

***Chamaexeros longicaulis* (Dasypogonaceae), a new species from
Walpole, south western Australia, with additional notes on *Chamaexeros***

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Abstract

Macfarlane, T.D. *Chamaexeros longicaulis* (Dasypogonaceae), a new species from Walpole, south western Australia, with additional notes on *Chamaexeros*. Nuytsia 9 (3): 375-382 (1994). The new species is described and illustrated with photographs. *Chamaexeros longicaulis* is most closely related to *C. serra* but differs in several characteristics including three unique in the genus: elongated stems, elongated rhizomes resulting in vegetative reproduction, and thickened vertical rhizomes which presumably provide for storage of reserves. The species is of conservation interest owing to the small number of populations known, and is listed among conservation priority taxa for Western Australia. A revised key to the species of *Chamaexeros* is presented. Features of the ovary, capsule and seed are clarified for this genus. Floral measurement data are given for all species. A range extension is noted for *C. serra*.

Introduction

Two recent taxonomic accounts of *Chamaexeros* Benth. have been published (Kuchel 1976, George 1986). Three described species were recognised prior to this paper, although George (1986) refers to a possibly undescribed fourth taxon represented by a 1950 collection by D.M. Churchill housed in the Western Australian Herbarium. This specimen, which is (virtually) without flowers, was not seen by Kuchel because it was identified as *Tricoryne* sp. until recognised as belonging to *Chamaexeros* by G.J. Keighery in 1979.

Following discovery of plants matching the Churchill collection at Rest Point near Walpole, the author kept the population under observation until flowering occurred. The more extensive flowering and subterranean material then collected was sufficient to confirm that the plants represented a new species, which is here formally described.

***Chamaexeros longicaulis* T. Macfarlane, sp. nov. (Figures 1 and 2)**

Herba perennis coloniam formans. Rhizomata longa praesentia, horizontalia, obliqua et verticalia. Caules ad 30 cm longi. Folia plana, membranacea mollia. Inflorescentia plerumque cymae compactae umbelliformis.

Typus: opposite Rest Point golf course, 150 m NW along Rest Point Road from Sandy Beach track, Rest Point, 1.5 km SW of Walpole, Western Australia, 34° 59' S, 116° 43' E, 5 Nov. 1986, T.D. Macfarlane 1731 (holo: PERTH 02664674; iso: AD, CANB, K, MEL, NSW, NY, P, PERTH 02664682 & 02664690).

Perennial colony-forming *semi-woody plants*. *Roots* wiry, arising from the rhizomes. *Rhizomes* of two kinds, slender and stout; slender rhizomes horizontal, ascending vertically or obliquely, or descending obliquely, located near soil surface or to 20 cm below it, up to 15 cm long, 1-2.5 mm diameter, with cataphylls c. 15 mm long, usually widely spaced, scarious, tough; stout rhizomes descending vertically, up to 20 cm long, 3-9 mm diameter, with cataphylls 2-8 mm long, closely spaced, fragile. *Stems* perennial, decumbent to erect, usually unbranched, arising usually 3-6 cm below ground level from the tip or along the length of the horizontal or ascending, slender rhizomes, occasionally from the upper region of stout rhizomes, up to 30 cm long, c. 3 mm diameter, woody, tough. *Young stems* covered by imbricate, white, sheathing cataphylls, changing to leaves above ground level. *Older stems* with crowded green leaves on upper 7-10 cm, with dead leaves or bare stem marked with leaf scars below. *Leaves* with blade 6-16 cm long, 2-5 mm wide, flat, relatively thin and soft, acute, obtuse or rounded, with margins white, scarious, the marginal membrane entire or fringed, sometimes absent or minute in the apical part of the blade. *Inflorescences* 1-3 per shoot, 2-20 cm long including peduncle, a compact umbel-like cyme on a simple peduncle or occasionally with a second cyme below the terminal one, occasionally with a short cyme-bearing branch arising from within a cyme on the main axis. Longest *bracts* (6)10-20(35) mm long, with broad sheathing base and short to long, leaf-like blade, green in centre with white entire sheath margins and white fimbriate blade margins. *Pedicels* 5-17 mm long. *Flowers* c. 7 mm long, faintly scented; sepals bright yellow with central green stripe; petals bright yellow; anthers 1-1.1 mm long; style c. 3.5 mm long. *Capsules* almost spherical (when all locules setting seed, otherwise asymmetrical), with apex slightly depressed, smooth except for grooves along the locule walls and the dehiscence zone in the middle of each locule, 3-locular, with 0-2 seeds maturing per locule. *Seeds* more or less reniform, c. 3.5 mm long, with endosperm, the ovule embedded, small, 0.5 - 0.7 mm long, cylindrical, basal.

Other specimens examined. WESTERN AUSTRALIA: N of Boggy Lake, Nov. 1950, Dr [D.M.] Churchill s.n. (PERTH); Rest Point, 2 km WSW of Walpole, 27 Feb. 1986, G.J. Keighery 7999 (PERTH); opposite golf course, Rest Point, 5 km (sic) W of Walpole, 3 Nov. 1986, G.J. Keighery 8741 (CBG n.v., NT n.v., PERTH); head of Forest of Arms, just NE of Mt Hopkins, 1 Aug. 1987, S.D. Hopper 5930 (CANB n.v., PERTH); margin of camping ground, Rest Point, near Walpole, 4 Nov. 1986, T.D. Macfarlane 1732 (PERTH); type locality, 5 Nov. 1986, T.D. Macfarlane 1733 (PERTH).

Distribution. The species is known only from the vicinities of Rest Point (34° 59' S, 116° 43' E) and Boggy Lake (35° 02' S, 116° 40' E) near Walpole, on the south coast of south western Australia. The above two localities are 7.5 km apart and separated by Deep River. Near Rest Point there are large populations of *Chamaexeros longicaulis*, but these are close to roads or recreational facilities. Further populations occur at places along a 1 km track leading from the type locality through forest to Sandy Beach. Areas away from roads have not been extensively searched for the species. The Boggy Lake area is difficult of access and has not been extensively searched for *C. longicaulis*. Two populations have been documented in that area, from north of Boggy Lake and c. 1 km south eastwards in the Forest of Arms. Further undocumented information deriving from trekkers indicates another large population a short distance north of Crystal Lake near Boggy Lake (A.S. Weston, personal communication).



Figure 1. *Chamaexeros longicaulis*. Plant with burnt old stem, thick vertical rhizomes and new shoots arising from the old stem and from new, ascending, slender rhizomes. From T.D. Macfarlane 1731.

Habitat. The species occurs on well-drained grey or white sand overlying clay, and brown sandy clay containing lateritic gravel carrying Jarrah (*Eucalyptus marginata* Donn ex Smith) and Marri (*E. calophylla* Lindley) forest, sometimes with *Agonis flexuosa* (Sprengel) Schauer trees, and a tall shrub understorey, or Red Tingle (*E. jacksonii* Maiden) forest with an understorey of the sedge *Lepidosperma effusum* Benth. and the shrub *Acacia pentadenia* Lindley. The rainfall in this area is high, averaging 1369 mm per year at Walpole.

Flowering and fruiting periods. Flowering October-November. Fruiting January.

Discussion. *Chamaexeros longicaulis* is most closely related to *C. serra* (Endl.) Benth., these two species sharing dense umbel-like inflorescences, but *C. longicaulis* differs in having elongated stems, elongated rhizomes, softer and more flexible leaves, an exerted rather than usually concealed peduncle which is naked rather than bracteate, green rather than scarious outer inflorescence bracts, and longer flowers (Table 1). The remaining two species have open paniculate inflorescences (see the key below).

Table 1. Measurements from flowers of *Chamaexeros* species.

Diagnostic measurements shown in bold. Observations made on reconstituted herbarium material; measurements in mm.

Species	Flower length	Anther length	Style length
<i>C. fimbriata</i>	3.3-4.5	0.25-0.45	1-1.75
<i>C. longicaulis</i>	c. 6.9	1.0-1.1	c. 3.5
<i>C. macranthera</i>	4.5-5.0	0.75-1.0	3.4-3.5
<i>C. serra</i>	5.0-5.7	0.8-0.9	3.1-3.25

Chamaexeros longicaulis occurs in large dense populations or colonies, sometimes having almost the appearance of a sward. These dense populations are at least partly clonal owing to the vigorous production of rhizomes. Nevertheless the species is capable of setting seed, and presumably of reproducing in this way. Recovery from fire is chiefly by vegetative sprouting from partly burned stems, from the apices of stout rhizomes which may be up to 5 cm below ground level, and from new or old slender rhizomes. The stout rhizomes, which are brittle and appear rather fleshy when broken, appear to function as reserve storage organs and sites of regeneration following fire or damage.

The possession of long horizontal rhizomes which give rise to new stems, the deeply penetrating and fleshy stout rhizomes, and the elongation of the aerial stems of *C. longicaulis* are unique in the genus. The other three species form tufts by very short (0.5 - 1 cm) extensions of the woody rhizome which each give rise to a single new leafy shoot that grows up closely adjacent to neighbouring shoots. When long unburnt, *C. fimbriata* (F. Muell.) Benth. can in this way form clumps up to 1 metre diameter, and the individual stems can attain 7 cm long as the apices are gradually buried by accumulating drift soil and leaf litter. Similarly *C. serra* can exhibit stems up to 6 cm long when long unburnt. However the stems of *C. longicaulis* commonly reach 20-30 cm in a comparatively short time after fire.



Figure 2. *Chamaexeros longicaulis*. Plant showing the long stem, old horizontal slender rhizome from which the plant arose, a vertical thick rhizome with a short horizontal slender rhizome growing from its tip, and new shoots arising from ascending slender rhizomes. From T.D. Macfarlane 1731.

The three previously known species of *Chamaexeros* all have wide geographic ranges. They all have tough, rather thick leaves which accords with their ranges being at least partly in relatively low rainfall areas. None of these three species occur in the high rainfall karri and tingle forests of south western Australia. *Chamaexeros longicaulis*, with its thinner, softer leaves, has a restricted geographic range limited to an area which has almost the highest rainfall in the south west of the continent. It is not possible on present knowledge to say whether the current distribution of *C. longicaulis* is a remnant of a formerly much wider distribution or whether the genus was primitively mesophytic or xerophytic. However some speculations can be made on its evolution. The three more xerophytic species have a caespitose habit, which can be considered the primitive state because it is less highly specialised and seemingly less likely to have arisen from the strongly rhizomatous state of *C. longicaulis*. The caespitose habit is also general in the large, closely related genus *Lomandra* Labill. Two of the caespitose species, *C. fimbriata* and *C. macranthera* Kuchel, occur wholly or largely in the arid zone, and they also both have large open branched inflorescences which seem more likely to have given rise, by reduction and condensation, to the dense umbel-like inflorescences of the other two species than the reverse. Thus there are grounds for considering that *C. longicaulis* is an evolutionarily advanced species.

Conservation status. *Chamaexeros longicaulis* is currently listed among the Declared Rare and Priority Flora for Western Australia (Atkins 1994) as "*Chamaexeros longicaulis* ms". It has been assigned the Conservation Code 2, which is for poorly known taxa which are known from one or a few populations, at least some of which are not believed to be under immediate threat. The species is very restricted geographically as far as is presently known. However the known populations are large, and the vigorous vegetative reproduction and regeneration after fire, coupled with their occurrence in forest in the Walpole-Nornalup National Park (including the Nuyts Wilderness area) mean that the species, as a whole, is not threatened. Nevertheless, the Rest Point populations are near roads and recreation areas so that they are vulnerable to future developments and road modifications. Consideration should be given to the need to appropriately record the existence of these populations so that they can be taken into account in the planning of human activities in the area, and to the advisability of monitoring them.

Etymology. The epithet *longicaulis* - long-stemmed is a compound of the Latin words *longus* - long and *caulis* - stem.

Key to the species of *Chamaexeros*

1. Inflorescence an open panicle
 2. Leaves terete, not glaucous; plants rooting from base of stem only *C. fimbriata*
 2. Leaves flat, glaucous; plants rooting from all along the stem *C. macranthera*
1. Inflorescence condensed, umbel-like
 3. Stems short, up to 6 cm long; plants lacking long subterranean rhizomes, forming discrete tufts; leaves relatively thick and tough; inflorescence bracts all straw-coloured to white, up to 7 mm long *C. serra*
 3. Stems long, up to 30 cm long; plants with long subterranean rhizomes, often forming colonies; leaves thin and soft; outer inflorescence bracts having green leaf-like blade with white fimbriate margins, 10-20 mm long *C. longicaulis*

General discussion

The new species conforms well to current circumscriptions of *Chamaexeros* (Stevens 1978, George 1986) in possessing such features as bright yellow bisexual flowers, a simple style, two ovules per locule and fimbriate leaf margins. New features for the genus are the long stems and the two types of rhizome, the slender ones which provide vigorous vegetative reproduction, and the stout ones which presumably provide for reserve storage.

Certain generic features of *Chamaexeros* have been described incorrectly in the past or have been based on very few observations. These are discussed and clarified below.

Chamaexeros was long thought to have one ovule per locule (Bentham 1878, Kuchel 1976) but Stevens (1978), George (1986) and Macfarlane (1987) stated that there are two per locule. This latter situation was confirmed for all four species in the present study.

The perianth segments of *Chamaexeros* were stated to be free by Kuchel (1976) and George (1986) and not explicitly described by Bentham (1878). However as mentioned by Macfarlane (1987), they are slightly connate at the base.

Bentham (1878) indicated, without being explicit, that there is a difference in the insertion of the antipetalous and antisepalous stamens. Kuchel (1976) and George (1986) stated that the antipetalous stamens are inserted on the petals while the antisepalous ones are hypogynous. However, careful examination of all four species during the present study has confirmed a previous description (Macfarlane 1987) that all six stamens are adnate to the segments at the base, or more exactly are inserted just above the base of the segments.

Capsules of *Chamaexeros* were unknown to Bentham (1878) but were described for *C. fimbriata* by Kuchel (1976), and George (1986) added information on those of *C. serra*. In addition to the above description of the capsule of *C. longicaulis*, I note that the capsules of *C. macranthera* (J. Brown 221, PERTH) resemble those of the other species. Although usually described as spherical or globular, *Chamaexeros* capsules are often beaked or curved when seeds fail to develop in one or two of the locules.

The seeds of *Chamaexeros*, described very briefly by previous authors, are described more fully above for *C. longicaulis*. They are similar in shape, colour, texture and internal structure to those of the related genera *Lomandra* and *Romnaldia* P.F. Stevens.

Floral features have not been much emphasised in distinguishing the species of *Chamaexeros*. Kuchel (1976) gave measurements of the flowers of the three species then known, and *C. macranthera* was named for its longer anthers. Measurements made during this study confirm that this species has longer anthers than those of *C. fimbriata*, but also show that the real distinction is between the short anthers of *C. fimbriata* (0.25-0.45 mm long) and the longer ones of the other three species, whose ranges of anther lengths overlap or adjoin (combined range 0.75-1.1 mm long). The anthers of *Chamaexeros longicaulis* are at the upper limit of this range. Among several floral features investigated during this study, two other measurements, flower length and style length, showed a clear disjunction for one species against the other three, with *C. longicaulis* being at the upper end of the range and *C. fimbriata* at the lower end (Table 1). Distinctly longer flowers characterise

C. longicaulis, and *C. fimbriata* stands out by its shorter style. These measurements thus have some utility for identification purposes and could have been used in the above key had there not been sufficient distinctions using more obvious characters.

A note on the distribution of *Chamaexeros serra*

Chamaexeros serra, previously thought to reach its northern limit near Perth and at Tammin (George 1986, Macfarlane 1987), is now known from 220 km further north of Perth near Eneabba (*C. Chapman s.n.*, 17 Aug. 1974, PERTH; *E.A. Griffin* 3143, PERTH).

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