

NOTES RELATING TO THE FLORA OF BHUTAN: XXI *Carex* (Cyperaceae)

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The following new species and subspecies are described: *Carex burttii* Noltie, *C. griersonii* Noltie, *C. nigra* (L.) Reich. subsp. *drukyulensis* Noltie, *C. schlagintweitiana* Boeck. subsp. *deformis* Noltie, *C. speciosa* Kunth subsp. *dilatata* Noltie, *C. speciosa* subsp. *pinetorum* Noltie, *C. laeta* Boott subsp. *gelongii* Noltie. The new combination *C. fusiformis* Nees subsp. *finitima* (Boott) Noltie is made. *C. sikkimensis* C.B. Clarke is reduced to the synonymy of *C. fucata* Boott ex C.B. Clarke, and *C. praelonga* C.B. Clarke to that of *C. teres* Boott. Notes are provided on *C. notha* Kunth, *C. inclinis* C.B. Clarke, *C. inanis* C.B. Clarke and *C. alopecuroides* D. Don ex Tilloch & Taylor. *C. fastigiata* Franch. and *C. radicalis* Boott are reported new to Bhutan and *C. montis-everestii* Kük. new to Sikkim. Lectotypes are designated for *C. fucata*, *C. sikkimensis*, *C. teres*, *C. praelonga*, *C. setigera* γ *humilis*, *C. inanis*, *C. fusiformis*, *C. finitima*, *C. alopecuroides*, *C. chlorostachys* D. Don ex Tilloch & Taylor and *C. alopecuroides* var. *chlorostachya* C.B. Clarke. A phytogeographical checklist is provided for species occurring in the *Flora of Bhutan* area.

INTRODUCTION

Carex L. is (next to *Pedicularis*) the second largest genus occurring in the area covered by the *Flora of Bhutan*. In the account 73 species and 9 infraspecific taxa are treated, although further collecting and research will undoubtedly raise this number somewhat. Sedges occur in virtually the full range of available habitats from seasonally burnt terai grassland (*C. oligostachya*) through broad-leaved and coniferous forest zones to extreme alpine situations - the highest reliable record being for *C. moorcroftii* at 5430m, although several species perhaps occur up to 5790m.

The following precursor notes relating to the *Flora* account mainly concern nomenclature and typification. Surprisingly few new taxa have been discovered during the course of the work. The sedges of Sikkim have been well-studied since the time of Hooker and Clarke, but much of Bhutan still remains practically unexplored caricologically. One significant recent addition has been *C. radicalis*, previously known only from the type specimens from Lachen (Sikkim) and now reported for W Bhutan (*Wood* 5650, *Noltie* 9).

Many problems of nomenclature and typification have been encountered, especially relating to the early (widely distributed) collections of Hooker and Royle. The great sedge expert Francis Boott described many of the E Himalayan taxa based on Hooker's Sikkim specimens in his *Illustrations* (1858–1867). Boott retained these type (and figured) specimens in his own herbarium, but at least the majority of them were eventually (1894) incorporated into the main Kew herbarium by C.B. Clarke, the other great authority on Himalayan *Carex*. Boott also saw, and annotated, the specimens retained in Hooker's own herbarium and the earlier NW Himalayan collections of Royle now in Liverpool. These latter had previously been 'arranged and described' by Nees von Esenbeck, who described (Nees, 1834) many new *Carex* species based on these

collections. Nees retained duplicates for his own herbarium (subsequently destroyed at Berlin) and it is not certain whether the Liverpool specimens can truly be considered to be holotypes (Harrison, 1978). For this reason it has been thought wiser to designate some as lectotypes (see below).

The rank of subspecies has been used below to describe several new taxa which differ in relatively small characters but which seem to be consistent and correlated with ecology or geography.

The following notes are arranged in the order of Kükenthal (1909) – although very out of date this work is still the only monograph of *Carex* and it still provides a useful and easily available framework. No other satisfactory infra-generic classification of the genus exists for the Sino-Himalayan region, whereas those for adjoining regions, such as the former USSR (Krechetovich, 1964), Malesia (Kern & Nooteboom, 1979) and Flora Iranica (Kukkonen, in prep.) differ widely; no revision is yet available for the Chinese species. Kükenthal's names for the various subgeneric ranks are given merely for convenience even where not nomenclaturally correct. Many problems relating to Bhutanese sedges remain (such as specific limits in certain critical groups, especially the Indocarices) and the following notes are only those required most urgently for the treatment to be published in the Flora.

NOTES

SUBGENUS INDOCAREX: SECTION INDICAE: SUBSECTION HISPIDULAE

Carex burttii Noltie, sp. nov.

Carex vesiculosa sensu C.B. Clarke (in Hooker f., Fl. British India, 6: 717, 1894), p.p. (Bhutan plants), non Boott.

C. vesiculosa Boott f. *pallida* Kük. in Engler, Das Pflanzenreich 38 (IV.20): 283 (1909).

C. continua sensu Ohwi in Hara, Fl. E. Himalaya, 2: 146 (1971), non C.B. Clarke.

Typo *C. vesiculosae* Boott (e Khasia) paniculis partialibus linearibus et spicorum fasciculis aequaliter dispositis arctissime affinis, sed culmis multo tenuioribus vaginis aphyllis ovatis rubescenti-purpureis ad bases paulo tumidas crebre adpressis, culmis basem versus exfoliatis (haud foliatis), foliis angustioribus, 2–3.5mm (non 2.8–6.5mm) latis, spicis minoribus, utriculis castanescentibus nitidescentibusque, haud costatis, rostro minus quam $\frac{1}{3}$ longitudinis corporis (non $\frac{1}{3}$ longitudinis corporis usque idem aequans, glumis femineis distincte (non minute) mucronatis, eis masculis mucronatis (non acutis), usque ad 3.5mm longis (non c.4.5mm) differt; axes inflorescentiarum partialium filiformes flexuose ascendentes. Tempos florendi vernali (Apr.–Mai), non aestati/autumni (Jul.–Nov.) etiam a *C. vesiculosa* recedit. **Fig. 1A–F.**

Rhizomes short, stems tufted; bladeless sheaths ovate, purplish-red, closely appressed to swollen culm-base; lower leaf-sheaths long, so lower part of culms naked, bases reddish-purple, not persistent, margins fibrillose. *Leaves* 2–3.5mm wide, exceeding inflorescence, margins hispid, surface hispid when young, evenly disposed along culm.

Culms 44–86cm. *Inflorescence* 18–36cm, almost equalling leafy part of culm, slender; partial panicles single at lower 2–4 nodes, c.3 at terminal node; bracts exceeding inflorescence; bracteoles with conspicuous, long, filiform points. *Partial panicles* linear, axes filiform, flexuous, secondary branches scarcely developed so lower spikes appearing clustered – these and upper single spikes widely and evenly spaced. *Spikes* androgynous, small, primarily male; male section 3.5–4.4mm, female 1.5–1.7mm, utricles suberect at maturity. *Utricles* 2.4–2.9 x 0.8–0.9mm, ellipsoid-trigonal, tapered into short beak, not curved, whitish-green becoming suffused chestnut and shining, not ribbed, hispid on upper part; beak c.0.6mm, hispid, deeply bifid. *Stigmas* 3. *Female glumes* 1.5–2.5 x c.1.6mm, ovate, becoming reddish-brown and shining, margins paler, subacute, mucronate, scabrid point 0.4–0.9mm. *Male glumes* 2.4–3.5 x 1–2mm, lanceolate to oblong-elliptic, reddish brown with green midrib, blunt with short mucronate point.

Type: Sikkim. Between Ramtek Gompa and Murtam (opposite Gangtok), c.6000ft, 30 iv 1913, *Lacaita* 16572 (holo. BM, iso. E)

Distribution: Sikkim, Bhutan, SE Tibet. Wet cliffs; on rocks; among bamboo. Altitude c.1070–2290m.

Other specimens seen

SIKKIM: Tumlong, 3500ft, 29 iv 1876, *C.B. Clarke* 27688 (BM, CAL, K – isotypes of *C. vesiculosa* f. *pallida* Kük.); N bank of Rate Chu N of Gangtok, 1670m, 31 vii 1992, *ESIK* 954 (E); Kabi, 9 v 1967, *R.S. Rao* 142 (CAL).

BHUTAN: Unlocalized specimens, *Griffith* (*Kew Distribution No.*) 2676 (BM, K), 2677 (BM), 2678 (= HEIC No 6088) (BM, CAL, K). Tashiling-Neylong-Charikhachor, 2200m, 20 iv 1967, *Kanai et al.* 8271 (BM). Tashiling-Tongsa Bridge-Tongsa, 1700–2100m, 16 iv 1967, *Kanai et al.* 5361 (BM).

CHINA (SE TIBET): Nyam Jang Chu, between Le and Pangchen, 7500ft, 2 ix 1938, *Ludlow, Sherriff & Taylor* 6500 (E).

Named after B.L. Burtt, on the occasion of his eightieth birthday, in recognition of his outstanding contributions to taxonomic botany and his generosity in sharing his enormous knowledge and experience with younger colleagues.

Considering the distinctive appearance of this elegant sedge, there has been a surprising amount of confusion over its status. Some of the Griffith collections (e.g. the one seen by Boott) are immature and so remained unidentified. Clarke identified others as *C. vesiculosa* and included them under this species in Clarke (1894) – he later changed his mind and queried the identification on the specimens. The Clarke specimens from Sikkim were identified by himself and Kükenthal (1909 – where it was described as f. *pallida*) as *C. vesiculosa*. The excellent Lacaita specimens were likewise identified as *C. vesiculosa*. Of the more recent specimens, the Bhutanese ones were identified by Ohwi (1971) as ‘?*C. continua* C.B. Clarke’ and the Tibetan one as ‘*Scleria* sp. aff. *lithosperma*’ by Nelmes (on label)! It is interesting to note that fruiting takes place at the end of the dry season (April–May); most Indocarices, including *C. vesiculosa*, flower during or towards the end of the wet season.

It should be noted that *C. vesiculosa* is not a well-understood species (‘hardly separable from *C. condensata*’ as Clarke (1894) observed) and the name has possibly

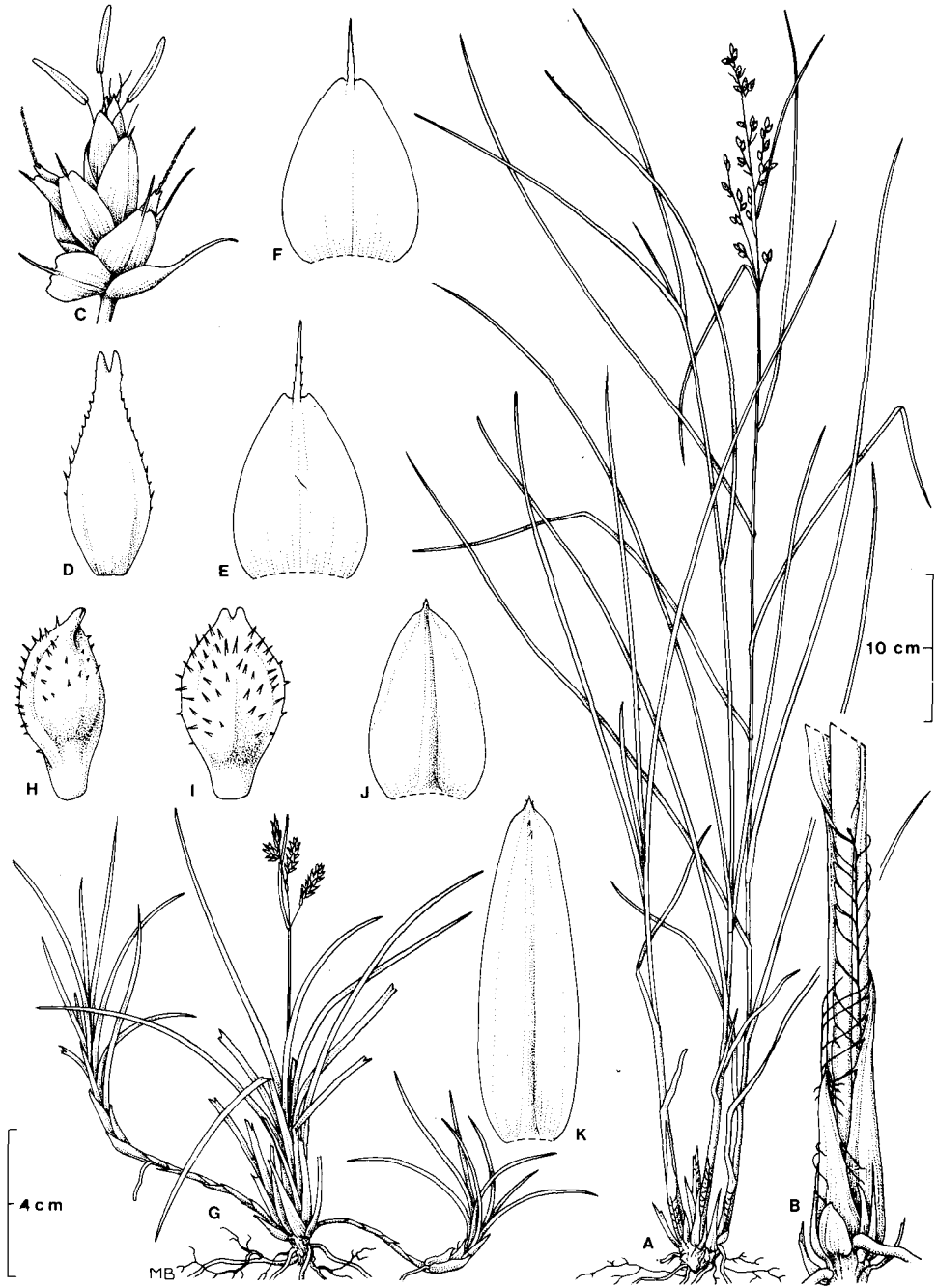


FIG. 1. *Carex burtii* Noltie. A, habit; B, culm base showing fibrillose margins of leaf sheaths (x 1); C, single (androgynous) spike (x 5); D, utricle (x 12); E, female glume (x 12); F, male glume (x 12). *C. griersonii* Noltie. G, habit; H, I, utricle (x 12); J, female glume (x 12); K, male glume (x 12).

been misapplied to Malesian specimens (e.g. Kern & Nooteboom, 1979). It can usually be distinguished from *C. condensata* by its fibrillose leaf sheaths and material matching the type (Chirra Pungee [= Cherrapunji], Khasia, Gomez s.n. ex herb. Boott, K), however, has been seen from Khasia, Bhutan and E Nepal. Much further work requires to be done to resolve the seemingly intractable *C. vesiculosa/cruciat/condensata* group over the whole of SE Asia.

SUBGENUS EUCAREX: SECTION ACUTAE: SUBSECTION VULGARES

Carex nigra

Members of subsections *Vulgares* and *Caespitosae* (sensu Kükenthal) are apparently rare in the Sino-Himalayan region and in SE Asia in general and are very poorly represented in herbaria. None had previously been reported for the E Himalaya so the occurrence of the present taxon in Bhutan was somewhat surprising. It cannot be accommodated in the Australian/E Asian *C. gaudichaudiana* Kunth and comes extremely close to the widespread European and N American *C. nigra*. The exact distribution of *C. nigra* s.l. in Asia is uncertain though it was not recorded (under *C. goodenoughii*) for India or China by Kükenthal (1909). *C. nigra* is recorded for Turkey (Nilsson, 1985); *C. juncella* Th. Fr. and *C. wiluica* Meinsh., which should almost certainly be included in *C. nigra* (Chater, 1980), are both recorded for Russia (Krechetovich, 1964), the former only for the European part and the latter occurring in arctic parts as far east as Kamtschatka. In the same work *C. dacica* Heuff. is recorded for the Caucasus and this is probably also best treated as a subspecies of *C. nigra*. This, therefore, seems to be as far east as the species extends in south-central Asia and it is not included in the list of species for the *Flora Iranica* area (Kukkonen, 1987). Records for NW Himalaya/W Tibet (under *C. vulgaris*; Clarke, 1894) must be regarded as doubtful as I have seen no specimens. Further work is needed to clarify the relationship between *C. nigra* and the related species *C. forrestii* Kük. and *C. prolongata* Kük. from SW China; and also the Japanese *C. gaudichaudiana* var. *thunbergii* (Steud.) Kük., which Clarke (1903) included under *C. goodenovii*.

It seems clear that the occurrence of *C. nigra* in Bhutan represents a dramatic disjunction and therefore worth recognizing at subspecific level, despite the fact that this species is notoriously polymorphic and the morphological distinctions of the present taxon relatively slight.

Carex nigra (L.) Reich. subsp. **drukyulensis** Noltie, subsp. nov.

A *C. nigra* subsp. *nigra* spicis femineis longioribus (infima 2–4.5cm longa), utriculis validiore 5–9-nervatis, spica mascula majore (2.2–4.5cm longa), magis distantis (pedunculo plus quam 1cm longo) recedit.

Rhizomes ?short; stems ?tufted. *Basal bladeless sheaths* few, short, acute, reddish-brown, non-fibrillose. *Culm* 23–33cm, trigonous, angles hispid; leaves sub-basal. *Leaves* shorter than to equalling culm, 1.6–2.6mm wide. *Bracts* leaf-like, lowest shorter than inflorescence, not sheathing. *Female spikes* 3, erect, overlapping, ± sessile, narrowly cylindrical; sometimes with long-peduncled sub-basal spike; upper sometimes with

some apical male flowers. *Female glumes* 1.9–2.6 x 0.7–1mm, narrowly oblong-lanceolate, blunt, dark purplish brown, midrib green, margins very narrowly hyaline. *Utricles* 2–2.4 x 1–1.2mm, elliptic, slightly contracted below apex and above base, biconvex, grey-green, minutely papillose, nerves 5–9 per face, beakless, base of style persisting projecting slightly from entire orifice. *Stigmas* 2. *Male spike* single, 2.2–4.2cm, terminal, peduncle 1.5–3.5cm. *Male glumes* 3.5–4 x 0.9–1mm, narrowly oblanceolate, blunt, slightly paler than female ones.

Type: Bhutan, Bumthang district, Byakar, 2750m, 9 vi 1979, *Grierson & Long* 1764 (holo. E, iso. K).

Other specimens seen:

BHUTAN: Bumthang district, Chunkar, 9500ft, 12 iv 1949, *Ludlow, Sherriff & Hicks* 20100 (BM); 6km N of Thimphu Dzong, 2450m, 9 vi 1975, *Grierson & Long* 119 (E).

The plant grows in damp flushes and moist meadows between c. 2450 and 2900m. The subspecific epithet is derived from the Bhutanese name for Bhutan, to which it appears to be endemic.

SUBSECTIONS FORSICULAE AND PRAELONGAE

Carex fucata, *C. sikkimensis* and *C. notha*

There has been much confusion over these three taxa in the E Himalaya. This has arisen for various reasons:

1. too much weight has been placed on the sex of the terminal spike in distinguishing species and assigning them to sections or subsections. For example, Clarke (1894) placed *C. sikkimensis* in sect. *Remotae* (terminal spikes gynaeandrous) and *C. notha* and *C. fucata* in sect. *Vulgares* (terminal spikes male). Kükenthal (1909) treated *C. sikkimensis* as a variety of *C. fucata* in subsect. *Forsiculae* and placed *C. notha* in subsect. *Praelongae*, these subsections being separated on very tenuous grounds, such as the degree of pendulousness of the female spikes.
2. the type sheets of *C. fucata* contain a mixture of 2 gatherings.

Field studies by the author, in 1992, at the presumed type locality of *C. sikkimensis* (Sikkim: near Dzongri) have confirmed the variability in distribution of sexes in the terminal spike actually demonstrable (but previously un-noticed) in the type collections. Variability in posture of female spikes is evident even from the old herbarium collections.

To clarify the situation it is firstly necessary to lectotypify the name *C. fucata* Boott ex C.B. Clarke. There are three relevant sheets at Kew: one from Boott's herbarium and two from Hooker's – all contain a mixture of two gatherings from Lachen, Sikkim, made by J.D. Hooker, at two different altitudes and on two dates. One element is extremely immature and has relatively paler (brownish-black) glumes, the mature element having black glumes, but both almost certainly belong to the same taxon. The original field labels are attached to one of the Hooker sheets. Boott was obviously unsure of the

identity of the plants as the sheet from his own herbarium is labelled *C. notha* Kunth, but one of the duplicates from Hooker's herbarium bears a note in his hand naming it *C. fucata* Boott, stating that it differs from *C. notha* in the entire orifice of the beak. The close relationship of the two taxa is particularly evident in immature specimens. Boott did not publish the name *C. fucata*, which was taken up by C.B. Clarke (1894: 710); it is therefore necessary to lectotypify by specimens which agree with Clarke's protologue, i.e. ones with a terminal male spike and black glumes.

As mentioned above, Clarke failed to notice that whereas some of the type specimens of *C. fucata* have entirely male terminal spikes, others have terminal spikes at least partly female. In the same work Clarke described *C. sikkimensis*, based on his own collections from Dzongri, Sikkim. He distinguished *C. sikkimensis* from *C. notha* chiefly by its larger size and gynaeceandrous terminal spike, but did not compare it with *C. fucata* with which it is quite clearly conspecific, as was realized by Kükenthal who treated it as a variety of *C. fucata*. The type specimens are merely robust examples at a more mature stage of fruiting than the types of *C. fucata* and are not even worth varietal rank.

C. fucata is apparently restricted to the E Himalaya occurring from E Nepal through Sikkim to E Bhutan.

It should be noted that most of the Nepalese specimens determined as *C. fucata* by Koyama (1978) are actually *C. notha* which he does not list for Nepal.

Carex fucata Boott ex C.B. Clarke in Hooker f., Fl. Br. India 6: 710 (1894).

Lectotype (selected here) 'Lachen, 11–12,000ft, 2 vii 1849, J.D. Hooker s.n.' – three left hand specimens on sheet ex herb. Hooker, bearing his field tickets (K).

C. sikkimensis C.B. Clarke in Hooker f., Fl. Br. India 6: 708 (1894).

Lectotype (selected here) 'Jongri, 12,000ft, 15 x 1875, Clarke 25788B (BM); Isolectotype: same number, ex herb. Gamble (K).

C. fucata var. β *sikkimensis* (C.B. Clarke) Kük. in Engler, Das Pflanzenreich 38 (IV.20): 344 (1909).

As indicated above *C. fucata* is close to *C. notha* and they can be separated as follows:

1. Glumes black; midribs of female glumes usually not excurrent; utricles \pm lanceolate in outline gradually tapering into beak; orifice of beak not notched; lowest bract overtopping inflorescence; terminal spike male or sometimes with female spikes in various positions _____ **C. fucata**
- + Glumes dark purplish-brown; midribs of female glumes usually minutely excurrent; utricles elliptic, abruptly contracted into beak; orifice notched; lowest bract usually not overtopping inflorescence; terminal spike almost invariably male-only _____ **C. notha**

C. notha is a Himalayan taxon, occurring from Himachal Pradesh as far east as Bhutan. Closely related species occur in Yunnan, SW China, notably *C. melinacra* Franch. (treated as a subspecies of the Japanese *C. forficula* Franch. & Sav. by Kükenthal). The inflorescence of this species is very similar to that of *C. notha* but the plant differs vegetatively in having reddish-brown, strongly fibrillose leaf sheaths. *C. luctuosa*

Franch. was said by Kükenthal (1909: 344) to be synonymous with *C. fucata*, which he therefore recorded for China. The type of *C. luctuosa* (from Sichuan), however, is so immature that it can only be referred to *C. notha* agg.

Carex teres and C. praelonga

There has been much confusion over this pair of species in E Himalaya with specialists such as C.B. Clarke and E. Nelmes often changing their minds over the assignment of individual specimens to one or other of the species. As with many sedge problems, the root of the trouble lies in the fact that the specimens on which the earlier name (*C. teres*) is based are immature. After examining the types and material available at BM, E and K it has been found impossible to draw a line between them and they are better regarded as conspecific. This was confirmed by collections made in Darjeeling (during the 1992 ESİK expedition) very close to the type locality and agrees with the conclusion reached by Kern & Nooteboom (1979) on the variability of the species in Sumatra and Java.

C. teres was described by Boott (1858) from material collected by Hooker at Senchul, Darjeeling District. The sheet from Boott's own herbarium and used for the illustration (marked 'figd.') is here chosen as the lectotype. The utricles are immature and the nut has not begun to expand, hence the utricle is narrow and tapers gradually into the beak. The utricles are darkish and conspicuously marked with purplish glands, and distinctly 5-nerved. The specimen does, however, bear some slightly more mature utricles in which the body is more elliptic. Boott also figured these wider utricles, but Clarke (1894) and later Kükenthal (1909) assumed that these belonged to another species, the intractably confused *C. prescottiana* Boott, apparently wanting to believe that the mature utricles of *C. teres* always remained narrow and tapered gradually into the beak.

C. praelonga was described by Clarke (1894) from specimens (with ripe fruit) he collected at Dikeeling, Sikkim. In the same work he describes *C. teres* as 'from the root to the glumes extraordinarily like *C. praelonga* but rather stouter; the fruiting spikes and utricles are totally unlike'. In these specimens the utricles are fully mature, olive-yellow with only small reddish glands, smooth (nerves scarcely visible), with the body widely ellipsoid and distinctly shouldered into the beak, and the nut filling the body.

In fact, specimens have been seen with intermediate utricle-characters, including the recent collection from Senchul (ESİK 56), and the two species must be united under the name *C. teres*.

The probable reason for Clarke's confusion is that some specimens, which he collected at Tonglo (Clarke 35636, K) and Sandukphoo (Clarke 35667, K), are rather atypical, but which he took to be the mature form of *C. teres*. In these, the mature utricles are large, lanceolate in outline, gradually tapered into the beak, and tending to reflex. Some of the specimens, however, bear a mixture of these and typical utricles and they seem to represent some sort of monstrous form; further collections are required to verify this.

Examination of herbaria revealed many previously unidentified or misidentified specimens, showing that the Sino-Himalayan distribution of *C. teres* extends from Nepal, through Sikkim/Darjeeling, Bhutan, SE Tibet, Khasia, N Burma to W Yunnan; it also occurs in Sumatra and Java. Further work is required to clarify the relationships

between *C. teres* and the related species *C. cremostachys* Franch. and *C. fargesii* Franch. from SW China.

Other specimens seen:

NEPAL: *Stainton, Sykes & Williams* 4939 (E, BM); *Stainton* 190 (E, BM) - both determined as 'probably *C. fucata*' by T. Koyama but not included in Koyama (1978); *EMAK* 892 (E).

SE TIBET: *Ludlow, Sherriff & Elliot* 13727 (E).

BHUTAN: *Ludlow, Sherriff & Hicks* 20566 (E, K).

NE UPPER BURMA: *Forrest* 25037, 26826 (E, K); *Kingdon Ward* 3185 (E).

W YUNNAN: *Sino-British Exped. Cangshan 1981* 825 (E).

Carex teres Boott, III. Genus *Carex* 1: 62, t. 167 (1858).

Lectotype (selected here) 'Sinchall (sic), Sikkim Himalaya, 8–9,000ft, Dr Hooker [s.n.] – specimen ex herb. Boott marked 'figd.' (K).

C. praelonga C.B. Clarke in Hooker f., Fl. Br. India 6: 707 (1894).

Lectotype (selected here) 'Dikeeling, Sikkim, 7000ft, 11 v 1876, Clarke 27879A (K); isolecto Clarke 27879C (BM).

SECTION TRACHYCHLAENAE

C. setigera, *C. schlagintweitiana* and *C. inanis* represent a difficult complex on which further research is required, having been variously treated by different authors. Problems have arisen from stunted and immature specimens, specimens in which the spikes are infected with a fungus (when the glumes become translucent), confusion over Royle collecting numbers, and which specimens of a given number Nees actually saw. It appears that Clarke's treatment (1894) is better than that of Kükenthal (1909), though in light of re-examination of the Royle types slight modification to Clarke's synonymy is required (see below).

Carex schlagintweitiana

Although I have been unable to locate any type material of *C. schlagintweitiana* Boeckeler (*Schlagintweit* 5056), it seems safe to follow Clarke's concept (1894) since he had seen the type and equated it with that part of Boott's *C. setigera* β *minor* figured as t. 6. fig. 1 in Boott (1858). Kükenthal also treated this taxon as a variety of *C. setigera*. Koyama (1978) stated that he had seen the type of *C. schlagintweitiana*, though without citing its herbarium location (the holotype should have been at Berlin, and was almost certainly destroyed, and I can find no isotype material at K or BM); he almost certainly wrongly sunk it under *C. inanis*. More recently Kukkonen (1987) has maintained *C. schlagintweitiana* as a species. The typical form of this species is restricted to the NW Himalaya and proves to be synonymous with *C. setigera* γ *humilis* Nees (lectotype (selected here) *Royle* 121, LIV). Eastern plants differ and are here described as a new subspecies.

***Carex schlagintweitiana* Boeckeler subsp. *deformis* Noltie, subsp. nov.**

A subsp. *schlagintweitiana* apice utriculi haud (vel minute) rostrato, ubi immaturo recurvato, orificio utriculi integro (non acute bidentato), et distributione orientalis-himalayensi differt.

Rhizomes slender, spreading, clothed with purplish-red fibrous scales. *Bases of leaf sheaths* pale reddish-fawn, fibrillose. *Leaves* 1.3–2.5mm wide, exceeding culms, weakly erect, sub-basal. *Culms* 15–30cm, very slender. *Inflorescence* of 2–4 delicate, erect spikes near top of culm, upper overlapping; peduncles erect, slender, lowest 0.4–1.5cm; terminal spike male, 1.4–2.1cm; lower 2–3 spikes female (upper sometimes with a few terminal male flowers) 1–1.8 x c.0.3cm, utricles dense, suberect; bracts with narrow leaf-like blades – lowest exceeding inflorescence, bases sheathing. *Utricles* 1.4–1.7 x c.0.7mm, narrowly obovoid, densely hairy, becoming marked reddish-brown, gradually narrowed to apex, apex deflexed when immature; beakless or extremely shortly beaked (under 0.2mm), aperture entire. *Stigmas* 3. *Female glumes* 2.3–3.3 (total length) x 0.6–1.2mm, lanceolate, acuminate into short (under 0.5mm) awn, reddish-brown, margins hyaline, midrib green, keeled. *Male glumes* c.3.5 x 0.6mm, linear-lanceolate, finely acuminate.

Type: Bhutan, Thimphu district, Hills above Taluka Monastery, 3700m, 19 vi 1988, *J.R.I. Wood* 6414 (holo. E).

Distribution: E Nepal, Bhutan, Chumbi, Yunnan. Screes and rocky hillsides; moss around base of trees in open *Abies* forest, c.3050–3960m.

Other specimens seen

NEPAL: Near Namche, 11–12,000ft, 2 v 1954, *Stonor* 57 (K).

TIBET (CHUMBI): Pipitang, 12,000ft, 14 v 1945, *Bor & Ram* 19201 (K). Yatung, 10,000ft, 15 v 1945, *Bor & Ram* 19242 (K).

TIBET/YUNNAN: Dokar La, Mekong-Salween Divide, 13,000ft, 29 vi 1913, *Kingdon Ward* 605 (E).

On account of the deflexed apices, the utricles look deformed when immature, hence the subspecific epithet.

C. tsangensis Franch. (*Delavay* 2615) from Yunnan is placed under synonymy of *C. schlagintweitiana* by Kükenthal (1909). Although I have not seen the type, it seems not to refer to the present plant as the utricle is described as ‘abrupte et breviter rostrati, rostro bidentulo’.

Carex inclinis

Also in this critical group must be placed *C. inclinis* C.B. Clarke. This name was coined by Boott as a variety of *C. setigera* but not published. Clarke (1894) took it up, but was at a loss as to know its relationships, placing it under ‘species of Sect. ‘*Indicae*’ not easily placed in any one of the preceding four subsections’. Kükenthal (1909) inexplicably placed it in sect. *Frigidae* subsect. *Decorae*, but it cannot belong there, having spikes inserted singly at the inflorescence nodes.

Carex inanis

The name *C. inanis* has been wrongly attributed to Kunth. Kunth (1837: 522) included this name at the end of his account of *Carex* under 'species obscura' and refers back to Nees (1834: 120). Nees provided a description of a plant but gave it no name, thus: 'C. - Royle. herb. n. 122 (ex parte)'. Kunth merely quoted Nees' description (and had evidently not seen the specimens) under the 'name' 'C. (inanis) Nees'. In this work no other epithet is included in parenthesis, and he did not intend to coin a binomial for the species, merely to indicate its nameless state. The name cannot therefore be attributed to Kunth. C.B. Clarke appears to be the first author to validate the name which should therefore be cited as follows:

Carex inanis C.B. Clarke in Hooker f., Fl. British India 7: 743 (1894).

Lectotype (selected here): Sikkim, Lachen, July 9 [18]49, *J. D. Hooker* s.n. (K).

Of Royle's specimens at Liverpool, part of no. 122 is *C. tenuis* Nees (= *C. hirtella* Drejer) and the remainder of 122 consists of two sheets mixed with Royle 131. According to Boott's annotation, Nees did not see Royle 131 and it cannot be said which part of the confused Royle 122 was actually seen by Nees. One specimen of Royle 122 at Liverpool certainly belongs to Clarke's concept of *C. inanis* and agrees with Nees' description in most respects. It differs, however, in that it has 3–4 spikes rather than a single one as described by Nees. Whether or not Nees only had a damaged and incomplete duplicate will never be known. In view of this confusion and the fact that the specimen lacks basal parts it is better to typify Clarke's name on material mentioned in the protologue and annotated in his hand. No specimens are cited but the distribution is given as 'Kashmir *C.B. Clarke*, to Sikkim *J.D.H.*' I select the sheet cited above since Clarke evidently regarded the Kashmir plants as being slightly atypical giving them an unpublished ms. name on the sheets. The E Himalayan plants are less variable than those occurring further west and have short, densely cylindric female spikes clustered near the apex of the culm. It should be noted that Clarke was incorrect in citing *C. setigera* var. *humilis* Nees as a synonym – the type of this variety is *C. schlagintweitiana* (see above).

Carex griersonii Noltie, *sp. nov.*

A *C. inanis* habitu concinniore spicis femineis magis compactis, glumis atrioribus et praecipue stolonibus gracilibus extendentibus (vice rhizomatium contractorum casepites densas formantium) differt. **Fig 1 G–K.**

Stolons slender (c.1mm diam.), covered in brown scales. *Bases of leaf sheaths* dark brown, becoming slightly fibrous. *Leaves* usually shorter than stems, 1.7–3mm wide, rather stiff, basal. *Culm* 2.5–19(–22)cm, trigonous. *Inflorescence* of 1 terminal male spike (occasionally with short basal branch) and 2–3 female spikes (upper occasionally with some terminal male flowers), upper spikes crowded, sometimes also with basal, long-peduncled female spike; male spike 0.5–1.1cm, sessile; female spikes 0.5–1.4 x 0.3–0.5cm, cylindric, erect on short peduncles (lowest 0.4–1cm), utricles spreading, dense; inflorescence bract equalling to slightly exceeding inflorescence, base shortly sheathing. *Utricles* 1.7–2.3 x 0.8–1mm, curved, trigonous, faces rhombic to oblanceolate, densely hispid, pale tawny-coloured, becoming flushed darker, beak short (0.2–

0.3mm), orifice entire. *Stigmas* 3. *Female glumes* 1.9–2.8 x 0.9–1.1mm, lanceolate, acute, shortly mucronate, midrib green, sides fuscous purple, margins hyaline. *Male glumes* 3–4 x 1mm, oblong-elliptic, acute, shortly mucronate.

Type. BHUTAN: Ha district, Ha, hill opposite bazaar, 2600m, 7 vi 1988, *J.R.I. Wood* 6380 (holo. E, iso. K).

Distribution: Kashmir to W Bhutan. Damp soil and silt by streams; grazed terraces, c.2290–3350m.

Other specimens seen:

KASHMIR: Near Gulmarg, 8–9000ft, 8 vi 1892, *Duthie* 11383 (BM).

UTTAR PRADESH: Palang Gadh, Byans, Kumaon, 11,000ft, 20 vii 1886, *Duthie* 6099 (K).

NEPAL: Jumla, 7500ft, 5 v 1952, *Polunin, Sykes & Williams* 910 (BM, E). Between Kalapani and Larjung, 8300ft, 3 vi 1971, *Barclay & Synge* 2453 (K). Tarakot, 2800m, 2 vii & 29 v 1973 *Einarsson, Skärby & Wetterhall* 1466 & 250 (BM).

This species also resembles some members of Kükenthal's section *Pachystylae* (such as *C. grioletii* Roemer), none of which, however, occur in the Himalaya. *C. griersonii* is named after the late A.J.C. Grierson, initiator and senior author of the *Flora of Bhutan*.

KEY TO HIMALAYAN MEMBERS OF SECT. *TRACHYCHLAENAE*

1. All spikes androgynous or terminal one(s) sometimes male-only _____ 2
+ Terminal spike(s) male, others entirely female _____ 3
2. Female glumes acute or minutely mucronate; utricles minutely hairy or sometimes glabrous _____ ***C. inclinis***
+ Female glumes long-aristate (awn over 1.2 mm); utricles densely hairy _ ***C. setigera***
3. Rhizomes short, plants forming dense clumps, basal sheaths never fibrillose, persisting as dense collars of dark, reddish-brown fibres _____ ***C. inanis***
+ Rhizomes spreading, stoloniferous, basal sheaths often fibrillose, not (or scarcely) persisting as fibres _____ 4
4. Utricle beak sharply bidentate _____ ***C. schlagintweitiana* subsp. *schlagintweitiana***
+ Utricle beak with ± entire orifice _____ 5
5. Female glumes reddish-brown, awned; stolons stout; basal sheaths fibrillose, reddish _____ ***C. schlagintweitiana* subsp. *deformis***
+ Female glumes fuscous-purple, shortly mucronate; stolons slender; basal sheaths not fibrillose, dark brown _____ ***C. griersonii***

SECTION DIGITATAE SUBSECTION RADICALES

Carex speciosa

C. speciosa Kunth is a widely distributed SE Asian species whose 'polymorphism ... is badly in need of special study' (Kern & Nootboom, 1979). It was originally described by Nees who gave it the illegitimate homonym *C. concolor*, Kunth merely provided a new name. Some Sikkim specimens exactly match the types from Nepal (*Wallich* 3391, isotypes E); however, two other forms occur in E Himalaya which are highly distinctive

and merit description at subspecific level; they differ from the type in an even greater degree than the S Indian var. *courtallensis* (Nees) Kük.

Carex speciosa Kunth subsp. **dilatata** Noltie, **subsp. nov.**

A subsp. *speciosa* (var. *courtallensis* inclusa) foliis ensiformibus latioribus (1–1.6cm latis), non minus quam 0.8cm, plerumque minus quam 0.5cm latis quam caulibus brevioribus (haud eos aequantibus vel superantibus), caulibus altioribus (39–)50–87cm, non 20–42cm), spicis (2–)5–7 (non 2–4), utriculis minoribus (3.8–4.5mm, non 4.2–6mm) glumas paulo tantum excedentibus, costis in quaque superfacie minus quam 10, inaequalites incrassatis (non plus quam 15 in quaque superfacie arcte dispositis aequaliter incrassatisque), glumis femineis longioribus (3–)3.2–4.4mm longis (non 2.2–3.2mm) magis acuminatis distingitur.

Type: NE INDIA (Nagaland): Kohima, 6500ft, 21 x 1885, *C.B. Clarke* 41058 (holo. K, iso. BM)

Distribution: Nepal, Sikkim, NE India, Yunnan. Dense evergreen, broad-leaved forest, c.1220–2200m (in China reputedly to 2850m).

Both Clarke and Nelmes noticed the distinctiveness of this spectacular taxon in manuscript notes on herbarium sheets, Clarke providing the varietal name '*dilatata*' but not publishing it. In its leaf width it resembles *C. speciosa* subsp. *latifolia* T. Koyama, described from Thailand, but that subspecies differs in having larger (5.5–6.2mm) utricles and winged culms.

Other specimens seen:

E NEPAL: Khabili, 4–6000ft, 10 xii [1848], *J.D. Hooker*, s.n. (K); Iwa Valley, *Hooker* s.n. (ex herb. Boott, K).

DARJEELING DISTRICT: Rumman [=Ramman], 6000ft, xi 1881, *Gamble* 10043 (K).

BHUTAN: Lomitsawa, 2200m, 13 viii 1989, *J.R.I. Wood* 2080 (E).

NE INDIA: (Nagaland) Khomi, 6000ft, 19 vii 1942, *Bor* 16031 (K). Takiya, Naga Hills, 6000ft, 6 xi 1935, *Bor* 6790 (K). (Arunachal Pradesh): Bomde La, 7000ft, 15 vii 1938, *Kingdon Ward* 13936 (E).

SW CHINA (Yunnan): Mianning, Poshang, 2850m, 11 x 1938, *T.T. Yü* 18018 (E). Kengma, Chuichayko, 2500m, 10 viii 1938, *T.T. Yü* 17307 (E).

Carex speciosa Kunth subsp. **pinetorum** Noltie, **subsp. nov.**

A subsp. *speciosa* habitu graciliore, utriculis minoribus 2.2–4mm longis superfaciebus omnibus utriculi breviter pilosis (vice superfacie adaxialis tantum pilosi), et costis paucioribus proobscuris recedit.

Type. Bhutan: Thimphu district, ridge W of the Thimphu Valley, 2500m, 1 vii 1987, *J.R.I. Wood* 5548 (holo. E).

Apparently restricted to W Bhutan, where it occurs in dry, relatively open habitats in the *Pinus wallichiana* zone. In its altitudinal range, habit and especially in its utricles it is somewhat intermediate between *C. speciosa* and *C. radicalis*.

Other specimens seen:

BHUTAN: hill above Thimphu Hospital, 2670m, 19 vii 1991, *Noltie* 7 (E). Above Lobnakha, 2830m, 22 vii 1991, *Noltie* 19 & 20 (E). Near Motithang Hotel, Thimphu, 2630m, 7 viii 1991, *Noltie* 120 (E).

It should be noted that leaf width on its own is not a good character: var. *angustifolia* Boott described from Khasia and S India has narrow leaves but the inflorescence and utricles are typical of subsp. *speciosa* of which it appears merely to be a starved form.

SUBSECTION EU-DIGITATAE

Carex laeta Boott subsp. **gelongii** Noltie, **subsp. nov.**

A *C. laeta* subsp. *laeta* habitu graciliore et partibus omnibus minoribus, utriculis glaberrimis minoribus 1.7–2.5mm (non 2.8–3.4mm) ambitu ellipticis (non oblanceolatis) distincte rostratis, rostro 0.3–0.7mm longo differt.

Type: Bhutan, Thimphu district, below Darkey Pang Tso, 3920m, 3 viii 1991, *Noltie* 98 (holo. E, iso. K).

Other specimens seen:

BHUTAN: Upper Bumthang Chu district, above Lambrang, 4050m, 11 viii 1991, *Noltie* 145

(E).

TIBET (Chumbi): Yatung, in bed of the Amo Chu, 10,500ft, 5 vi 1945, *Bor & Ram* 20043

(K)

Apparently endemic to Bhutan and Chumbi, where it occurs at high altitudes in flushes associated with species such as *Blysmus compressus*, *Carex atrofusca*, *C. microglochis*, *C. parva*, *Kobresia duthiei*, *Juncus triglumis*, *J. sikkimensis*, *J. allioides* and *J. thomsonii*.

Named after the Dzongkha word for a monk (*gelong*) in honour of the Bhutanese monastic body and in particular of the anonymous *gelong* who acted as guide on a trek to the type locality and who found the rare endemic *Allium rhabdotum* for me – even although his interest in the plant was more gastronomic than botanical.

Although this taxon is completely distinct from the type of *C. laeta* (of which typical specimens have been seen from Bhutan), specimens from E Nepal are intermediate, having the utricule size and hairiness of subsp. *laeta* but the shape of subsp. *gelongii*. It therefore seems wiser to recognize the plant at subspecific rank. Ecological factors could be significant, with subsp. *gelongii* occurring where there is moving ground-water and subsp. *laeta* in drier habitats.

Taxa in this group seem to be very variable in utricule characters, with variation seen in the degree of beak development even within a single specimen. Further field studies are needed, for example to ascertain the status of *C. laeta* var. *major* Boott. It should be noted that *C. laeta* (described from Sikkim) is endemic to the E Himalaya. Of the specimens determined as *C. laeta* by Koyama (1978) from W and C Nepal, some are *C. cardiolepis* Nees, whereas others probably belong to *C. pisanensis* Koyama, which he later wrongly treated as a synonym of *C. laeta*. It should also be noted that *C. setosa* Boott, placed by Kükenthal under sect. *Frigidae* subsect. *Ferrugineae* is closely related.

SECTION FRIGIDAE SUBSECTION FERRUGINEAE/FULIGINOSAE

Carex montis-everestii Kük.

A little known species, until recently known only from the immature type collected on Mount Everest. A.O. Chater correctly determined a group of more mature specimens

from S Tibet as belonging to this taxon and an augmented description can now be provided based on less stunted, more mature specimens; its geographical range is also extended.

Augmented description (measurements from original description in brackets):

Rhizomatous; culms surrounded at base by dense tufts of many-leaved vegetative shoots. *Bases of leaf sheaths* reddish-brown, persistent, not becoming fibrous. *Leaves* about half length of culm, very slender, (1–)1.4mm wide, erect, basal. *Culms* (1.5–)12–14cm, subterete. *Inflorescence* of 2–3 spikes; terminal male or gynaeandrous, narrowly ellipsoid, borne on suberect peduncle (0.5–)2cm; lower spikes female, broadly cylindric, (0.7–)1.2–1.3 x 0.8–1cm, borne on pendent, filiform peduncles c.1.5cm; lowest bract with filiform blade shorter than inflorescence, sheath obliquely open with dark, hyaline margins. *Utricles* (2–)4.5 x 1mm, completely glabrous, elliptic, compressed when dry, beakless, shining, chartaceous, pale below, reddish chestnut above, orifice minutely notched. *Stigmas* 3. *Female glumes* to 5.5 x 2mm, oblanceolate, acute, dark reddish-brown, shining. *Male glumes* to 6 x 1.2mm.

Specimens seen (all):

C NEPAL: Sangda La, 17,300ft, 12 viii 1977, *Miehe Feldbuch* 5 468 (BM). c.4 miles SW of Saldangaon, 18,500ft, 26 vi 1952, *Polunin, Sykes & Williams* 22 (E) – mixed gathering with *C. supina*.

SIKKIM: Llonok [= Llonakh], 15,000ft, 5 viii 1909, *Smith & Cave* 2155 (E).

TIBET: Shisha Pangma, N slope, 5000–5530m, 9 & 13 ix 1984, *Miehe* 1495, 1527, 1607, 1760 (BM). Shisha Pangma Base Camp, 5020m, 8 vi 1984, *Miehe* 1486, 1653 (BM). Up from Nielma, 4400–5300m, 2 & 4 ix 1984, *Miehe* 1382, 1450 (BM). Mt. Everest, N slope Rongluk Lateral, 5200–5440m, 18 ix 1984, *Miehe* 1788, 1810 (BM). Central Tibet, chiefly from Gooring Valley, 30°12'N, 90°25'E, c.16,500ft, vii & viii 1895, *Littledale* s.n. (K). Camp I [Mt Everest], 18,200ft, 2 vii 1933, *Wager* 66 (holo. K).

Other specimens of this taxon from N Sikkim were seen in CAL but have unfortunately not been released on loan.

C. montis-everestii is superficially rather similar to *C. atrofusca* Schkuhr from which it differs in bearing many-leaved vegetative shoots at the base of the culm (rather than few-leaved vegetative shoots borne on stolons, distant from the culm) and its extremely narrow leaves; female spikes squatter, with more widely spreading utricles, female glumes shining, acute (rather than acuminate); utricle beakless.

This group is in great need of revision in the Sino-Himalayan region, requiring further collections and field-study. Relationships between the very variable *C. atrofusca* and species such as *C. nivalis* need to be resolved, as pointed out long ago by Boott (1858: 13). *C. atrofusca* var. *angustifructus* Kük. was described partly from Sikkim material. Nelmes (1940) raised this to specific rank, but recent field observations in Sikkim (*ESIK* 570) showed it to be merely a form of *C. atrofusca* and certainly not worthy of more than varietal recognition. In its elongate spikes, however, this variety resembles the W Himalayan *C. nivalis* Boott. Both *C. nivalis* and *C. cruenta* Nees are recorded for Sikkim by Kükenthal (1909) but all specimens seen so determined refer to forms of *C. atrofusca*. Other (probably undescribed) taxa, however, appear to occur in Bhutan.

SECTION HYMENOCHLAENAE SUBSECTION DEBILES

Carex finitima and C. fusiformis

C. fusiformis Nees (1834) was described from material collected at Mussoorie (NW Himalaya) (Royle 88, lecto LIV, isolecto K; both selected here). Up until now the name has been more or less restricted to this gathering and to a handful of other specimens from Kumaon and Sikkim. Examination of the type shows it to be a slightly atypical form (chiefly in its large utricles) of the widely distributed plant commonly identified as *C. finitima* Boott, which occurs from NW Himalaya to SW China. This latter taxon is also reported from Taiwan, Sumatra and New Guinea (Kern & Nooteboom, 1979) - I have seen no specimens from these areas, but it is almost certain that they too should be referred to *C. fusiformis*.

To understand how this confusion arose it is necessary to investigate the taxonomic history of *C. finitima*, described by Boott (1858) from Sikkim and distinguished from *C. fusiformis* by its greater number of narrower, denser-flowered spikes; glumes muticous as opposed to aristate; utricles smaller and glabrous; leaves subrigid. However, Boott's plate (1858, t. 112) and the sheet from which this was drawn (and which can therefore be taken as the type sheet) are found to include material of two rather different taxa – the left hand specimen can be referred to *C. fusiformis*, but the right hand one is distinct. Boott's description refers at least in the important vegetative characters (leaf width, colouring at base of stem, length of lowest bract sheath) to the latter. It is to this element which the name *C. finitima* must be applied, the right hand specimen being chosen here as the lectotype.

The two plants on the type sheet (and duplicates at K ex herb. Hooker – see Introduction) seem to have been collected at different localities, though the locality on the type sheet is merely given as 'Sikkim Himalaya. J.D. Hooker. 12000 ft'. However, on a duplicate sheet (also from Boott's herbarium and bearing both taxa) two localities are given, viz '1. Lachen. Ind. Orient. Woods. June 11 1849. Dr Hooker' [narrow-leaved] and '2. Tonglo Top. Dr Hooker' [broad leaved]. Unfortunately the sheet from Hooker's own herbarium bears only one field label (Lachen), but two taxa – the Tonglo field label has evidently been lost at some stage.

Although the type of *C. finitima* differs greatly from *C. fusiformis* examination of a wider range of material suggests that the former is better treated as a subspecies of the latter. It appears to be rare and is perhaps an ecological form; specimens exactly matching the type have been seen from E Nepal and somewhat intermediate ones from Kulu and Manali (NW Himalaya).

Carex fusiformis Nees subsp. **finitima** (Boott) Noltie, **stat. et comb. nov.**

C. finitima Boott, Ill. Gen. Carex 1: 44–5; t. 112 (1858). Lectotype (selected here): right hand specimen on sheet ex herb. Boott marked 'specimens figured by Miss Rees': Sikkim Himalaya (probably Tonglo Top [Darjeeling District]: see above), 12,000ft, J. D. Hooker s.n. (K).

The differences between subsp. *fusiformis* and subsp. *finitima* are as follows:

1. Leaves and bracts long and narrow (occasionally broad), gradually tapering to apex; longest leaves 24–42cm x (1.8–)2.5–7(–12.7)mm, rather weak, often with patches of puckering; lowest bract sheath 2–3(–4.5)cm; extreme bases of leaf sheaths chestnut to reddish-brown; male glumes tapering to acute apex; beak of utricule over 2mm _____ subsp. **fusiformis**
- + Leaves and bracts short and broad, rather abruptly contracted below apex; longest leaves 11–22cm x [4–]5.5–7.2mm, rather stiff, never with puckering; lowest bract sheath 3–7.5cm; extreme bases of leaf sheaths intense reddish-purple; male glumes with broad, obtuse apices; beak of utricule under 2mm _____ subsp. **finitima**

C. fusiformis subsp. *fusiformis* – representative specimens

INDIA: NW Himalaya, *Watt* 5365 (E). Mussoorie, *Royle* 88 (lecto. LIV, isolecto. K).
 NEPAL: Foot of Deorali Danda, Simbua Khola, 2920m, 22 ix 1989, *KEKE* 879 (E, K).
 SIKKIM/DARJEELING: Lachen, 11,000ft, 11 vi 1849, *Hooker* s.n., (BM, K); Sundukphoo, 10,000ft, 6 vi 1884, *Clarke* 35059 (K).
 BHUTAN: Drugye Dzong, 10,000ft, 12 v 1949, *Ludlow, Sherriff & Hicks* 16210 (BM).
 CHINA (Sichuan): Tien-chuan-hsien, 2400m, 27 v 1936, *Chu* 2655 (E).
 CHINA (Yunnan): Dali Xian, Diancang Shan Range, 2900–3300m, 18 vii 1984, *Sino-American Bot. Exped.* 1098 (E).

C. fusiformis subsp. *finitima* – specimens seen (all)

INDIA (Himachal Pradesh): Marsh above Manali, 16 vi 1888, *Drummond* 24158, (E, K); Kulu, 1888, *Drummond* 24157 (E, K).
 E NEPAL: Sankhuwa Sabha District, Kosi Zone, Gai Kharka, Kasua Khola (16 km N of Num), 3172m, 16 vi 1974, *Emery* 75 (K).
 SIKKIM: [probably Tonglo Top], *Hooker* s.n. (K, BM).

Carex fastigiata

A comment is required on the Hooker specimens from Lachen referred to by Boott (1858) as '*C. fusiformis* var. β ' but only given the ms. name '*var. polystachya*' on one of the sheets. These unfortunately are immature but are exceptional plants with wide (0.8–1.3cm) leaves, long spikes and female glumes c.5mm. They are uncommonly like a Nepal specimen (*Stainton, Sykes & Williams* 6062, BM, E) identified by Koyama (1978) as *C. fastigiata* Franchet, a species described from China. The Nepal plant agrees with *C. fastigiata* vegetatively and in having gynaeandrous terminal spikes whereas the Sikkim plants have male terminal spikes. However, this character is likely to be variable and too much weight should probably not be placed on the distribution of sex in a single specimen. Clarke comments 'terminal [spike] not rarely female in the middle' for *C. finitima*. If these collections represent the same taxon (merely varying in sex of terminal spike), they both differ from *C. fastigiata* in length of spikes and size of glumes and might well represent an undescribed taxon, but further collections are needed.

It should be noted that *C. fastigiata* exactly matching Yunnan specimens is reported (*Noltie* 138, E) for Bumthang in central Bhutan – a new record for the country. Interestingly it occurred in a valley in which another Chinese species (*Iris bulleyana*) occurred; floristic links with SW China are much more likely in central Bhutan than in central Nepal.

SECTION TUMIDAE

Carex alopecuroides

Much confusion has surrounded the nomenclature and identity of the species *C. chlorostachys* and *C. alopecuroides* traditionally ascribed to D. Don (1825), but in fact (see Mabblerley, 1980) the names were published earlier (1823) by Tilloch and Taylor. The former was, in any case an illegitimate homonym, for which Sprengel (1826) published the new name *C. doniana*, as well as publishing an unnecessary new name (*C. emodorum*) for the latter.

Tilloch and Taylor's and Don's descriptions of the two species are inadequate, being based on immature specimens, and there has always been confusion over the correct application of the names. A further confusion was initiated by Boott (1860: 88 and t. 257) when he included *C. chlorostachys* in *C. japonica* Thunb., illustrating a Sikkim specimen under the latter name (source of plant not mentioned in text, but noted on the specimen at K). Boott retained *C. alopecuroides* as a (closely related) species. Boeckeler (1877: 283) took things a stage further giving *C. chlorostachys*, *C. doniana* and *C. alopecuroides* as synonyms of *C. japonica*, commenting that *C. alopecuroides* was a 'forma', though not recognizing it formally. Clarke (1894) followed Boott in referring Indian material to *C. japonica* (but evidently with reservations as he wrote 'Indian *C. japonica* is *C. chlorostachys* Don!') of which he made *alopecuroides* a variety. Later (1903: 271) Clarke resolved the situation by abandoning the name *C. japonica* for Chinese and Indian plants and making the new var. *chlorostachya* (sic) of *C. alopecuroides* - adding 'I have taken Boott's *Carex* t. 257 as the 'type' of this variety, i.e. it is the most strongly marked form, and it was drawn from Boott's specimen of "*C. doniana*, Spreng.'" - this figured specimen (labelled by Clarke as '*Carex alopecuroides* D. Don var. *chlorostachya* C.B. Cl.') may thus be taken as the lectotype of the variety. Unfortunately, Kükenthal (1909) reverted to the older treatment and retained both *chlorostachys* and *alopecuroides* as distinct varieties of *C. japonica*. Koyama (1966) added to the confusion by raising var. *chlorostachys* to subspecific rank under *C. japonica*. Kern & Nooteboom (1979) correctly re-instated Clarke's 1903 treatment, stating the diagnostic characters of *C. japonica*, though they assigned at least the majority of the Malesian material to the wrong variety (see below).

Fortunately it is possible to resolve this confusion since specimens have been found at K which can serve as lectotypes for both of Don's names. Both were incorporated into Boott's herbarium from Don's own herbarium and are labelled '*C. alopecuroides*. Nipal' and '*C. chlorostachys*. Nipal'. Both are immature, but are obviously very similar to one another, differing chiefly in leaf-width (c.4.5mm versus 5.5-7mm). There is also a specimen at E from Don's herbarium ex herb. Menzies labelled 'Nepal Dr Wallich. Mr D. Don' and named in pencil (unknown writing) '*C. alopecuroides* Don *C. Emodorum* Sp.' This has leaves 5mm wide and can be considered an isolectotype. As Clarke (1903) wrote, 'most of D. Don's own *C. chlorostachya* (sic) appears to be nearer *C. alopecuroides*, D. Don, between which and my variety b *chlorostachya* I see no good line.'

Material matching this description of var. *chlorostachya* has been seen from throughout the range of the species, but appears to be rarer than intermediates – suggesting that it is probably just an extreme growth form or ecotype. Field-work is obviously necessary to establish this, so it seems safer to retain them as varieties for the time being. It should be noted that most of the Malesian (Sumatra, New Guinea, Philippines) specimens seen belong to var. *alopecuroides* and not to var. *chlorostachya* as stated by Kern & Nootboom (1979).

For full synonymy see Clarke (1903); the following is only to names referred to above.

C. alopecuroides [var. **alopecuroides**] D. Don ex Tilloch & Taylor in Phil. Mag. 62: 455 (1823) and Trans. Linn Soc. 14: 332 (1825). Lectotype (selected here): 'Nipal' ex herb Don & Boott (K); Isolectotype 'Nepal Dr Wallich. Mr D. Don' ex herb. Don and Menzies (E).

C. emodorum Sprengel, Syst. Veg. 3: 818 (1826) *nom. superfl.*

C. japonica Thunb. var. *alopecuroides* (D. Don) C.B. Clarke in Hooker f., Fl. Brit. India 6: 737 (1894).

var. **chlorostachya** C.B. Clarke in J. Linn. Soc. Bot. 36: 271 (1903). Lectotype (selected here): Rungeet, East Indies, iv 1850, *J.D. Hooker* s.n. ex herb. Boott, figured as t. 257 in Boott (1860) (K).

C. chlorostachys D. Don ex Tilloch & Taylor in Phil. Mag. 62: 455 (1823) and D. Don in Trans. Linn. Soc. 14: 330 (1825) non Steven in Mem. Soc. Imp. Nat. Moscou 4: 68 (1813). Lectotype (selected here): 'Nipal' ex herb Don & Boott (K).

C. doniana Sprengel, Syst. Veg. 3: 825 (1826).

C. japonica Thunberg var. *chlorostachys* Kük. in Engler, Das Pflanzenreich 38 (IV.20): 620 (1909).

C. japonica Thunb. subsp. *chlorostachys* (Kük.) T. Koyama in Hara, Fl. East Himalaya 382 (1966).

KEY TO VARIETIES:

1. Leaves 2.6–5.5(–7)mm wide; spikes 5–6mm wide at maturity; utricles 2.5–3.5 mm long, spreading to recurved, narrowly ovoid, slightly inflated, shortly tapered into short (under 1mm) beak; apex of beak weak, hyaline, shallow teeth often recurved _____ var. **alopecuroides**
- + Leaves (5.5–)6–11mm wide; spikes fatter, 7–8mm wide at maturity; utricles 4–4.5 mm long, sub-erect to spreading, narrowly lanceolate, not inflated, gradually tapered into long (c.1.5mm) beak; apex of beak stout, erect, bidentate _____ var. **chlorostachya**

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APPENDIX

Large genera are interesting to analyse phytogeographically since they represent an epitome of the floristic elements of the flora as a whole. Since external distributions are not given in the *Flora of Bhutan* it has been thought worthwhile to provide a list of species arranged according to their distribution type, which will also serve as an enumeration of the Bhutanese taxa:

1. Widespread N Hemisphere (Eurasia):
C. diandra Schrank, *C. echinata* Murray, *C. viridula* Michaux.
- 1a. Widespread (Eurasia) arctic-alpines:
C. atrata L., *C. atrofusca* Schkuhr, *C. microglochin* Wahlenb.
2. Central Asian:
C. orbicularis Boott.
3. Tibetan:
C. moorcroftii Falconer ex Boott, *C. montis-everestii* Kük., *C. praeclara* Nelmes.
4. Sino-Himalaya (occurring from NW Himalaya to SW China):
C. gracilentata Boott ex Boeck., *C. lehmannii* Drejer, *C. parva* Nees, *C. remota* L. subsp. *rochebrunii* (Franch. & Sav.) Kük., *C. setosa* Boott, *C. thomsonii* Boott.
- 4a. E Sino-Himalayan (occurring from E Nepal to SW China):
C. fastigiata Franch., *C. remota* subsp. *rochebrunii* (Franch. & Sav.) Kük., *C. speciosa* Kunth subsp. *dilatata* Noltie.
5. Himalayan (occurring from NW Himalaya to Bhutan):
C. condensata Nees, *C. desponsa* Boott, *C. duthiei* C.B. Clarke, *C. foliosa* D. Don ex Tilloch & Taylor, *C. fusiformis* Nees subsp. *finitima* (Boott) Noltie, *C. griersonii* Noltie, *C. haematostoma* Nees, *C. inanis* C.B. Clarke, *C. notha* Kunth, *C. obscura* Nees, *C. pseudofoetida* Kük., *C. psycrophila* Nees, *C. remota* L. subsp. *stewartii* Kukkonen, *C. setigera* D. Don.
- 5a. E Himalaya endemic (E Nepal, Bhutan, ± Khasia):
C. atrata L. var. *glacialis* Boott, *C. burtii* Noltie, *C. composita* Boott, *C. continua* C.B. Clarke, *C. crassipes* Boeck., *C. daltonii* Boott, *C. decora* Boott, *C. fragilis* Boott, *C. fucata* Boott ex C.B. Clarke, *C. anomoea* Hand.-Mazz., *C. inclinis* C.B. Clarke, *C. insignis* Boott, *C. laeta* Boott, *C. laeta* Boott subsp. *gelongii* Noltie, *C. munda* Boott, *C. nigra* (L.) Reichard subsp. *drukyulensis* Noltie, *C. obscuriceps* Kük., *C. polycephala* Boott, *C. pulchra* Boott, *C. radicalis* Boott, *C. rubro-brunnea* C.B. Clarke, *C. schlagintweitiana* Boeck. subsp. *deformis* Noltie, *C. speciosa* subsp. *pinetorum* Noltie, *C. vesiculosa* Boott.
6. SE Asian (Peninsular India, Malesia, China, ± Japan):
C. alopecuroides D. Don ex Tilloch & Taylor, *C. baccans* Nees, *C. breviculmis* R. Br. subsp. *royleana* (Nees) Kük., *C. cruciata* Wahlenb., *C. filicina* Nees,

C. fusiformis Nees, *C. hebecarpa* C.A. Meyer, *C. indica* L., *C. jackiana* Boott, *C. lenta* D. Don, *C. longicruris* Nees, *C. longipes* D. Don ex Tilloch & Taylor, *C. myosurus* Nees, *C. nubigena* D. Don ex Tilloch & Taylor, *C. oedorrhampha* Nelmes, *C. oligostachya* Nees, *C. olivacea* Boott, *C. phacota* Sprengel, *C. pruinosa* Boott, *C. rara* Boott, *C. speciosa* Kunth, *C. stramentita* Boott ex Boeck., *C. teres* Boott.