

## A new Australian species of *Carex* (Cyperaceae) and notes on two other species

Karen L. Wilson

### Abstract

Wilson, Karen L. (National Herbarium of New South Wales, Royal Botanic Gardens, Sydney NSW 2000, Australia) 1996. A new Australian species of *Carex* (Cyperaceae) and notes on two other species. *Telopea* 6(4): 569–577. A new species ***Carex klaphakei*** is described from the Central Tablelands region of New South Wales. Two other species that occur in this State but were not included in the *Flora of New South Wales* are *C. raleighii* (a native species) and *C. buxbaumii* (introduced from Europe). Descriptions in the 'Flora' format are given for these two species, and the 'Flora' key to species is amended to include the extra species.

### Dedication

I am pleased to contribute to this publication in honour of Dr Lawrie Johnson. It is apposite for several reasons. Firstly, he was one of the instigators of our institution's recent four-volume 'Flora of New South Wales'. Secondly, he has had a long-standing interest (among his many others) in the family Cyperaceae. Thirdly, I have been privileged to work with him on various projects and to benefit from his extensive botanical knowledge, always generously given.

### Introduction

When the treatment of Cyperaceae for the 'Flora of New South Wales' (Wilson 1993) was being prepared, a species of *Carex* that was either a new introduction or an undescribed species had to be omitted because only immature specimens were available. Since then, more material has been collected by Mr V. Klaphake that confirms this to be an undescribed native species.

The opportunity is also taken here to provide descriptions for *Carex buxbaumii* Wahlenb. and *C. raleighii* Nelmes in the format of 'Flora of New South Wales'. Both species were found to occur in this State too late to be included in the Flora treatment, although *C. raleighii* was included in the key to species. An amended 'Flora' key is given, to accommodate the extra species. Terminology for ligule and utricule beak morphology follows Jermy, Chater & David (1982).

***Carex klaphakei* K.L. Wilson, sp. nov.**

Inter speciebus *Caricis* australiensis, combinatione sequente characterum distinguitur: stylus 2-fidus; rhizoma longa; inflorescentia parva; utriculus grandis rostro longe acuminato, nervosis numerosis abaxialiter instructus.

**Type:** New South Wales: Central Tablelands: Blackheath, V. Klaphake 663, 10 Jan 1993; holo NSW; iso MEL, P. Figure 1.

Perennial herb; rhizomes long, firm but not strongly woody; shoots at 2–6 cm intervals along rhizomes. Culms erect, terete or oval, 45–160 cm long, to 1.2 mm diam., smooth or faintly scaberulous. Leaves with reduced, flat blades to 7 cm long, c. 1.5 mm wide; ligule white- to brown-membranous, rounded, c. 0.3 mm wide. Inflorescence 0.8–1.5 cm

long, composed of a single spike or up to 3 spikes forming a short cluster; lowest 1 or 2 leafy involucre bracts shorter than the inflorescence or rarely slightly exceeding it, to c. 1.5 cm long. Spikes androgynous with upper male portion often half-hidden by the female portion, 6–10 mm long, 1–3 per inflorescence, few-flowered. Male bracts ('glumes') c. 4 mm long, pale yellow-brown to pale red-brown, with apex acute and mucro c. 0.3 mm long; female bracts ('glumes') 3–4 mm long, pale yellow-brown to red-brown, with apex acute and mucro 0.5–1 mm long. Stamens 3; anthers c. 2 mm long excluding apical appendage c. 0.2 mm long. Utricles ovate in outline, plano-convex, thickened near base, strongly 8–10-nerved on abaxial surface, not or faintly few-nerved adaxially, exceeding the subtending bract, 5.5–7 mm long, 1.7–2 mm diam. in broadest part, green to yellow-brown, eventually grey-brown, shining when mature; beak long-tapering, more or less excurved eventually, slightly hispidulous on margins, with 2-fid or split apex. Style 2-fid. Nut narrow-elliptical to obovate in outline, with obuse apex, plano-convex, 2–2.5 mm long, 1.3–1.5 mm diam., pale brown. Figure 2.

**Distribution and habitat:** Known from only three locations, near Blackheath (about 1000 m altitude), Mt Werong (1200 m), and Penrose (about 600 m alt.), on the Central Tablelands of New South Wales. In all locations, it was growing mixed with other native sedges and rushes in undisturbed swamps on sandstone.

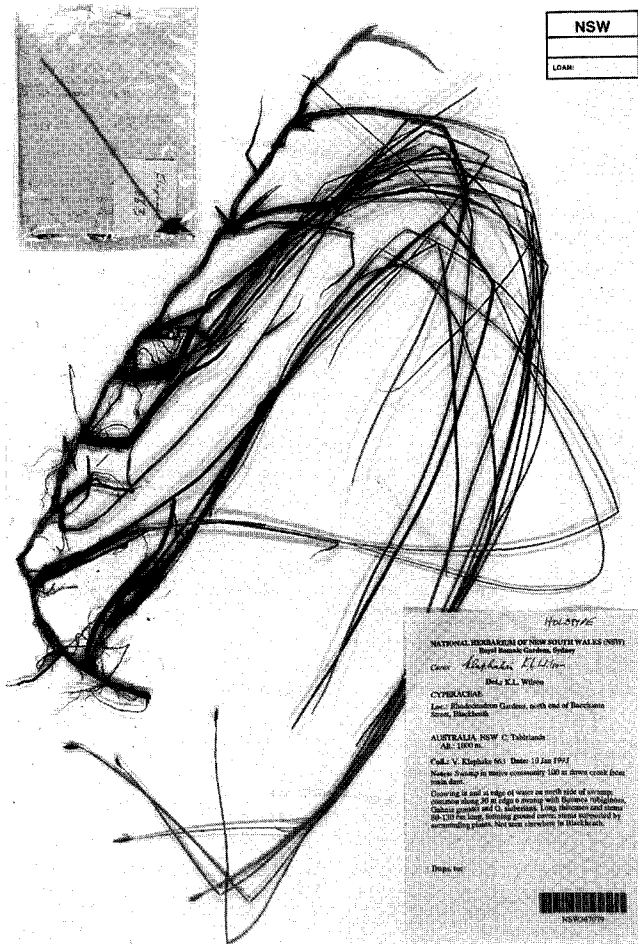


Fig. 1. Holotype of *Carex klaphakei*.

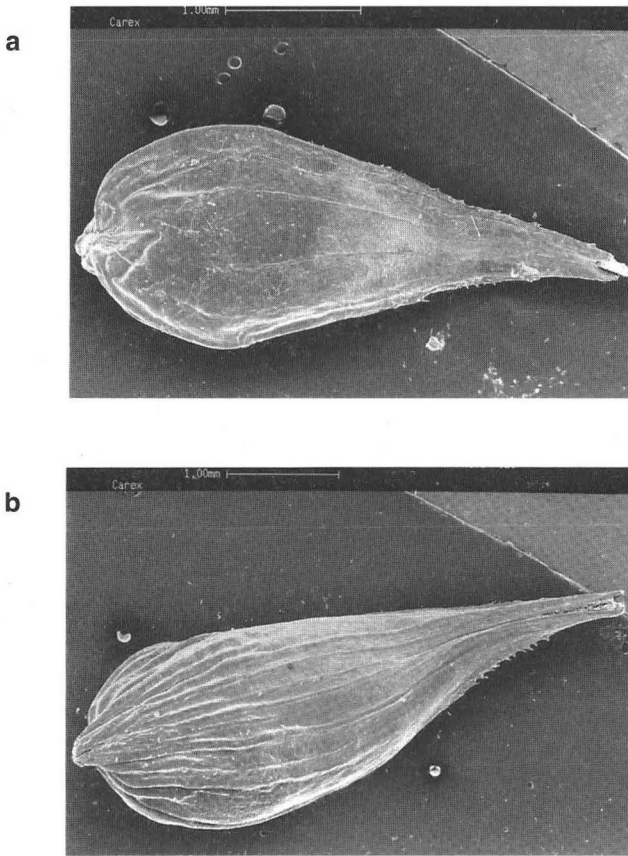


Fig. 2. Utricle of *Carex klaphakei*: a, adaxial surface; b, abaxial surface.

**Conservation status:** 3K; the species is not known from any national parks or reserves, but it is a very slender species and could well be overlooked because it grows mixed with other sedges and rushes such as *Empodisma minus* in swamps.

**Notes:** The long rhizome, extremely long slender culms, short leaf-blades, small inflorescence, and large, tapering utricle are distinctive features amongst the Australian species of *Carex*. These features place *C. klaphakei* in Kükenthal's section *Divisae* (Kükenthal 1909). There are no other members of that north-temperate section native to Australia, but *C. divisae* is introduced in Victoria and possibly in Tasmania (it is also naturalised in New Zealand (Healy & Edgar 1980: 157)). *C. klaphakei* is grossly similar to *C. divisae* but it differs from the latter in the following features: the inflorescence in the new species is more slender; the utricle is larger, more gradually tapered to the apex, and less shining (cf. Figure 2 and the illustration of the utricle of *C. divisae* in Wilson 1994: fig. 71e); the rhizome is not as woody. *C. klaphakei* resembles another introduced species, *C. disticha* Hudson, in having a long rhizome but that species differs in having a bigger inflorescence with up to twenty spikes, the arrangement of sexes in the spikes being rather variable (see notes in Wilson 1994: 350), and a narrowly winged utricle.

In the 'Flora of New South Wales' treatment (Wilson 1993), this species can be slotted in as *Carex* species no. 20a, between *C. tereticaulis* F. Muell. and *C. arenaria* L. This does not reflect a close relationship to either of those species but rather its

placement in the arrangement of Australian species given by Nelmes (1944); this arrangement needs re-assessment in the light of more recent studies.

**Epithet:** The species is named after Mr Van Klaphake, who has collected this and many other species of monocots in the Sydney region.

**Specimens seen:** New South Wales: Central Tablelands: Rhododendron Gardens, Blackheath, *Klaphake* 373, Nov 1991 (NSW), 549, Mar 1992 (NSW, CHR, NY); Yarramundi Road, 1 km E of Mt Werong turn-off, *Klaphake* 1032, Apr 1994 (NSW, CANB); Hanging Rock Swamp, 4 km NW of Penrose railway station, *Klaphake* 805, Mar 1993 (NSW, K); Hanging Rock Swamp, *Godden 211 & Wilson*, Apr 1995 (NSW, GENT, L, MEL, US).

### **Carex buxbaumii**

*C. buxbaumii* Wahlenb. subsp. *buxbaumii* is a European taxon that has become naturalised in a few localities in New South Wales, Victoria and Tasmania. In New South Wales, it was recently found for the first time, in the Cathedral Rock National Park between Ebor and Armidale. It can be slotted into the 'Flora of New South Wales' treatment as *Carex* species no. 11a, following *C. brownii* Tuckerman and preceding *C. maculata* Boott. This does not reflect a close relationship to either of those species but rather its placement in the arrangement of Australian species given by Nelmes (1944), where it was given under the name *C. canescens* L. However, that name applies to another species (native in Australia) that used to be called *C. curta* Gooden., as explained by Toivonen (1981) when he lectotypified *C. canescens* L.

Only the type subspecies of *C. buxbaumii* has been introduced into Australia. Most Australian specimens have rather paler male and female bracts than European specimens but are otherwise similar. The utricle is illustrated in Wilson 1994: fig. 70l.

Rhizome short; shoots loosely tufted. Culms erect, triquetrous, smooth below, scabrous above, 25–70 cm long, c. 1.3 mm diam. Leaves shorter than or scarcely exceeding culms, 1.5–3 mm wide. Inflorescence erect, 4–10 cm long, with 2–5 spikes solitary at nodes; lowest involucral bract shorter than to exceeding inflorescence. Spikes sessile, ± contiguous, spreading slightly at maturity, 0.7–2.5 cm long; uppermost spike gynaecandrous; lower spikes female. Male and female bracts ('glumes') acuminate to acute, often long-mucronate (mucro to 1.5 mm long), red-brown to dark red-brown with paler midrib; female bracts 3–6 mm long. Utricles ovoid to narrow-ellipsoid, nerveless or indistinctly nerved, 3.0–4.5 mm long, c. 2 mm diam., minutely papillose, pale green to brown; beak a minute notch to 0.2 mm long. Style 3-fid. Nut obovate to elliptical in outline.

Occasionally naturalised on swampy flats at higher altitudes; in N.S.W. in Cathedral Rock National Park. \*NT; \*Vic., \*Tas.; native of Europe.

**Specimens seen:** New South Wales: Northern Tablelands: c. 6 km W of Ebor–Armidale road on road to Round Mountain, Cathedral Rock National Park, *James 1383 & McCune*, Nov 1992.

Victoria: Snowy plains between the Cabongra and Bogong Range [sic], *Mueller*, Dec 1854 (MEL 226617); snowy wet plains between the Cabongra and Boyong Mountains [sic], *Mueller*, — (K); Cobboras Mountains, *Mueller*, — (K); below Red Bank Plain on the upper Victoria River, 28 km NW of Omeo (direct), *Scarlett 80–120*, Mar 1980 (NSW ex LTB); Rocky Plain (approx. 15 km WNW of Suggan Buggan), *Wakefield 3024*, Jan 1949 (MEL).

Tasmania: Western Mountains, 3500 ft [1070 m], *Rodway*, Dec 1908 (K).

### **Carex raleighii**

*C. raleighii* Nelmes is a slender native species, found at high altitude in New South Wales (only one record) and Victoria, and also in Tasmania. The opportunity is taken to provide a description of this species in the format of the 'Flora of New South Wales' (it was included in the published key). It can be slotted into that

treatment as *Carex* species no. 26a, following *C. hebes* Nelmes, the species to which it is probably most closely related. The utricle is illustrated in Wilson 1994: fig. 71k.

Rhizome long; shoots loosely tufted. Culms slender, weak, terete to trigonous, smooth, 25–40 cm long, 0.3–0.7 mm diam. Leaves shorter than to equalling culms, c. 1 mm wide. Inflorescence erect, 0.5–1 cm long, with 1–4 spikes solitary at nodes; lowest involucrel bract exceeding inflorescence. Spikes sessile, contiguous, spreading to erect at maturity, to c. 1 cm long; all spikes androgynous. Male and female bracts ('glumes') acute, orange-brown with broad white to hyaline margins near apex; female bracts 3.5–4 mm long. Utricles 2.5–3.0 mm long, 1.0–1.4 mm diam., ovoid to ellipsoid, weakly several-nerved, slightly hispid on narrowly winged shoulders and beak, green to pale brown; beak 0.7–1 mm long, with apex split. Style 2-fid. Nut elliptical to obovate in outline.

Scattered on high altitude swampy flats; only one depauperate specimen known from a subalpine flat in the Snowy Mountains in south-eastern N.S.W.; also in Vic. and Tas.

Close to *C. hebes*, differing in having taller but more slender culms, with the inflorescence longer than broad and usually with fewer spikes, the spikes androgynous, and the utricles smaller with a longer, narrower beak.

**Selected specimens seen:** New South Wales: Southern Tablelands: Head of Tumut River, *Mueller* 1972, Feb 1954 (NSW).

Victoria: Snowy Range, Pieman Creek Plain, c. 10 miles [16 km] SE of Mt Howitt, *Beaughlehole* 41172 & *Chesterfield*, Jan 1973 (MEL, NSW); west bank of Livingstone Creek near Shanahans, 23 km SW of Omeo (direct), *Scarlett* 80–117, Mar 1980 (NSW ex LTB); Native Dog Flat, close to the Buchan River, alt. 1200 m, *Scarlett* 80–118, Mar 1980 (NSW ex LTB); below Red Bank Plain on the upper Victoria River, 28 km NW of Omeo (direct), *Scarlett* 80–119, Mar 1980 (NSW ex LTB).

Tasmania: Near Gormanston, flood plain of King River, *Blake* 18402, Jan 1949 (BRI, NSW); Carr Villa, Ben Lomond National Park, *Wilson* 6462, Feb 1986 (NSW); Arm River Track, between Douglas Creek crossing and Pelion Hut, Cradle Mountain–Lake St Clair National Park, *Wilson* 8317, Mar 1992 (NSW, HO).

### Key to *Carex* species in 'Flora of New South Wales'

Fitting the above species into the 'Flora' key to species necessitated several changes, so it was felt useful to present here a full, amended key to the species of *Carex* native or naturalised in New South Wales.

- 1 Style 3-fid; nut trigonous
  - 2 Inflorescence of a single spike, less than 1.5 cm long
    - 3 Male part of the spike as long as or longer than the female part and not less conspicuous ..... 31. *C. capillacea*
    - 3\* Male part of the spike from slightly to much shorter than the female part, always inconspicuous and usually the spike appears to be wholly female
      - 4 Spike 7–12 mm long, with many female flowers; lowest bract glume-like ..... 29. *C. cephalotes*
      - 4\* Spike 4–5 mm long, with about 3–6 female flowers; lowest bract leaf-like, exceeding the spike ..... 30. *C. archeri*
  - 2\* Spikes several to numerous; inflorescence 3–90 (rarely 1–3) cm long
    - 5 Spikes in clusters of 2–5 (or occasionally some solitary) at distant nodes

- 6 Female glumes white with greenish midrib, 1.2–1.5 mm wide ..... 1. **C. hubbardii**
- 6\* Female glumes pale yellow-brown to red-brown with greenish midrib, 1.5–4 mm wide
- 7 Female glumes yellow-brown to red-brown, 3.5–5.5 mm long, 1.5–2 mm wide; spikes lax-flowered below, rather dense-flowered above, 3–5 mm thick in mature fruiting stage, upper gynaeandrous (sometimes with male apices), the uppermost with a long, usually very long, male basal part, the lower gynaeandrous or female ..... 2. **C. longibrachiat**
- 7\* Female glumes pale yellow-brown, 4–8 mm long, 2.5–4 mm wide; spikes dense-flowered, 5–8 mm thick in mature fruiting stage, the uppermost 1–4 wholly male, rarely with a few female flowers in the terminal spike, the remainder wholly female or with male bases and/or apices ..... 3. **C. iynx**
- 5\* Spikes solitary at nodes (nodes may be close together)
- 8 Utricles hispid; nut with persistent enlarged disk-like junction of nut body and style-base ..... 5. **C. breviculmis**
- 8\* Utricles glabrous, except sometimes on the margins of the beak; nut without enlarged junction with style-base
- 9 Utricles corky, with impressed nerves
- 10 Culms extending above the leaf-sheaths for a considerable distance; male spikes 3–15; female spikes mostly spread at some distance from one another; female glumes mucronate, dark to very dark red-brown; utricles 4–5 mm long, yellow-brown usually tinged dark red-brown; leaves with marginal prickles ± regularly antrorse ..... 6. **C. bichenoviana**
- 10\* Culms usually hidden in the leaf-sheaths; male spikes 1–4; female spikes usually approximate; female glumes not mucronate, yellow-brown to red-brown; utricles 4–8 mm long, yellow-brown occasionally tinged dark red-brown; leaves with marginal prickles irregular and at 90° to leaf ..... 7. **C. pumila**
- 9\* Utricles neither corky nor with impressed nerves
- 11 Leaves prominently septate-nodulose (septa less obvious when fresh); beak of utricle with apex deeply divided into 2 stiff slender teeth c. 1 mm long ..... 8. **C. fascicularis**
- 11\* Leaves not septate-nodulose; beak of utricle with apex truncate, split or shortly divided into 2 membranous, short but broad teeth
- 12 Male glumes with a mucro as long as or longer than the ..... 11. **C. brownii**
- 12\* Male glumes not mucronate or with mucro shorter than the body of the glume; utricles glabrous, minutely papillose or minutely hispid on margins and beak
- 13 Utricles minutely papillose, with beak to 0.3 mm long; leaf-sheath and ligule occasionally red-dotted; culms 10–70 cm long

- 14 Terminal spike gynaecandrous; leaves shorter than or scarcely exceeding culms; utricles not or faintly nerved, 3–4.5 mm long ..... 11a. *C. buxbaumii*
- 14\* Terminal spike male or at least male in the uppermost portion; leaves much exceeding culms; utricles strongly numerous-nerved, 2.3–3 mm long ..... 12. *C. maculata*
- 13\* Utricles not minutely papillose, with beak 0.5–2 mm long; leaf-sheath and ligule not red-dotted; culms 1–10 cm long
- 15 Inflorescence 1–3 cm long, hidden amongst leaves; utricles 4–6.5 mm long, glabrous, with beak 1–2 mm long ..... 9. *C. jackiana*
- 15\* Inflorescence 8–35 cm long, mostly exceeding leaves (lowest spikes may be amongst the leaves); utricles 3.3–4 mm long, minutely hispid on upper margins (occasionally glabrous), with beak 0.5–0.8 mm long ..... 10. *C. blakei*
- 1\* Style 2-fid (rarely some styles 3-fid within an inflorescence in *C. gaudichaudiana*); nut lenticular or plano-convex
- 16 Inflorescence of a single spike
- 17 Plants long-rhizomatous; female bracts 3–4 mm long; utricles slightly hispidulous on upper margins
- 18 Female flowers above male in spike; utricles 2.5–3 mm long, weakly several-nerved; culms 25–40 cm long ..... 26a. *C. raleighii*
- 18\* Male flowers above female in spike; utricles 5.5–7 mm long, with 8–10 strong nerves abaxially; culms 80–130 cm long ..... 20a. *C. klaphakei*
- 17\* Plants short-rhizomatous; female bracts 2.5–3 mm long; utricle glabrous ..... 29. *C. cephalotes*
- 16\* Spikes 2–numerous
- 19 Spikes long-cylindrical (i.e. much longer than broad), mostly 2–17 cm long (rarely some as short as 0.5 cm but then glumes dark red-brown or blackish), clearly distinct and often distant from each other
- 20 At least lower spikes obviously pedicellate, drooping to spreading
- 21 Utricle white-hispid, with beak c. 1 mm long with 2-fid or split apex; spikes clustered at nodes or rarely solitary at lower nodes ..... 4. *C. brunnea*
- 21\* Utricle minutely papillose; beak to 0.3 mm long with truncate or obliquely truncate apex; spikes solitary at nodes ..... 13. *C. lobolepis*
- 20\* Spikes sessile to subsessile ('pedicels' may be up to 1 cm long in *C. polyantha*), erect to spreading
- 22 Leaves 4–9 mm wide; spikes mostly 3–17 cm long; utricles nerveless or with few rather faint nerves ..... 14. *C. polyantha*
- 22\* Leaves 2–4 mm wide; spikes 0.5–6 cm long; utricles distinctly several-to numerous-nerved

- 23 Uppermost spike male; inflorescence 7–18 cm long; mouth of utricle notched to obliquely truncate, pallid, occasionally minutely hispid, 0.2–0.3 mm diam ..... 15. **C. gaudichaudiana**
- 23\* Uppermost spike gynandrous or occasionally male; inflorescence 2–8 cm long; mouth of utricle truncate, blackish, smooth, c. 0.15 mm diam ..... 16. **C. hypandra**
- 19\* Spikes ovoid or short-cylindrical (mostly c. 0.5 cm long, occasionally to 1.5 cm long) or ovate in outline, often densely clustered in an inflorescence that is itself ovoid or short-cylindrical
- 24 All spikes androgynous (male portion often not conspicuous), or upper male and lower androgynous or occasionally female
- 25 Leaves curly towards apex ..... 21. \***C. arenaria**
- 25\* Leaves  $\pm$  straight
- 26 Spikes very numerous, forming a long narrow spike-like panicle 6–30 cm long, with appressed secondary branches to 4 cm long; leaves often obviously septate-nodulose; culms 2–4 mm diam.
- 27 Utricle glabrous, margins not winged ..... 17. **C. declinata**
- 27\* Utricle hispid on slightly winged margins at least near apex.
- 28 Culms trigonous to triquetrous at least above; glumes uniformly whitish, or yellow-brown without or with very narrow whitish or hyaline margins above
- 29 Utricle with thickened truncate base, dark yellow-brown at maturity; inflorescence often > 12 cm long (4–45 cm); plants forming large tussocks ..... 18. **C. appressa**
- 29\* Utricle without thickened truncate base, blackish at maturity; inflorescence 3–12 cm long; culms in slender tufts spread along long rhizome ..... 19. **C. incomitata**
- 28\* Culms terete; female glumes orange-brown with broad white or hyaline margins above ..... 20. **C. tereticaulis**
- 26\* Spikes 2–12 in an inflorescence, forming a short clustered panicle 0.8–3 cm long, without secondary branches; leaves not septate-nodulose; culms to 1.5 mm diam.
- 30 Spikes 4–12; utricles 3–4 mm long, with narrow stipe-like base, faces nerveless or with a few faint nerves; male and female bracts acuminate to acute but not or scarcely mucronate, with hyaline or white margins 0.2–0.3 mm wide; culms 8–35 cm long ..... 22. **C. chlorantha**
- 30\* Spikes 2 or 3; utricles 5.5–7 mm long, with obtuse base, abaxial face with 8–10 strong nerves; male and female bracts acute, mucronate, with margins not or scarcely hyaline; culms 80–160 cm long ..... 20a. **C. klaphakei**
- 24\* All spikes gynaecandrous (male portion often not conspicuous) or lower wholly female
- 31 Lowest involucral bract much shorter than inflorescence, glume-like or leaf-like



- 32 Utricle winged on upper margins ..... 23. \**C. ovalis*
- 32\* Utricle not winged on margin
- 33 Utricles strongly reflexed at maturity, with smooth surface; beak about as long as the body of the utricle, 2-fid or notched with teeth 0.25–0.5 mm long ..... 23. *C. echinata*
- 33\* Utricles spreading at maturity, minutely hispid and colliculate near apex; beak much shorter than the body of the utricle, truncate or shortly split abaxially ..... 24. *C. canescens*
- 31\* Lowest involucral bract exceeding (usually by far) the whole inflorescence, leaf-like.
- 34 Glumes orange-brown or pale red-brown, with  $\pm$  broad whitish or hyaline margins; utricles never transversely wrinkled
- 35 Inflorescence longer in outline than wide; culms 25–40 cm long; leaves c. 1 mm wide; utricles 2.5–3 mm long, 1–1.4 mm diam ..... 26a. *C. raleighii*
- 35\* Inflorescence broader in outline than long (or about the same length and breadth); culms 4–20(–35) cm long; leaves 1–2.5 mm wide; utricles 3.2–4.5 mm long, 1.5–2 mm diam ..... 26. *C. hebes*
- 34\* Glumes whitish to pale yellow-brown with green midrib; utricles often transversely wrinkled at maturity
- 36 Utricle with beak 0.3–1.1 mm long ..... 27. *C. inversa*
- 36\* Utricle with beak c. 2 mm long ..... 28. *C. lophocarpa*

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