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VEGETATIVE KEY TO THE ALPINE VASCULAR PLANTS OF MOUNT KENYA

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INTRODUCTION

In recent years there has been an increasing interest in several aspects of plant biology in the alpine zone of Mount Kenya. To my knowledge, at least a dozen research projects were carried out between 1977 and 1984. Fortunately, the flora of the region has been the subject of a fine monograph by Hedberg (1957), and the currently available volumes of the Flora of Tropical East Africa (FTEA hereafter) contain a majority of the alpine species. Although reproductive individuals are generally more prevalent on the mountain throughout the year when compared to the drier lowlands, many species are only rarely found in the reproductive state (personal observations). As part of a comprehensive study of the vegetation of the upper Teleki Valley on Mount Kenya, we produced this key based on vegetative characters. It has since proven useful (in manuscript form) in studies by various other researchers. It is hoped that its publication will facilitate and encourage future biological research on Mount Kenya.

A lower elevational limit of 3500 meters was chosen to eliminate a number of forest species that occur sporadically above the timberline. Several species not listed by Hedberg are included. These represent either new records for Mount Kenya, such as *Helictotrichon umbrosum* and *Cystopteris diaphana,* or new altitudinal ranges discovered in our studies, such as *Kniphofia thomsonii* and *Asplenium E* (Agnew 1974). A separate paper will document the distribution, frequency, and ecology of the approximately 70 species found in the upper Teleki Valley.

As an additional aid to identification, three short reproductive keys for difficult groups are appended to the main vegetative key. The first of these covers three species of *Helichrysum,* the second covers herbs with opposite entire leaves, and the third covers the grasses. For three genera *(Poa, Colpodium,* and *Cerastium)* of two species each, no reliable vegetative distinguishing traits could be found. These genera are included in the reproductive keys.

One other genus deserves special mention. Hedberg (1957) and Clayton (1970) distinguished *Pentaschistis minor* and *P. borussica* by panicle shape. The former reportedly has a linear panicle, and the latter an open panicle. In addition, their altitudinal distributions on Mount Kenya were thought to be disjunct (Hedberg 1957). We have found that not only can *Pentaschistis* spp. be found at intermediate elevations, but that panicle shape in *P. minor* varies with plant age and air temperature (T.P.) Young, personal observations). In addition, Clayton (1970) reports the existence of intermediates between *P. minor* and *P. borussica.* We have found no consistent vegetative differences, and both key out here as *P. minor.*

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Hints to Using the Key

It is particularly helpful to use this key in conjunction with Hedberg (1957), Agnew (1974), and relevant volumes of the Flora of Tropical East Africa (cf. Clayton 1970), sections of whose keys we have used here. After reaching one or more possible species identities in the key, compare your specimen to the descriptions in these texts, paying attention also to habitat and elevation. Unfortunately, the first two of these references are difficult to obtain at this time in East Africa. One hopes that this will not always be the case.

This key is designed for use with living vegetative material. Dry material may differ, especially in color. Reproductive material is often very different from vegetative material; for example, several small rosette species produce long leafy stems at reproduction, and leaves on reproductive stems may differ from those on vegetative plants. As in any vegetative key, there is likely to be some confusion concerning seedlings and young plants. For example, very young shaded *Lobelia telekii* individuals look similar to mature *Limosella africana* plants. In this case the latex of the former is indicative, but in others it must be left to the reader's own development of a 'feel' for the species. In particular, young plants of woody or shrubby species often appear herbaceous. We have tried in this key to reduce such ambiguities, relying on invariable characters as much as possible.

In order to make this key accessible to as broad a readership as possible, we have tried to minimize the use of botanical jargon. Nonetheless, some specialized terminology is unavoidable, particularly for the grasses.

1) Plant a fern; leaves (fronds) thin, compound, glabrous (but may have scales); ultimate segments dentate; leaves arising from a rhizome; plant not a rosette 2
Plant not a fern; if leaves compound and glabrous, then ultimate segments entire or the vegetative plant a rosette 3
2) Leaves multipinnate; final frond segments (pinnae) fan-shaped; rachis with coppery scales . . . . . *Asplenium* sp. *E.* (Agnew)
Leaves pinnate; pinnae lanceolate, rachis without scales . . . . . *Cystopteris diaphana* (syn. *C. fragilis)*
3) Plant glabrous; erect stems densely covered by numerous single-veined leaves less than 2 cm long (a nonseed plant that often has sporangia in its leaf axils) . . . . . *Lycopodium saururus*
Plant not as above – if leaves small, glabrous and entire, then not densely covering erect stems (Angiosperms) 4
4) Leaves with parallel venation, entire, simple, often grasslike, not succulent, >2 cm long; if <2 cm long, then with distinct ligules (Monocotyledons) 5
Leaf veins net-like; leaves entire to deeply lobed, simple or compound, if somewhat grasslike, then succulent or woody or with liguless leaves<2 cm long (Dicotyledons) 32
5) An aquatic plant with long internodes and leaves >1 cm broad . . . . . *Potamogeton schweinfurthii*
Plant terrestrial, or with narrow leaves and short internodes 6
6) Leaves >1.5 cm wide 7
Leaves <1.0 cm wide 9
7) Leaves often >3 cm wide, always narrowing near the base. . . . . *Disa stairsii*
Leaves 1.5 to 2.5 cm wide, linear 8
8) Leaves with a raised midvein on both upper and lower surfaces; leaf blades flat . . . . . *Gladiolus watsonoides*
Leaves without a raised midvein, or only on the lower surface; Leaf blades often V-shaped . . . . *Kniphofia thomsonii*
9) Leaves triangular to rectangular in cross section, with notched corners (in cross section) . . . . . *Romulea keniensis*
Leaves flat, folded, rolled, round, or V-shaped, not notched 10
10) Leaves>4 mm wide, tinged red and densely long hairy. . . . . *Luzula abyssinica*
Leaves < 4 mm wide, if greater, then not tinged red and densely long hairy 11
11) Leaves with a distinct ligule, either membranous or a fringe of hairs (Graminae)....14 (see also 134)
Ligule indistinct or absent (Carex) 12

12) Leaves (culms) round ..... *Carex runssoroensis*
Leaves flat to V-shaped 13
13) Leaves <4 mm wide, strongly V-shaped ..... *Carex monostachya*
Leaves >4 mm wide ..... *Carex sp.* (prob. *bagaertii)*
14) Ligule a fringe of hairs 15
Ligule membraneous 16
15) Backs of leaves with single raised midveins ..... *Pentaschistis minor*
Backs of leaves with a number of equal ribs ..... *Andropogon amethystinus*
16) Leaf forming two right angles between the sheath and the blade ..... *Koeleria capensis*
Leaf forming a single acute angle at the ligule 17
17) Leaves flat or folded, not readily rolled between the fingers 18
Leaves (tightly) rolled or subulate, readily rolled between the fingers 28
18) Leaves >20 cm long, >5 mm wide ....*Andropogon amethystinus* (incl. *A. longipes*)
Leaves <20 cm long, if longer then <5 mm wide 19
19) Leaves flat 20
Leaves flolded; if open, then with a distinct crease. 23
20) At least some leaves >4 mm wide 21
All leaves <3.5 mm wide 22
21) Leaves glabrous or (sparsely hairy) when crushed not having a distinct aromatic smell or taste ..... *Colpodium* spp. (see 139)
Leaves usually long hairy; when crushed smelling and tasting of cumarin .....
. ..... *Anthoxanthum nivale*
22) Leaves sparsely pubescent; some hairs >2 mm long. ..... *Helictotrichon umbrosum*
Leaves glabrous or with a few hairs <1.5 long ..... *Agrostis quinqueseta*
23) Folded leaf >1.5 mm wide 24
Folded leaf <1.5 mm wide 26
24) Stem with distinct internodes >2 cm long ..... *Calamagrostis hedbergii*
Plant tufted; internodes <1 cm long 25
25) Upper leaf sheath of two distinct parts—a membraneous extension of the ligule inside, and a green leafy lip outside ..... *Colpodium* spp. (see 139)
Upper leaf sheath not of two distinct parts .....*Poa* spp. (see 146)
26) Ligule <1.5 mm long with dark glands at its base, especially in older leaves.....*Festuca abyssinica*
Ligule > 1.5 mm long, without dark glands at its base 27
27) Leaf bases, sheathes, or blades tinged red; blades flexuous ..... *Deschampsia flexuosa*
Plant not tinged red; leaf blades straight ..... *Agrostis sclerophylla*
28) Leaves smooth or only slightly rough to the touch 29
Leaves scabrous, distinctly rough to the touch 30
29) Culm bases white, not grey or brown or reddish ..... *Agrostis gracifolia*
Culm bases grey or brown or reddish 30
30) Ligules <1.5 mm long; culm bases often reddish ..... *Festuca pilgeri*
Ligules >1.5 mm long; culm bases not reddish 31
31) Leaves striate .....*Agrostis volkensii*
Leaves estriate .....*Agrostis trachyphylla*
32) Leaves producing a milky latex 33
Leaves not producing a milky latex 35
33) Latex white; leaves never >4 cm long; leaves entire, often emarginate ..*Dianthoseris schimperi*
Latex cream colored; leaves usually >4 cm long; leaves shallowly crenate, not emarginate ....
(Lobelia) 34
34) Midvein glabrous in smaller plants; in larger plants, rosette
retaining a reservoir of water..... *Lobelia deckenii* ssp *keniensis*
Lower midvein pubescent on the underside, rosette not retaining a reservoir of water (note: hybrids between these two species occur rarely)..... *Lobelia telekii*
35) Leaves or stem armed with stout spines, not merely barbed 36
Plant not armed with spines, although some leaves may have weak barbs..... 38

36) Only stems armed; plant a woody shrub ..... *Helichrysum citrispinum*
Leaves armed, plant a rosette *(Carduus)* 37
37) Leaves compound; undersides white with pubescence ..... *Carduus keniensis*
Leaves dentate, undersides green ..... *Carduus chamaecephalus* (syn. *C. platyphyllus)* (note: hybrids occur rarely)
38) Leaves distinctly compound *and* plant herbaceous or woody only at the base 39
Leaves simple, entire to deeply lobed; or if leaves compound, then plant distinctly shrubby (see 106) 49
39) Leaves with three leaflets; leaflets entire or minutely toothed ..... *Trifolium multinerve*
Leaves with more than three leaflets, or if three then distinctly dentate 40
40) Leaflets ovate, with acuminate teeth ..... *Cardamine obliqua*
Leaflets dentate, lobed, entire, sometimes filiform; not ovate 41
41) Leaves <10 cm long and leaflets >5 mm wide *(Ranunculus)* 42
Leaves >10 cm long; or if less, then leaflets <5 mm wide 44
42) Leaves multipinnate ..... *Ranunculus oreophytus*
Leaves trifoliate 43
43) Leaflets deeply lobed ..... *Ranunculus keniensis*
Leaflets merely dentate ..... *Ranunculus aberdaricus*
44) Leaflets <2 mm wide, filiform *(Peucedanum)* 45
Leaflets >3 mm wide, dentate 46
45) Leaf rachis glabrous ..... *Peucedanum friesiorum*
Leaf rachis sparsely pubescent ..... *Peucedanum kerstenii*
46) Leaves densely pubescent, white to silvery in appearance 47
Leaves sparsely pubescent, greenish 48
47) Leaflets pinnately lobed or leaves bipinnate ..... *Anthemis tigrensis*
Leaflets entire to 1-2 lobed ..... *Cotula abyssinica*
48) Leaflets <5 mm wide ..... *Haplosciadium abyssinicum*
Leaflets >7 mm wide ..... *Heracleum inexpectatum* (syn. *Heracleum elgonense*)
49) Plant a rosette, internodes <5 mm long (although leafy stolons or reproductive shoots may be present) 50
Vegetative plant with distinct internodes 73
50) Leaves entire 51
Leaves dentate to deeply lobed 58
51) Leaves spatulate, >1.5 cm long 52
Leaves not distinctly spatulate; if slightly so then <1.5 cm long 54
52) Leaves <5 mm wide, not purple tinged ..... *Limosella aquatica* (syn. *Limosella africana)*
Leaves >5 mm wide, or purple tinged *(Swertia)* 53
53) Plants producing stolons ..... *Swertia crassiuscula*
Plants not producing stolons ..... *Swertia volkensis*
54) Leaves succulent ..... *Subularia monticola*
Leaves not succulent 55
55) Leaves glabrous 56
Leaves pubescent 57
56) Leaves >3 mm wide ..... *Dianthoseris schimperi*
Leaves <3 mm wide ..... *Sagina afroalpina*
57) Underside of leaf apex with a distinct gland; leaf hairs not glandular ..... *Myosotis keniensis*
Underside of leaf apex without a white gland; leaf hairs glandular ..... *Cerastium* spp. (see 133)
58) Leaves dentate to lobed less than halfway to the midvein 59
Leaves lobed more than halfway to the midvein 70
59) Leaves robust, thick (1 mm), with stout midveins and incurved margins, dentate 60
Leaves thin, with thin margins, dentate or not 66

60) Leaves white woolly underneath 61
Leaves green underneath, sometimes light green due to a thin layer of hairs 62
61) Upper leaf surfaces relatively smooth, plant becoming megaphytic ..... *Senecio brassica*
Upper leaf surfaces rugulose; plant a small flat rosette ..... *Haplocarpha rueppellii*
62) Leaves <1 cm wide; plant not becoming megaphytic (see 121) 63
Leaves >2 cm wide; plant becoming megaphytic 64
63) Plant glandular sticky ..... *Senecio schweinfurthii*
Plant not glandular sticky ..... *Senecio keniophytum*
64) Leaves green beneath ..... *Senecio keniodendron*
Leaves greenish-white beneath, due to a thin layer of hairs 65
65) Megaphytic rosette plant growing to several meters; absent from the Teleki Valley, occurs along rocky courses elsewhere ..... *Senecio battiscombei*
Megaphytic rosette plant never reaching much taller than 1 m; only found along the ecotone between adjacent *Senecio brassica* and *Senecio keniodendron* populations, not uncommon in these situations ..... *Senecio keniodendron* x *S. brassica* hybrid
66) Leaves lobed or crenate, >2 cm long 67
Leaves toothed, <2 cm long 68
67) Leaves >5 cm long, often deeply lobed ..... *Scabiosa columbaria*
Leaves <5 cm long, crenate ..... *Conyza subscaposa*
68) Hairs simple or leaves glabrous ..... *Wahlenbergia pusilla*
Hairs forked or stellate 69
69) Leaves densely covered by stellate hairs usually <.5mm long; (silique >.7 mm broad). ..... *Arabis alpina*
Leaves sparsely to moderately covered by stellate and simple hairs, some hairs at the bases of leaves up to 7 mm long; (silique <.7mm broad) ..... *Arabidopsis thaliana*
70) Basal leaves usually thrice ternately lobed ..... *Anenome thomsonii*
Leaves pinnately, bipinnately, or palmately lobed 71
71) Leaves palmately lobed; not longer than wide; sometimes reddish *(Geranium)* 112
Leaves pinnately to bipinnately lobed; longer than wide, not reddish 72
72) Leaves >5 cm long ..... *Scabiosa columbaria*
Leaves <5 cm long ..... *Oreophyton falcatum*
73) Leaves succulent 74
Leaves not succulent 77
74) Plant woody at base ..... *Sedum ruwenzoriense*
Plant herbaceous 75
75) Leaves alternate ..... *Sedum crassularia*
Leaves opposite *(Crassula)* 76
76) Plant restricted to shallow soil on dry ledges; leaves distinctly succulent, nearly spherical ..... *Crassula alba*
Plant of seasonal boggy flats; leaves weakly succulent ..... *Crassula granvikii*
77) Leaves entire or with barbs or small acuminate teeth *78*
Leaves distinctly dentate to lobed to compound 104
78) Plant woody, at least at the base 79
Plant herbaceous throughout 93
79) Leaves broader than 7 mm, never sticky 80
Leaves narrower than 5 mm, or glandular sticky 81
80) Leaves opposite ..... *Hypericum keniense*
Leaves alternate ..... *Protea kilimandscharica*
81) Leaves clasping the stem *(Helichrysum)* 82
Leaves petiolate, not clasping the stem 85
82) Leaves >8 mm wide, glandular sticky ..... *Helichrysum formosissimum*
Leaves <5 mm wide, not glandular sticky ..... 83 (see also 125)
83) Stems usually >6 mm in diameter; upper and lower leaf surfaces distinctly different in color; plant a shrub to 2m ..... *Helichrysum chionoides*
Stems <5 mm in diameter; upper and lower leaf surfaces similar; plant >.5m high 84

84) Leaves on young vegetative stems appressed, spreading when older; dark apical glands inconspicuous ..... *Helichrysum cymosum*
Leaves on vegetative stems spreading; dark apical glands conspicuous .... *Helichrysum brownei*
85) Leaves >1 cm long 86
Leaves <1 cm long 87
86) Leaf bracts on uppermost leafless parts of stems large, dense, covering most of the stem ..... *Euryops brownei*
Leaf bracts small, sparse; the stem clearly visible ..... *Hebenstretia angolensis* (previously *H. dentata)*
87) Leaves in clusters, silvery grey, linear ..... *Stoebe kilimandscharica*
Leaves not in clusters, if linear, then deep green (Ericaceae) 88
88) Young leaves densely pubescent, <3 times long as broad *(Blaeria)* 89
Young leaves glabrous or nearly so, >3 times long as broad 90
89) Leaf hairs >.5mm; plant sparsely branched, the side branches much weaker than the main stem, leaves usually >3 mm long ..... *Blaeria filago*
Leaf hairs <5mm long; plant richly branched; leaves usually <2.5 mm long ..... *Blaeria johnstonii*
90) Young stems densely pubescent 91
Young stems glabrous or nearly so 92
91) Leaf blade <5 times the length of the petiole, petiole >1mm long ..... *Phillipia trimera*
Leaf blade > 5 times the length of the petiole, petiole usually <1mm long ..... *Erica arborea*
92) Leaves <5mm long; plant a shrub to several meters ..... *Philippia excelsa*
Leaves >5mm long; plant a small woody herb to .5m ..... *Erica whyteana*
Note: The genera *Erica* and *Philippia* can be distinguished most reliably in flower by the relative size of the dry stigma:
Dry stigma >3 times the width of the style ..... *Philippia*
Dry stigma <3 times the width of the style ..... *Erica*
93) Leaves in whorls of four or more *(Galium)* 94
Leaves opposite or alternate 96
94) Leaves 4-6 in a whorl ..... *Galium glaciale*
Leaves (6-)8-10 in a whorl 95
95) Leaves barbed ..... *Galium ruwenzoriense*
Leaves not barbed ..... *Galium ossirwoense*
96) Leaves alternate 97
Leaves opposite ..... 98 (see also 127)
97) Leaves >4 times long as broad ..... *Senecio jacksonii*
Leaves <3 times long as broad ..... *Anagallis serpens*
98) Leaves distinctly spathulate and some >2 cm long 99
Leaves not distinctly spathulate, or less than 2 cm long 100
99) Leaves >1.5cm wide ..... *Swertia kilimandscharica*
Leaves <1.5cm wide ..... *Swertia subnivalis*
100) Leaves with thickened margins *(Satureja)* ..... *Satureja biflora* (inc. *S. punctata)*
Leaves without thickened margins 101
101) Stem with glandular hairs *(Cerastium)* 133
Stem without glandular hairs 102
102) Opposite leaf bases united ..... *Crassula granvikii*
Opposite leaf bases not united 102b
102b) Stems succulent, reddish; leaves rarely >3 times long as broad ..... *Anagallis serpens*
Stems non-succulent, not reddish if alive; leaves often >3 times as long as broad 103
103) Leaves narrowing at the base ..... *Callitriche stagnalis*
Leaves broad at the base ..... *Montia fontana*
104) Leaves with distinct stipules 105
Leaves exstipulate 113
105) Plant woody, at least at the base 106
Plant herbaceous 109

106) Leaves bipinnate ..... *Artemisia afra*
Leaves trifoliate or simple 107
107) Leaves bipinnate ..... *Adenocarpus mannii*
Leaves or leaflets dentate or serrate 108
108) Leaves densely pubescent, usually trifoliate; stipule membraneous, with undivided apex .....
..... *Alchemilla argyrophylla*
Leaves sparsely to moderately pubescent, simple; stipule foliaceous, with a dentate apex .....
..... *Alchemilla johnstonii*
109) Leaves with stinging hairs ..... *Urtica massaica*
Leaves without stinging hairs 110
110) Stipules dentate; plant erect ..... *Cineraria grandiflora*
Stipules entire; plant spreading 111
111) Leaves sharply dentate ..... *Alchemilla cyclophyla*
Leaves without acute teeth *(Geranium)* 112
112) Leaf blades reniform (kidney shaped) ..... *Geranium kilimandscharica*
Leaf blades pentagonal ..... *Geranium arabicum*
113) Leaves opposite, at least near the base 114
Leaves alternate 120
114) Leaves more than twice as long as broad 115
Leaves less than twice as long as broad 117
115) Leaves deeply lobed toward base, entire at apex ..... *Valeriana kilimandscharica*
Leaves crenate-dentate throughout *(Bartsia)* 116
116) Leaves usually <3 times long as broad, rarely rolled (flowers purple) ..... *Bartsia abyssinica*
Leaves usually >3 times long as broad, often rolled (flowers yellow). .....
..... *Bartsia decurva* (syn. *Bartsia kilimandscharica)*
117) Leaves minty, stems hairy *(Satureja)* 118
Leaves not minty, stems glabrous *(Veronica)* 119
118) Leaf bases cordate ..... *Satureja kilimandscharica*
Leaf bases cuneate to truncate ..... *Satureja simensis*
119) All stems prostrate ..... *Veronica gunae*
Some stems ascending to erect ..... *Veronica glandulosa*
120) Leaves glabrous ..... *Hebenstretia angolensis* (see at 86)
Leaves pubescent *(Senecio,* see Hedberg 1957, page 225) 121
121) Plant glandular sticky 122
Plant not glandular sticky 123
122) Plant woody at the base ..... *Senecio roseiflorus*
Plant herbaceous ..... *Senecio purtschelleri*
123) Plant woody, at least at the base ..... *Senecio schweinfurthii*
Plant herbaceous 124
124) Leaves petiolate, dentate ..... *Senecio keniophytum*
Leaves apetiolate, mostly entire ..... *Senecio jacksonii*

SPECIAL REPRODUCTIVE KEYS TO DIFFICULT GROUPS

Unarmed Helichrysum spp.

125 Involucre bracts appressed, inconspicuous; capitula diameter <4mm ... *Helichrysum cymosum*
Involucre bracts open, showy; capitula diameter >15mm 126
126) Heads 1-5 in each corymb, 2.5-3.0cm wide, white with faint reddish tinge in bud .....
..... *Helichrysum brownei*
Heads usually 5-10 or more in each corymb, 1.5-2.5cm wide, pure white or with a brownish tinge
..... *Helichrysum chionoides*

Herbs with opposite, entire, glabrous leaves

127) Ovary of four separate carpels 128
Carpels united 129
128) Flowers unisexual ..... *Callitriche stagnalis*
Flowers bisexual ..... *Crassula granvikii*

129) Flowers irregular ..... *Satureja biflora*
Flowers regular 130
130) One style and stigma 131
3-5 styles or stigmas 133
131) Petals small, <4mm long ..... *Montia fontana*
Petals longer than 6mm 132
132) Petals with indistinct nectaries without ciliation ..... *Swertia subnivalis*
Petals with distinct ciliate nectaries ..... *Swertia kilimandscharica*
133) Petals often inconspicuous, with a narrow slit at apex; capsule teeth erect with reflexed margins ..... *Cerastium octandrum*
Petals emarginate at apex, capsule teeth backwards or spirally ..... *Cerastium afromontanum*

Gramineae

134 Inflorescence [two to] several digitately arranged spikes ..... *Andropogon amethystinus*
Inflorescence an open or contracted panicle 135
135 Ligule a fringe of hairs ..... *Pentaschistis minor*
Ligule membraneous 136
136 Spikelets with one floret 137
Spikelets with more than one floret (sometimes only one fertile, but then with more than one awn per spikelet) 144
137 Floret with long hairs longer than the spikelet (sometimes deciduous upon drying) ..... *Calamagrostis hedbergii*
Floret without hairs or with only short hairs 138
138 Leaves >3mm wide; florets awnless *(Colpodium)* 139
Leaves <3mm wide, if greater then florets awned *(Agrostis)* 140
139 Spikelets 4-6.5mm long; leaves to 12cm long ..... *Colpodium chionogeiton*
Spikelets 2.5-3.5mm long; leaves to 6.5cm long ..... *Colpodium hedbergii*
140 Florets awnless ..... *Agrostis sclerophylla*
Florets awned 141
141 Leaves flat, >2mm wide ..... *Agrostis quinqueseta*
Leaves rolled, <2mm wide 142
142 Leaves smooth ..... *Agrostis gracifolia*
Leaves rough 143
143 Leaves striate ..... *Agrostis volkensii*
Leaves estriate ..... *Agrostis trachyphylla*
144 Florets awnless 145
Florets short to long awned 147
145 Glumes enclosing the florets ..... *Koeleria capensis*
At least the upper florets exserted *(Poa)* 146
146 Panicle contracted ..... *Poa leptoclada*
Panicle open ..... *Poa schimperiana*
147 Upper florets distinctly exserted; lemma straight-awned from the tip *(Festuca)* 148
Upper florets not distinctly exserted; awns dorsal or bent 149
148 Leaves rough ..... *Festuca pilgeri*
Leaves smooth ..... *Festuca abysinica*
149 Spikelets enclosed by the glumes, 2-8mm long ..... *Deschampsia flexuosa*
Spikelets exserted from the glumes, 8-16mm long 150
150 Leaves usually >4mm wide, smelling of cumarin ..... *Anthoxanthum nivale*
Leaves <4mm wide, without a distinctive smell ..... *Helictotrichon umbrosum*

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