

CG6

Avenula pubescens grassland

Synonymy

Chalk grassland *auct. angl. p.p.*; *Helictotricho-Caricetum flaccae*, Sub-association of *Holcus lanatus* & *Trifolium repens* Shimwell 1968a *p.p.*; Swyncombe Down grasslands Smith *et al.* 1971 *p.p.*; Chalk grassland, *Helictotrichon pubescens* type Duffey *et al.* 1974; *Festuca rubra*/*Helictotrichon pratense*/*H. pubescens* tussock grassland Wells *et al.* 1976; *Festuca rubra* grassland Smith 1980; *Helictotrichon* grasslands Smith 1980 *p.p.*

Constant species

Avenula pratensis, *A. pubescens*, *Festuca rubra*, *Lotus corniculatus*, *Taraxacum officinale* agg., *Pseudoscleropodium purum*.

Physiognomy

The vegetation here is usually dominated by various mixtures of *Festuca rubra* (occasionally with a little *F. ovina*) and generally smaller amounts of *Avenula pubescens* and *A. pratensis*. The abundance of these grasses gives the swards a markedly rank character and their intravaginal growth can produce a pronounced hummocky structure. The only other grass which is at all frequent throughout is *Koeleria macrantha*, though it is rarely present in large amounts. There is occasionally some *Agrostis stolonifera* and *Anthoxanthum odoratum*; *Arrhenatherum elatius* occurs rarely, though it can be locally prominent.

In this grassy ground, frequent associates are relatively few and mostly hemicryptophytes which can produce larger rosettes or sprawls of shoots. *Taraxacum officinale* agg. and *Lotus corniculatus* are constant and there are frequently scattered plants of *Carex flacca*, *Leontodon hispidus*, *Plantago lanceolata*, *Sanguisorba minor* and *Cirsium acaule*. There are sparse records for a variety of species of calcicolous swards and weedy mesotrophic grasslands. Chamaephytes and smaller paucennial species are characteristically few and infrequent.

Bryophytes, too, are uncommon apart from the

robust pleurocarp *Pseudoscleropodium purum* which can be abundant.

Sub-communities

***Dactylis glomerata-Briza media* sub-community:** *Helictotricho-Caricetum flaccae*, Sub-association of *Holcus lanatus* & *Trifolium repens* Shimwell 1968a *p.p.* Although the three constant grasses of the community, and especially *F. rubra*, can be very abundant here, they are less uniformly dominant and the swards have a distinctly patchy appearance which is often accentuated by the local prominence of *Dactylis glomerata*, *Holcus lanatus*, *Briza media* and *Danthonia decumbens*.

Among the preferential associates, some calcicoles are more frequent in this sub-community, notably *Linum catharticum*, *Sanguisorba minor*, *Carex flacca* and *Helianthemum nummularium*. Other distinctive species here include *Succisa pratensis*, *Cirsium palustre*, *Agrimonia eupatoria*, *Centaurea nigra*, *Primula veris* and *Listera ovata*.

***Potentilla reptans-Tragopogon pratensis* sub-community:** Swyncombe Down grasslands Smith *et al.* 1971 *p.p.*; *Festuca rubra*/*Helictotrichon pratense*/*H. pubescens* tussock grassland Wells *et al.* 1976. *F. rubra* and the *Avenula* spp. are more consistently and overwhelmingly dominant in this sub-community and the swards are usually taller and ranker and frequently have a marked, uniform tussocky structure. This is especially well seen in winter when this vegetation can present a desolate appearance of wind-waved hummocks with litter-choked runnels between. At Porton Down on the Hampshire/Wiltshire border, Wells *et al.* (1976) reported tussocks as attaining diameters up to 50 cm and heights of up to 30 cm.

Other grasses and calcicolous dicotyledons are less frequent here and their place is taken by a variety of coarse weeds, some perennials, some more short-lived, which occur patchily between the hummocks. The com-

monest of these are *Potentilla reptans*, which can produce locally prominent pads of stoloniferous rosettes, *Tragopogon pratensis* and the scrambler *Vicia cracca*. Less frequent, but sometimes giving a pronounced individual character to particular stands, are *Knautia arvensis*, *Cynoglossum officinale*, *Erigeron acer*, *Reseda luteola*, *R. lutea*, *Linaria vulgaris*, *Cirsium arvense*, *Pastinaca sativa* and *Crepis capillaris*.

Habitat

The *Avenula pubescens* grassland typically occurs over moister and more mesotrophic calcareous soils on flat or gently-sloping sites on a variety of lowland limestones where there is sometimes a history of gross disturbance, such as ploughing, but little or no grazing.

Festuca rubra occurs with somewhat uneven frequency and prominence throughout the *Festuca-Avenula* grassland but it seems to be able to attain prominence, in the absence of grazing, where there is some amelioration of the dry and oligotrophic soil conditions characteristic of lowland grey rendzinas. An adequate supply of available nitrogen appears to be of especial importance (e.g. Elston 1963, Mirghani 1965, Bunting & Elston 1966, Smith *et al.* 1971 on the Swyncombe Down grasslands in Oxfordshire and Lloyd 1964, Lloyd & Pigott 1967 on the Pulpit Hill Field in the Buckinghamshire Chilterns). The other major distinctive grass of this community, *Avenula pubescens*, though little investigated, seems to respond to similar conditions.

There are two particular situations over limestones where such conditions are met. The first is towards the foot of valley sides where the accumulation of colluvium (often over solifluctional head) gives rise to deep and moist, though usually free-draining, colluvial rendzinas or calcareous brown earth soils (e.g. Green & Fordham 1973, Jarvis 1973, Cope 1976, Smith 1980, *Soil Survey* 1983). It is in such sites, and especially towards the bottom of north-facing slopes, where the low insolation reduces water loss from the soils, that the *Dactylis-Briza* sub-community is characteristically found (e.g. Duffey *et al.* 1974, Smith 1980). This vegetation is often lightly pastured, though usually by cattle rather than sheep, and their more selective grazing helps maintain the typically patchy sward in which some light-demanding or more diminutive calcicoles can survive.

The second situation, where tracts of deeper, moister and more mesotrophic soils occur over flat limestone surfaces which are not exploited for agriculture, is now much rarer. Virtually all the available samples from this kind of habitat originate from Porton Down where, within the bounds of the Ministry of Defence ranges, there occur extensive stands of vegetation, long ungrazed by stock and now available only to fluctuating populations of rabbits and hares and military personnel.

It is here that the *Potentilla-Tragopogon* sub-community was first described by Wells *et al.* (1976) from areas where there was no record of ploughing for at least 50 years and sometimes evidence of continuous grassland cover for more than 130 years. Under such conditions, it was suggested, this kind of vegetation had developed, with an absence of pasturing, over soils which had slowly accumulated a reasonable level of fertility. The colonisation of ant-hills, initially by *F. rubra* and then, after abandonment, by other coarse grasses, was thought to have given a head start in some areas to the development of the pronounced tussock physiognomy so characteristic of this vegetation. Different levels of rabbit-grazing were invoked to explain varying degrees of dominance by the rank grasses within stands of the sub-community.

Wells *et al.* (1976) noted that many tussocks consisted of living herbage perched on top of and rooting through a base of dead material and that large tussocks were readily upturned. It is perhaps through such disruption of the vegetation cover by natural disturbance that the typical weeds of this sub-community are able to attain a hold. Studies at Swyncombe Down in Oxfordshire, unsampled in this survey but evidently supporting similar vegetation (Smith *et al.* 1971), have also shown how, as downwind parts of the tussocks become frayed, they decompose, exposing the mineral soil to colonisation by just such coarse weeds.

Zonation and succession

Despite the widespread decline in pasturing over the lowland limestones, large stands of the community are rare because the bulk of the most suitable soils has passed into arable cultivation. Where it does occur, this vegetation usually forms part of zonations which are both related to edaphic variation but also a reflection of seral changes mediated by grazing.

The *Dactylis-Briza* sub-community is typically found as a narrow, patchy fringe towards the bottom of valley-side slopes or as small, isolated stands on local accumulations of colluvium or head. As the soil cover thins to more shallow, dry and oligotrophic rendzinas, it grades to more calcicolous swards. For the most part, these are various kinds of *Festuca-Avenula* grassland though, on the Durham Magnesian Limestone, this sub-community may pass to *Sesleria-Scabiosa* grassland.

The more extensive stands of the *Potentilla-Tragopogon* sub-community at Porton occur in analogous edaphically-related zonations, grading to *Festuca-Avenula* swards over shallower rendzinas and on the sorted soils of occupied ant-hills. Over very oligotrophic, flint-strewn soils, especially where there has been a history of rabbit-warrening, the sub-community gives way to the *Festuca-Hieracium-Thymus* grassland.

The most likely immediate seral precursors of the

Avenula pubescens grassland are perhaps the more mesotrophic *Festuca-Avenula* swards, like those in the *Holcus-Trifolium* and *Succisa-Leucanthemum* sub-communities. In more calcicolous vegetation, ant-hills may provide nuclei from which the ranker grasses can spread. Once established, the *Avenula pubescens* grassland can probably progress to scrub provided the sward is not so overwhelmingly dominated by a mattress-like or tussocky cover of grasses as to leave no space for seedlings to gain a hold. The less rank vegetation of the *Dactylis-Briza* sub-community is more likely to be invaded and species like *Crataegus monogyna* and *Prunus spinosa* sometimes gain a vigorous hold in its deep, moist soils and from there slowly advance up valley sides.

Rabbits may play some part in keeping the vegetation of the *Potentilla-Tragopogon* sub-community in check but, even without any grazing, it seems doubtful whether the very rank swards here can be easily invaded by shrubs. They may therefore maintain themselves for very long periods with, perhaps, some measure of cyclical change as tussocks decay and the weeds come and go. At Swyncombe, Smith *et al.* (1971) noted that, if *Urtica*

dioica gained a hold on bare patches, it precipitated a very rapid breakdown of grass litter which opened the way for colonisation by more extensive areas of weed vegetation.

Distribution

The *Dactylis-Briza* sub-community has been recorded from scattered localities over a variety of lowland limestones, the *Potentilla-Tragopogon* sub-community only from Porton Down and Swyncombe.

Affinities

Vegetation of this kind has been described but rarely, sometimes being included within a 'Chalk grassland' community (e.g. Tansley 1939, Duffey *et al.* 1974, Ratcliffe 1977), sometimes being given separate status (e.g. Wells *et al.* 1976). Phytosociologically, it has affinities with both the Mesobromion (through the *Dactylis-Briza* sub-community) and ranker, mesotrophic grasslands of the Arrhenatheretalia (through the *Potentilla-Tragopogon* sub-community).

Floristic table CG6

	a	b	6
<i>Festuca rubra</i>	V (3–9)	IV (1–9)	V (1–9)
<i>Lotus corniculatus</i>	V (1–5)	IV (1–6)	IV (1–6)
<i>Avenula pubescens</i>	IV (1–5)	IV (1–9)	IV (1–9)
<i>Avenula pratensis</i>	IV (2–5)	IV (1–7)	IV (1–7)
<i>Taraxacum officinale</i> agg.	IV (1–3)	IV (1–3)	IV (1–3)
<i>Pseudoscleropodium purum</i>	III (1–4)	IV (1–8)	IV (1–8)
<i>Leontodon hispidus</i>	V (1–7)	III (1–8)	III (1–8)
<i>Carex flacca</i>	V (2–7)	III (1–5)	III (1–5)
<i>Dactylis glomerata</i>	V (2–6)	I (1–5)	II (1–6)
<i>Linum catharticum</i>	III (1–3)	I (1–2)	II (1–3)
<i>Briza media</i>	III (1–5)	I (1–5)	II (1–5)
<i>Holcus lanatus</i>	III (1–4)	I (1–6)	II (1–6)
<i>Succisa pratensis</i>	III (1–7)		I (1–7)
<i>Danthonia decumbens</i>	III (1–6)		I (1–6)
<i>Viola hirta</i>	II (1–3)	I (1–4)	I (1–4)
<i>Plantago media</i>	II (1–6)	I (1–4)	I (1–6)
<i>Ranunculus bulbosus</i>	II (1–3)	I (1–2)	I (1–3)
<i>Helianthemum nummularium</i>	II (1–6)	I (1–3)	I (1–6)
<i>Cirsium palustre</i>	II (1–3)		I (1–3)
<i>Bellis perennis</i>	II (1–3)		I (1–3)
<i>Primula veris</i>	II (1–3)		I (1–3)
<i>Centaurea nigra</i>	II (1–5)		I (1–5)
<i>Listera ovata</i>	II (1–3)		I (1–3)

<i>Brachypodium sylvaticum</i>	I (1–6)		I (1–6)
<i>Fraxinus excelsior</i> sapling	I (1–3)		I (1–3)
<i>Leucanthemum vulgare</i>	I (1–4)		I (1–4)
<i>Cynosurus cristatus</i>	I (1–5)		I (1–5)
<i>Agrostis capillaris</i>	I (1–3)		I (1–3)
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<i>Potentilla reptans</i>	I (1)	IV (1–3)	III (1–3)
<i>Tragopogon pratensis</i>	II (1–3)	III (1–3)	II (1–3)
<i>Vicia cracca</i>	I (1–3)	III (1–3)	II (1–3)
<i>Knautia arvensis</i>	I (1)	II (1–3)	I (1–3)
<i>Coeloglossum viride</i>		I (1–3)	I (1–3)
<i>Erigeron acer</i>		I (1)	I (1)
<i>Reseda luteola</i>		I (1–3)	I (1–3)
<i>Linaria vulgaris</i>		I (1–3)	I (1–3)
<i>Reseda lutea</i>		I (1–3)	I (1–3)
<i>Orobancha elatior</i>		I (1–3)	I (1–3)
<i>Phleum pratense pratense</i>		I (1–3)	I (1–3)
<i>Crepis capillaris</i>		I (1–3)	I (1–3)
<i>Phleum pratense bertolonii</i>		I (1–3)	I (1–3)
<i>Cynoglossum officinale</i>		I (1)	I (1)
<i>Cirsium arvense</i>		I (3–6)	I (3–6)
<i>Pastinaca sativa</i>		I (1–2)	I (1–2)
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<i>Plantago lanceolata</i>	IV (1–5)	III (1–7)	III (1–7)
<i>Sanguisorba minor</i>	IV (2–7)	III (1–7)	III (1–7)
<i>Koeleria macrantha</i>	III (1–4)	III (1–5)	III (1–5)
<i>Cirsium acaule</i>	III (1–5)	III (1–7)	III (1–7)
<i>Galium verum</i>	II (1–5)	II (1–4)	II (1–5)
<i>Prunella vulgaris</i>	II (1–4)	II (1–3)	II (1–4)
<i>Festuca ovina</i>	II (2–8)	II (1–9)	II (1–9)
<i>Thymus praecox</i>	I (1–3)	II (1–7)	II (1–7)
<i>Agrimonia eupatoria</i>	II (1–3)	I (1–3)	I (1–3)
<i>Calliargus cuspidatum</i>	II (1–4)	I (1–4)	I (1–4)
<i>Centaurea scabiosa</i>	II (1–5)	I (1–5)	I (1–5)
<i>Carex caryophylla</i>	II (1–3)	I (1–4)	I (1–4)
<i>Agrostis stolonifera</i>	II (1–4)	I (1–3)	I (1–4)
<i>Anthoxanthum odoratum</i>	II (1–3)	I (1)	I (1–3)
<i>Trifolium repens</i>	II (1–4)	I (1–2)	I (1–4)
<i>Trifolium pratense</i>	II (1–3)	I (1)	I (1–3)
<i>Campanula rotundifolia</i>	II (1–2)	I (1–3)	I (1–3)
<i>Scabiosa columbaria</i>	II (1–4)	I (1–2)	I (1–4)
<i>Achillea millefolium</i>	I (2–4)	I (1–4)	I (1–4)
<i>Asperula cynanchica</i>	I (1–3)	I (1–3)	I (1–3)
<i>Medicago lupulina</i>	I (1–3)	I (1–5)	I (1–5)
<i>Poa pratensis</i>	I (1–3)	I (1–3)	I (1–3)
<i>Hieracium pilosella</i>	I (1–4)	I (1–4)	I (1–4)
<i>Filipendula vulgaris</i>	I (2–4)	I (1–6)	I (1–6)
<i>Trisetum flavescens</i>	I (1–4)	I (1–2)	I (1–4)
<i>Fissidens cristatus</i>	I (1–4)	I (1–2)	I (1–4)
<i>Arrhenatherum elatius</i>	I (1–4)	I (1–6)	I (1–6)
<i>Anacamptis pyramidalis</i>	I (1)	I (1–3)	I (1–3)

Floristic table CG6 (cont.)

	a	b	6
<i>Cerastium fontanum</i>	I (1–3)	I (1)	I (1–3)
<i>Homalothecium lutescens</i>	I (1)	I (1–4)	I (1–4)
<i>Rumex acetosa</i>	I (1)	I (1–3)	I (1–3)
<i>Rhytidiadelphus triquetrus</i>	I (1–4)	I (1–5)	I (1–5)
<i>Ctenidium molluscum</i>	I (1–6)	I (1–3)	I (1–6)
<i>Fragaria vesca</i>	I (1–3)	I (1–6)	I (1–6)
<i>Cirsium vulgare</i>	I (3)	I (1–3)	I (1–3)
<i>Urtica dioica</i>	I (1)	I (1–3)	I (1–3)
<i>Hypnum cupressiforme</i>	I (3)	I (1–8)	I (1–8)
<i>Senecio jacobaea</i>	I (1–4)	I (1–2)	I (1–4)
<i>Veronica chamaedrys</i>	I (1–2)	I (1–2)	I (1–2)
<i>Pimpinella saxifraga</i>	I (1–3)	I (1–3)	I (1–3)
<i>Clinopodium vulgare</i>	I (2–3)	I (1–3)	I (1–3)
<i>Campylium chrysophyllum</i>	I (2)	I (2–3)	I (2–3)
<i>Gentianella amarella</i>	I (2)	I (1–2)	I (1–2)
<i>Polygala vulgaris</i>	I (1–3)	I (1)	I (1–3)
<i>Galium mollugo</i>	I (1–3)	I (1)	I (1–3)
<i>Rhytidiadelphus squarrosus</i>	I (1–5)	I (1)	I (1–5)
<i>Euphrasia officinalis</i> agg.	I (1–4)	I (1)	I (1–4)
Number of samples	36	87	125
Number of species/sample	25 (8–40)	16 (7–29)	17 (7–40)

a *Dactylis glomerata*-*Briza media* sub-community

b *Potentilla reptans*-*Tragopogon pratensis* sub-community

6 *Avenula pubescens* grassland (total)

