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**Journal of the Royal Society of Western Australia**

Perth: The Society, 1915.

<https://www.biodiversitylibrary.org/bibliography/77508>

**v.7 (1920-1921):** <https://www.biodiversitylibrary.org/item/189945>

Page(s): Page 79, Page 80, Page 81, Page 82, Page 83, Plate XIII, Page 84

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## THE GENUS XANTHORRHOEA IN WESTERN AUSTRALIA.

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Read December 14th, 1920.

The genus *Xanthorrhoea* adds to the flora of South-Western Australia one of its most striking and decorative characteristics. The dominant species is *Xanthorrhoea Preissii*, the Blackboy, which though fairly distinct as a species, has such a wide range of distribution over widely different types of soils and through different conditions of moisture and rainfall that its different forms have produced a rather polymorphic species. These have resulted in the proposal of a number of species which on field examination are found to merge into one another or to be mere local variations of the ordinary type. Such are *X. pecoris*, F. v. M., and *X. Brunonis*, Endl. (*Plantae Preissianae* 11, 39). Another doubtful species is *X. Drummondii*, Harvey (*Hooker's Kew Journal of Botany* VII., 57) the description and account of which is as follows:—

### Liliaceæ.

*Xanthorrhoea Drummondii*, Harv.; trunco elato simplici, foliis rectangule tetragonis, amento cylindrico longissimo (4—8 pedali), bracteis fasciculorum flore subbrevioribus apice barbatis, perigonii foliolis imberbibus.

Hab. On dry hills, near Perth and elsewhere. This is the largest and finest of the genus, and produces the most valuable gum. It is readily known from the common Blackboy (*X. Preissii*) by the square, instead of rhomboidal section of its leaves, which are of a bluish green colour and far less brittle.

Harvey's type comes from the Swan River, and the main differences from *X. Preissii* are in field characters. It is probable that this species is identical with *X. reflexa*, D.A.H. (*Proc. Roy. Soc. W.A.* VI., part 1, 33) which, though typically an Avon species, also occurs scattered through the Swan River area amongst *X. Preissii*. The description, however, is too vague to make sure of this point.

*X. Preissii* probably attains its greatest dimensions on the coastal country from King George's Sound to the Leeuwin. Here specimens of 20 feet or more in height are of common occurrence, and the caudex may have as many as forty branches. One speci-



men at Nornalup has forty-five. This branching is characteristic of those plants growing in swampy localities, the blackboys of the dry hills and the sandplains having a simple or only slightly branched caudex. Branching frequently takes place below the surface of the soil, so that what at first sight appears to be a colony of distinct blackboys is really one plant arising from a common subterranean axis. In a typical specimen such as is met with round Perth on the laterite hills the stem is about nine feet in height, simple or with one or two branches, and about nine inches in diameter. On the coastal limestone belt amongst the tuart (*Eucalyptus gomphocephala*) the diameter may be much greater, up to 15 inches, though the height is not proportionally greater. Here, too, the persistent leaf bases consist partly of the linear portion of the leaf as well as the flattened part, and part of the increased diameter is due to this. There seems to be no other distinguishing feature of this form to distinguish it from the typical blackboy, but its general appearance is rather different.

Very frequently specimens are acaulescent or nearly so, and the absence of the caudex makes them appear more of the type of *X. brevistyla*, n. sp. Examination, however, shows no specific differences from *X. Preissii*. The extremely slow rate of growth of the blackboy accounts for this, and for periods of years no stem appears above ground. Along railway lines and in land which has been cleared for a long time and on which regrowth has taken place, these plants rarely attain a height of more than a foot or so. Specimens round Perth kept under observation for several years showed no appreciable change in height. Some of the giant specimens of the South-West must, therefore, be extremely ancient.

The caudex consists of two distinct zones, an inner core of fibrous leaf trace bundles, and an outer shell of persistent leaf bases impregnated with resin. The core contains a high percentage of sugar, and in the early days this was used in the preparation of whisky. The resin has been the subject of a great deal of investigation, and Rennie, Cooke & Finlayson\* of Adelaide, have recently obtained from it—

- (a.) A small quantity of fragrant liquid, not yet identified.
- (b.) l-citronellol.
- (c.) paeonol.
- (d.) hydroxypaeonol.
- (e.) a compound, which is possibly methoxydiphenyl ether.
- (f.) a small quantity of a so far uncrystallizable material of very high boiling point.

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\* Rennie, Cooke & Finlayson: An Investigation of the Resin from species of *Xanthorrhoea*. *Journl. Chemical Society* CXVII, (1920), 338.



Substances previously obtained by other workers were—

- (a.) Acids, either free or partly in the form of esters—  
Benzoic, cinnamic, *o*-coumaric.
- (b.) Aldehydes—vanillin, *p*-hydroxybenzaldehyde.
- (c.) *Products of oxidation by alkaline Permanganate*—  
Chromic Acid, etc. Acetic and oxalic acids or insoluble chromium compounds.
- (d.) *Products of fusion with Potassium Hydroxide*—  
Resorcinol, *p*-hydroxybenzoic acid, carbonic acid.
- (e.) *Products of Action of Nitric Acid*—Picric Acid, *p*-nitrophenol, acetic acid.
- (f) *Products of Distillation with Zinc Dust in the Presence of Hydrogen*—Benzene, toluene, naphthalene.
- (g.) *Products of Destructive Distillation*—Phenol, styrene and tarry matters.
- (h.) A residue obtained by acidification of an alkaline solution, consisting of a complex substance, which has been named "resinotannol."

Rennie, Cooke, & Finlayson have examined the resin of *X. tateana*, F. v. M., a South Australian species. There are two forms of this. The resin of the common form is red, but that of a form from Kangaroo Island is yellow. Professor Osborne, of the University of Adelaide, who examined vegetative material of the latter, found it impossible to determine whether it was a distinct species or whether age or environment might not be the factors determining the differences from the normal form. It was found that paeonol occurred in larger quantities in the yellow than in the red.

The occurrence of the two resins in South Australia is of particular interest, as there are two forms of resin obtained from the species hitherto known as *X. Preissii*. The common form in the hills round Perth has a red resin, but a darker resin is obtained from a form which in a previous paper\* was separated as a distinct species under the name *Xanthorrhoea reflexa*. No analyses of this have yet been published.

*X. Preissii* is a species typical of the Darling, Warren and Stirling Districts. *X. reflexa* is more typical of the Avon District, though it penetrates West amongst the other species in isolated patches. Its floral characters are not well marked from those of the previously described species, but its vegetative characters are very distinct. The reflexed leaf bases with their darker resin are an important point. The leaves are more square in section and tougher. The leaves in *X. Preissii* form a large globular tuft; in *X. reflexa*, they are more bluish and form a funnel shaped tuft at the top and

\* D. A. Herbert: Proc. Roy. Soc., W.A., VI., part I, 33, "Xanthorrhoea reflexa, a new species of Blackboy."



the old dead leaves hang down and form a matlike petticoat round the upper part of the caudex. The dead and living leaves thus produce a sort of hour-glass shape instead of the more rounded bushy clump of the other species. Its stem is not so easily burnt and channelled by bush fires, though its leaf bases when broken up are more inflammable than those of the common blackboy. Another point is that in the pithy core a well developed woody cone is present in the base of *X. reflexa*. In *X. Preissii* this is not so evident, and may be absent. The former generally has a simple stem, sometimes attaining 15 or 16 feet, as at Popanyinning.

These two species are the only described arborescent ones in the South-West. It is possible (and probable) that there is a further species in the interior. Spencer Moore noticed it at Yilgarn, Giles at Queen Victoria Springs, and the Elder Exploring Expedition at Camp 55, in the Victoria Desert. Messrs. H. W. B. Talbot and E. de Courcy Clarke, of the Geological Survey, have seen them North of Wiluna and East of Laverton. They attain a height of about 15 feet. No specimens have yet been obtained, so that it remains to be seen if it is distinct from those already described from this or other States.

One stemless species has been described from the South-West. This is *X. gracilis*, a very common species with a slender, graceful scape and a small cylindrical spike of flowers. Two new species described below, approach acaulescence, but their short caudices often protrude a few inches above the ground. These are *X. brevistyla*, n.sp. and *X. nana*, n.sp. Both are closely related to *X. Preissii*, but are easily distinguished, the former by its short style, and the latter by the large capsule valves; other differences are contained in the descriptions. *X. brevistyla* might sometimes be taken for *X. gracilis*, for it frequently possesses the slender scape and very short spike of this plant, but generally its inflorescence is more like that of the common blackboy, though the flowering part is shorter.

*XANTHORRHOEA BREVISTYLA*, sp. nov.

*Caudex*—underground or very slightly protruding above ground, so that the plant is caespitose. It is frequently branched so that a number of leaf-clumps occur in a cluster.

*Leaves*—triangular in section, flattened, about three feet long and rather tough in comparison with *X. Preissii* and *X. reflexa*.

*Base of leaves*—flattened, not curved.

*Scape*—up to about six feet high, less than half occupied by the spike which is sometimes as short as in *X. gracilis*. Peduncle glaucous, slender, sometimes as much as in *X. gracilis*.

*Bracts*—narrow, linear, spathulate.

*Bracteoles*—narrow, linear, spathulate.

*Perianth segments*—inner four lines long and not one line broad, with a spreading hyaline apex; outer, shorter.



*Stamens*—6-7 lines long.

*Ovary and style*—shorter than the stamens, about four lines long, the style being three lines long.

*Capsule*—as in *X. Preissii*.

*Locality*—Narrogin. The type comes from the Narrogin State Farm, but the range is fairly wide as the plant, which has a very distinct appearance with its apparently caespitose tufts of leaves and often several erect scapes, can be observed as far south as Katanning along the railway line and for 20 miles or so west of Narrogin.

*Date of collection*—November 13th, 1920. (D.A.H.)

Its affinity is with *X. Preissii*, from which it is readily distinguished by the extremely short or absent caudex, relative length of the flowering portion as compared with the rest of the scape, and the length of the style.

*XANTHORRHOEA NANA*, sp. nov.

*Caudex*—very short, up to six inches high, and often branched.

*Leaves*—triangular or quadrangular and flattened in section, about two feet long and 2-3 lines broad, pungent and not so brittle as in *X. Preissii* or *X. reflexa*. They pass into a flattened base  $1\frac{1}{2}$  inches long.

*Base of leaves*—persistent, 3-6 lines broad,  $1\frac{1}{2}$  inches long, flattened but not curved.

*Gum*—yellow and not as abundant as in *X. Preissi* or *X. reflexa*.

*Scape*—about two feet long at first, horizontal, but curving upwards so that the flowering part is vertical or approximately so, and occupying one foot or less of the whole length. The scape is very brittle, snapping like a carrot when bent, and is conspicuously glaucous.

*Bracts*—narrow, spatulate.

*Bracteoles*—linear-spatulate, very narrow.

*Perianth segments*—inner slightly more than one line broad and five lines long or a little longer with a hyaline apex. Outer perianth segments shorter and with ciliate tips.

*Stamens*—6-7 lines long.

*Ovary and style*—7-8 lines long.

*Capsule*—1 inch long, valves  $\frac{3}{8}$  inch wide, with a point about  $\frac{1}{8}$  inch long.

*Localities*—Sandplain about two miles N.E. of Bruce Rock (type), and sand plain about 15 miles East of Merredin on the Burracoppin road.

*Date collected*—October 25th, 1920. (D.A.H.)

This species differs from *X. Preissii* and from *X. reflexa* in the height of the caudex, the tougher and shorter leaves, the leaf bases, the gum, and in the length of the capsule. In habit it bears little



resemblance to them though on close examination it is seen to have the same structure as the dwarfed scale. The settlers at Merredin do not regard it as a Blackboy, but know it as a Bulrush. On sand-plains, under cultivation, it is apt to be a nuisance as, after clearing, leaves are again produced from the subterranean part of the caudex.



Plate XIII.—*Xanthorrhoea Reflexa*.