);  $\frac{1}{2}$  mile W of Katoomba, Constable 1.1962 (61330), 10.1961 (61331) and 11.1961 (61328); Mt. White, SW of Gosford, Johnson 10.1953 (59797); Mt. White, Lee 9.1961 (59798); Terrey Hills, McKee No. 786, 11.1953 (59799); French's Forest, Boorman 5.1914 (26363); French's Forest Cemetery, Johnson 11.1958 (59801); Roseville East, Chadwick 9.1953 (59830, 59831); Middle Harbour, Cleland 9.1918 (59832); Port Jackson district, Boorman 9.1905 (59833); Bellevue Hill near Sydney, Betehe 8.1896 (59834); Centennial Park, Constable 7.1962 (57853); Waverley, Camfield 1896 (59835); Pagewood, Sprague 5.1963 (63534); La Perouse, Betehe 10.1897 (26362); La Perouse, Camfield 10.1897 (59837); La Perouse, Boorman 5.1914 (59836); Loftus, Camfield 9.1895 (59838); Heathcote, Briggs 5.1964 (68995); boundary of Heathcote and Waterfall, Constable 9.1963 (64327, 64328); Helensburgh, Constable 1.1962 (61334); plateau W of Coalcliff, Johnson 5.1951 (59839); plateau W of Scarborough, Johnson 4.1953 (59840); Robertson's Lookout W of Wollongong, Chadwick 9.1953 (59841); Carrington Falls, Constable 1.1955 (32233); top of Barren Grounds, S of Robertson, Constable 7.1964 (71650). Also in Victoria.

The description under *X. hastile* in J. D. Hooker, Fl. Tas. II (1860) 59 (quoting a manuscript of Gunn) applies to *X. australis* and not to any part of the present species.

The description given for *X. hastilis* by Bentham (loc. cit.) indicates that some of his material with broader, flatter leaves may have been ssp. *concava*. The concept expressed by *X. hastilis* in Moore & Betehe (loc. cit.) and Maiden & Betehe (loc. cit.) was derived from specimens of all three subspecies then in the National Herbarium.

In New South Wales and Victoria this subspecies is the plant from which resin has most commonly been obtained. Its resin is yellow, in distinction from a darker red or brown in most of the other species. It was known to the earliest colonists as the plants were common on sandhills which then stretched from Botany Bay to Bondi and some distance inland, and they coined the name "Yellow Gum Tree" or "Yellow Resin Tree" (see J. White, Journal of a Voyage to New South Wales (1790) 235, 249). The epithet "tree" derived from White's confusion of the arborescent *X. arborea* with the yellow-resin-producing *X. resinosa*. White records that he found it useful in treating a diarrhoea which was prevalent among his charges. The aborigines were already using it to assist in sticking together parts of their spears, and the colonists later used it as a varnish or stain. There have been later moves, always short-lived, to develop its use in industry, and though it can be used in the manufacture of picric acid and was believed to have reached enemy hands for this purpose in the 1914-18 war, it is unlikely to have been used to any extent for this purpose as phenolic materials were soon found to be more economic. See also Maiden, Useful Native Plants (1889) 231-4; F. Muell., Select Extratropical Plants (1891) 522.

ssp. *concava* Lee in Contrib. N.S.W. Nat. Herb. IV (1966) 45. Differs from the Type in its broader, flatter or concave leaves, often dull bluish green in aspect, slightly twisted and rather sparse. Caudex almost always entirely subterranean; leaves triangular (very *depressed-obtriangular*) in section, the upper surface often slightly concave, 3.5-6.5, usually 3.5, cm. broad, firm and tough; spikes distinctly shorter than their scapes, 15-150, usually 50-90, cm. long, about 20 mm. in diameter; scapes smooth or nearly so, 50-250, usually 100-200, cm. long and about 10 mm. in diameter; mature spikes dark brown but at least sometimes grey or fawn when young, the bracts, flowers and fruits as in the Type subspecies.

Central Coast from near Sydney to South Coast, south-eastern part of Central Tablelands and eastern part of Southern Tablelands. Parramatta R., Boorman 11.1914 (59803); Observatory Park, Pennant Hills, Lee 12.1961 (61309); between Wahroonga and Warrawee, Blakely 11.1914 (59802); Ingleburn, Boorman 11.1914 (59804); Thirlmere, Lee 12.1961 (61299); Tahmoor, Constable 1.1956 (39883); Buxton, Lee 12.1961 (61300); Nepean Dam, Bargo, Constable 12.1953 (59805); Bargo R. via Hilltop, Cheel 10.1914 (59808); Hilltop, Cheel 10.1914 (59810) and 1.1915 (59809); Hilltop, Lee 12.1961 (61301); ea. 5 miles NW of Mittagong, Lee 10-11.1961 (59811); Kangaloon Valley, Constable 1.1963 (63535); Robertson, Hadley 12.1939 (61304); 1 mile NE of Uringalla Ck., Paddy's R. to Marulan, Johnson 1.1954 (59812); Wogamia near Nowra, Rodway 10.1927 (61306); Waggamia, Shoalhaven R., Rodway 6.1932 (61305); 2 miles S of Nowra, Constable 1.1962 (61302); Windellama, ea. 20 miles SE of Goulburn, Briggs 12.1961 (61298); Charleyong, SW of Nerriga, Rodway 6.1935 (61307); Merimbula, Hoogland No. 7722, 10.1960 (CANB); Merimbula, McKee No. 6919, 1.1960 (59806); Nungatta Mt., SSE of Bombala, Constable 8.1963 (64324); Timbilliea, Constable 8.1963 (71664).

This subspecies appears to have been part of the collection from which Bentham and Moore & Betche drew up their descriptions of *X. hastilis* (see under ssp. *resinosa*); the same applies to the entry in Maiden & Betche, Census N.S.W. Pl. (1916) 42.

ssp. *fulva* Lee in Contrib. N.S.W. Nat. Herb. IV (1966) 45. Differs from the Type in its light coloured and usually more slender spikes, and from ssp. *concava* in its thinner and narrower leaves; spikes generally more slender than in either of the other subspecies. Caudex subterranean or very short, but up to 2.5 m. in hybrid derivatives (see *X. johnsonii*). Leaves usually triangular (*very depressed-obtriangular*) in section, often slightly concave above. 2-4 mm. broad, sometimes very thin and thus almost flat, often with a slightly bluish green tint. Spike usually 10-60 cm. long and 12-29, usually 12-20, mm. in diameter, the bract surface greyish or fawn coloured but sometimes covered in the fruiting stage by the blackened, persistent stamens and perianths; seape slender, smooth or finely wrinkled, 20-160, usually 20-60, cm. long and 6-19, usually 7-9, mm. in diameter, longer than its spike.

North Coast and northern part of Central Coast, in sandy soils or in peaty or swampy situations. Presumed hybrid derivatives from this subspecies and *X. johnsonii*, q.v., occur in the North Coast where a hybrid swarm has been observed, and on Stradbroke Island, Queensland. Cudgen Lake, 10 miles E of Murwillumbah, Constable 5.1962 (61665); Tweed R., Forsyth 11.1898 (56783); Byron Bay, Phillips 8.1963 (64325); Bareoongere State Forest, 10 miles SE of Grafton, Constable 4.1956 (56786); Bareoongere State Forest, ea. 6 miles N of Corindi, Constable 11.1956 (56785); Corindi to Red Rock road, Constable 10.1961 (61337); Coff's Harbour, Constable 10.1961 (61666) and 5.1964 (64595); Hat Head to Kinchela Creek, Johnson 1.1962 (61336); Hastings R., Dr. Beckler (MEL); Lake Cathie NNE of Kew, Constable 5.1964 (64598); near Heron's Creek, Constable 5.1964 (64589); N of Booti Booti, Johnson 10.1953 (59795); Morisset, Boorman 9.1899 (56788, 59796); Wyong to Warnervale, Salasoo No. 1624, 10.1958 (56789); (the last five specimens show some degree of intergradation with the Type subspecies). Also in Queensland.

It may be inferred that the plant from Endeavour River described and illustrated in Banks & Solander, Ill. Bot. Cook's Voy. III (1905) 95 and Pl. 315, belongs to ssp. *fulva*. The description under *X. hastilis* in F. M. Bailey, Qld. Fl. V (1902) 1665, and the entry by the same author in Compr. Cat. Qld. Pl. (1913) 566, would also apply to this subspecies which is the only one occurring in Queensland.

6. *X. minor* R. Br., Prodr. (1810) 288; Aiton, Hort. Kew. II (1811) 271; Smith in Rees, Cycl. XXXIX (1818); Kunth, Enum. IV (1843) 649; Hook. f., Fl. Tas. II (1860) 59; F. Muell., Fragm. IV (1864) 112; W. J. Hooker in Curtis's Bot. Mag. CIII (1877) t. 6297; Benth., Fl. Austral. VII (1878) 114; Tate, Handb. Fl. Extratrop. S. Austral. (1890) 173; Moore & Betche, Handb. Fl. N.S.W. (1893) 425; Rodway, Tas. Fl. (1903) 219; Maiden & Betche, Census N.S.W. Pl. (1916) 42; Beuhne in Journ. Dept. Agric. Vic. XV (1917) 114 and Fig. 63; Ewart, Fl. Vic. (1931) 274; Williamson in Vic. Nat. XLV (1928) 38 and Fig. 2; Willis, Handb. Pl. in Vic. I (1962) 296; Lee in Contrib. N.S.W. Nat. Herb. IV (1966) 39-43, 46. An acauline species with a frequently branched but subterranean caudex, rather short leaves and small slender inflorescences. Leaves green, triangular in section (*depressed- to very*

*depressed-obtriangular*) with the upper surface usually slightly concave, 1.5–4.5, usually 2–2.5, mm. broad and 1 mm. thick. Inflorescences small and slender, often several on the caespitose plants (up to 36 have been recorded on one plant in Tasmania by W. J. Hooker, loc. cit.). Spike bright green at first, then brown near anthesis, 2.5–22, usually 5–12, cm. long, and about 10–15 mm. in diameter, much shorter than the slender scape which is usually 25–50 cm. long and only 2–5 mm. in diameter and almost smooth to quite deeply wrinkled longitudinally. Bracts short-acute to intermediate, glabrous or with a few hairs; cluster bracts apparent only in the young bud stage. Young fruit obtuse, the points 1–2 mm. long. Chromosome number:  $2n = 22$  (Briggs, Contrib. N.S.W. Nat. Herb. IV (1966) 27. *X. bracteata* R. Br., Prodr. (1810) 288. Smith in Rees, Cycl. XXXIX (1818); Kunth, Enum. IV (1843) 649; this is an equivalent synonym and the plants are not typical *X. minor*, q.v., in Lee, loc. cit. p. 46.

Southern part of North Coast, and Central Coast, mostly on clay or lateritic soils. 1 mile W of Monkeyjaeket, NW of Tea Gardens, in community showing gradation to *X. media*, Johnson 10.1953 (59868); Castlereagh State Forest, 4 miles W of Windsor, Maiden 10.1917 (59879); Riekaby's Creek, 7 miles S of Richmond, Constable 1.1964 (67651); Blue Mts., ? Betehe (61281); Glenbrook, Forsyth 10.1897 (25003); Parramatta, Betehe 10.1881 (59871); Parramatta, Camfield 10.1894 (59873); Parramatta, Cheel 10.1900 (59872); Gladesville, Deane 11.1906 (59876); Liverpool, Boorman 11.1897 (24972, 59875); Liverpool to Heathcote road, Evans 10.1961 (59878); East Hills, McKee No. 789, 11.1953 (59874). In addition, the following specimens are regarded as belonging to *X. minor* but tend to have larger inflorescences and occasionally quadrangular leaves and thus approach the condition in *X. media*: Wallaby Creek, 49 miles by road N of Windsor, Constable No. 4279, 7.1963 (64334); Milson Is., Cleland 11.1913 (59869); Parramatta, Betehe 9.1894 (59846); Parramatta R., Boorman 5.1914 (59845); Mulgoa, Boorman 11.1908 (59848); Panania, Johnson 10.1946 (59847); Oatley, Camfield 10.1897 (59866); Macquarie Fields, Boorman 10.1914 (59849). Also in Victoria, South Australia and in Tasmania where it shows apparent hybridism with *X. australis* ssp. *australis* (see Lee, loc. cit., pp. 39, 42, 46, 51).

The description under *X. minor* in F. M. Bail., Qld. Fl. V (1902) 1664, and the citations by Bailey in Compr. Cat. Qld. Pl. (1913) 566 and by Domin in Bibl. Bot. Heft 85<sup>1</sup> (1915) 52, probably refer to some of the smaller plants of *X. media*, but may be partly derived from *X. johnsonii*.

The name *X. bracteata* has been applied by Bentham (loc. cit. p. 116) to specimens probably belonging to *X. johnsonii* and *X. media* ssp. *latifolia* (see Lee, loc. cit. pp. 47, 50–51). The description under *X. bracteata* by Bailey (loc. cit. p. 1665) is mixed, and probably derived in part at least from *X. johnsonii* (see Lee, loc. cit.).

**7. *X. macronema* F. Muell. ex Benth.**, Fl. Austral. VII (1878) 113; Moore & Betehe, Handb. Fl. N.S.W. (1893) 425; F. M. Bail., Qld. Fl. V (1902) 1664; F. M. Bail., Compr. Cat. Qld. Pl. (1913) 566; Maiden & Betehe, Census N.S.W. Pl. (1916) 42; (all the preceding as *X. macronema* F. Muell.); Lee in Contrib. N.S.W. Nat. Herb. IV (1966) 35, 38, 54. Acauline, the caudex sometimes branched underground and then bearing a number of flowering shoots. Leaves rather flexible, about 1 m. long, green, shining and drying glossy, with a strong abaxial angle and several unequal ribs and grooves adaxially, the margins noticeably rough to the touch, triangular in section (*depressed- to very depressed-obtriangular*), 3–4 mm. broad, 1–2 mm. thick at the abaxial angle. Scapes much longer than the spikes, slender and flexible, up to 210 cm. long, often about 100 cm., and only 3–7, often about 4, mm. in diameter, smooth, often glaucous at least when young. Spikes small, 3.5–16 cm. long, about 2 cm. in diameter, or up to 5 cm. from tip to tip of the spreading stamens, the cluster bracts somewhat long-acute but obscured by the long flowers and so not prominent, the floral bracts short-acute though sometimes with a short, fine point, glabrous. Sepals often 5 mm. long, about as long as the bracts, scarious, brownish, exceeded by the cream or greenish white petals with their expanded acute apical lobes scarcely reflexed, the whole petal about 8 mm. long. Stamens not reflexed at anthesis, about 2 cm. long, projecting about 1 cm. beyond the perianth and more or less equal to

the pistil; ovary ribbed, often ripening only one seed, the sterile carpels becoming crushed; fruits very long-pointed from the persistent long style bases, about 1 cm. long. Chromosome number:  $2n = 22$  (Briggs, Contrib. N.S.W. Nat. Herb. IV (1966) 27).

North Coast and Central Coast in forest country. Boyd's Bay, Tweed R., White 11.1929 (BRI 029125); Cudgen, White 1.1934 (BRI 029123); Whian Whian State Forest, Constable 5.1964 (64592); Byron Bay, Maiden & Boorman 11.1903 (56768); Byron Bay, Boorman 9.1909 (56767); Lennox Head, N of Ballina, Davis 1.1952 (56769); Ballina, Bäuerlen 6.1891 (56770); Richmond R., Betche 8.1884 (56771); Richmond R., Hodgkinson 1874 (MEL *bis*; another without date); opposite the entrance to Barcoongere State Forest, 14 miles S of Grafton, Constable 5.1962 (61333); Corindi to Red Rock road, Constable 10.1961 (61279); Orara East State Forest, ca. 8 miles NW of Coffs Harbour, Constable 5.1956 (56772); Bucca Creek, Boorman 11.1912 (56773); 25 miles W of Bowraville, Borger 1.1962 (61280); Taylor's Arm road, Macks-ville, Cann 1.1959 (56774); Hat Head, Johnson 10.1953 (7122); Hastings R., Dr. Beckler (MEL); Kendall State Forest, Kew, Constable 5.1964 (64591); Failford to Forster, Maiden 6.1895 (56675); N of Booti Booti, Johnson 10.1953 (7084); Tait's Hill, Myall Lakes, Earp 1.1964 (64331); Boolambayte, Myall Lakes, Constable 1.1952 (23594); Bulahdelah, Rupp 11.1923 (56776); Crawford R., Cheel 10.1902 (56777); Karuah road, 3 miles E of Karuah, Constable 10.1961 (61277); Tahlee to Karuah road, about 2 miles E of Karuah, Constable 10.1961 (61276); Wyong, Boorman 12.1897 (24940); Tuggerah, Boorman 12.1897 (56778); Bateau Bay near The Entrance, White 12.1961 (61278); near Helensburgh, Salasoo No. 1542, 12.1957 (56780); Lilyvale to Burning Palms, Robinson (56781). Also in Queensland.

## 2. LOMANDRA Labill.

Mostly tufted plants with rather short, ascending rhizomes and restricted aerial stems, a few decumbent with creeping leafy stems. Leaves linear and usually tough, flexible or rigid, terete to flat, canaliculate or more or less rolled, the apex entire or toothed, the base with scarious or chartaceous margins often showing characteristic colour and laceration. Inflorescence (measured in the descriptions below from the lowest flower or branch) from obscure among the leaf bases to long-pedunculate, but rarely exceeding the leaves, consisting of a spike, raceme or panicle of single flowers or of clusters, or a globular to cylindrical head or segmented head, the cluster and the head being condensed branch systems; each branch of the inflorescence, including those condensed into clusters, subtended by broad-based and acute "cluster bracts" showing gradation, by progressive shortening and broadening towards the apex of each branch system, into the ultimate floral "bract" and "bracteole"; male inflorescence usually larger than the female; female inflorescence similar to or different in form from that of the male. Flowers small, dioecious, sessile or pedicellate, each subtended by an ultimate floral "bract" and usually bearing close above it but on the pedicel (when pedicellate) a "bracteole". Male flowers with six perianth segments in two nearly similar whorls, the outer three often slightly thinner than the inner, all free from the thickened receptacle, or all united to the middle, or the outer three free and the inner united in a tube for half their length; stamens six, the filaments of the inner whorl often expanded and fused with the perianth segments, those of the outer whorl free, or all seated near the mouth of a tubular perianth; rudimentary ovary sometimes present, perhaps always in the young bud. Female flower often a little longer or larger than the male, the perianth segments usually free and all similar, hardening with age; ovary usually sessile, more or less trilobed, the three loculi each with a single ovule on an axile placenta, the style short or absent with three short, thick, recurved stigmatic lobes. Capsule globular to tetrahedral, smooth, wrinkled or longitudinally striate, with loculicidal dehiscence, the hardened perianth usually persistent at its base.

A genus of xeromorphic perennials with about 40 species in Australia, 21 in New South Wales, and one each in New Caledonia and New Guinea.

The common names "Mat Rush", "Iron Grass" and "Cocky's Bootlace" have been applied to various species. They are occasionally eaten by stock but generally regarded as useless weeds. A glucoside has been extracted from the fruits of one species (*L. longifolia*) and this and one other (*L. multiflora*) have been suspect in cases of stock poisoning.

Chromosome numbers, where stated, are the work to date of B. G. Briggs, who is continuing this investigation.

1. Perianth segments of the male flower all free from the base which may be slightly thickened or expanded.
2. Flowers in a spike, raceme or panicle, singly or 2-3 together, each subtended by a floral bract and, usually, a bracteole; flowers pedicellate except in *L. sororia*.
3. Flowers all sessile; bract and bracteole both usually distinct, narrow, pale to white, not orange-brown or yellowish as in reduced forms under 2\* .. *L. sororia* 1.
- 3.\* Male flowers pedicellate, the females shortly so.
  4. Flowers large (3-6 mm. long), open-campanulate; bracts and bracteoles scarious, conspicuous ..... *L. effusa* 9.
  - 4.\* Flowers smaller, the males 1-2.5 mm., the females 2-3 mm. long; bracts not usually conspicuous, except in *L. bracteata* and *L. filiformis* ssp. *flavior*.
  5. Male inflorescence a panicle with scabrid branches, the flowers campanulate or open, borne singly or in pairs and then of different ages so that only one may appear; perianth segments thin, much mottled with purple, finally reflexed from the stamens. Female flowers larger, open-campanulate ..... *L. micrantha* 7.
  - 5.\* Male inflorescence a raceme or panicle, the flowers campanulate to globular, more or less enclosing the stamens, singly or in irregular groups of 2-3, on the smooth to scabrid branches; perianth segments with only a minute tip reflexed, the inner whorl thick, usually all yellow, the outer thinner, pale and more or less marked with purple. Female flowers similar or narrower.
  6. Male and female inflorescences similar, obscure among the leaf bases. Floral bracts large, white, broadly sheathing, enclosing the pedicel and often the flower as well .. *L. bracteata* 8.
  - 6.\* Male and female inflorescences dissimilar but not markedly, not obscure among the leaf bases except in the female of *L. filiformis* ssp. *flavior*. Floral bracts shorter and narrower, only those bracts subtending branches of the inflorescence sometimes large, white and sheathing.
  7. Leaves cylindrical to semicylindrical, or if flattened then distinctly thicker towards the centre, the apex entire. Inflorescence usually paniculate, the peduncle about as long as the panicle, the rachides usually smooth.
  8. Leaves cylindrical to semicylindrical, often twisted, few in the shoot but with several scale leaves below them, the leaf bases at first purple to brown then pale. Male inflorescence paniculate or racemose, usually about 8-15 cm. long ..... *L. cylindrica* 3.
  - 8.\* Leaves plano- or slightly concavo-convex, thick, purplish at the base, with very little or no twisting near the apex, several in each shoot; male inflorescence paniculate, usually large and open, often over 20 cm. long ..... *L. gracilis* 4

- 7.\* Leaves flat or more or less rolled (sometimes into a complete cylinder) or folded, rather thin or more or less uniformly thick, toothed or entire at the apex. Inflorescence a small raceme to a large panicle, the peduncle very short to long, the rachides smooth to scaberulous.
9. Plants small, often about 15 cm. high, forming dense tufts. Leaves slightly inrolled, 5-23 mm. long, 0.5-1 mm. broad, the apex acute, entire. Inflorescence a raceme or small panicle of rather broad, well-spaced flowers becoming blackish after long drying, the rachis quite smooth. . . . . *L. brevis* 5.
- 9.\* Plants very small to large, the leaves correspondingly short to long; leaf apex toothed when young except in the very finest leaves and in some *L. laxa*. Inflorescence from a very small raceme to a short- or long-pendunculate, dense or open panicle, the rachis smooth to scaberulous, the flowers white or yellow, drying pale to brownish, not black.
10. Plants usually decumbent with short leafy stems, sometimes tufted. Leaves flat, thin, mostly 2-3 mm. broad, the apex tapered and soon eroded-entire, or with 2 marginal teeth exceeding a small central point. Male inflorescence a panicle with well-spaced, whitish, thin-textured, almost globular flowers 1.5-2 mm. long on pedicels not longer than the flowers, the rachis entirely smooth; female flowers 3-4 mm. long in shorter panicles, on short pedicels . . . . . *L. laxa* 6.
- 10.\* Plants tufted. Leaves very narrow to 4 mm. broad, thin and more or less inrolled to thicker and slightly inrolled to flat, the apex toothed except in the narrowest leaves, but often eroded in the broader ones. Male inflorescence a raceme or panicle various in size, the rachis slightly scaberulous at least near the tip, rarely smooth; male flowers yellow or with some purplish marking on the rather thick segments, mostly 1.5-2 mm. long and broad, and shorter than the 2-4 mm. pedicel; female flowers 2-3 mm. long in smaller inflorescences and on shorter pedicels . . . *L. filiformis* 2.
- 2.\* Flowers in distinct clusters, rarely reduced to few or single flowers but then sessile and subtended by cluster bracts (often long- or fine-pointed) in addition to the floral bracts and bractcoles; clusters in a spike or panicle.
11. Male flowers pedicellate, or if sessile or subsessile then the cluster bracts firm in texture below regularly spaced clusters, deltoid to narrow-deltoid and not usually conspicuous.
12. Male flowers distinctly though sometimes very shortly pedicellate.
13. Pedicel of mature male flowers 8-10 mm. long, the flower 2-3 mm.; inflorescence a small spike to large panicle of clusters, more often a spike in the female, the clusters often 1-2 cm. apart . . . . . *L. multiflora* 15.
- 13.\* Pedicel of mature male flowers only 0.3-1 mm. long, the flower 4-6 mm.; inflorescence a large open panicle of clusters often more than 2 cm. apart . . . . . *L. patens* 16.
- 12.\* Mature male flowers 2-3 mm. long, sessile or almost so, very rarely with pedicels up to 2 mm. long; inflorescence a rather short, broad, dense, conical panicle of clusters often 1 cm. or less apart . . . . . *L. dura* 17.



- 11.\* Male flowers sessile or subsessile, the cluster bracts conspicuous, spreading, acicular-tipped or linear or, in a few groups with reduced clusters, the cluster bracts chaffy in texture and coloured like the floral bracts, with or without an acicular tip, less conspicuous.
14. Male inflorescence a panicle of clusters or, if rarely spicate, then the clusters reduced to few or even one flower. Leaves very narrow to broad, the apex with two marginal teeth often but not always exceeding a central point in the sinus. Tufted or decumbent plants of various habitats.
15. Plants with condensed stems forming often large clumps. Leaves firm to rigid.
16. Leaves broad (usually 5-10 mm., rarely less than 2 mm. broad), more or less flat, the apex two- or three-toothed, the base-margins orange to yellowish brown. Peduncle longer or shorter than the panicle and cluster bracts conspicuous, or rarely the inflorescence a spike or narrow panicle of reduced clusters sometimes with inconspicuous cluster bracts ..... *L. longifolia* 10.
- 16.\* Leaves narrower (usually 1-2 mm. broad), somewhat inrolled, the apex commonly two-toothed, the base-margins dark reddish to dark brown. Peduncle at maturity distinctly longer than the panicle with conspicuous cluster bracts ..... *L. fluviatilis* 11.
- 15.\* Plants with more or less decumbent, leafy stems, or if tufted then the peduncle shorter or not much longer than the panicle (except in ssp. *leptostachya* where the stems are tufted and peduncle longer than the inflorescence as in *L. fluviatilis* but leaves are very narrow (up to 1.5 mm. broad) and the inflorescence frequently spicate with clusters reduced to few or single flowers). Leaves 0.3-2.5 mm. broad, more or less inrolled or nearly flat, usually two-toothed with a point in the sinus, rather lax ..... *L. confertifolia* 12.
- 14.\* Inflorescence a spike of many-flowered, regularly whorled clusters on a long peduncle, very rarely with one or two short branches at the base. Leaves 2-12 mm. broad, the apical point usually exceeding the small lateral teeth. Tufted plants of rainforest or gully habitats.
17. Leaves broad (4-12 mm.), flat or nearly so. Male spike about 10-30 cm. long with conspicuous cluster bracts usually more than 10 mm. long; fruity fleshy at first, turning red. Northern rainforests ..... *L. spicata* 13.
- 17.\* Leaves narrower (2-4 mm.), slightly inrolled, irregularly rolled or folded in dried specimens. Male spike 4-7 cm. long, with cluster bracts of 4-12 mm. sometimes obscured by the clusters; fruit not known. Rainforests and gullies of the Blue Mountains ..... *L. montana* 14.
- 1.\* Male flower with the perianth segments of both whorls or at least of the inner whorl fused for half their length; female flower with perianth segments free or partly fused.
18. Male flowers in spikes or panicles of discrete clusters, the females in a shortly pedunculate to subsessile globular head; floral bracts and bracteoles short, broad, intact or almost so; perianth segments all joined in a tube.
19. Stems extensively decumbent with regularly spaced short leaves characteristically twisted or recurved. Leaves usually 2-4 cm. long, 1-2 mm. broad, with white, auriculate base-margins showing little laceration except when old ..... *L. obliqua* 20.
- 19.\* Stems condensed, or shortly decumbent with the leaves often crowded near the apex. Leaves usually at least 8 cm. long, 1-1.5 mm. broad, the base-margins decurrent or only slightly auriculate, soon lacerate into fibres.

20. Leaves nearly plano-convex, noticeably thicker towards the centre, 30–70 cm. long, the lacerate base-margins usually pinkish-brown. Male inflorescence a spike of clusters, sometimes very crowded, much shorter than the leaves; female inflorescence usually a single head, rarely segmented into two. Stem very condensed . . . . . *L. elongata* 19.
- 20.\* Leaves flat or concavo-convex, 3–30, often 8–20, cm. long, the lacerate base-margins pale, or rarely pinkish when young and dark brown when old. Male inflorescence a spike, or usually a panicle, of clusters, about half as long as the leaves but sometimes longer or shorter; female flowers in a single head. Stem usually shortly spreading, decumbent . . . . . *L. glauca* 18.
- 18.\* Male and female flowers in congested globular to cylindrical heads, commonly intact in the females and segmented into 2–6 parts in the males, on a rather long peduncle; floral bracts and bracteoles fringed and fragmenting into hairs; outer perianth segments free, inner segments joined for half their length . . . . . *L. leucocephala* 21.

1. *L. sororia* (F. Muell. ex Benth.) Ewart in Proc. Roy. Soc. Vic. n.s. XXVIII (1916) 219 as to Lectotype (see Lee, Contrib. N.S.W. Nat. Herb. III (1962) 162); Williamson in Vic. Nat. XLV (1928) 35 and Fig. 2a; Ewart, Fl. Vic. (1931) 278; Willis, Handb. Pl. Vic. I (1962) 298, 302; Lee, loc. cit.: see notes below on some applications of this name. Rather short small-tufted plants with shortly creeping rhizomes. Leaves narrow-linear, from 2 mm. broad and flat to narrower and folded or rolled, or semiterete or terete (about 1 mm. diam.), 5–30 cm. long, the margins and often the edges of the grooves scaberulous, the bases with rather short membranous margins, pale to purplish brown without much laceration, the apex shortly pointed or with 1–3 irregular short teeth soon eroding. Inflorescence a spike or small panicle of sessile flowers sometimes irregularly clustered, 3–9 cm. long, much shorter than the leaves, the branches usually few and short, the peduncle equal to, or usually shorter than, the panicle and often scarcely exceeding the leaf bases, the females shorter and less branched than the males. Male flowers 1–2 mm. long, almost globular, similar to those of *L. filiformis* but sessile and erect, often dark with purplish colouration in the outer segments; floral bract often equal to the flower in length, or shorter in the upper flowers and longer in the lowest, the bracteole lateral and very small, both membranous and lanceolate. Female flowers very similar, but with the tips of the perianth segments standing erect or reflexed, the ovary deeply narrow-lobed. Fruit yellowish, coarsely wrinkled, nearly spherical, about 4 mm. long. *Xerotes sororia* F. Muell. ex Benth., Fl. Austral. VII (1878) 100 as to Lectotype, excluding the Queensland and Mt. McIvor (Vic.) syntypes.

Known chiefly from south-eastern South Australia and western Victoria, but apparently also extending into Western Australia. Although recorded for New South Wales (Moore & Betche, Handb. Fl. N.S.W. (1893) 425; Maiden & Betche, Census N.S.W. Pl. (1916) 42) there are no specimens from this State in Australian herbaria, and its distribution suggests that it is unlikely to be found in New South Wales.

Williamson's (loc. cit.) concept of this species was mixed, since he included, as well as *L. sororia*, specimens of *L. filiformis* (Mt. McIvor) and *L. cylindrica* (Hilltop). Ewart's description, in Fl. Vic., is inaccurate for *L. sororia*, being derived largely from syntypes not conspecific with the Lectotype.

Black (Fl. S. Austral., ed. 2 (1943) 189) has applied the name of a related Western Australian species, *L. caespitosa*, to *L. sororia* in South Australia.

2. *L. filiformis* (Thunb.) J. Britt. in Banks & Sol., Ill. Bot. Cook's Voy. III (1905) 95 (see below); Lee in Contrib. N.S.W. Nat. Herb. III (1962) 151; see also under ssp. *filiformis*. Plants usually tufted with condensed stems and rhizomes, very rarely a little more extensive and decumbent. Leaves of various sizes and shapes but usually several to many on each shoot, smooth or variously scaberulous, flat or

somewhat inrolled, the apex minutely toothed except in the very narrowest leaves, but eroding early in some broader leaves, the sheathing bases usually with white or pale margins showing little laceration at least for some time. Male inflorescence a raceme or panicle of varying size, with nodding, pedicellate, globular to campanulate flowers borne singly in the axils of usually small, membranous bracts. Female flowers slightly longer, on short, sometimes more erect pedicels in a similar but more limited inflorescence. Fruit globular or ovoid, wrinkled with age, about 4–5 mm. long with the hardened perianth persisting at its base. Flowering in Spring to early Summer.

Common in open forest of Coast, Tablelands and Western Slopes, occasional on Western Plains; also in Queensland and Victoria.

This highly variable species, closely approaching *L. cylindrica*, *L. laxa*, *L. gracilis* and *L. brevis*, displays a number of variants with some geographical correlation, treated as the subspecies below. As here circumscribed, it contains specimens yielding several chromosome numbers, and cytological studies on the complex are being continued (B. G. Briggs, p.c.).

In New South Wales all the subspecies are present, ssp. *filiformis* showing greater development in the northern half of the State and in Queensland; in Victoria ssp. *coriacea* appears to be dominant; ssp. *flavior* is known at present only from a few specimens from the North and Central Western Slopes, and Central Tablelands near Orange.

1. Leaves slightly folded to inrolled, rarely flat and narrow, usually under 3 mm. broad, the apex 2- or 3-toothed, or rarely acuminate-entire when very narrow, smooth or slightly scaberulous on the margins and rarely also abaxially. Male inflorescence various, the rachides smooth, or more or less scaberulous distally.
  2. Male inflorescence a small raceme to a small or larger panicle, the flowers not usually close, subtended by rather small bracts, the rachides not particularly robust nor markedly yellow, smooth, or scaberulous distally; female inflorescence like the male but shorter and less branched. Leaves often lax, folded, rolled or rarely flat and stiffer, not yellowish green. Chiefly from central to northern New South Wales and Queensland . . . ssp. *filiformis*.
  - 2.\* Male inflorescence a short, dense panicle, the flowers close on slender, straw-coloured, smooth rachides, the subtending bracts large, thin, white or pale; female inflorescence short and sometimes obscure among the leaf bases but much branched. Leaves tough and stiff, inrolled, with a yellowish aspect, at least in dried specimens. New South Wales: Manilla, Orange, Molong . . . ssp. *flavior*.
- 1.\* Leaves flat or nearly so, broader (about 3 mm.), tough, often scabrid on the margins and abaxially but sometimes the surface quite smooth and the marginal asperities almost microscopic, the apex usually rounded and entire but perhaps at first with 1–3 easily eroded teeth. Male inflorescence a panicle usually less than half as long as the leaves with spreading scabrous branches often strongly yellow in colour and rather robust, with widely spaced flowers; female inflorescence shorter and less branched. Chiefly in the southern half of New South Wales, and in Victoria and Tasmania . . . ssp. *coriacea*.

ssp. *filiformis*. Plants of very varied size with a condensed rhizomatous stem, very rarely extending into a leafy aerial stem a few centimetres long, bearing narrow shoots commonly 5–10 mm. in diameter with numerous leaves (about 10–20), sometimes forming extensive mats. Leaves commonly 10–30 cm. long and 0.5–2 mm. wide with 3–15 veins, inrolled (often into a complete circle) or, if very narrow, then slightly folded, their bases pale, or pink, brown- or purple-tinted in the young state, with usually slight laceration of the base-margins but occasionally torn into brownish fibres; leaf apex almost invariably with three irregular minute teeth eroding with age, only the narrowest simply acuminate; margins and underside smooth or rarely scaberulous; interfascicular sclerenchyma present abaxially as in the Type, or absent. Male inflorescence a raceme or a narrow panicle with few, short branches, from 3 cm. long (Type 4.5 cm.) to longer (about 20 cm.) and more spreading with

numerous branches, narrower in axillary than in terminal shoots, often standing half to two-thirds as high as the leaves on a peduncle slightly shorter than the panicle, the rachides smooth to moderately scaberulous, often smooth below and slightly rough distally; female inflorescence less branched and fewer flowered than the male, the peduncle often longer than the panicle. Male flower globular-campanulate, 1-2.5 mm. (usually 1.5-2 mm.) long, on a slender curved pedicel often longer than the flower and up to 4 mm. long, subtended by a white membranous bract of about 1 mm. and sometimes a minute, often obscure bracteole lateral to the bract; perianth segments free to the thickened receptacle simulating a short tube, the outer thin, cream with a darker or greenish central area, distinctly shorter than the thick, yellow, inner ones. Female flower longer (2-3 mm.) on a short, less recurved to almost erect pedicel often under 1 mm. long and shorter than the bract, the outer perianth segments thicker than and firmly enclosing the inner; abortive anthers sometimes present; stigmatic lobes sessile on the ovary. *Dracaena filiformis* Thunb., Diss. bot. de *Dracaena* (1808) 4. *Xerotes filiformis* (Thunb.) R. Br., Prodr. (1810) 261; Smith in Rees, Cycl. XXXIX (1818); Kunth, Enum. III (1841) 373; Benth., Fl. Austral. VII (1878) 103; F. M. Bail., Qld. Fl. V (1902) 1662, and Compr. Cat. Qld. Pl. (1913) 565; Domin in Bibl. Bot. XX, Heft 85<sup>1</sup> (1915) 526; Maiden & Betche, Census N.S.W. Pl. (1916) 42. *X. denticulata* R. Br., loc. cit.; Smith in Rees, loc. cit.; Kunth, loc. cit. *X. tenuifolia* R. Br., loc. cit.; Smith in Rees, loc. cit.; Kunth, loc. cit.; (the last two names are equivalent synonyms whose Types represent variants common in the Sydney district). *X. thunbergii* F. Muell., Fragm. VII (1874) 208, nomen illegit.; Moore & Betche, Handb. Fl. N.S.W. (1893) 425. *Lomandra filiformis* (Thunb.) J. Britt. in Banks & Sol., Ill. Bot. Cook's Voy. III (1905) 95 and Pl. 314; Williamson in Vic. Nat. XLV (1928) 37 and Fig. 9; Ewart, Fl. Vic. (1931) 276; Willis, Handb. Pl. Vic. I (1962) 298, 302; Lee in Contrib. N.S.W. Nat. Herb. III (1962) 151. See notes below on some applications of these synonyms.

Common in Coast, Tablelands and Western Slopes, also Western Plains near Narrabri. Above Maryland R., ca. 7½ miles SW of Legume, Constable 1.1963 (63108); Liston, via Wallangarra, Clemens 11.1943 (BR1 020285); Jennings, Maiden & Boorman 12.1903 (51782); Tenterfield to Sandy Flat, Maiden 12.1898 (51778); Cangai, Upper Clarence, Boorman 5.1916 (51779); Copmanhurst, Rupp 11.1909 (51780); 60 miles W of Grafton on Tabulam Road, Floyd No. 19, 11.1959 (51781); Tower Hill, Dalmorton, Constable 10.1952 (24033); about 10 miles from Tingha, Blakely, McKie & Zouman 11.1929 (51783); Bohena Ck., 14 miles S of Narrabri, E. Pilliga State Forest, Johnson & Constable 11.1954 (30367); Pilliga Scrub, Cleland 10.1918 (AD 95936104); Barcoongere State Forest (near Corindi), Floyd No. 26, 9.1959 (51784) and No. 7, 9.1959 (51785); Biseuit Ck. (near Ebor), Ford 1.1958 (51786); Warrumbungle Ranges, Forsyth 10.1901 (51787); Port Macquarie, 12.1897 (51788); 3 miles N of Wallabadah, Goode No. 105, 11.1954 (51789); 1 mile S of Cedar Party Creek, N of Wingham, Salasoo No. 2763, 12.1963 (67951); Nabisia, Gilbert 10.1949 (51790); Stroud road, Newcastle district, Weismantel 6.1952 (51791); Sofala, Cripps Clark 11.1936 (51792); Bowan Park near Cudal, Blakely 10.1906 (51793); Colo R., Rodd 9.1964 (73928); Dangar Is., Hawkesbury R., Darnell-Smith 9.1926 (51645); near Vineyard Stn., Richmond line, Salasoo No. 1002, 9.1952 (51646) and No. 1001, 9.1952 (51647); near Glenbrook, Salasoo No. 1219, 10.1954 (51648); Erskine Ck., Davis 10.1933 (52303); Palm Beach, Lee 10.1953 (51794, 51795, 51796, 51807, 51808, 51651); Whale Beach, Lee 10.1953 (51797); Berowra, Boorman 10.1899 (51798); hillside above Berowra ferry, Lee 9.1956 (51799); Kuringai, Blakely 8.1916 (51800); Hornsby, Blakely (51801, 51803, 51655); Hornsby, Florence St., Blakely (51804); Hornsby, The Waterfall, Blakely 10.1916 (51805, 51806); Hornsby, Blakely 10.1914 (51652, 51653, 51654) and 10.1916 (51655); Hornsby, Mt. Wilga, Lee 8.1952 (51657) and 11.1952 (51659); slopes above the Fishponds, Hornsby, Lee 1.1954 (51802) and 9.1954 (51658); Warrabee, Blakely 11.1914 (51660); Beecroft, Johnson 10.1945 (51661); E of Turramarra, Salasoo No. 899, 11.1951 (51662); North Ryde, Lee 10.1953 (51663); ca. 2 miles W of Couridjah, Ford 10.1953 (51666); ca. 5 miles NW of Colo Vale, Lee 10.1960 (52298); Nowra, Rodway 11.1929 (52306); Huskisson, Jervis Bay, Rodway 10.1949 (52307); Burrinjuck, Moore 12.1952 (51860); CANB 2186; Red Head Beach road, near Milton, Constable 10.1957 (51668); S of Queanbeyan, Mueller No. 2121, 9.1953 (51669); Gibraltar Ck., McKee No. 9678, 11.1962 (58787), No. 9679, 11.1962 (58786) and No. 9680, 11.1962 (58788); Tharwa, Cambage No. 3006, 11.1911 (51670); The Glen, Tumbarumba, McBarron No. 4023, 11.1946 (51671); Monument Hill, Albury, McBarron No. 3767, 10.1949 (51672); with doubtful locality (AD 95941015, upper specimen only). Also in Queensland and Victoria.

In making the combination *L. filiformis*, Britten (loc. cit.) based the name on *Xerotes filiformis* R. Br., but his description and the locality of collection suggest that his specimen (not seen) was *L. laxa*, and his published figure (Plate 314) supports this.

*Xerotes filiformis* R. Br. (loc. cit.) was based nomenclaturally on *Dracaena filiformis*, but the cited specimens are *L. cylindrica* Lee and the description applies to that species. I have not seen White's specimen mentioned under *X. filiformis* in Rees (loc. cit.) but the description indicates differences from Brown's description without revealing its identity conclusively.

This subspecies is probably, from its distribution, the plant referred to as *Xerotes filiformis* R. Br. by F. M. Bailey, and by Domin; it comprises a part of the population referred to under *X. filiformis* R. Br. by Bentham and by Maiden & Bethe, under *X. Thunbergii* by Mueller and by Moore & Bethe, and under *Lomandra filiformis* J. Britt. by Ewart, Williamson and Willis (see references under synonymy above).

ssp. **flavio** Lee in Contrib. N.S.W. Nat. Herb. III (1962) 152. Differs from the Type subspecies in its yellowish aspect, its tougher leaf texture and absence of asperities, and its very condensed panicle inflorescence. Leaves tough and rather rigid, inrolled, 30–40 cm. long, 2 mm. wide, with 11–15 veins and no interfascicular sclerenchyma in the few specimens so far examined; leaf apex irregularly toothed, the base-margins pale and finely torn into fibres, the margins and surfaces quite smooth. Male panicle under 7 cm. long and only about one quarter the length of the leaves on a short, obscure peduncle of about 2 cm., the bracts white, broad-based, 10–15 mm. long below to shorter near the apex of the panicle but usually exceeding the pedicels, the rachides quite smooth; female inflorescence shorter with fewer flowers and branches, sometimes only 2–4 cm. long but still many-branched with smooth rachides. Flowers as in ssp. *filiformis*.

North and Central Western Slopes and Central Tablelands near Orange. Casino\*, Cleland 10.1912 (AD 95936108 C & F in mixture); Borah Creek, Manilla, Grantham 10.1963 (63738); Molong\*, Cleland 10.1913 (AD 95936106); Orange district, Madsen 11.1948 (51673); Neutral Bay, Sydney\*, Cleland 9.1910 (AD 95936107).

ssp. **coriacea** Lee in Contrib. N.S.W. Nat. Herb. III (1962) 152. Differs from the other subspecies in its generally grosser and tougher habit, its flatter and often scabrid leaves with eroded-entire apices, and its short, relatively broad male panicles with scabrid rachides. Leaves more or less rigid, often about 30 cm. (up to 70 cm.) long, 2.5–4 mm. wide, flat or slightly incurved with 12–20 veins and interfascicular sclerenchyma apparently always present; leaf apex rounded, apparently truncate with a central point and sometimes two smaller lateral ones in the young state but soon eroding, the margins and less often the abaxial surface more or less strongly scabrid but occasionally quite smooth with the marginal asperities microscopic, the bases pale to brown, often light brown with some laceration. Inflorescence a short, broad panicle with the lowest branches often verticillate, the panicle longer than the peduncle and the whole standing usually below the middle of the leaves; rachides strongly scabrid or at least distally so, but less in the females than the males, often pale yellow or chrome in colour. Flowers as in ssp. *filiformis* but rather distant, subtended by small bracts.

Central Coast, Central and Southern Tablelands, Central and South Western Slopes and South Western Plains. Cobbora, Garden 10.1949 (51674); Dubbo, Cleland 9.1911 (AD 95936105); Tomingley, near Dubbo, Bethe 10.1883 (51675); Natural Bridge, Mt. Cameron, Constable 12.1948 (16247); Mullions Ra. State Forest, 16 miles N of Orange, Constable 10.1959 (48905); Glen Davis road, ca. 25 miles N of Lithgow, Constable 11.1961 (65089); Ovens Ra., Giles & Ingram 12.1964 (72293); Mt. Walker, Constable 2.1964 (69428); Yarramundi, Tindale 1.1960 (49132); Penrith–Richmond road, Constable 10.1950 (51678); Oberon, Lindsay 1.1937 (51676, 51677); Werong Ra., 25 miles S of Oberon, Constable 11.1962 (63107); Richmond, 8.1853 (51862); Duffy's Ck., Hornsby, Blakely 11.1916 (51679); Lidcombe, Salasoo No. 965,

\* This locality is suspect, being derived from a folder containing a number of specimens with possible confusion of labels.

9.1952 (51680); near Wollondilly R. crossing ca. 1 mile from Bimlow, Chippendale 11.1953 (51681, 51682); Woronora Dam S of Waterfall, Constable 8.1956 (45235); Appin, Maiden 9.1898 (51683); Picton Lakes, about 1 mile WNW of Couridjah, Ford 10.1953 (51684-51687); ca. 2 miles W of Couridjah, Ford 10.1953 (51688); Austinmer, May 10.1935 (51689); Bargo R., near Hilltop, Cheel 8.1930 (51690); Hilltop, Cheel 10.1912 (51692) and 10.1913 (51691); ca. 5 miles NW of Colo Vale, Lee 10.1960 (52299); Colo Vale on road to Mt. Flora, Lee 11.1955 (51852); Taralga, Rodway 12.1921 (52304); Temora, Dwyer 10.1915 (51853) and 12.1916 (51855); 10 miles SE of Robertson, Rodway 10.1943 (52305); 8 miles SE of Bowral, Ford 1.1959 (51856); Ryde Park 25 miles N of Yass, Simmons 11.1959 (51857); Crookwell to Gunning near Grabben Gullen, Moore No. 2841, 12.1953 (51858); W. Goulburn, Lumsden 11.1906 (51859); Burrinjuck, Moore 12.1952 (51860); near Wagga, 11.1897 (51861); Deniliquin district, Crawford 7.1950 (51863); Yarrangobilly, Vickery 1.1940 (51864); Broeklesby Rd., Burrumbuttock, McBarron No. 3863, 10.1949 (51865); Nail Can Hill, West Albury, McBarron No. 3811, 10.1949 (51866). Also in Victoria.

This subspecies comprises a part of the population referred to as *Xerotes filiformis* R. Br. by Maiden & Betche, and described as *X. Thunbergii* by Mueller and Moore & Betche, and as *Lomandra filiformis* J. Britt. by Ewart, and as *L. filiformis* (Thunb.) J. Britt. by Williamson and Willis, in references given under the synonymy of ssp. *filiformis*.

3. *L. cylindrica* Lee in Contrib. N.S.W. Nat. Herb. III (1962) 153. Small wiry plants typically with very narrow shoots bearing only a few, often only two, leaves on the condensed rhizomes. Leaves terete or semiterete, usually at least the distal part terete, often twisted in growth and rather stiff and wiry, 1-2 mm. in diameter, 15-70 (usually about 30) cm. long, smooth to scabrous, the base-margins reddish or purplish with very little laceration, the apex entire, acute, rarely flattened (in a semiterete leaf); short straw-coloured scale leaves at the base of the shoots more conspicuous than in most species. Male inflorescence a panicle with few branches, usually short, standing one-third to half as high as the leaves or rarely almost as high as the leaves, often 4-9 cm. long on a peduncle of nearly equal length; female inflorescence similar or, usually, reduced to a raceme with very few flowers (8-16 only); rachides usually smooth in the male, sometimes scaberulous in the female. Flowers as in *L. filiformis*, subtended by a small bract of 0.5-1 mm. with an almost microscopic bracteole lateral to it, the male 1.25-2 mm. long on a slender recurved pedicel of 2-3 mm. the female 2-3 mm. long on a pedicel of only 0.5-1 mm., but the flowers often showing irregularities of sex, male, female and hermaphrodite occurring in the one panicle with corresponding lengths of pedicel and form of flower, the hermaphrodite more or less intermediate. Fruit as in *L. filiformis*, often 3-4 mm. long. Flowering in Spring to early Summer. Chromosome number:  $2n = 32$  (Briggs, unpubl.).

Central Coast, Central Tablelands and northern part of South Coast, on sandstone. 2 miles NW of Grassy Hill, Rodd 2.1965 (73232); Lithgow Water Supply, Clarence, Blakely and J. & W. Buckingham 11.1939 (41927); near the Font, Cowan, Blakely 6.1929 (49122); 1 mile N of Berowra Station, Blakely 8.1935 (49125); Palm Beach, Lee 10.1953 (49118, 49129); Bilgola Heights Estate, Lee 10.1953 (49113); Wentworth Falls, Blakely 10.1938 (49121) and 11.1938 (49111); Hornsby, Blakely 10.1914 (49130), 12.1914 (49109), 7.1916 (49123), 10.1916 (49115) and without date (49114); Hornsby, Lee 10.1952 (49112) and 9.1958 (49116); Wahroonga, Lee 10.1953 (49124); Glenbrook, McBarron 11.1964 (73698); South Coogee, Mair No. 102, 10.1954 (49120); Long Bay, 10.1927 (ADW 20899); Picton Lakes, Ford 10.1953 (49126, 49119); Hilltop, Cheel 9.1913 (49131; MEL); ca. 5 miles NW of Colo Vale, Lee 10.1960 (52297); Nowra, Rodway 8.1928 (49129); N of Currumbene Creek, Huskisson, Rodway 10.1949 (52288); Pt. Perpendicular, Constable 10.1960 (52287, 52291).

When Brown described *Xerotes filiformis* in Prodr. (1810) 261, he based this name on *Dracaena filiformis* Thunb.; the description he gave, however, and his cited specimens, belong to the present species, *L. cylindrica*. Smith in Rees, Cycl. XXXIX (1818) translated Brown's text and added details, but probably referred to the same species; Kunth, Enum. III (1841) 373, repeated Brown's text.

This species has usually been included, without distinction, in *L. filiformis* sens. lat., e.g. under *Xerotes filiformis* by Bentham, Fl. Austral. VII (1878) 103, and Maiden & Betche, Census N.S.W. Pl. (1916) 42, or under *X. thunbergii* by Moore & Betche, Handb. Fl. N.S.W. (1893) 425.

4. *L. gracilis* (R. Br.) Lee in Contrib. N.S.W. Nat. Herb. III (1962) 153. Small to medium tufted plants bearing typically narrow-erect shoots with several to many leaves often slightly twisted distally, on short rhizomes. Leaves narrow-linear and rather thick, concavo-convex to almost plano-convex, often about 40 cm. long (rarely only 15 cm.), 1–2 mm. wide, the margins smooth, the apex acute to acuminate, the bases typically purplish with the margins showing much laceration into dark brown fibres. Male inflorescence a panicle, usually large and spreading, standing, on its peduncle, nearly as high as the leaves or at least to their middle, the rachides usually smooth or the distal parts sometimes with minute, smooth protuberances; female inflorescence a smaller panicle with fewer branches and flowers, and the rachides often more scaberulous. Male flowers as in *L. filiformis* but generally slightly larger, on a very slender pedicel 2–3 times as long as the flower and often 4–5 mm. long, subtended by a minute, acute, membranous bract often less than 1 mm. long; female flowers and fruits also as in *L. filiformis*. Flowering in Spring. Chromosome number:  $2n = 16$  (Briggs, unpubl.). *Xerotes gracilis* R. Br., Prodr. (1810) 261; Smith in Rees, Cycl. XXXIX (1818); Kunth, Enum. III (1841) 373.

Central Coast, northern part of South Coast, and Central Tablelands (Blue Mountains). Colo Heights to Putty, Johnson & Constable 9.1959 (48907); Colo R., Rodd 9.1964 (73926); Whale Beach, Lee 10.1953 (49162); Berowra, Boorman 10.1899 (49158); Hat Hill Creek, Blackheath, Constable 11.1953 (26471); Springwood, Eames & Hotchkiss 10.1953 (49163); Springwood, Hamilton 9.1914 (49157); Woodford, Constable 10.1950 (19805); near Glenbrook, Salasoo No. 1221, 10.1954 (49156); Hornsby, Blakely 10.1914 (49150) and 10.1916 (49138); Hornsby, Ford 10.1946 (49166); Hornsby, Lee 9.1952 (49159), 9.1953 (49160) and 9.1958 (49146); Wahroonga, Lee 10.1953 (49154) and 10.1956 (49143); Cheltenham, Johnson 10.1945 (49148); Pennant Hills, Fraser 9.1933 (49142); North Ryde near Lane Cove R., Lee 10.1953 (49161); Balgowlah, Cheel 10.1922 (49153); Centennial Park, Forsyth 11.1896 (49140) and 10.1906 (49139); Centennial Park, Cheel 10.1898 (49147); Woolwash, Campbelltown, McBarron No. 6158, 11.1953; Nowra, Rodway 10.1943 (52290); Boolijah Creek ca. 27 miles SW of Nowra, Constable 10.1957 (45261); Conjola, Heron, 10.1898 (49141).

This species has usually been included without distinction in *L. filiformis* sens. lat., together with *L. cylindrica*, in references given under the latter name.

5. *L. brevis* Lee in Contrib. N.S.W. Nat. Herb. III (1962) 154. Small densely tufted plants with shoots crowded on short, ascending rhizomes. Leaves narrow-linear, thin, concavo-convex and inrolled, 5–23, often about 15, cm. long, 0.5–1 mm. wide, with 3–7 veins, the margins and surfaces smooth or nearly so, the apex acute without teeth, the base purplish just above the sheath, paler below, with the base-margins showing much laceration into fine fibres. Male inflorescence a small narrow panicle with a few, short branches, 4–9 cm. long on a peduncle of about equal length, the rachides smooth. Female not seen. Male flowers as in *L. filiformis* but slightly broader, and in herbarium specimens characteristically blackish, on spreading to recurved pedicels 2–4 mm. long, usually about equal to the acute bract; female flowers not known, but some hermaphrodites occur. Flowering in Spring and Summer.

Central Coast, apparently in damp to swampy sandstone areas. Cowan, Blakely 6.1929 (49168); about 1 mile N of Cowan Station, Blakely & Shires 2.1921 (49353); Long Pt. Swamp, Berowra Creek, Blakely 3.1916 (49354); near Mt. Kuringai, Evans 12.1963 (64306); junction of Berowra and Connelly's Creeks, Blakely 1.1918 (49355); Hornsby, Blakely 1.1915 (49356); top of Gibberygong Hill, Hornsby, Blakely 2.1917 (49357); Kogarah, Camfield 11.1892 (49358); Heathcote, Boorman 11.1899 (49359).

Superficially this species resembles the smallest plants of *L. filiformis* ssp. *filiformis* but differs from comparable plants in the darker colour (at least when dry), the entire leaf apex, and the paniculate inflorescence with entirely smooth rachides; its flowers, rather broader than in *L. filiformis*, resemble those of *L. laxa* and *L. gracilis* but it lacks the size of leaves and inflorescence seen in those species.

6. *L. laxa* (R. Br.) Lee in Contrib. N.S.W. Nat. Herb. III (1962) 153. Tufted plants with condensed stems, or more extensive with short, decumbent leafy stems. Leaves flat, rather thin and soft, 15–40 cm. long, 2–4 mm. broad, with numerous veins (13–17) and irregularly occurring interfascicular sclerenchyma, the apex rounded-acute or truncate, the margins sometimes slightly and irregularly inrolled, the base-margins pale or white with little laceration. Male inflorescence a spreading panicle of solitary flowers standing nearly or quite as high as the leaves, the peduncle shorter or longer than the panicle, flattened, thin, with numerous more or less whorled, fine, smooth, sometimes compound branches; female panicle usually much smaller with fewer branches and flowers. Male flowers globular-campanulate, like those of *L. filiformis* but slightly broader (to 3 mm.) and more open, creamy white in colour, the perianth segments thin, especially the outer three, the pedicels 0.5–2.5 mm. long, no longer than the flowers and often deciduous with them; female flowers long and narrow, 4–6 mm. long, 2 mm. broad, on a very short pedicel about 0.5 mm. Fruit globular-pyramidal, about 4 mm. long, smooth, with the hardened perianth persistent below it. Flowering usually in Autumn and Winter, also rarely in Summer. *Xerotes laxa* R. Br., Prodr. (1810) 261; Smith in Rees, Cycl. XXXIX (1818); Kunth, Enum. III (1841) 373.

North Coast in Eucalypt or rainforest. Uralba, Ballina, Bäuerlen 5.1891 (51909); Barcoongere State Forest, Johnson & Constable 6.1957 (42295); Moonee, 8 miles N of Coff's Harbour, Wilson No. 571, 4.1957 (49134); with doubtful locality (AD 95941015, lower specimen only). Also in Queensland.

This species has, judging from its distribution and other considerations, usually been included in *L. filiformis* sens. lat., e.g. under *Xerotes filiformis* by Bentham, Fl. Austral. VII (1878) 103, F. M. Bailey, Qld. Fl. V (1902) 1662 and Maiden & Betche, Census N.S.W. Pl. (1916) 42, or under *X. thumbergii* by Moore & Betche, Handb. Fl. N.S.W. (1893) 425. The illustration in Banks & Sol., Ill. Bot. Cook's Voy. (1905) t. 314 under *L. filiformis* (Thunb.) J. Britt. appears to be of *L. laxa*.

7. *L. micrantha* (Endl.) Ewart in Proc. Roy. Soc. Vic. n.s. XXVIII (1916) 219; Williamson in Vic. Nat. XLV (1928) 37 and Fig. 8, 8a; Ewart, Fl. Vic. (1931) 276; Gardner, Enum. Pl. W. Austral. (1930) 20; Black, Fl. S. Austral. ed. 2 (1943) 188; Blackall, W. Austral. Wildflowers (1954) 73; Willis, Handb. Pl. Vic. I (1962) 298. A fairly robust plant 30–50 cm. high, often olive-green in dried specimens, the ascending rhizomes bearing slender or sometimes robust shoots usually 5–10 mm. in diameter (South Australian and Victorian specimens tend to be more robust than those from New South Wales). Leaves firm, sometimes very thick and more or less quadrangular or almost terete, narrow-linear, commonly plano-convex, 30–40 cm. long, 1–2 mm. wide, the adaxial surface with usually conspicuous marginal bands and a more or less narrow, central, coarsely ribbed zone, the apex acute or rounded, the margins usually smooth or rarely minutely scaberulous, the bases pale with purplish brown to almost black margins showing very little laceration. Male inflorescence a panicle, sometimes compound, of pedicellate flowers borne often in pairs but the pair of different ages so that only one may be apparent, the other fallen or very young; female inflorescence similar but often smaller and sometimes reduced to a raceme; panicle generally trending from a rather short, broad form in the south to a longer and perhaps more open structure in N.S.W., standing from a quarter to two-thirds the height of the leaves on its peduncle of about equal length, often yellow to straw-coloured, the rachides and often also the peduncle scabrid with hair-like protuberances sometimes reduced in length, especially in the females, to give an almost smooth but finely dotted surface. Male flowers very small, under 2 mm. in diameter, noticeably more open at anthesis than in other species, the lanceolate to oval perianth segments free to the base, the outer very slightly narrower than the inner, all thin in texture, red to purplish with narrow, pale yellow margins but drying pale, the outer finally reflexed, the inner spreading, and the stamens



more or less erect; pedicels spreading or slightly recurved, about 3 mm. long, partly enveloped in the short, broadly acute, cup-like bract and bractcole; female flowers larger, about 5 mm. long, campanulate with more acute perianth segments, at first greenish or yellowish, then dark red, drying purplish black, usually with narrow margins of pale yellow or sometimes all pale, the pedicels about 1 mm. long. Fruit at first rounded-tetrahedral, finally flattened or depressed on top, not wrinkled, 4–6 mm. long, greenish or with purplish markings, the hardened perianth persistent at the base. Flowering commonly in Autumn, occasionally also in Winter to Spring. *Xerotes micrantha* Endl. in Lehm., Pl. Preiss. II (1846) 49; Benth., Fl. Austral. VII (1878) 103; Moore & Betche, Handb. Fl. N.S.W. (1893) 425; Maiden & Betche, Census N.S.W. Pl. (1916) 42.

Central Coast and eastern parts of Central and Southern Tablelands, with a preference for cool, damp habitats, at least in New South Wales. Near Blackheath, Constable 9.1956 (45231); Hazlebrook, Maiden 5.1905 (49372); Hazlebrook, Holttum & Tindale 3.1960 (52246); Hornsby, Blakely 4.1914 (49373) and 4.1917 (49371); Hornsby, Lee 3.1954 (49370); East Willoughby, McKee 4.1951 (52244, 52245); Sans Souci, Herb. Tate 7.1884 (AD 95936083); Kanangra Walls, Blakely 9.1900 (49366); Maddens Plains 2–3 miles N of Sublime Pt., Evans & Blaxell 4.1960 (50282, 50283); Minnamurra Falls Reserve, Judd 3.1959 (49367) and 4.1959 (49368); Monga, Braidwood, Bäuerlen 9.1890 (49365) and 10.1890 (MEL). Also in Victoria, South Australia and Western Australia.

The Type specimen of this species is a fine-leaved, rather small plant with smooth rachides in the male panicle. In South Australia and Victoria the more abundant specimens show a much more robust habit and the male panicles have more or less scaberulous rachides, though the few Western Australian collections indicate that similar specimens may occur in the Type locality, near Perth. In Victoria there is also a limited population of broad-leaved plants in montane habitats described as *Xerotes micrantha* var. *sororia* by Bentham (loc. cit.). The New South Wales population is of more slender plants than the Victorian and South Australian, though usually larger than the Western Australian, and in some Tableland localities approaches the montane Victorian form.

**8. *L. bracteata* Lee** in Contrib. N.S.W. Nat. Herb. III (1962) 160. A tufted plant with condensed stems, the narrow shoots about 3–8 mm. in diameter on short ascending rhizomes. Leaves plano-convex or almost flat, scarcely inrolled, rigid and very tough, 10–28 cm. long, 1–2 mm. broad with about 12–15 veins, smooth or the margins sometimes slightly scaberulous, the apex irregularly 3-toothed but often grazed off, the sheathing bases with conspicuous white membranous margins decurrent for 10–12 cm. along the lamina, at least in young growths. Male and female inflorescences similar, a very short panicle of solitary flowers about 1–4 cm. long, obscure among the leaf bases with rather conspicuous white floral bracts, the very short peduncle smooth and slightly angular; rachides smooth. Male flowers more or less globular, 1.5–3 mm. long, mostly erect on a pedicel of 1–2 mm. or up to 5 mm. in the lowest flowers, subtended by a broad-based, acute, white, membranous bract exceeding the pedicel and often the flower as well, up to 6 mm. long, often with a similar but smaller lateral bracteole near the base of the pedicel. Male flower with the perianth segments joined only near the base, the outer ones thinner, narrower and slightly shorter than the rather fleshy, yellow, more or less ovate inner ones; female flowers similar in size and shape, the perianth segments broader at their base and hardening at maturity. Fruit rounded-tetrahedral, about 5 mm. long, much wrinkled when dried. Chromosome number:  $2n = 16$  (Briggs, unpubl.).

Western Slopes, Central and Southern Tablelands. Spirey Creek, Warrumbungle Mts., Rodd 8.1964 (72292); Mt. Mider, Warrumbungles, Ingram 8.1958 (59108); Neilrex, Spotswood 9.1962 (63500); Nevertire-Dubbo, Abrahams 11.1911 (49459, specimen A in mixture); Molong, Cleland 10.1913 (AD 95937008); Cowra, per Department of Agriculture 10.1959 (49457); Yass, P. P. Board Yass 9.1936 (49458); French Park, Fielder 10.1961 (56314); Canberra, Cabbage 11.1911 (49456); Queanbeyan, McKee No. 9576, 9.1962 (60304) and No. 9700, 11.1962 (57970).

9. *L. effusa* (Lindl.) Ewart in Proc. Roy. Soc. Vic. n.s. XXVIII (1916) 219; Macbride in Contrib. Gray Herb. LVI (1918) 4; Williamson in Vic. Nat. XLV (1928) 36 and Fig. 6; Ewart, Fl. Vic. (1931) 276; Gardner, Enum. Pl. W. Austral. (1930) 20; Black, Fl. S. Austral., ed. 2 (1943) 188; Blackall, W. Austral. Wildflowers (1954) 73; Willis, Handb. Pl. Vic. I (1962) 297, 301. Reed-like plants about 60 cm. high, the shoots crowded on condensed rhizomes to form clumps often as broad as high, the individual shoots 1–1.5 cm. in diameter surrounded by the coarsely lacerated, fibrous leaf-bases. Leaves glaucous, thick and rigid, often twisted or curled and 30–50 cm. long, 1–2 mm. broad, plano- or concavo-convex with about 12 veins, the margins minutely scaberulous, the apex with a deep sinus between two marginal teeth, or sometimes irregularly 2- or 3-toothed, the bases pale with brown membranous margins, the whole base ultimately reduced to reddish brown fibres. Male inflorescence a panicle of solitary pedicellate flowers usually much shorter than the leaves, often 6–12 cm. long (occasionally to 20 cm.), the short peduncle of about 3 cm. (up to 8 cm.) usually obscured by the leaf bases; branches of the panicle rather few, smooth, pale and angular, the large, well-spaced flowers subtended by large, white or pale, membranous, often slightly toothed bracts; female inflorescence similar but smaller, often 4–8 cm. long. Male flowers 3–6 mm. long on a slender pedicel of 4–8 mm., the conspicuous floral bract 5–12 mm. long, the bracteole smaller; perianth segments lanceolate, white drying cream to golden brown, joined only at the base, all equal and similar or the outer three slightly broader with a median marking, almost membranous, recurved at maturity, the stamens erect in the open flower with filaments 1.5 mm. long; female flowers about 7 mm. long, the perianth segments slightly keeled, yellow, soon becoming hard and dry, the gynoecium about 2 mm. long at anthesis, and small sterile filaments sometimes present. Fruit rounded-tetrahedral, about 8–10 mm. long, 5 mm. broad, brownish like the persistent, lanceolate, hardened perianth segments, longitudinally striate. *Xerotes effusa* Lindl. in Mitch., Three Exped. E. Austral. ed. 1, II (1838) 101; F. Muell., Fragm. VIII (1874) 209; Benth., Fl. Austral. VII (1878) 102; Moore & Betche, Handb. Fl. N.S.W. (1893) 424; F. M. Bail., Qld. Flora V (1902) 1662; Maiden & Betche, Census N.S.W. Pl. (1916) 42. *X. fragrans* F. Muell. ex Sond. in Linnaea XXVIII (1856) 219.

Western and Far Western Plains, and western parts of Central and South Western Slopes. Cobar, Haviland 8.1913 (49482); Boppy Mtn., Boorman 7.1903 (49476); West Bogan–Nyngan, Butcher 11.1934 (49481); BRI 020266); 4 miles S of Broken Hill, Morris No. 597, 6.1921 (49461); Condobolin to Borambil, Maiden 8.1897 (49478); Wanganella via Hay, Officer 5.1903 (49473); 10.1917 (49479) and 12.1918 (49475); between Euston and Gol Gol, Vickery 10.1949 (10215); 8 miles from Euston on Balranald road, Burbidge 7.1960 (52770, CANB 6646; 52771, CANB 6647); Balranald, McOnie 3.1942 (49460); Narrandera, Fletcher 5.1891 (49477); Jerilderie district, Dykes ea. 1880 (49480); Hill Plains 10 miles S of Deniliquin, Whaite No. 1437, 7.1953 (49472); Berrigan district, Godden 2.1951 (49474). Also in Queensland, Victoria, South Australia and Western Australia.

10. *L. longifolia* Labill., Pl. Nov. Holl. I (1805) 92 and t. 119; Lee in Contrib. N.S.W. Nat. Herb. III (1962) 155; see also under ssp. *longifolia*. Plants up to 1 m. or more in height, forming large clumps of robust shoots crowded on condensed rhizomes. Leaves firm, glossy green drying greyish, flat or nearly so, about 5–14 mm. broad, the apex irregularly toothed often with two strong marginal teeth and an irregularly central, shorter tooth in an apical sinus but sometimes, especially in ssp. *hystrix*, the central tooth exceeding the laterals; leaf bases with broad, shining, yellow, orange or brownish chartaceous margins; base-margins showing very little laceration, except in ssp. *exilis*. Inflorescence usually a panicle (in ssp. *exilis* sometimes a spike) of clusters of sessile flowers, of varied size, often about half the leaf-length, the males larger and more floriferous but with shorter cluster bracts than the females in which the inflorescence may be spicate; peduncle smooth, straw-

coloured, strongly flattened; rachides smooth; the cluster and smaller groups within it subtended and usually clearly exceeded by rigid, broad-based, acicular cluster bracts, the individual flower ultimately subtended by a small, broad-based, shortly acute, membranous floral bract and slightly longer bracteole within it, and below these by one or more progressively longer, firmer and more acicular-pointed structures grading into the cluster bracts. Male flowers almost cylindrical with a slightly tapered base, 3–4 mm. long, the outer segments free to the base, narrow-lanceolate to lanceolate, thin, purple or paler with a purplish centre, the inner about as long, slightly wider and thicker, joined near the base by the filaments of the outer whorl of stamens, creamy or yellow, all six segments with minute inflexed or reflexed tips; stamens of the inner whorl inserted at about the centre of the inner perianth segments; vestigial ovary sometimes present; female flowers with more rigid, thicker and broader outer segments less purplish in colour, the ovary about 2 mm. long, 3-ribbed, shortly tapered to the stigma. Fruit smooth, shining, brownish, 5 mm. long, 3 mm. in diameter.

Queensland to Tasmania and South Australia.

Bentham (Fl. Austral. VII (1878) 97) under *X. longifolia* included *L. fluviatilis* (as *Xerotes*) in addition; he also referred to *L. montana* (as *Xerotes*) as "a variety" of *X. longifolia* but it is certainly a distinct species. Domin's treatment of *X. longifolia* was also broadened to include *X. fluviatilis* R. Br. (as *X. longifolia* var. *fluviatilis*), but see *L. fluviatilis* below.

Plants of this species, probably of ssp. *longifolia*, have been suspected of causing a form of paralysis in stock (Hurst, Pois. Pl. N.S.W. (1942) 61).

The species may be subdivided into three subspecies related to habitat: ssp. *longifolia*, adapted to a great variety of conditions from Coast to Western Slopes; ssp. *hystrix* found in northern rainforest marginal habitats; and ssp. *exilis* which grows at higher altitudes from New England to Victoria; intermediates between the subspecies occur in marginal habitats.

1. Male inflorescence a panicle of clusters with the primary branches often under 5 cm. long (up to 15 cm.) with few or no secondary branches, or rarely a spike of few-flowered clusters; cluster bracts more or less conspicuous or somewhat obscure.
  2. Leaves often 8–10 mm. broad. Panicle commonly 5–6 cm. broad with 6–8 pairs of distichous primary branches; cluster bracts very variable, 0·8–6 cm. long (usually 1–2 cm.) ..... ssp. *longifolia*.
  - 2.\* Leaves 1·5–5 mm. broad. Panicle often dense, under 2·5 cm. broad, or the inflorescence a short spike of reduced clusters; cluster bracts 0·6–1·5 cm. long ..... ssp. *exilis*.
- 1.\* Male inflorescence a panicle of clusters with longer primary branches up to 20 cm. long, the secondary branches often long and numerous. Leaves as in ssp. *longifolia*. Cluster bracts very prominent, up to 9 cm. long ..... ssp. *hystrix*.

ssp. *longifolia*. Male inflorescence very variable, but often with 6–8 pairs of distichous primary branches, the lowest pairs about 5 cm. long, sometimes shorter or up to 15 cm., usually with 2 or 3 smaller branches at their bases and sometimes a few along their axes, the panicle often about 5 or 6 cm. broad; flowers often 6–12 in the cluster; cluster bracts 0·8–6 cm. long, frequently 1–2 cm., usually longer, broader and denser in the female panicles. Leaves flat, tough, broad, usually 8–10 mm. in width, but sometimes narrower (2·5 mm.) especially in inland districts, the base-margins scarcely lacerate. Chromosome number:  $2n = 32$  (Briggs, unpubl.). *Lomandra longifolia* Labill., Pl. Nov. Holl. I (1805) 92, t. 119; Britten in Banks & Sol., Ill. Bot. Cook's Voy. III (1905) 95 and t. 312; Williamson in Vic. Nat. XLV (1928) 35 and Figs. 4 & 4a; Ewart, Fl. Vic. (1931) 277; Black, Fl. S. Austral. ed. 2 (1943) 187; Willis, Handb. Pl. Vic. I (1962) 300, 302; Lee in Contrib. N.S.W. Nat. Herb.

III (1962) 155. *Xerotes longifolia* R. Br., Prodr. (1810) 262; Smith in Rees, Cycl. XXXIX (1818); Lindl. in Edwards Bot. Reg. n.s. II (1839) t. 3; Kunth, Enum. III (1841) 374; Schnizlein, Icon. I (1845) t. 516 (8); Sonder in Linnaea XXVIII (1856) 220; J. D. Hooker, Fl. Tas. II (1860) 63; F. Muell., Fragm. VIII (1874) 210; Benth., Fl. Austral. VII (1878) 97; Moore & Betche, Handb. Fl. N.S.W. (1893) 424; F. M. Bail., Qld. Fl. V (1902) 1661; Maiden & Betche, Census N.S.W. Pl. (1916) 42. *X. longifolia* var. *typica* Domin in Bibl. Bot. XX, Heft 85<sup>1</sup> (1915) 525. *X. longifolia* var. *arenaria* (R. Br.) Domin, loc. cit. p. 526. *X. longifolia* var. *macrocarpa* Domin, loc. cit. *X. arenaria* R. Br., loc. cit.; Smith in Rees, loc. cit.; Kunth, loc. cit. See notes below on some applications of these names.

Coast and Tablelands, and less commonly North and Central Western Slopes, in very diverse habitats, from dry, rocky hillsides to wet creek banks at times submerged. COASTAL DISTRICTS: Dalmorton, Constable 10.1952 (24035, 24028); Bareoongere State Forest near Corindi, Floyd 9.1959 (49742); Coff's Harbour, Floyd 9.1959 (49739); Nambueca area, Flynn 9.1955 (49745); south branch, Wilson R., 15 miles NW of Wauchope, Constable 10.1956 (41955); Kendall, Bailey 9.1929 (49740); Myall R. State Forest, ca. W of Bulahdelah, Constable 10.1956 (45579); Bulahdelah, Cleland 9.1919 (49746); Reedy Ck., S of Howe's Valley. Johnson & Constable 10.1954 (30163); Wollombi, Story No. 6628, 9.1959 (49743); Martinsville, Constable 8.1949 (11168); Olney State Forest West, NW of Wyong, Constable 8.1949 (11170); Ourimbah to Berkeley Vale, Salasoo No. 1084, 10.1953 (49741); Wamberal, Cheel 4.1911 (49747); Bowen's Ck., Bilpin-Mt. Irvine Rd., Constable 11.1950 (16597); Mt. Lagoon Rd. ca. 5 miles NE of Bilpin, Constable 11.1958 (47494); Milson Island, Cleland 3.1915 (49719); Port Jackson district: many collections (including Wahroonga, Salasoo No. 741, 8.1951 (49718); Roseville, Morris No. 1843, 9.1927 (49728); Cremorne Pt., Eames 9.1953 (49730); Elizabeth Cove, Leichhardt 6.1842 (49715); and Kogarah Bay, Camfield 1896 (49729)). Upper Burrigorang, Constable 10.1956 (45221); Nepean Dam, Bargo, Constable 12.1953 (26603, 26597); Albion Park, McBarron No. 2172, 10.1948 (49751); Woodhill, 4 miles N of Berry, Rodway 10.1943 (49771); Mt. Cambewarra. Rodway 10.1918 (49772); Mt. Cambewarra, Nowra, Constable 12.1950 (19106); Comerong Is., Shoalhaven R., Rodway 9.1932 (49769); Moonie Ck., Jervis Bay, Rodway 10.1918 (49763) and 12.1929 (49762); Shoalhaven R., 4 miles W of Nerriga, Rodway 1.1950 (49770); Conjola, Heron 10.1898 (49732); Tabourie Island, Rodway 1.1940 (49768); Lawler's Ck., Bodalla State Forest, Constable 9.1953 (25618); Montague Is., Cassell 2.1949 (49737); Montague Is., Rodway 4.1932 (49776); Narrabarba Ck., Constable 10.1954 (30142); Green Cape, Lighthouse Rd., Constable 10.1954 (30159). TABLELANDS AND WESTERN SLOPES: Howell, Hart 11.1905 (49744); Imbra or Crow Mt., Barraba, Rupp 11.1913 (49711); Boggabri, Cambage 11.1909 (49709); Barrington Tops, Fraser & Vickery 1.1934 (49748); Upper Williams R., Fraser & Vickery 1.1934 (49749); Pike's Gap, 5 miles NW of Denman, Constable 8.1957 (42856); NW outskirts of Wollar, Story No. 6807, 10.1959 (CANB 73144); Bowan Park, Blakely 10.1906 (49713); Clarence to Eskbank, Blakely 11.1938 (49714); Wynne's Rocks, Mt. Wilson, Garden 8.1950 (49710); Hilltop, Cheel 12.1912 (49733); Colo Vale, Lee 11.1955 (49734); Mittagong, herb. Dixon (49738); Bundanoon, Lumsden 10.1906 (49736); Gudgeby Valley, Burbidge 11.1960 (64332; CANB 6748). Also in Queensland, Victoria, South Australia and Tasmania.

This subspecies is a part of the population referred to as *Lomandra longifolia* by Williamson and by Willis, the other part being *X. longifolia* ssp. *exilis*, and part of the population named *Xerotes longifolia* by F. Mueller, Bentham, Moore & Betche, Bailey, and Maiden & Betche, the other part consisting of ssp. *hystrix* and/or ssp. *exilis*; Brown, Kunth and Smith treated ssp. *longifolia* as two species, *X. longifolia* R. Br. and *X. arenaria* R. Br., and Domin divided ssp. *longifolia* into three varieties: var. *typica*, var. *arenaria* and var. *macrocarpa* (see references under synonymy above).

ssp. *hystrix* (R. Br.) Lee in Contrib. N.S.W. Nat. Herb. III (1962) 155. Differs from the Type in its larger and more compound inflorescences, the males with apparently whorled rather than distichous primary branches up to 20 cm. long, the secondary branches longer and more numerous; flowers in the cluster comparable in number with those of ssp. *longifolia* but, due to greater compounding of the inflorescence, dominated by the more numerous and often longer cluster bracts, up to 9 cm. long; female inflorescence particularly dense with usually broader cluster bracts than in the males. Leaves usually 8–10 mm. broad. *Xerotes hystrix* R. Br., Prodr. (1810) 262; Smith in Rees, Cycl. XXXIX (1818); Kunth, Enum. III (1841) 374. *Xerotes longifolia* var. *hystrix* Domin in Bibl. Bot. XX, Heft 85<sup>1</sup> (1915) 526. *Lomandra hystrix* (R. Br.) Fraser et Vickery in Proc. Linn. Soc. N.S.W. LXII (1937) 286.

Coast districts, chiefly in the northern half of the State, usually in open or marginal rainforest habitats. Murwillumbah district, Waring 11.1954 (49689); Tintenbar, Bäuerlen 10.1893 (49690); Harwood to Broadwater, Cheel 9.1916 (49691); Barcoongere State Forest, near Corindi, Floyd 9.1959 (49692); Mt. Boss State Forest, Wauchope, Constable 10.1956 (41956); Gloucester, per Glenfield Veterinary Research Station 10.1948 (49695); Bulahdelah, Rupp 12.1923 (49696); Brush Island, S. Coast, Rodway 9.1936 (49697). Also in Queensland.

This subspecies has been grouped with ssp. *longifolia* as *Xerotes longifolia* by Mueller, Bentham (together with other elements), Moore & Betche, Bailey, and Maiden & Betche, in references given under ssp. *longifolia*, by inference or, in Mueller's case, from the cited specimens.

ssp. *exilis* Lee in Contrib. N.S.W. Nat. Herb. III (1962) 156. Differs from the other subspecies in its smaller stature, to about 50 cm. high, narrower leaves 1.5–5 (usually 2–3) mm. broad, 30–50 cm. long with more laceration of the orange base-margins, and smaller, narrower inflorescence, usually a panicle of clusters up to 12 cm. long and less than 2.5 cm. wide, with closely spaced clusters on few, short branches, or sometimes reduced to a short spike of few-flowered clusters only a few centimetres long; cluster-bracts exceeding the flowers but sometimes obscure in the denser panicles, 0.6–1.5 cm. long. Chromosome number:  $2n = 32$  (Briggs, unpubl.).

Northern Tablelands (New England), Southern Tablelands, and far South Coast, at high altitudes; not known from Central Tablelands. Armidale district, Begg 1951 (49651); upper Cotter R., Queanbeyan, Cambage No. 3421, 1.1912 (49648); 4 miles S of Bull's Head, Mt. Franklin Rd., Brindabella Ra., Constable 4.1958 (44423); Mt. Gingera, Moore No. 2512 (49642); 20 miles E of Tumbarumba, Morland 2.1948 (49700); Bargo State Forest, Tumbarumba, Lindsay 5.1937 (49646); Thredbo R., Mt. Kosciusko, Maiden & Forsyth 1.1899 (49644); Tingiringi Mtn., Bäuerlen 1.1899 (MEL); Mt. Naghi, ENE of Timbillica, Constable 8.1963 (67518). Also in Victoria.

Specimens of this subspecies have previously been grouped with *L. longifolia* without nomenclatural distinction; specimens with characters between those of ssp. *exilis* and ssp. *longifolia* are known chiefly from intermediate altitudes in the Southern Tablelands, and in Victoria.

**11. *L. fluviatilis* (R. Br.) Lee** in Contrib. N.S.W. Nat. Herb. III (1962) 156. Tufted plants 30–45 cm. high forming tussocks from short, erect or ascending rhizomes. Leaves narrow-linear, 25–45 cm. long, rarely more, 0.5–2.5, usually about 1, mm. wide, concavo-convex to inrolled, the apex irregularly toothed, usually with two marginal teeth and sometimes a smaller central one, the margins smooth or microscopically scaberulous, the base-margins reddish to very dark brown, soon lacerating to dark shining strips in a tangled mass at the base. Male inflorescence a narrow panicle of clusters, 5–17 cm. long, the peduncle usually longer than the panicle when fully grown, the branches few and short with 1–4 clusters; female inflorescence similar or smaller, sometimes reduced to a spike of clusters, the panicle only 3–6 cm. long on a much longer peduncle of 20–30 cm.; cluster bracts fine-pointed from a broader base, the margins reddish brown like the floral bracts, the centre pale, rather stiffly spreading but delicate, up to 1.5 cm. long in male plants and 2 cm. in female. Male flowers as in *L. longifolia* with floral bracts and bracteoles also similar in form but reddish brown in colour, few to about 12 in a cluster. Fruit as in *L. longifolia* but more reddish brown. Chromosome number:  $2n = 32$  (Briggs, unpubl.). *Xerotes fluviatilis* R. Br., Prodr. (1810) 262; Smith in Rees, Cycl. XXXIX (1818); Kunth, Enum. III (1841) 374; *Xerotes longifolia* R. Br. var. *fluviatilis* (R. Br.) Domin in Bibl. Bot. XX, Heft 85<sup>1</sup> (1915) 525 (Domin's record of this species for Queensland is questionable since there are no specimens from that State in Australian herbaria).

Central Coast, chiefly in creek beds, river banks and shady gullies. Galston Gorge, Lee 10.1954 (49804); Terrey Hills, McKee No. 777, ? 10.1953 (52322); Bent's Basin, Woolls (MEL); Bent's Basin, Evans 9.1961 (34436); Banks of Nepean R., Woolls (MEL); Woolwash, Campbelltown, McBarron No. 6352, 9.1954 (52323); Waterfall, Camfield 12.1895 (49803, 49805); Loddon Falls, Evans 5.1961 (54121); Illawarra, Shepherd (MEL).

Bentham regarded this species as not distinct from *L. longifolia* (as *Xerotes*), q.v., but with the collection of further material, always from creek beds or close to watercourses, it appears to maintain a high degree of distinctness, though putative hybrids have recently been found at Bent's Basin, Nepean R. (Briggs 10.1964 (73922)) and Colo R., (Rodd 10.1964 (73921)).

**12. *L. confertifolia*** (F. M. Bail) A. Fahn in Journ. Linn. Soc. Lond. (Bot.) LV (1954) 168; Lee in Contrib. N.S.W. Nat. Herb. III (1962) 156; see also under ssp. *confertifolia* and ssp. *leptostachya*. Decumbent, stem-forming plants or less commonly (perhaps only in new growth) forming loosely erect tussocks, with individual shoots 4–15 mm. in diameter. Leaves narrow-linear, flat, concavo-convex, incurved or rolled into a cylinder, 0.3–2.5 mm. broad, 6–60 mm. long with 3–12 veins, the apex 2- or 3-toothed, or simply acute in the narrowest leaves, the margins microscopically scaberulous. Male inflorescence a rather small panicle of clusters, very variable in size and density, rarely reduced to a spike of few-flowered or even 1-flowered clusters; female inflorescence often very small and spicate but with larger cluster bracts. Flowers, floral bracts and bracteoles like those of *L. longifolia*; cluster bracts variable, usually shorter, more slender and delicate than in *L. longifolia* and in small inflorescences sometimes very short-pointed, or very fine and hair-like at the apex. Fruit ovoid, slightly wrinkled, about 4 mm. long.

South-eastern Queensland, eastern New South Wales and north-eastern Victoria.

This species may be divided into five subspecies; the Type subspecies is not present in New South Wales, occurring only in Queensland (see Lee in Contrib. N.S.W. Nat. Herb. III (1962) 156 for Lectotype selection, etc.).

1. Stems widely spreading, or more shortly decumbent and sometimes of limited extent in ssp. *pallida* and *rubiginosa*. Male inflorescence a panicle of clusters or if unbranched the peduncle about equal to the panicle or shorter.
  2. Stems extensive, the shoots slender with adpressed leaf bases; leaf base-margins largely intact, pale to reddish brown; old leaves often curled back on the stem.
    3. Leaf base-margins and floral bracts pale, giving a pale aspect to shoot and inflorescence; leaf apex rather conspicuously toothed with slightly divergent teeth often 2–4 mm. long. Glasshouse Mts. and other mountains of south-east Queensland in exposed situations near the summit ..... ssp. *confertifolia*.
    - 3.\* Shoot and inflorescence with a golden or reddish brown aspect from the leaf base-margins and floral bracts; leaf apex shortly toothed, the teeth up to 1 mm. long and the adjacent tissue brown. South Coast of New South Wales ..... ssp. *similis*.
  - 2.\* Stems usually less extensive with thicker shoots and more loosely arranged leaf bases; leaf base-margins showing little to much laceration, pale to reddish or sometimes dark brown; old leaves rarely showing much curling.
    4. Shoots and inflorescences with a pale aspect from the leaf base-margins and floral bracts; leaf base-margins usually pale and somewhat lacerate; leaves not glaucous. Male panicle often 2 cm. or more in width with cluster bracts over 1 cm. long ..... ssp. *pallida*.
    - 4.\* Shoots and inflorescences with reddish or golden brown aspect from the leaf base-margins and floral bracts; leaf base-margins reddish or golden brown and usually finely lacerate into fibres; leaves dark green in the fresh state (? sometimes), often glaucous when dry. Male panicle usually less than 2 cm. broad with cluster bracts of less than 1 cm. .... ssp. *rubiginosa*.
- 1.\* Stems more or less erect, of limited extent. Male inflorescence usually a spike of reduced clusters or even of single flowers, occasionally a narrow panicle with only very few branches; cluster bracts short and obscure; peduncle usually much longer than the panicle ..... ssp. *leptostachya*.

ssp. *confertifolia*. Stems widely decumbent; leaf bases adpressed forming a slender shoot. Leaves 0.75–1.5 mm. broad, the older ones often curled back on to the stem, the base-margins pale and scarcely lacerate, the apex conspicuously toothed with two slightly divergent marginal teeth often 2–4 mm. long. Male inflorescence a spike or few-branched panicle of clusters, pale in aspect from the pale floral bracts, often less than 1 cm. broad and about 7 cm. long, the cluster bracts very fine, about 5–7 mm. long; female inflorescence smaller than the male, often a spike of clusters. *Xerotes confertifolia* F. M. Bail. in Qld. Agric. Journ. XXV (1910) 11; F. M. Bail., Compr. Cat. Qld. Pl. (1912) 565 and Pl. 549; Domin in Bibl. Bot. XX, Heft 85<sup>1</sup> (1915) 526.

Glasshouse Mountains and other high ground in south-eastern Queensland.

ssp. *pallida* Lee in Contrib. N.S.W. Nat. Herb. III (1962) 157. Stems not widely spreading, sometimes very short, giving a tufted habit. Leaves dark green (*vide* collector's note) and not glaucous, rather rigid, plano-convex to inrolled, usually 30–60 cm. long, 1–2 mm. broad, the base-margins rather firm, pale or rarely dark- or golden-brown and without much laceration, the old leaves rarely showing the curling characteristic of the Type subspecies. Male panicle with a pale aspect from its pale floral bracts, the inflorescence often 2 cm. in width with fine but firm cluster bracts usually 1–1.5 cm. long. Female inflorescence spicate, only about 2 cm. long, obscure among the leaf bases; fruit not seen.

North Coast and Northern Tablelands. Richmond R., Fawcett No. C27, 1878 (MEL, bis); New England, Timbarra, C. Stuart No. 32 (MEL); Tenterfield, C. Stuart No. 1036, Nov. (MEL); New England, Poverty Point, C. Stuart No. 700, Oct. (MEL, bis); New England, Mangula, C. Stuart No. 1035, Sept. (MEL); Corindi–Red Rock road, Constable 10.1961 (63106, shows gradation towards ssp. *rubiginosa*). Also in Queensland.

ssp. *rubiginosa* Lee in Contrib. N.S.W. Nat. Herb. III (1962) 157. Similar in habit to the last, but with considerable stem development always shown except in new growth, as after burning. Leaves at least sometimes dark green in the fresh state but commonly greyish or glaucous when dry, very fine and rather lax, 0.3–2 mm., usually less than 1 mm., broad, often 30–40 cm. long and more or less inrolled, the base-margins thin, reddish or golden brown, finely lacerate into fibres, giving the shoots a characteristically reddish brown aspect, the lowest leaves showing curling only when very old, that is when the stems are very extensive. Male panicle, or rarely spike, often less than 1 cm. broad with a golden- or reddish-brown aspect from the floral bracts of that colour, with paler, very fine cluster bracts usually less than 1 cm. long., the rachides often glaucous, the clusters sometimes few-flowered or rarely the flowers singly near the apex of a small inflorescence. Female inflorescence not seen. Chromosome number:  $2n = 32$  (Briggs, unpubl.).

Central Western Slopes and Tablelands, and southern part of North Coast to South Coast usually in rather dry situations in open sclerophyll forest. Lake Cathie, Constable No. 4796, 5.1964 (64739); Gloucester Buckets, Maiden 9.1897 (49824); Gungah, near Merriwa, Boorman 9.1904 (49811); Cox's Gap, Constable 9.1948 (16246); (the four preceding specimens show gradation towards ssp. *pallida*); Alum Mt., Bulahdelah, Maiden 10.1907 (49820); Alum Mt., Rupp 9.1923 (49832, 49833); Alum Mt., Cleland 9.1919 (49831); Bulahdelah Mt., Cleland 8.1919 (AD 95938010); below top of Mt. Bulahdelah, Ford 10.1951 (49823); Newcastle (MEL); Milson Is., 10.1911 (49813); Milson Is., Cleland 3.1915 (49830); 2 miles E of Windsor, McKee (52294); above junction of Berowra & Connelly's Creeks, Blakely 5.1918 (49819); Berowra, Salasoo No. 693, 6.1951 (49814); Berowra, Lee 9.1956 (49815, 49817, 49822); near Kuringgai boathouse, Blakely 8.1916 (49827); Terrey Hills, McKee 10.1953 (52295); Bent's Basin, Nepean R., Maiden 6.1913 (49829); near Glenbrook, Salasoo No. 1220, 10.1954 (49825); Bluebush Ra., Kowmung R., Johnson 3.1948 (5015); Douglas Park, Hamilton 12.1915 (49828); Nepean Dam, Bargo, Constable 12.1953 (26605); Colo Vale, Lee 1.1958 (49826); W of Colo Vale, Lee 10.1960 (52292, 52293); Bomaderry Creek, Rodway 10.1943 (49809); Nowra, Rodway (49808; an apparent duplicate of this is BRI 00001); Pulpit Rock, Nowra, Rodway 5.1947 (49806); Waggamia, Shoalhaven, Rodway (49807); Bateman's Bay district, McColl No. 147, 9.1964 (71637); Bateman's Bay, Boorman 6.1906 (49816); dry barren ranges, Mt. Dromedary, Reader 8.1880 (49818; dup. MEL); Narira Ck., Reader 8.1880 (MEL); Tanja, Floyd 4.1951 (49821).

ssp. *similis* Lee in Contrib. N.S.W. Nat. Herb. III (1962) 158. Stems usually extensive as in the Type subspecies, the slender shoots 2–5 mm. in diameter clothed with the adpressed leaf bases. Leaves nearly flat, 8–20 cm. long, 0.5–1.5 mm. broad, pale or yellowish green not glaucous (in dried specimens), the apex with two lateral teeth 0.5–1 mm. long, shorter and less conspicuous than in ssp. *confertifolia*, exceeding the minute central tooth sometimes undeveloped, the teeth and a small adjacent area rather conspicuously brown in colour, the base-margins reddish brown with little to much laceration; old leaves on the longer stems curled back as in ssp. *confertifolia*. Male inflorescence a small panicle of clusters, sessile or nearly so, 2–8 cm. long, the branches usually short with one or few clusters, the clusters often with only 2 or 3, less commonly up to 6, flowers, the general aspect golden brown from the floral bracts of that colour, the cluster bracts often very small below the upper clusters, the longest fine-pointed, 6–8 mm. or rarely to 1.2 cm. long. Female inflorescence very short and few-flowered as in ssp. *confertifolia*, the fruit also similar.

South Coast. Clyde Mt., Walker 9.1963 (68753; ANU 1106); Benandra State Forest, Bateman's Bay, Constable 12.1950 (16604); Bateman's Bay district, McColl No. 134, 9.1964 (71636); ridge NE of Nerrigundah, Constable 9.1953 (25619); Lawler's Ck., Bodalla State Forest, Constable 9.1953 (25616); Mt. Comerang, Constable 1.1963 (63105); near Mt. Dromedary, Bate 1882 (MEL, bis).

ssp. *leptostachya* Lee in Contrib. N.S.W. Nat. Herb. III (1962) 158. Stems rather limited, erect or decumbent, the erect condition possibly an early stage in growth or regrowth after burning. Leaves 10–45 cm., usually about 30 cm., long, more or less inrolled, up to 1.5 mm. broad, the apex with rather short teeth, the laterals exceeding the central point, the bases purplish coloured with rather pale golden-brown margins showing considerable laceration; older leaves without any indication of curling. Male inflorescence a long-pedunculate spike or very narrow few-branched panicle of very reduced clusters or even of single flowers, subtended by inconspicuous bracts, the spike (1–6 cm.) much shorter than the fine purplish-brown slightly flattened peduncle (4–30 cm.); floral and cluster bracts pale golden brown, the latter rarely exceeding 2 mm. in length and only the longest with the fine tip exceeding the broad base. Female plants not seen.

Far South Coast. Tathra, M. Mueller No. 2189, 10.1953 (49810); Dry Ck., Womboyn-Prince's Highway road, Constable 10.1954 (30153); Doyle's Farm, Narrabarba Ck., Constable 10.1954 (30138); Mt. Naghi, ENE of Timbillica, Constable 8.1963 (67517). Also in north-eastern Victoria.

This is the subspecies referred to as “ ? *L. confertifolia* ” by Willis, Handb. Pl. Vic. I (1962) 300, 302.

13. *L. spicata* Lee in Contrib. N.S.W. Nat. Herb. III (1962) 159. A species with the habit of *L. longifolia* forming large clumps of robust short shoots from condensed rhizomes. Leaves linear, flat, 4–12 mm. broad, often 40–80 cm. long, thinner and more lax than in *L. longifolia*, the margins smooth, the apex with a few irregular lateral teeth usually exceeded by the central point, the bases with shining, yellowish to orange-brown, chartaceous margins lacerated only in extreme age. Inflorescence a spike of golden-brown clusters fading pale, rarely with a few short branches at the base or forked at base or apex, the cluster bracts narrow linear but not pungent and in herbarium specimens often irregularly bent, 0.7–3 (usually 1–2) cm. long, pale; male spike 10–30 cm. long, more floriferous and often longer than the female (4–15 cm.), shorter than its broad, flattened peduncle. Male flower at first cylindrical like that of *L. longifolia* then more campanulate, narrowed sharply into a minute pedicel which remains within the bracts when the flower is shed; perianth segments nearly equal, the outer thin but firm, the inner cream or white



with a central thickened yellowish zone, all free except near the base; floral bract and bracteole as in *L. longifolia*. Fruit at first somewhat fleshy, green and shining, turning red and drying light to dark brown and somewhat wrinkled, about 6 mm. long, tapered from a rounded base.

North Coast and Northern Tablelands in rainforests. Mt. Lindsay, Constable 5.1949 (10983) and 11.1952 (23729, 24153); Toonambar State Forest, SE of Woodenbong, Constable 4.1947 (49654); Tintenbar, Bäuerlen 10.1893 (49653); Whian Whian State Forest, N of Lismore, Constable 1.1953 (22168); Tabulam, Boorman 11.1904 (49658); Clarence R. (MEL); Timbarra, C. Stuart No. 30 (MEL); Timbarra No. 703, Oct. (a C. Stuart collection, MEL, bis); New England (serub, Tenterfield) C. Stuart No. 1037 (MEL); New England C. Stuart No. 730 (MEL); Moonpar State Forest, NW of Dorrigo, Hayes 3.1956 (49661); Dorrigo, Fraser 1.1934 (49660); Dorrigo, Boorman 5.1909 (49656); Dorrigo State Forest, White No. 7478, 10.1930 (BRI 020321); Pt. Lookout, Rodway 7.1941 (49707); Pt. Lookout, New England National Park, St. John No. 24512, 12.1950 (49655); Craven Plateau, ca. 20 miles NW of Gloucester, Briggs 8.1964 (64996); Moonan Brook, Hunter's R., Carter 1.1885 (MEL); Upper Williams R., near Salisbury, White No. 11617, 3.1938 (BRI 020322); Barrington, Davis 8.1933 (49657); Barrington, Vickery 5.1935 (49662); Upper Williams R., Rodway 8.1935 (49707). Also in Queensland.

Specimens of this species have been described or referred to under the following misapplied names: *Xerotes longifolia* var. *montana* by F. M. Bailey in Qld. Agric. Jour. XXVIII (1912) 203 and in Compr. Cat. Qld. Pl. (1913) 565; *X. montana* by Domin in Bibl. Bot. XX Heft 85<sup>1</sup> (1915) 526; *Lomandra montana* by Fraser & Vickery in Proc. Linn. Soc. N.S.W. LXII (1937) 286.

14. *L. montana* (R. Br.) Fraser et Vickery in Proc. Linn. Soc. N.S.W. LXII (1937) 285 as to Basionym, excl. descr. Smaller plants than the last, tussock-forming with a rather lax habit. Leaves narrow-linear, thin and lax, often 35–50 cm. long, 2–4 mm. broad, but irregularly rolled or flattened in herbarium specimens, the apex irregularly toothed but often with two lateral teeth exceeded by a central point as in *L. spicata*, the margins smooth, the bases with pale-brown margins at first shining, soon lacerated, losing their gloss and becoming somewhat fibrous. Inflorescence a spike of dense clusters, 5–8 cm. long, much shorter than the flattened peduncle of 15–25 cm.; cluster bracts rather weak, pale, 4–12 mm. long, fine-pointed and spreading but often reflexed or irregularly bent in dried material, the shorter ones somewhat obscured by the clusters. Flowers, floral bracts and bracteoles as in *L. spicata*, but in the fresh state flowers can be removed with the minute pedicel attached. Fruit pale to dark brown, wrinkled, tapered from a rounded base, 4–5 mm. long, the perianth persistent. Chromosome number:  $2n = 16$  (Briggs, unpubl.). *Xerotes montana* R. Br., Prodr. (1810) 262; Smith in Rees, Cycl. XXXIX (1818); Kunth, Enum. III (1841) 374; Domin in Bibl. Bot. XX, Heft 85<sup>1</sup> (1915) 526 as to Basionym. *Xerotes longifolia* R. Br. var. *montana* (R. Br.) F. M. Bail. in Qld. Agric. Journ. XXVIII (1912) 203 as to Basionym, and Compr. Cat. Qld. Pl. (1913) 565 as to Basionym.

Central Coast and Central Tablelands: Blue Mountains, near Creeks and waterfalls. Blue Mts., Betche 10.1881 (49802); Bowen's Ck., Bilpin, Tindale & Constable 3.1952 (19372); Happy Valley, Mt. Wilson, Constable 7.1964 (73927); Mt. Tomah, Rodd 1.1965 (77834, 77835); 8 miles NNE of Leura, Constable 8.1964 (77823); Springwood, Jacobs 11.1935 (49801); head of Linden Ck., Linden, Constable 1.1954 (26666); Wentworth Falls, Burgess 1.1956 (49799); Wentworth Falls, near second falls, Blakely 11.1938 (49800); Atkinson No. 21 (MEL); St. Helena, Constable 11.1960 (34336); banks of the River Grose, R. Brown Iter Austral. No. 5760, 1804 (BM, photograph only seen).

This species appears to be very localised in occurrence and easily distinguished from *L. spicata*, the larger, more northern species to which the epithet *montana* has been frequently and erroneously applied.

15. *L. multiflora* (R. Br.) J. Britt. in Banks & Sol., Ill. Bot. Cook's Voy. III (1905) 95, t. 313; Williamson in Vic. Nat. XLV (1928) 35, Fig. 3, 3a; Ewart, Fl. Vic. (1931) 278; Gardner, Enum. Pl. W. Austral. (1930) 20; Black, Fl. S. Austral.,

ed. 2 (1943) 188; Blackall, W. Austral. Wildflowers (1954) 72; Willis, Handb. Pl. Vic. I (1962) 299, 302. Slender to robust plants forming rather small or open tussocks from condensed ascending rhizomes or rarely developing short aerial stems, the individual vegetative shoots usually under 1 cm. in diameter, the floriferous shoots sometimes but not often narrower, with scale leaves only. Leaves firm and rather thick, dark or greyish green, smooth to scabrid, 30–90 (usually 40–60) cm. long and 1.5–4 (usually 1.5–2.5) mm. wide with about 10–20 veins, the apex broadly rounded without teeth, the margins smooth or microscopically serrulate, the bases often purplish with shiny brown margins showing little laceration. Male inflorescence very variable even on the one plant, at least a little shorter than the leaves, a spike or panicle of clusters of pedicellate flowers, 5–30 cm. long and nearly always longer than the more or less scaberulous, often purplish peduncles, the clusters often 1–2 cm. apart; female inflorescence a panicle or more often a spike of clusters of sessile flowers, longer or shorter than the peduncle. Cluster bracts long- to short-deltoid, only the longest and lowest at all conspicuous, not widely spreading and finally reflexed below the cluster, those among the flowers obscure. Male flower narrow-campanulate, 2–3 mm. long on a slender pedicel which develops to about 1 cm. long as the flower opens, young buds appearing sessile; floral bract and bracteole membranous, with brown or purple colouring, broad- and sheathing-based, shortly acute, but usually 2- or 3-lobed by early splitting lengthwise; perianth segments joined only near the base, all about equal in length, the outer ones thin, yellowish with some purple colouration, the inner three thicker, yellow, and often apiculate; female flower sessile and a little longer, 3–4 mm., the segments all free, the ovary tapered to a shortly trifid stigma. Fruit about 5 mm. long with a few transverse wrinkles at maturity, the hardened perianth persistent, the carpel margins strongly ridged. Flowering in Spring. Chromosome number:  $2n = 16$  (Briggs, unpubl.). *Xerotes multiflora* R. Br., Prodr. (1810) 262; Smith in Rees, Cycl. XXXIX (1818); Kunth, Enum. III (1841) 375; Benth., Fl. Austral. VII (1878) 100; F. M. Bail., Qld. Fl. (1902) 1661; Domin in Bibl. Bot. XX, Heft 85<sup>1</sup> (1915) 526; Maiden & Betche, Census N.S.W. Pl. (1916) 42; Ewart, Fl. Vic. (1931) 278. *Xerotes Brownii* F. Muell., Fragm. VIII (1874) 206, nomen illegit.; Moore & Betche, Handb. Fl. N.S.W. (1893) 424. The following are equivalent synonyms: *X. aemula* R. Br. (loc. cit.); Smith (loc. cit.); Kunth (loc. cit.). *X. multiflora* var. *aemula* (R. Br.) Domin (loc. cit.). *X. distans* R. Br. (loc. cit.); Smith (loc. cit.); Kunth (loc. cit.). *X. multiflora* var. *distans* (R. Br.) Domin (loc. cit.). *X. media* R. Br. (loc. cit.); Smith (loc. cit.); Kunth (loc. cit.). *X. multiflora* var. *media* (R. Br.) Domin (loc. cit.). *X. decomposita* R. Br. (loc. cit.). Photographs of Brown's Types in the British Museum have been examined, and I have found it impossible satisfactorily to subdivide the species on the basis of Brown's characters or of any others. *X. decomposita* from tropical Queensland may prove an exception, but only one or two specimens have been seen which would be referred to it, one of them the Type of *X. savannorum* Domin (loc. cit.).

Widely distributed in Coast, Tablelands and Western Slopes, occasional in eastern edge of Western Plains. COAST AND TABLELANDS DISTRICTS: Murwillumbah, Campbell 10.1900 (51049); Unumgar State Forest, NW Kyogle, Constable 11.1952 (24155); Ballina, Bäuerlen 10.1892 (51061); Copmanhurst, Rupp 11.1909 (51063); Purgatory Ck., 7 miles NW of Ramornie, Blakely & Shires 7.1922 (51058); Coff's Harbour to Grafton, Maiden & Boorman 11.1903 (51050); Barcoongere State Forest, ca. 6 miles N of Corindi, Constable 11.1956 (41954); Coryah Gap near Mt. Kaputar, Nandewar Ra., Johnson & Constable 11.1954 (30359); Mt. Boss, 15 miles NW of Wauchope, Constable 10.1956 (41814); 3 miles N of Curricabark Ck., Curricabark, Johnson 10.1953 (51071); Bowman & Barrington Rivers, Maiden 9.1897 (51054); Belmont near Newcastle, Davis 8.1941 (51088); 6 miles NW of Morisset, Story No. 6675, 9.1959 (CANB 71820); Bosche's Ck., Mullions Range State Forest, 16 miles N of Orange, Constable 10.1959 (48906); Wolgan East, Constable 12.1948 (16245); Glen Davis, Constable 11.1961 (65090); Wyong-Warnervale, Salasoo No. 1617, 10.1958 (51064); Nepean R., opposite Glenbrook Ck., Cambage No. 1572, 9.1906 (51041); Hornsby, Lee 1.1953 (51066); Penrith-Richmond road, Constable 10.1950 (18813); Iter Australiense, R. Brown 1802-5 (55265); Blue Mts., Betche

10.1881 (51047); Springwood, Eames & Hotchkiss 10.1953 (51044, 51039); Faulconbridge, Hamilton 9.1914 (51038); National Park, Constable 9.1955 (37597); Yerranderie, Cambage No. 2303, 10.1909 (50994); Hilltop, Cheel 9.1913 (50996); Barber's Ck., Rumsey 10.1898 (50982); Shoalhaven R., Tolwong, about 6 miles E of Bungonia Caves, Constable 1.1956 (51048); "McMillans", 2 miles N of Nowra, Constable 9.1961 (58789); Bomaderry, Rodway 9.1944 (51090); Boolijah Ck., Nowra-Nerriga road ca. 27 miles SW of Nowra, Constable 10.1957 (45262); Conjola, Heron 10.1898 (50999); Red Head Beach road 4 miles E of Prince's Highway, Constable 10.1957 (50998); Lawlers' Ck., Bodalla State Forest, Constable 9.1953 (25617); E of Bega, Mueller 10.1953 (50991); Watergum Ck., Womboyn, Constable 10.1954 (30148). WESTERN SLOPES AND PLAINS: Warialda, Hadley 10.1907 (51060); Howell, Hart 10.1905 (51062); Narrabri, Burrow 4.1913 (51010); Bohena Ck., 14 miles S of Narrabri, Johnson & Constable 11.1954 (30366); Barraba, Cambage No. 2327, 11.1909 (51011); Warrumbungle Ra., Forsyth 10.1901 (51012); Tamworth, Rupp 9.1904 (51059); Blandford near Murrurundi, Rupp 10.1944 (51052); Narromine, Maiden 9.1898 (50981); Dubbo, per Glenfield Veterinary Research Station 12.1945 (898); Tomingley near Dubbo, Betehe 9.1883 (51036); Harvey Ra., Peak Hill, Boorman 11.1905 (51092); Bowan Park, Blakely 10.1906 (51045) and 11.1907 (50995, 51046); Monia Gap, Constable 10.1947 (51006); Barmedman, Dwyer 10.1916 (51040, 51008); Thuddungra, Caldwell 10.1953 (51037); Burrumbuttoek, McBarron No. 3944, 10.1949 (51005); Mulwala, Fletcher 10.1890 (51007); Albury, Patterson 10.1916 (51004). Also in Queensland, Victoria, South Australia, Western Australia and the Northern Territory.

This species (as *Xerotes Brownii*) has been suspected of causing paralysis in stock (Hurst, Poison Plants of N.S.W. (1942) 61) but confirmation is lacking.

16. *L. patens* Lee in Contrib. N.S.W. Nat. Herb. III (1962) 160. Plants similar in habit to those of *L. multiflora* and *L. dura* but larger, the individual shoots up to 3 cm. in diameter with rather conspicuously distichous leaves. Leaves thin but more or less rigid, glaucous or bluish green and considerably inrolled after drying but perhaps green and nearly flat when fresh, about 1 m. long, 2.5–5 (usually 4–5) mm. broad, the apex rounded-acute with the dead tips commonly split for 1 cm. or more, the membranous margins of the bases at first white, later brownish and lacerated, the leaf margins smooth after erosion of the somewhat extensive membrane. Male and female inflorescences similar: large spreading panicles of rather few-flowered, distant clusters (often 2 cm. or more apart) on widely spaced, slender, verticillate branches, the peduncle smooth or faintly scaberulous like the rachides, 11–15 cm. long, shorter than the panicle, the panicle 30–60 cm., the lowest branches usually with 4–5 clusters or occasionally compound with one or few secondary branches. Male flowers cream-coloured, 4–6 mm. long on a pedicel of 0.3–1 mm., the perianth segments free except near the base, the outer sometimes with a purplish central zone, the inner slightly thicker and with incurved tips, the stamens as in *L. multiflora*. Female flowers known only in the very young stage when they appear hermaphrodite (as in at least several other species), and from fruiting material, but apparently similar to those of *L. dura*, perhaps somewhat larger. Cluster bracts and floral bracts and bracteoles like those of *L. multiflora*, the largest cluster bracts about 2.5 cm. long, but often breaking and eroding to a broad-deltoid relict, obscured by the clusters except in the lowest verticils. Fruit about 6 mm. long, purplish with yellow-brown septal markings, the style about 1 mm. and the perianth persistent.

Western Plains. Mt. Oxley, ESE of Bourke, Constable 10.1963 (67360); Mt. Boppy, near Cobar, Boorman 7.1903 (51081); Mt. Boppy, Abrahams No. 440, 10.1911 (51082); Canbelego, Bäuerlen No. 2945, 6.1903 (67673); Griffith, Dwyer 5.1928 (51083); Griffith, Rowlands 8.1961 (55316); Beelangra slopes, Griffith, Burbidge 6.1961 (60743-4; CANB 6425-6); 20 miles NW of Yanco, Cleland 10.1912 (AD 95936115). Also in the Northern Territory (Central Australia).

17. *L. dura* (F. Muell.) Ewart in Proc. Roy. Soc. Vic. n.s. XXVIII (1916) 219; Black, Fl. S. Austral., ed. 2 (1943) 187; Lee in Contrib. N.S.W. Nat. Herb. III (1962) 163. Similar in habit to *L. multiflora*, the leaves usually shorter, firm to rigid and rather thick, slightly glaucous at first but drying with a yellowish aspect, flat or slightly concavo-convex, smooth, 20–65 cm. long, 2–4 mm. broad, the apex rounded-acute,

the margins smooth to microscopically scaberulous, the bases with membranous margins at first white, then orange to brown, somewhat lacerated at the base but not long persistent; individual vegetative shoots usually under 1 cm. in diameter, the floriferous shoots often narrower with reduced or scale leaves only. Male and female inflorescences very similar: broad-conical panicles of clusters of almost sessile flowers, shorter than the leaves, 5–40 (often 9–15) cm. long and usually longer than the 3–15 (often 6–9) cm. peduncles; clusters often 1 cm. or less apart; peduncle and rachides usually yellowish and slightly scaberulous; cluster bracts usually shorter than in *L. multiflora*, those below the largest clusters usually deltoid (perhaps by erosion of the tips). Male flowers as in *L. multiflora* but without development of the pedicel beyond 0.25 mm. (rarely to 0.75 mm.; a very few specimens with the general aspect of *L. dura* show pedicels of fully mature male flowers 2 mm. long, suggesting a lack of complete discontinuity between *L. dura* and *L. multiflora* in Victoria (Grampians) and South Australia (Mt. Lofty Ra.)). Floral bracts and bracteoles, female flowers, and fruits as in *L. multiflora*. *Xerotes dura* F. Muell. in Trans. Vic. Inst. (1855) 42; Sonder in Linnaea XXVIII (1856/7) 219; F. Muell., Fragm. VIII (1874) 207; Moore & Betche, Handb. Fl. N.S.W. (1893) 424; Maiden & Betche, Census N.S.W. Pl. (1916) 42.

South Western Slopes and Western Plains. County Cooper, Beadle 5.1941 (SYD); Blue Hill Reserve, Henty, McBarron No. 4907, 9.1950 (SYD). Also in south-eastern South Australia.

**18. *L. glauca* (R. Br.) Ewart** in Proc. Roy. Soc. Vic. n.s. XXVIII (1916) 219; Macbride in Contrib. Gray Herb. LV1 (1918) 4; Williamson in Vic. Nat. XLV (1928) 36 and Fig. 7, 7a; Ewart, Fl. Vic. (1931) 277; Gardner, Enum. Pl. W. Austral. (1930) 20; Black, Fl. S. Austral. ed. 2 (1943) 188; Blackall, W. Austral. Wildflowers (1954) 72; Willis, Handb. Pl. Vic. I (1962) 299, 302. A widespread and variable species with rhizomes extending into more or less restricted leafy aerial stems, sometimes very condensed as in *L. elongata*: leafy aerial shoots 4–15 mm. in diameter, often under 1 cm. in diameter and 5–10 cm. long. Leaves glaucous at least when young, narrow linear, 3 to more than 30 (usually 8–20) cm. long, 1–1.5 mm. wide, flat or slightly concave but not noticeably thicker in the middle, the apex usually shortly acute, sometimes acuminate, or obtuse by erosion, the margins more or less minutely scaberulous, the bases pale with whitish margins decurrent on the lamina or only slightly auriculate on the youngest leaves and soon showing considerable laceration into pale fibres (rarely pinkish when young or dark brown when old). Male inflorescence a few-branched panicle (in small plants sometimes a spike) of clusters of about 3–7 sessile flowers 2–12 cm. long on a short, sometimes obscure peduncle, the cluster bracts broad-based, narrow, acute, obscure; female inflorescence a single head of flowers on a short, stout peduncle 1–3 cm. long or rarely almost sessile, the cluster bracts at the base short, acute, often obscured by the flowers. Male flowers about 2 mm. long, surrounded at the base by the broad, scarious, golden-brown (pale at first) floral bract outside a broader bracteole, both lobed or split to the base as the bud enlarges; perianth segments free only in the upper half, tapered and purplish below, the outer three thinner, paler and broader than the yellowish inner ones, or all similar in colour and texture, the apices, especially of the inner three, incurved; stamens with short filaments inserted at the top of the perianth tube; female flowers about 3 mm. long, the perianth segments oblanceolate, free to the narrowed base, yellowish or with purplish centres, becoming hard and blackish, the inner three narrower than the outer and often with inflexed tips. Fruit about 5 mm. long slightly wrinkled at maturity, pale brown above the persistent perianth. Flowering in Spring. Chromosome number:  $2n = 28$  (Briggs, unpubl.). *Xerotes glauca* R. Br., Prodr. (1810) 260; Smith in Rees, Cycl. XXXIX (1818); Kunth, Enum. III (1841) 372; Schnizlein, Iconogr. 1 (1845) t. 51b (1); J. D. Hooker,

Fl. Tas. II (1860) 63; F. Muell., *Fragm.* VIII (1874) 208; Benth., *Fl. Austral.* VII (1878) 105; Moore & Betche, *Handb. Fl. N.S.W.* (1893) 424; Maiden & Betche, *Census N.S.W. Pl.* (1916) 42. *Xerotes mucronata* Sieb. ex Benth. pro syn., loc. cit. p. 106.

Southern part of North Coast to South Coast and Central and Southern Tablelands; less commonly on Central Western Slopes and Western and Far Western Plains, often in dry sandstone soils. Mt. Murchison, Dallachy (50568; MEL) cited by Bentham under *X. elongata*; Goonoo State Forest, Dubbo-Mendooran, Chippendale & Constable 9.1951 (17380); Nubiach, heathland, Gilbert 9.1947 (50556); Hunter Valley, Story No. 6666, 9.1959 (50564); Lee's Pinch, Wollar-Merriwa road, Johnson 9.1951 (18755); Tea Gardens, Briggs 8.1964 (73924); 2 miles E of Currant Mtn. Gap, 7 miles E of Olinda, Johnson 9.1951 (49812); Howe's Valley to Putty, Johnson 9.1951 (17953); Island Mt. N. of Colo R., Rodd 10.1964 (73923); Bell-Lithgow road, Garden 11.1952 (50562); Blue Mts., Betche 10.1881 (50557); Mt. Victoria, Hamilton 1.1915 (50563); Hat Hill Creek, Blackheath, Constable 11.1953 (26472); Springwood, Eames & Hotchkiss 10.1953 (50553); Burratorang to Wentworth Falls, Maiden 10.1898 (49694); Berowra, Boorman 10.1899 (50597); Cowan, Blakely 9.1937 (50596) and 11.1927 (50585); Spring Gully, Wahroonga, Salasoo Nos. 846, 847, 9.1951 (50586); Palm Beach, Morris No. 1844, 9.1927 (ADW 13873); Bilgola Heights Estate, Lee 10.1953 (50592); Mosman, Sydney, Kenny (BRI 000007); Lindfield Reserve, White 10.1927 (BRI 000006); Centennial Park, Cheel 11.1898 (50595); Waverley, Camfield 11.1898 (50598); Port Jackson district, Helms 10.1902 (BRI 000002); South Coogee, Mair 11.1955 (50581); Botany Bay district, Camfield 1893 (50594); near Port Hacking R., National Park, Salasoo No. 1614, 7.1958 (50587); Yerranderie, Cambage No. 2299, 10.1909 (50566); Woronora Dam S of Waterfall, Constable 8.1956 (45234); Hilltop, Shirley (BRI 000005); Pt. Perpendicular, Constable 10.1960 (52296); Jervis Bay, Rodway 9.1928 (50647); Jervis Bay, Maiden 7.1899 (50558); head of Tuross R., Kybean, Cambage No. 2007, 4.1908 (50565); Murray R., Dallachy (50567; MEL) cited by Bentham under *X. elongata*. Also in South Australia, Victoria, Tasmania and Western Australia.

19. *L. elongata* (Benth.) Ewart in *Proc. Roy. Soc. Vic.* n.s. XXVIII (1916) 219; Lec in *Contrib. N.S.W. Nat. Herb.* III (1962) 164. Plants of tufted habit with a very condensed stem, the individual shoots about 10–12 mm. in diameter. Leaves greyish green, narrow-linear, thick, triangular or semicylindrical in transverse section or at least distinctly thicker at the centre, 30–70 (usually 30–40) cm. long, 0.75–1 mm. broad, the apex shortly acute, the margins minutely scaberulous, the base-margins lacerating early, at first pale then pinkish-brown. Male inflorescence a spike of clusters much shorter than the leaves, 5–12 cm. long including the short peduncle of about 3 cm., the clusters usually distinct but sometimes so crowded as to appear as a continuous spike of flowers, each cluster of about 5–12 sessile flowers subtended by an obscure narrow bract of about 1–3 mm.; female inflorescence a single head of flowers about 1 cm. in diameter, or rarely a spike of two clusters on a short stout peduncle, the whole 1.5–5 (usually 3–4) cm. long. Flowers, floral bracts and bracteoles as in *L. glauca*. Fruit not seen. Flowering in Spring. *Xerotes elongata* Benth., *Fl. Austral.* VII (1878) 106 as to Lectotype (sec Lee, loc. cit.); Moore & Betche, *Handb. Fl. N.S.W.* (1893) 424; F. M. Bail., *Qld. Fl.* (1902) 1662; Maiden & Betche, *Census N.S.W. Pl.* (1916) 42.

Northern Tablelands: New England district. New England, Timbarra, C. Stuart "37, *Xerotes*" (MEL); New England, C. Stuart " *Xerotes* 701 Oct. Poverty Point " (50555; MEL); Armidale-Grafton, Floyd 10.1959 (50830). Also in Queensland whence field notes indicate a preference for damp habitats.

20. *L. obliqua* (Thunb.) Macbride in *Contrib. Gray Herb.* n.s. LVI (1918) 4. Small prostrate to ascending plants with extensive leafy stems up to 50 cm. long. Leaves rather thin, flat or slightly concave, green or glaucous, characteristically twisted or curled back towards the stem, alternate, markedly distichous, mostly 2–4 (rarely up to 15) cm. long and 1–2 mm. broad, the apex long-acute, the margins minutely scaberulous, the membranous base-margins white or pale, showing little

laceration and only with age, clearly auriculate at their upper ends but the auricles eroded in old leaves. Male inflorescence a spike or few-branched panicle of clusters; clusters usually with 4-7 sessile flowers or sometimes few-flowered and crowded so as to appear as a continuous spike of flowers; female inflorescence as in *L. glauca*. Flowers, floral bracts and bracteoles, and fruit as in *L. glauca*. Flowering in Spring. Chromosome number:  $2n = 14$  (Briggs, unpubl.). *Dracaena obliqua* Thunb., Diss. bot. de *Dracaena* (1808) 6. *Xerotes flexifolia* R. Br., Prodr. (1810) 260; Smith in Rees, Cycl. XXXIX (1818); Kunth, Enum. III (1841) 372; F. Muell., Fragm. VIII (1874) 207; Benth., Fl. Austral. VII (1878) 105; Moore & Betche, Handb. Fl. N.S.W. (1893) 424; Maiden & Betche, Census N.S.W. Pl. (1916) 42. *Xerotes obliqua* (Thunb.) Domin in Bibl. Bot. XX, Heft 85<sup>1</sup> (1915) 527. *Lomandra flexifolia* (R. Br.) Ewart in Proc. Roy. Soc. Vic. n.s. XXVIII (1916) 219.

North Coast, Central Coast, Central Tablelands and northern part of South Coast; common in sandy soils. Mt. Harriet, Ramornie, Blakely & Shiress 7.1922 (50609); near Bombah Pt., Myall Lakes, Briggs 8.1964 (73925); Reedy Ck., S of Howes Valley, Johnson & Constable 10.1954 (30162); 3-4 miles NE of Putty, Salasoo No. 2887-8, 1.1964 (67952, 67953); Newcastle (Merewether), Cambage No. 565, 10.1901 (50616); Morisset, Boorman 10.1899 (50603); Kulnura, near Gosford, White No. 10237, 12.1935 (BRI 020260); Springwood, Eames & Hotchkiss 10.1953 (50630); Glenbrook, Forsyth 10.1897 (50605); Wentworth Falls, King's Tableland, Hamilton 1.1915 (50623); W end of Mt. Solitary, 5 miles S of Katoomba, Constable 11.1960 (54023); Iter Australiense, R. Brown (55264, probable isotype of *Xerotes flexifolia*); Port Jackson, Helms 12.1900 (50622); Port Jackson, Betche 10.1881 (50620); Port Jackson, J. D. Hooker 1841 (50631); Whale Beach, Lee 10.1953 (50639); Hornsby, Blakely 10.1914 (50635); Lane Cove R., Forrest 9.1892 (BRI 020261); Kogarah, Camfield 10.1896 (BRI 020259) and 11.1898 (50608); near crossing of Wollondilly R., near Bimlow, Chippendale 11.1953 (50606); Oakdale-Burragorang Lookout, Johnson 9.1951 (50610); National Park, Baumann 12.1896 (50638); Bargo, Cambage No. 4439, 11.1923 (50628); Nepean Dam, Bargo, Constable 12.1953 (26453); Bulli road, Atkin (BRI 020258); Bulli to Appin, Johnson 11.1949 (50626); Hilltop, Shirley (BRI 020257); Colo Vale, on road to Mt. Flora, Lee 11.1955 (50607); near Taralga, Daniel 10.1959 (50602); Belmore Falls, Rodway 10.1918 (50644); Box Point to Kangaroo R., Maiden 10.1898 (50619); W. Cambewarra, Monaghan 9.1933 (50643); Moonie Ck., Jervis Bay, Rodway 11.1919 (50642); 10 miles SE of Nerriga, J. Sturgess 4.1944 (50645); near Conjola, Rodway 10.1921 (50641). Also in Queensland, where it seems to approach *L. glauca* in some characters.

**21. *L. leucocephala* (R. Br.) Ewart** in Proc. Roy. Soc. Vic. n.s. XXVIII (1916) 219; see also under the subspecies. Slender or more robust plants with condensed stems, forming dense clumps; shoots 0.5-2 cm. in diameter, rarely elongating into short decumbent leafy branches. Leaves narrow-linear, greyish to yellowish green, plano- or concavo-convex with about 5-12 (often 7-11) coarse veins, the apex acute, eroding to a rounded point and often darkened, the membranous margins of the sheathing bases pale, white or orange-brown, decurrent along a considerable part of the lamina and partially persistent, sometimes strongly crinkled, more or less lacerate at the base. Inflorescence a spherical to cylindrical head or segmented head, the females usually not segmented, the males in 1-6 segments on the rachis, comprising apparently a very congested spike of clusters of shortly pedicellate flowers; cluster bracts acute from a broad base, the membranous margins of the larger and the whole of the smaller ones extremely thin and soon fragmenting into crinkly hairs varying from white to reddish brown; clusters and their subtending cluster-bracts distinct only in very young inflorescences soon obscured by fragmentation of the bracts. Male and female flowers similar, on slender pedicels about 3 mm. and 1 mm. long respectively, the outer perianth segments white, thin, irregularly toothed, about 4-5 mm. long, free to the base where they join the base of a tube formed of the slightly thicker, yellowish, inner perianth segments, the tube 3-5 mm., the lobes about 2 mm., long; stamens in the males inserted near the top of the tube; ovary in the females

borne on a gynophore 1 mm. long and tapering gradually into a short but distinct style below the shortly trifid stigma. Fruit about 7 mm. long, the pale lower half embedded in the inflorescence hairs, the upper half reddish brown, smooth, shining, the perianth segments not persistent.

Tablelands, Western Slopes and Plains. Also in Queensland (ssp. *leucocephala*) and Victoria, South Australia and Northern Territory (ssp. *robusta*). The species is also recorded from Western Australia by Gardner, Enum. Pl. W. Austral. (1930) 20 and by Blackall, W. Austral. Wildflowers (1954) 73.

The species shows divergence into two subspecies, north-eastern and south-western within the specific range.

1. Plants slender, usually less than 40 cm. high, the leaves usually 1–2 mm. broad with abundant loose, usually white, silky or woolly fragments from the decurrent membranous base-margins. Male inflorescence usually with 1 or 2 segments on a rather short, slender, minutely hirsute peduncle. North-eastern part of the range.  
..... ssp. *leucocephala*.
- 1.\* Plants generally more robust, the leaves usually 40–50 cm. long, 1.5–2.5 mm. broad, the loose fragments of the membranous margins less abundant, often yellowish or brownish and more woolly or fibrous than silky. Male inflorescence usually with more than three segments on a stouter, glabrous peduncle. Western and southern parts of the range ..... ssp. *robusta*.

ssp. *leucocephala*. Slender plants with leaves usually 20–40 cm. long, rarely longer, 0.5–2.5, usually 1–2 mm. broad, the abundant membranous margins or their lacerate remains persistent along the laminae and forming a rather silky, usually white mass near the base. Male spike of 1 or 2, rarely more, nearly spherical segments 1–2 cm. long, variously spaced, often about 10 cm. from the lowest segment to the tip, on a slender peduncle 4–30, often 8–15, cm. long, minutely hirsute (the hairs usually visible with a hand lens); female inflorescence usually a solitary spherical to shortly cylindrical head. *Xerotes leucocephala* R. Br. Prodr. (1810) 260; Smith in Rees, Cycl. XXXIX (1818); Kunth, Enum. III (1841) 373; F. Muell., Fragm. VIII (1874) 210; Benth., Fl. Austral. VII (1878) 109; Moore & Betche, Handb. Fl. N.S.W. (1893) 424; F. M. Bail., Qld. Fl. (1902) 1662; Maiden & Betche, Census N.S.W. Pl. (1916) 42. *Xerotes filamentosa* A. Cunn. ex Brongn. in Duperr. Voy. Coq. Bot. II (1829) 183 and t. 35; Kunth, loc. cit. p. 375. *X. fibrillosa* Gandoger in Bull. Soc. Bot. France LXVI (1919) 295. *Lomandra leucocephala* (R. Br.) Ewart, loc. cit.; Macbride in Contrib. Gray Herb. n.s. LXI (1918) 5. See notes below on some applications of these names.

North and Central Western Slopes, where it shows gradation to ssp. *robusta*, eastern part of Western Plains and extreme south of North Coast. 3 miles N of Coolatai, Vickery 4.1954 (51122); Ashford, Hayes 4.1908 (51110); Warialda, Maiden & Boorman 8.1905 (51102); Warialda, Hadley 7.1907 (51107); District Warialda, de Beuzeville 8.1913 (51108); 40–50 miles NW of Collarenabri, Jackson 11.1911 (51111); Tingha, Boorman 3.1917 (51114); Bundarra district, Johnson 9.1947 (5123); Narrabri West, Boorman 6.1907 (51123); Cuttabri-Pilliga, Boorman 7.1913 (51109); Pilliga, Swain 8.1913 (51112); Pilliga Scrub, Cleland 10.1918 (AD 95936096); Pilliga, de Beuzeville 7.1915 (51113); Tamworth, Rupp 9.1904 (51117); Spirey Creek, Warrumbungle Mts., Rodd 8.1964 (72291); near Timor Rock, W of Coonabarabran, Vickery 4.1954 (51124); Goonoo State Forest, Eumungerie, Chippendale & Constable 9.1951 (17384); Dubbo, Boorman 8.1903 (16244); Dubbo, Betche 10.1883 (51104); Minor, Boorman 2.1899 (51103); Boomley-Caratcl, Johnson & Constable 8.1950 (16118); Gulgong, Maiden & Boorman 4.1901 (51105); Weston district near Maitland, Davis 7.1918 (51116); Lake Cargelligo, Horne (67672); Barryrenie, 14 miles NW of Cowra, McBarron 8.1964 (73700). Also in Queensland.

It may be inferred from their texts and the distribution of the subspecies that Mueller (loc. cit.), Bentham (loc. cit.), Moore & Betche (loc. cit.), Maiden & Betche (loc. cit.) and perhaps Bailey (loc. cit.), included both this and ssp. *robusta* below under *Xerotes leucocephala*; Ewart (loc. cit.), Williamson (in Vic. Nat. XLV (1928) 34 and figs. 5, 5a), Black (Fl. S. Austral. ed. 2 (1943) 190) and Willis (Handb. Pl. Vic. I (1962) 301, 302) had only ssp. *robusta* in Victoria and South Australia, so their use of *Lomandra leucocephala* signifies that subspecies only.

It is clear from Gandoger's (loc. cit.) descriptions, specimens and duplicate or comparable material in Australia that he not only confused his material of *Xerotes apiculata* and *X. fibrillosa* but also transposed his names on the labels which accompanied the specimens. Thus his sheet 2496a bears a New South Wales National Herbarium label with the data "Dubbo, J. L. Boorman 8.1903", and on it Gandoger has written "*X. apiculata*"; on this sheet are mounted two specimens: A, which agrees with his description of *X. apiculata*, and B, which corresponds with his description of *X. fibrillosa*. His sheet 2496b bears one specimen which is obviously conspecific with B (i.e. *X. fibrillosa*), and is labelled "Wimmera, Octbr 1900, Chas Walter" to which Gandoger has added the name "*X. fibrillosa*". From a duplicate in Australia (N.S.W. 12644, which is female) of B on sheet 2496a (which is male) we know that B is the specimen collected at Dubbo by Boorman in August 1903, but Gandoger has published these collecting data associated with the name *X. apiculata*, erroneously since his description of *X. apiculata* does not agree with the Dubbo specimen. From a fragment which is probably a duplicate piece of specimen A ("Wimmera, October, C.W." (i.e. Chas Walter), MEL cx herb. Tisdall) we can infer that A (*X. apiculata*) is the specimen collected in the Wimmera. It agrees with Gandoger's description of *X. apiculata* and with his handwritten name on sheet 2496a but not with the collecting data on that label (Dubbo, Boorman 8.1903). Therefore specimen A on sheet 2496a must be accepted as the HOLOTYPE of *X. apiculata* and as having been collected from the Wimmera, C. Walter 10.1900. To establish the correct application of the name, specimen B on sheet 2496a is here designated LECTOTYPE of *X. fibrillosa* Gandoger, coll. Dubbo, J. L. Boorman 8.1903.

ssp. *robusta* Lee in Contrib. N.S.W. Nat. Herb. III (1962) 161. Robust plants with leaves 35–65, usually 40–50, cm. long, 1–5, usually 1.5–2.5, mm. broad, smaller in a few depauperate specimens; membranous margins of the leaf bases sparsely decurrent along the laminae, their lacerate fragments not conspicuous around the base of the shoot, often yellowish to brownish and fibrous or woolly rather than silky. Male inflorescence with 3–8, usually 4 or 5, segments, over 10 and usually about 15–20 cm. long from the lowest segment to the tip on a stout peduncle very variable in length but rarely under 10 cm., biconvex, glabrous or with microscopic sparse, short hairs; female head usually solitary, cylindrical, 4–15 cm. long, the cluster bracts occasionally projecting to 18 mm. beyond the surface. *Xerotes typhina* Lindl. in Mitch., Three Exped. II (1838) 41 (tending towards the intermediate condition between the subspecies). *Xerotes apiculata* Gandoger, (see note under ssp. *leucocephala* regarding typification of this name).

Western and Far Western Plains, showing gradation to ssp. *leucocephala* in the Western Slopes. Terrananya Stn., 65 miles SW of Broken Hill, Constable 7.1955 (35572); Loch Lily Stn. near S.A. border 70 miles S of Cockburn, Constable 7.1955 (35303); Griffith, Dwyer 5.1928 (51133); Zara, Wanganella via Hay, Officer 12.1912 (51134) and 12.1918 (51144). Also in the Northern Territory (Central Australia), southern Queensland, South Australia and western Victoria.

This subspecies formed part of the population described or recorded as *Xerotes leucocephala* R. Br. by Mueller, Bentham, Moore & Betche, Maiden & Betche and perhaps Bailey; it may also be inferred that Ewart, Williamson, Black and Willis used the name *Lomandra leucocephala* for this subspecies alone (see references above and under ssp. *leucocephala*).

*Xerotes mucronata* R. Br., Prodr. (1810) 260 is recorded as from Port Jackson; the label on its Type specimen however (photograph and report received from BM) shows clearly that it came from Lucky Bay, Western Australia. The identity of this plant is not yet clear; it is not, however, *Acanthocarpus preissii* as suggested by Bentham (Fl. Austral. VII (1878) 112) nor does it match *Lomandra obliqua* nor *L. glauca*, which from the description and appearance seem closest.







93	Crassulaceae	143	Melastomataceae
94	Escalloniaceae	144	Onagraceae
95	Pittosporaceae	145	Haloragiaceae
96	Cunoniaceae	146	Araliaceae
97	Davidsoniaceae	147	Umbelliferae
98	Rosaceae	148	Alangiaceae
99	Mimosaceae	149	Ericaceae
100	Caesalpinjiaceae	150	Epaeridaceae
101	<i>Papilionaceae, Part</i>	151	Myrsinaceae
102	Geraniaceae	152	Primulaceae
103	Oxalidaceae	153	Plumbaginaceae
104	Linaceae	154	Sapotaceae
105	Erythroxylaceae	155	Ebenaceae
106	Zygophyllaceae	156	Symplocaceae
107	Rutaceae	157	Oleaceae
108	Simaroubaceae	158	Loganiaceae
109	Burseraceae	159	Gentianaceae
110	Meliaceae	160	Menyanthaceae
111	Tremandraceae	161	Apocynaceae
112	Polygalaceae	162	Aselepiadaceae
113	Euphorbiaceae	163	Convolvulaceae
114	Callitrichaceae	164	Polemoniaceae
115	Anacardiaceae	165	Hydrophyllaceae
116	Aquifoliaceae	166	Boraginaceae
117	Celastraceae	167	Verbenaceae
118	Siphonodontaceae	168	Avicenniaceae
119	Hippocrateaceae	169	Labiatae
120	Stackhousiaceae	170	Solanaceae
121	Icacinaceae	171	Scrophulariaceae
122	Sapindaceae	172	Sclaginaceae
123	Akaniaceae	173	Bignoniaceae
124	Rhamnaceae	174	Pedaliaceae
125	Vitaceae	175	Martyniaceae
126	Elaeocarpaceae	176	Orobanchaceae
127	Tiliaceae	177	Gesneriaceae
128	Malvaceae	178	Lentibulariaceae
129	Stereuliaceae	179	Acanthaceae
130	Dilleniaceae	180	Myoporaceae
131	Eucryphiaceae	181	Plantaginaceae
132	Hypericaceae	182	Rubiaceae
133	Elatinaceae	183	Caprifoliaceae
134	Frankeniaceae	184	Dipsacaceae
135	Violaceae	185	Cueurbitaceae
136	<i>Flacourtiaceae</i>	186	Campanulaceae
137	Passifloraceae	187	Lobeliaceae
138	Cactaceae	188	Goodeniaceae
139	Thymelaeaceae	189	Brunoniaceae
140	Lythraceae	190	Stylidiaceae
141	Rhizophoraceae	191	Compositae
142	Myrtaceae		

## PTERIDOPHYTA

192	Lycopodiaceae	205	Pteridaceae
193	Selaginellaceae	206	Adiantaceae
194	Isoetaceae	207	Vittariaceae
195	Psilotaceae	208	<i>Davalliaceae</i>
196	Ophioglossaceae	209	<i>Grammitidaceae</i>
197	Marattiaceae	210	<i>Polypodiaceae</i>
198	Osmundaceae	211	<i>Aspidiaceae</i>
199	Schizaceae	212	Thelypteridaceae
200	Gleicheniaceae	213	Aspleniaceae
201	<i>Hymenophyllaceae</i>	214	Blechnaceae
202	Cyatheaceae	215	Marsileaceae
203	Dicksoniaceae	216	Azollaceae
204	Lindsaeaceae	217	Salviniaceae

