CYPERACEAE OF EAST AFRICA - I

By

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Introduction

The sedges are regarded by many people as being 'worse than the grasses' to recognise and identify. Since, owing to their economic value, the latter group has been covered by various official publications for Kenya, Uganda and, shortly, for Tanganyika, it seems appropriate that the other major family in the Glumiflorae should now receive attention.

It is hoped that this and the series of papers which follow it will stimulate the collection of these interesting and too rarely gathered plants, as in many cases little or nothing is known of their habitat, distribution and variation. The species recorded here, and the names given to them, are merely the result of routine work carried out in the East African Herbarium and do not necessarily make a complete list of all material collected.

Owing to the diversity of vegetative form and inflorescence found throughout the larger genera, botanists find it extremely difficult to separate them and have relied on minute characters of flower structure and seed, examination of which requires the aid of a microscope; an attempt has been made here to separate both the genera and species occurring in a limited area on the more readily observed characters of root, leaf and inflorescence. All characters used in the keys will be found to be visible on careful examination with a x 10 hand lens, though occasionally a needle or pin may be necessary to separate the spikelets or remove a nutlet. Explanations of the botanical terms employed can be found in the Glossary of the Flora of East Tropical Africa.

The Cyperaceae is predominantly a family of moist habitats, damp meadows, river banks, swamps, etc., and has a world-wide distribution. Although relatively poor in number of genera the family includes two very large ones, *Cyperus* and *Carex*; the former is mainly tropical in its distribution and occurs throughout East Africa, while the latter occurs chiefly in the temperate areas of the northern hemisphere and its few tropical representatives are restricted to the cooler montane regions, in East Africa rarely at altitudes lower than 7,000 ft. Twenty-five genera occur in East Africa and with the exception of *Cyperus* they are all fairly small, with from 1 to 30 recorded species.

Characters of Taxonomic Importance.

Vegetative. It cannot be too strongly emphasised that to simplify the naming of sedges, especially the many species of *Cyperus*, the underground parts need to be dug out and examined. To find out whether the plant is annual, has stolons, or has a creeping rhizome
with long or very short internodes and tubers is usually easier than dissecting the spikelets under a microscope. Whether the sheathing bases of the lower leaves are swollen into a pseudo-bulb or not can be an equally important feature.

It is rarely wise to place too much reliance on the recorded size of the plant except where this is noted in relation to habitat, as most sedges are very sensitive to available ground water and show considerable variation in size accordingly.

Inflorescence. Solitary spikes, dense heads, simple and compound panicles are all to be found in the family, and frequently in the same genus, so they rarely make useful characters for generic distinctions; but for separating related species, the form of the inflorescence and the shape of the bracts at its base, their number and length relative to the inflorescence are characters of value. The colour of the spikelets is also helpful, but since this often varies from green when young to golden brown on maturity, care must be taken to ensure that mature specimens are examined.

The spikelets, being the ultimate divisions of the inflorescence, need a more detailed examination. The number of glumes, whether all are nutlet-bearing, whether fertile ovary and stamens are in the same flower (best ascertained by the presence of nutlet and persistent filaments) are among the characters used in the keys, as well as glume length, nutlet size and shape, etc. The finer points have been avoided as far as possible in order to keep the keys simple.

Flower and Spikelet Structure. Spike and spikelet are much more varied in the sedges than in the grasses and care must be taken in the use of these terms as, for example, a short female spike of a Carex may look very like an unmodified spikelet of a less specialized sedge. The basic spikelet pattern is that of a raceme (as in Cyperus, Scirpus etc.) or a cyme (as in Rhynchospora, Scleria etc.) of 1 to many bisexual florets, each with a subtending bract (Fig. 1), these spikelets then being variously arranged in spikes, umbels, capitulae, etc. (Figs. 7 - 12). Floral reduction of some sort occurs in all species; the corolla is reduced to small hypogynous bristles or scales or, more frequently, is completely absent (Figs. 2 - 5); the stamens are variously 2 or 3, mostly the latter, and may be present in the fertile flowers or only in unisexual ones. It is quite usual in spikelets with several florets for some of them to be bisexual and some staminate, either above or below the bisexual. Completely barren flowers are often present at the base or apex of such a spikelet (Fig. 1). The ovary contains a single ovule and has a single style with 2 or 3 branches; in the former instance the mature nutlet is lens-shaped, in the latter it is triangular in section. In some genera the number of style branches seems to be linked with the other generic characters, but in others both forms occur.

Reductions also occur in the number of flowers in a spikelet and in some genera authors have attached primary importance to the number of nutlets matured per spikelet. Where the number of flowers is reduced, there is often a correlation with separation into unisexual spikelets (subfamilies Sclerieae and Cariceae etc.). In the Cariceae a further peculiar modification of the spikelet
occurs. The bract or glume of the fertile flower is expanded and
the margins fused to form the 'utricle' which completely surrounds
both the flower and its rachilla, so the so-called glume is really
the bract subtending the spikelet. In Schoenoxiphium where the
spikelet consists of a single basal fertile flower and several
staminate ones above it the rachilla and staminate flowers protrude
from the mouth of the utricle (Fig. 6) and the nature of the "glume"
is more obvious. In Carex the reduction is more extreme and the
fertile spikelet is represented only by the bract and the utricle
containing the nutlet (Fig. 3). Utricles enclosing the nutlets are
also found in Coleochloa, but in this genus the spikelets are
hermaphrodite and the utricle develops within the perianth of the
female floret which is represented by conspicuous long hairs (Fig. 2).

The Tribes of the Cyperaceae according to their Natural Affinities

Flowers unisexual
Utricle present ........................................ Cariceae
Utricle absent ........................................ Sclerieae

Flowers hermaphrodite
Hypogynous scales well developed, folded, often
enclosing the flower ................................... Hypolytreae
Hypogynous scales absent, filiform, or broader
and flat
Glumes spirally arranged, spikelets not compressed
Spikelets with several empty glumes at the
base and only 1 - 2 flowers ..................... Rhynchosporae
Spikelets with 2 - 0 empty glumes and
more numerous flowers ............................. Scirpeae
Glumes distichous, spikelets often compressed .... Cypereae

Cariceae - Carex, Schoenoxiphium
Sclerieae - Scleria, Diplachrum, Acriulus, Coleochloa
Hypolytreae - Hypolytrum, Ascolepis
Rhynchosporae - Cladium, Carpha, Rhynchospora, Remirea
Scirpeae - Ficinia, Bulbostylis, Pimbristylis, Scirpus,
Eleocharis, Fuirena, Lipocarpha
Cypereae - Kyllinga, Pycrus, Mariscus, Courtoisia,
Junceellus, Cyperus.

Key to Genera

1. Utricles present, completely enclosing the nutlets .......... 2
   Utricles absent ........................................ 4

2. Utricles surrounded by long hairs ..................... Coleochloa
   Utricles not surrounded by long hairs .................. 3

3. Stiffly erect perennials of montane forest
   or alpine grassland; utricles containing
   a solitary female flower ............................ Carex
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Slender forest perennials with scanty inflorescences; some or all of the utricles with the staminate portion of the spikelet or its rhachilla protruding, rarely all reduced to the female floret only. ... Schoenoxiphium

4. Large leafy perennials 3 - 8 ft. high ......................... 5
   Small plants 3 ins. - 3 ft. high, or if larger, then with leafless stems though a few basal leaves may sometimes be present ................ 11

5. Glumes grey-green with a conspicuous reflexed terminal bristle (rarely straight) .................. Fuirena
   Glumes brown or green, sometimes purplish .................. 6

6. Nutlets globose, large and whitish, partially exposed .................. Scleria
   Nutlets small, 2- or 3-angled .................. 7

7. Leaf margins coarsely serrate or toothed .................. 8
   Leaf margins entire .................. 10

8. Peduncles short, up to 3 ins. long .................. 9
   Peduncles slender 3 - 8 ins. long .................. Acriulus

9. Nutlets 3-angled .................. Cladium
   Nutlets 2-angled .................. Hypolytrum

10. Spikelets compressed; glumes distichous (2-ranked); style branches 3 ............. Cyperus
    Spikelets plump; glumes spirally arranged; style branches 2 .................. Rhynchospora

11. Inflorescence a solitary spikelet; subtending bracts small and scale-like .................. 12
    Inflorescence variously compound with at least 2 spikelets .................. 16

12. Succulent-stemmed leafless plants .................. Eleocharis
    Slender leafy plants .................. 13

13. Spikelets small, up to 4 mm. long .................. 14
    Spikelets over 8 mm. long .................. 15

14. Subtending bracts 1 or more, as long as or longer than the spikelets .................. Scirpus
    Subtending bracts, if present, about as long as the glumes .................. Eleocharis

15. Spikelets whitish or cream .................. Fimbristylis
    Spikelets brown .................. Bulbostylis

16. Glumes distichous; spikelets compressed (Cyperus s.l) ............. 36
    Glumes spirally arranged; spikelets not compressed .................. 17

17. Inflorescence white or yellow, daisy-like, the hypogynous scales large with petal-like extensions .................. Ascolepis
Inflorescence various but never with daisy-like "petals", hypogynous scales small or absent .................................................. 18

18. Spikelets whitish; inflorescence capitate or subumbellate (see Remirea) .................. 19
Spikelets variously coloured but never white .......................... 20

19. Leaves basal only ................................................. Lipocarpha
Numerous stem leaves also present ......................... Rhynchospora

20. Spikelets dense, plump, with grey-green glumes (rarely brown) having a conspicuous and usually reflexed terminal bristle .......... Fuirena
Spikelets dense or lax, but the glumes not as above (except Fimbriastylis squarrosus which has whitish glumes with green bristles) ............... 21

21. Inflorescence paniculate with usually leafy bracts, or contracted into an unbranched, interrupted spike .......................... 22
Inflorescence capitate or umbellate, bracts rarely leafy ...................... 26

22. Nutlets globose, white or bluish, partly exposed in the spikelet .......................... 23
Nutlets not visible, 2- or 3-angled ........................................ 24

23. Annuals or perennials over 9 ins. high ......................... Scleria
Small annuals 2 - 7 ins. high ................................ Diplachrum

24. Style branches 2; nutlet 2-angled ......................... Rhynchospora
Style branches 3; nutlet 3-angled or rounded .......................... 25

25. Peduncles short, up to 1½ ins. long ......................... Carpha
Peduncles 3 - 8 ins. long ........................................ Acridius

26. Rhizomatous perennial of the seashore; very rare .......................... Remirea
Not as above ......................................................................... 27

27. Inflorescence capitate ............................................. 28
Inflorescence umbellate .................................................. 33

28. Flowering head appearing lateral, the subtending bract looking like a continuation of the stem ................................ Scirpus
Flowering head terminal .................................................. 29

29. Heads composed of 1 - 3 spikes .................................. 30
Heads of numerous spikes ................................................. 31

30. Head over ¾ in. wide ........................................... Rhynchospora
Head up to ½ in. wide ............................................... Kyllinga

31. Perennials with stout woody rhizomes ........................ Ficinia
Annuals or perennials, slender rhizomes sometimes present ............... 32
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32. Heads usually very dark, brown or purplish .... Bulbostylis
   Heads pale green .................................. Scirpus

33. Leaves filiform or narrow; heads with small
    scaly bracts ...................................... 34
   Leaves wider, flat; heads with foliose
    subtending bracts ................................ 35

34. Spikelets very small, not over 1.5 mm. wide...... Bulbostylis
   Spikelets larger, at least 2 mm. wide .......... Fimbristylis

35. Heads globose ...................................... Scirpus
   Heads spike-like .................................. Mariscus

36. Style branches 2; nutlet 2-angled .................. 37
   Style branches 3; nutlet 3-angled ................. 38

37. Inflorescence appearing lateral, the subtending
   bract looking like a continuation of the stem... Juncellus
   Inflorescence obviously terminal, with
   several unequal bracts ............................ Pycreus

38. Glumes with a conspicuous wing on the keel ...... Courtoisia
   Glumes rounded on the back, or keeled but
   not winged ........................................ 39

39. Glumes deciduous, falling from the persistent
   rhachilla ........................................... Cyperus
   Glumes not deciduous, the rhachilla and
   glumes falling together .......................... Mariscus

CAREX L.

Carex is one of the larger genera of sedges, with nearly 1,000
species most of which occur in the temperate regions of the
northern hemisphere. In tropical Africa there are only about 30,
restricted to the damp grasslands, forest and montane vegetation of
the higher altitudes (mostly over 7,000 ft.). The similar, but
more slender, representatives of Schoenoxiphium in East Africa
normally occur at lower altitudes.

Most African species of Carex are leafy perennial herbs, some
with creeping rhizomes and some compacted into dense tufts. Three
kinds of inflorescence are readily recognisable in the genus;
solitary, dense bisexual spikes (Fig. 13); much branched, often
dense panicles with numerous short sessile or subsessile bisexual
spikes of few spikelets (Figs. 18, 25); and very sparingly branched
inflorescences of a few sessile or pedunculate long spikes
(Figs. 20, 38). The spikelets are always unisexual. In some
species they are borne in unisexual spikes, in others the spikes
are bisexual. In the section Eu-Carex three obvious trends occur
in the arrangement of male and female in the spikes. In C. vallis-
rosetto and its allies all the spikes are bisexual with the male
spikelets at the top. In the rest, the upper 1 to 3 spikes are
male or almost entirely so with the lateral spikes predominantly
female; in some of these species the male spikelets are above the female in the spikes, in others the male spikelets are below. In the field, male spikelets may be recognised either by the presence of stamens or, when these have been shed, by the absence of utricles as the male flowers mature first and shed their stamens before the utricles reach maturity.

**Key to Species**

1. Spikes solitary, terminal
   Spikes several or numerous

2. Culms angular; glumes light brown with broad hyaline margins
   Culms terete; glumes dark brown, margins not hyaline
   1. C. monostachya
   2. C. runssoroensis

3. Spikes sessile, bisexual; inflorescence always very dense
   Spikes pedunculate, unisexual or bisexual; inflorescence paniculate

4. Leaves 2 - 4 mm. wide; utricles much longer than the bracts and with a long scabrid beak
   Leaves 4 - 12 mm. wide; utricles scarcely longer than the bracts, beak often very short
   5. C. erythrorrhiza var. scabrida
   4. C. lycurus

5. Utricles 3 - 4 mm. long; leaves 4 - 8 mm. wide; culm bases up to 6 mm. thick
   Utricles 4 - 6 mm. long; leaves 8 - 12 mm. wide; culm bases over 7 mm. thick
   3. C. conferta var. leptosaccus
   4. C. lycurus

6. Inflorescence much branched with very numerous, scarcely stalked, short spikes
   Inflorescence of a few long very dense spikes

7. Utricles much longer than the mucronate chestnut bracts
   Utricles equalling or scarcely exceeding the aristate bracts

8. Utricles pale green, hispid below the beak, 4 mm. long
   Utricles very dark brown or black, glabrous, 5 mm. or more long

9. Utricles 4 mm. long
   Utricles 5 - 6 mm. long

10. Lateral spikes always distinctly pedunculate;
    leaf sheaths parallel veined
    Lateral spikes sessile or subsessile;
    leaf sheaths reticulate veined

11. C. echinochloe
    8. C. chlorosaccus

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11. Utricles with a very short truncate beak ............................ 12
Utricles with a well developed beak, bidentate except in *C. johnstonii* ............................ 13

12. Utricles brown, biconvex and very broad; bracts green ............................ 10. *C. papillosissima*
Utricles 3-angled, narrower; bracts tawny ............................ 11. *C. bequaertii*

13. Female spikes loose; utricles 5 - 7 mm. long with a long entire beak ............................ 12. *C. johnstonii*
Female spikes dense; utricles 3 - 5 mm. long with a bidentate beak ............................ 14

14. Spikes all androgynous, similar; male spikelets making less than half the length of the spike ............................ 15
Upper 1 - 3 spikes usually male or almost entirely so, the lateral spikes female or bisexual ............................ 17

15. Utricle bracts golden brown ............................ 15. *C. mildbraediana*
Utricle bracts green or brown ............................ 16

16. Utricle beak conspicuously bent ............................ 13. *C. vallis-rosetto*
Utricle straight ............................ 14. *C. greenwayii*

17. Lateral spikes female, the upper ones usually with several male spikelets at the top; terminal spike often with a few female spikelets at the base ............................ 18
Lateral spikelets purely female, or some of the upper ones with a few male spikelets at the base; terminal spike often with a few female spikelets at or near the top ............................ 20

18. Spikes 2 - 3 ins. long, brown or green ............................ 16. *C. cyrtosaccus*
Spikes 1 - 2 ins. long, reddish or green ............................ 19

19. Bracts 5 - 6 mm. long, as long as the mature utricles ............................ 17. *C. elgonensis*
Bracts 4 mm. long, shorter than the mature utricles ............................ 18. *C. mannii*

20. Lateral spikes all unisexual, 5 mm. wide ............................ 21
Lateral spikes mostly bisexual, 6 - 8 mm. wide ............................ 22

21. Bracts black, with a conspicuous green midrib ............................ 19. *C. simensis*
Bracts green and rust ............................ 20. *C. fischeri*

22. Leaves stiff, longest spikes 2 ins. long; lower glumes rust coloured, shorter than the utricle; peduncles stoutish, usually short ............................ 21. *C. cuprea*
Leaves flaccid; spikes often over 2 ins. long; glumes brown, as long as the utricles; peduncles very slender and long ............................ 23
23. Leaves 3 - 4 mm. wide; mountains west of the Rift Valley ........................................... 22. C. ninagongensis Leaves 6 - 9 mm. wide; mountains east of the Rift Valley .......................... 23. C. longipedunculata


26. Spikelets very densely packed; utricles 3 mm. long .................. 26. C. pseudosphaerogyna Spikelets loosely packed; utricles 4 mm. long .................................. 27. C. cognata

1. C. monostachys A. Rich. (Figs. 13, 14) Stiffly erect tufted perennials, about 18 ins. high, often forming 'stilts' Wet Alpine grassland, 9,000 - 15,000 ft. KENYA - Kenya and Aberdare Mountains. TANGANYIKA - Kilimanjaro.

2. C. runssoroensis K. Schum. (Fig. 15) Tufted perennial forming tussocks up to 3 ft. high. Leafless. Very similar to the above. Wet montane grasslands 11,000 - 13,000 ft. UGANDA - Virunga Mts., Ruwenzori Mts., Mt. Elgon. var. aberdarensis Kuk. differs in the white hyaline margins to the bracts and is more slender. KENYA - Kenya and Aberdare Mountains.

3. C. conferta A. Rich. var. leptosaccus (C.B.Cl.) Kuk. (Figs. 18, 19) Short tufted plants ½ - 2 ft. high. Montane moorland and swamps 8,000 - 12,000 ft. The typical form of the species, known from Ethiopia, has shorter beaked utricles, but is otherwise indistinguishable. KENYA - Naro Moru, Ol Joro Orok, Nyiru, Aberdare and Elgon Mountains. TANGANYIKA - Kilimanjaro. UGANDA - Mt. Mgahinga.

4. C. lycurrus K. Schum. (Fig. 17) Stout tufted perennial 2 - 4 ft. high. Leaves broad. Inflorescence pale brown. Mostly in shady places, forests, stream banks, or upland swamp grassland at 7,000 - 10,000 ft., but down to 4,500 ft. in the Usambara Mountains. KENYA - Cherangani Hills, Kinangop, Molo. TANGANYIKA - Crater Highlands, Usambara Mts., Mufindi.

5. C. erythrorrhiza Boeck. var. scabrida Kuk. (Fig. 16) Narrow leaved tufted sedge 1 - 2 ft. high. In swamps, bamboo and montane forests 10,000 - 12,000 ft., rarely lower. So far only the variety is known from East Africa. KENYA - Mt. Kenya, Cherangani Hills. TANGANYIKA - Crater Highlands. UGANDA - Mt. Mgahinga.
6. *C. spicato-paniculata* C.B.Cl. (Fig. 23)
Tufted perennial very like *C. chlorosaccus* but differing in the usually denser and browner inflorescence, the absence of awns and the scabrid utricle. 3,000 - 6,000 ft.
TANGANYIKA - Mlinga Peak (Usambara), Iringa District, Kigogo.

7. *C. echinochloe* Kunze (Fig. 27)
Tufted perennial 2 - 3 ft. high with a rather dense inflorescence. High rainfall grasslands, bush and *Combretum* savannah.
KENYA - Kitale.
TANGANYIKA - Arusha, Kilimanjaro, Usambara Mts.
UGANDA - Fort Portal, Kigezi.

8. *C. chlorosaccus* C.B.Cl. (Figs. 25, 26)
Tufted leafy perennial 2 - 3 ft. high. Glumes aristate, green or yellowish becoming pale brown like the utricle.
Forests, 6,000 - 8,000 ft., rarely lower.
KENYA - Trans Nzoia, Aberdares, Kericho, Mau, Mt. Elgon, Chyulu Hills.
TANGANYIKA - Mufindi, Kilimanjaro, Ngorongoro, Pare and Usambara Mountains.
UGANDA - Bugishu.

9. *C. castanostachya* K. Schum. (Fig. 24)
Tufted leafy perennial 4 ft. high with a fairly dense paniculate inflorescence. Bracts chestnut brown, utricles very dark, curved. 6,500 - 7,500 ft.
TANGANYIKA - Uluguru, Usambara and Pare Mountains.

10. *C. papillosissima* Nelmes (Fig. 29)
Stout tufted perennial up to 4 ft. high. Spikes numerous. Utricles very broad, dark brown, with a very short beak.
Forests, 5,000 - 6,000 ft.
TANGANYIKA - Sao Hill.

11. *C. bequaertii* De Wild. (Fig. 28)
(T. petiliana auctt. non A. Rich.)
Tufted leafy perennial 3 - 4 ft. high with long broad leaves.
Inflorescence of 6 - 8 dense pedunculate spikes, the upper 1 to 3 male only, the rest female, long, and 8 mm. broad.
Wet grasslands, swamps, forest edges and stream banks, 9,000 - 12,000 ft.
KENYA - Elgon, Kenya and Aberdare Mountains.
TANGANYIKA - Crater Highlands, Southern Highlands.
UGANDA - Virunga Mts., Kigezi.

12. *C. johnstonii* Boeck. (Fig. 30)
Tufted perennial 2 - 3 ft. high with very narrow spikes.
Utricles 8 - 9 mm. long and inflated. Bamboo and upland forests, 7,000 - 10,000 ft.
KENYA - Elgon and Aberdare Mountains, Kericho, Mau Forest.
TANGANYIKA - Oldeani, Kilimanjaro, Usambara and Uluguru Mountains.

Tufted perennial 2 - 3 ft. high with 8 - 12 androgynous spikes. Utricles 5 mm. long, few nerved, conspicuously bent at the base of the beak.
TANGANYIKA - Usambara and Uluguru Mountains.
14. C. greenwayi Nelmes (Fig. 33)
   Very close to the above. The main differences lie in the more numerous spikes (about 12) and the very straight utricle.
   Montane and bamboo forests, swampy places, 5,000 - 11,000 ft.
   KENYA - Kenya and Aberdare Mountains, Mau Forest.
   TANGANYIKA - Meru, Kilimanjaro and Uluguru Mountains.

15. C. mildbraediana Kuk. (Fig. 34)
   3 - 6 ft. high perennial of wet montane forests and water pools, at about 8,000 ft.
   UGANDA - Karamoja, Ruanda.

16. C. cyrtosaccus C.B.C. (Fig. 35)
   Tufted perennial 1½ - 2 ft. high, similar to C. fischeri but with larger utricles. In forest, 6,000 - 7,000 ft.
   TANGANYIKA - Southern Highlands. Also Nyasaland.

17. C. elgonensis Nelmes (Figs. 38, 39)
   Tufted perennial 1 - 2 ft. high similar to C. cuprea but with shorter dark red androgynous spikes. In ericaceous and Hypericum scrub 10,000 - 11,000 ft.
   KENYA - Elgon, Kenya and Aberdare Mountains.

18. C. mannii E.A. Bruce
   (C. boryana auctt. pro parte)
   Tufted perennial 2 - 3 ft. high. Leaves up to ¼ in. wide.
   Upper spike male, rarely female at the base, the others female with a few male spikelets at the top. Alpine grasslands and thickets etc. over 10,000 ft.
   UGANDA - Ruwenzi.

19. C. simensis A. Rich. (Fig. 40)
   Stout tufted perennial 1½ - 2 ft. high with broad leaves.
   Upper spike or spikes male, the lateral ones female or with a few male spikelets at the top. Fertile glumes black. Utricles green, shortly beaked, bidentate, 4 - 5 mm. long. Alpine grasslands, Hypericum thicket, swampy ground, 11,000 - 13,000 ft.
   KENYA - Elgon, Kenya and Aberdare Mountains.

20. C. fischeri K. Schum. (Figs. 31, 32)
   Tufted perennial with green and brown spikes 2 - 3 ins. long.
   Uppermost spike male, often with some female spikelets near the top. The lateral spikes female throughout. Ericaceous thicket, forest, valley and ravine scrub, often on swampy ground, 8,000 - 11,000 ft.
   KENYA - Occurs on all mountain ranges.

21. C. cuprea (Kuk.) Nelmes (Figs. 36, 37)
   Common tufted perennial 2 - 3 ft. high with several chestnut brown spikes 2 ins. long. Bracts chestnut with conspicuous green keels. Upland grasslands, swamps and stream sides, 8,000 - 9,000 ft.
   KENYA - Kinangop, Ol Joro Orok, Mau.
   UGANDA - Kigezi.

22. C. ninagonensis (Kuk.) Robyns (Fig. 41)
   Tufted perennial 2 - 3 ft. high, with leaves under ¼ in. wide.
   Spikes 2 ins. long. Swamps, forest and Hypericum thicket, 10,000 - 12,000 ft.
   KENYA - Mt. Elgon.
23. **C. longipedunculata** K. Schum.
Tufted perennial with 2 in. long spikes scarcely distinct from the above except for the ¼ - ½ in. wide leaves. Swampy stream banks about 8,000 ft.
KENYA - Aberdare Mts., Mau Forest.
TANGANYIKA - Kilimanjaro.
UGANDA - Mt. Mgahinga.

24. **C. phragmites** Kukenth.
Tufted perennial over 1½ ft. high with 4 - 5 brown spikes about 1½ ins. long. Bracts hairy, awned, much longer than the utricles.
TANGANYIKA - Crater Highlands.

25. **C. taylori** Nelmes
Tufted perennial very similar to the above.
KENYA - Aberdare Mountains.

I have not been able to examine material of either of these species but from a comparison of the rather inadequate descriptions it would seem that they are possibly synonymous, in which case **C. phragmites** is the name which should be used.

26. **C. pseudosphaeroqyna** Nelmes (Fig. 22)
Tufted perennial 2 - 3 ft. high. Very similar to **C. cognata**.
UGANDA - Ruwenzori and Virunga Mountains.

27. **C. cognata** Kunth (Figs. 20, 21)
Densely tufted perennial 2 - 3 ft. high with short thick yellowish spikes. Stream banks in forest or plateau grasslands.
TANGANYIKA - Southern Highlands.

**SCHENOXIPHIUM** Nees

This predominantly South African genus of about 15 species has only three known representatives in East Africa, in each case representing the northern limit of distribution of a species better known from Nyasaland and the Transvaal. The majority of the southern species are stout plants 2 to 3 ft. high, but the ones represented here are characterised by slender, very leafy culms which in the field can be readily mistaken for grasses unless in flower. The normal habitats are damp forests and wooded or open grasslands.

The inflorescence is similar to a depauperate Carex with short distant androgynous lateral spikelets, but the two genera are distinguished by the lesser reduction of the fertile spikelets in Schoenoxiphium where it is rare for all the fertile spikelets to be reduced to the nutlet-bearing flower; some of them at least have 4 - 6 staminate flowers above the female flower which protrude from the mouth of the utricle. However, care must be taken as it does sometimes happen that reduction is complete on a particular plant. It is unusual for Schoenoxiphium to occur at the higher altitudes (over 7,000 or 8,000 ft.) where Carex usually occurs.
Key to Species

1. Bracts twice as long as the utricles, awned...1. S. caricoides
   Bracts as long as the utricles or slightly shorter ........................................ 2

2. Utricles 2 - 3 mm. long including the
   ½ - ¾ mm. long beak .......................... 2. S. sparteum
   Utricles 4 - 5 mm. long, including the
   1 - 1½ mm. long beak .......................... 3. S. lehmannii

1. S. caricoides C.B.Cl. (Fig. 46)
   (= Carex dregeana Kunth, Schoenoxiphium kunthianum Kuk.)
   An erect shortly rhizomatous perennial 10 - 15 ins. high with yellow-green foliage. Inflorescence a narrow, scanty panicle. Fertile spikelets mostly reduced to the fertile floret only. Damp wooded or open grasslands. 6,000 - 7,000 ft.
   KENYA - Trans Nzoia, Kericho.

2. S. sparteum (Wahlenb.) Kuk. (Figs. 42-44)
   Erect tufted perennial 1 - 2 ft. high. Inflorescence with numerous pedunculate panicle branches. Forest edges and damp upland grasslands, rarely below 6,000 ft.
   KENYA - East Wall of the Rift Valley.
   TANGANYIKA - Usambara Mts., Southern Highlands.
   UGANDA - Kigezi, Karamoja.

3. S. lehmannii (Nees) Steud. (Fig. 45)
   (S. sparteum var. lehmannii auctt, Carex uhligii C.B.Cl.)
   Very similar to the above, but with a more scanty inflorescence with subsessile lateral panicle branches. Damp places in evergreen forest, 3,500 - 6,500 ft.
   KENYA - Marsabit, Ngong, Mau Forest.
   TANGANYIKA - W. Usambara Mts., Kilimanjaro, Bukoba District.
   UGANDA - Karamoja.

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CYPERACEAE OF EAST AFRICA

Explanation of Figures

PLATE I

Fig. 1. Diagrammatic spikelet of Cyperus esculentus: a. sterile glume, b. fertile glume, c. rachilla, d. stamen filament, e. anther, f. ovary, g. style, h. stigma.

Fig. 2. Coleochloa abyssinica - floret: b. fertile glume, k. utricle, l. hypogynous bristles.

Fig. 3. Carex cyrtosaccus - spikelet: h. stigma, i. bract, k. utricle.

Fig. 4. Ascolepis anthemiflora - floret: b. fertile glume, f. ovary, m. fused hypogynous scales (2).

Fig. 5. Rhynchospora corymbosa - floret: b. fertile glume, g. ovary, f. style, i. hypogynous bristles.

Fig. 6. Schoenoxiphium sparteum - spikelet: i. bract, k. utricle, n. glumes of florets, o. anthers.

Fig. 7. Solitary spikelet - Fimbristylis monostachya.

Fig. 8. Umbel - Mariscus cyperoides.

Fig. 9. Panicle - Scirpus glabra.

Fig. 10. Dense head of spikes (3) - Kulvinga odorata.

Fig. 11. Capitulum - Ascolepis anthemiflora.

Fig. 12. Pseudo-lateral head - Scirpus mucronata.

PLATE II

Figs. 13, 14. Carex monstachya.

Figs. 15, 24. Carex runssoroensis.

Figs. 16, 25, 26. Carex erythromchiza var. scabrida.

Figs. 17, 27. Carex scirpus.

Figs. 18, 19. Carex conferta var. leptosaccus.

Figs. 20, 21. Carex cognata.

Figs. 22. Carex pseudosphaerogyna.

Inflorescences x ½, utricles x 4.

PLATE III

Figs. 23. Carex spicato-paniculata.

Figs. 24, 25. Carex castanostachya.

Figs. 26, 27. Carex chlorosaccus.

Figs. 28. Carex bequaertii.

Figs. 29. Carex papillosissima.

Figs. 30. Carex johnstonii.

Figs. 31, 32. Carex fischeri.

Figs. 33. Carex greenwavi.

Figs. 34. Carex mildbraediana.

Figs. 35. Carex cyrtosaccus.

Inflorescences x ½, utricles x 4.

PLATE IV

Figs. 36, 37. Carex cuprea.

Figs. 38, 39. Carex elgonensis.

Figs. 40. Carex simensis.

Figs. 41. Carex ninagongensis.

Figs. 42, 43, 44. Schoenoxiphium sparteum.

Figs. 45. Schoenoxiphium lehmannii.

Figs. 46. Schoenoxiphium carloides.

Inflorescences x ½, utricles x 4.

m. ¼ portion of spike, s. flowers protruding from utricle, u. utricles.