# CG12

# *Festuca ovina-Alchemilla alpina-Silene acaulis* dwarf-herb community

**Synonymy**

Arctic-Alpine grassland Smith 1911 *p.p.*; *Sibbaldia procumbens* nodum Poore 1955*b p.p.*; Dwarf Herb nodum McVean & Ratcliffe 1962; *Myosotis alpestris* localities Elkington 1964 *p.p.*

**Constant species**

*Agrostis capillaris*, *Alchemilla alpina*, *Deschampsia cespitosa*, *Festuca ovina/vivipara*, *Luzula spicata*, *Selaginella selaginoides*, *Sibbaldia procumbens*, *Silene acaulis*, *Thymus praecox*.

**Rare species**

*Alchemilla filicaulis* ssp. *filicaulis*, *Cerastium alpinum*, *Draba norvegica*, *Euphrasia frigida*, *Loiseleuria procumbens*, *Minuartia sedoides*, *Myosotis alpestris*, *Omalotheca supina*, *Poa alpina*, *Potentilla crantzii*, *Sagina saginoides*, *Saxifraga stellaris*, *Sibbaldia procumbens*, *Veronica alpina*, *Aulacomnium turgidum*, *Barbilophozia hatcheri*, *B. lycopodioides*, *Lescuraea incurvata*.

**Physiognomy**

The *Festuca-Alchemilla-Silene* community comprises rich mixtures of grasses and herbaceous dicotyledons which, with bryophytes, form a very distinctive kind of short (usually less than 10 cm) and sometimes rather open sward. Floristically, the vegetation has much in common with the *Festuca-Agrostis-Alchemilla* grass-heath. *Festuca ovina*, *F. vivipara*, *Agrostis capillaris* (with some *A. canina*) and *Nardus stricta* all remain frequent here and, with *Deschampsia cespitosa*, which rises to constancy in this community, they can make up a substantial proportion of the sward. *Alchemilla alpina*, *Thymus praecox* and *Selaginella selaginoides* also remain very common and *A. alpina* especially can be locally abundant. Usually, however, it is the cushion-forming *Silene acaulis* and, less frequently, *Minuartia sedoides* or the tufted *Sibbaldia procumbens* which give the vegetation its unmistakeable stamp, forming on occasion a discontinuous velvety carpet in which the other species are rooted. Although each of these occurs in other montane vegetation types, among the more calcicolous communities it is here that they make their strongest contribution.

Moreover, they are accompanied, with varying degrees of frequency, by a wide variety of montane plants, mostly Arctic-Alpines, some with very restricted distributions in Britain, which make this one of the most renowned of our vegetation types. Most frequent among these are *Luzula spicata*, *Saxifraga oppositifolia* and *Polygonum viviparum* with, less commonly, *Antennaria dioica*, *Salix herbacea*, *Omalotheca supina*, *Thalictrum alpinum*, *Juncus trifidus*, *Euphrasia frigida*, *Epilobium anagallidifolium*, *Alchemilla filicaulis* ssp. *filicaulis* and, especially distinctive of this community, *Sagina saginoides* and *Cerastium alpinum* (this last sometimes hybridising with *C. fontanum* which is occasional in the community: Stace 1975). More rarely, there are records for *Myosotis alpestris* (confined to this vegetation type and to calcicolous swards in higher reaches of the northern Pennines where the plants are distinctly smaller: Pigott 1956*a*, Elkington 1964), *Saxifraga hypnoides*, *S. aizoides*, *S. stellaris*, *S. nivalis*, *Diphasium alpinum*, *Loiseleuria procumbens*, *Veronica alpina*, *Poa alpina*, *Draba norvegica*, *Potentilla crantzii* and *Juncus triglumis*.

The Nardo-Galion and mesophytic elements prominent in the *Festuca-Agrostis-Thymus* and *Festuca-Agrostis-Alchemilla* grasslands are here much less obvious: *Potentilla erecta*, *Galium saxatile*, *Anthoxanthum odoratum*, *Viola riviniana* and *Ranunculus acris* are, at most, occasional and *Vaccinium myrtillus*, *Calluna vulgaris* and *Carex pilulifera* rare. Interestingly, sedges as a group are noticeably scarce here: apart from *C. pilulifera*, there are only very occasional records for *C. pulicaris*, *C. panicea*, *C. demissa* and *C. bigelowii*; *C. flacca* and *C. caryophyllea* are absent and they are not replaced by the Arctic-Alpine calcicoles *C. capillaris*, *C. atrata* and *C. rupestris*, species which are most characteristic of the high-altitude *Dryas-Silene* ledge vegetation.

Other vascular species of note in the community are

*Armeria maritima* and *Viola palustris* which are frequent and *Huperzia selago* which is occasional. There are also sometimes grazed-down plants of a variety of tall herbs such as *Succisa pratensis*, *Geum rivale*, *Rumex acetosa*, *Rhodiola rosea* and *Luzula sylvatica*.

Bryophytes are varied and often prominent in the vegetation but, apart from *Racomitrium lanuginosum* and *R. canescens*, each of which can be locally abundant, individual species do not usually have high cover. As well as these two, the most frequent species are *Hylocomium splendens*, *Pleurozium schreberi*, *Polytrichum alpinum* and *Pogonatum urnigerum* with, less commonly, *Rhytidiadelphus loreus*, *R. squarrosus*, *Ctenidium molluscum*, *Ptilidium ciliare* and *Nardia scalaris*. Among the numerous mosses and hepatics which occur at low frequency, there are various species of more restricted national distribution such as *Aulacomnium turgidum*, *Andreaea alpina*, *Hypnum callichroum*, *H. hamulosum*, *Lescuraea incurvata*, *Bartramia ithyphylla*, *Scapania subalpina*, *Barbilophozia hatcheri* and *B. lycopodioides*. Lichens are never frequent but there is occasionally a little *Cladonia uncialis*, *C. arbuscula*, *C. pyxidata*, *Cetraria islandica* or *Peltigera canina*.

**Habitat**

The *Festuca-Alchemilla-Silene* community is confined to more calcareous rocks in the high montane regions of Scotland where it occurs on often skeletal mull soils, usually moist and of only moderate base-status and sometimes influenced by solifluction and snow-lie. It is usually grazed.

The community is characteristically found only at higher altitudes. It seldom occurs below 700 m, the mean altitude of its stands (about 890 m) is above the upper limit of most other upland calcicolous communities and, in some places, it extends to almost 1200 m. In these mountainous reaches, the climate is typically cold, wet and windy throughout the year. Temperatures are below freezing for much of the long winter and the growing season starts very late, with mean temperatures at 1000 m rising above 5 °C for only five months of the year (Elkington 1964). Over the range of the community, the mean July temperature is usually within the range 11–15 °C (Coker 1966) and the mean maximum for the year rarely exceeds 21 °C (Conolly & Dahl 1970). Annual precipitation is somewhat variable over this montane area, declining markedly from over 2400 mm in the north-west Highlands where there can be more than 220 wet days $yr^{-1}$, to 1500 mm in the southern Highlands, with about 180 wet days $yr^{-1}$ (*Climatological Atlas* 1962, Ratcliffe 1968), but the community is noticeably scarce on potentially suitable exposures further east, as around Caenlochan and Clova, where the precipitation is about 1000 mm $yr^{-1}$ (McVean & Ratcliffe 1962). Although the occurrence of snow is somewhat unpredictable, there are usually at least 50 mornings with snow-lie and, on cooler, north-facing slopes, the community may be affected by the long persistence of snow-beds and their late melting in summer.

Within this regional climatic area, the community is generally restricted to more calcareous bedrocks, free of drift. It is, above all, a vegetation type of Dalradian mica-schists which are most extensively exposed around Breadalbane, but fine stands occur also on Dalradian limestones in the Ben Nevis range and on Moine metasediments around Ben Alder and Beinn Dearg. Outlying localities are found over apparently less calcareous rocks within the Lewisian complex in the north-west Highlands (Poore 1955*b*, McVean & Ratcliffe 1962, Ratcliffe 1977).

Over such bedrocks, the community occurs on loamy mull soils. In some places, the profiles are fairly deep and less disturbed and there may be the differentiation of a distinct, often orange-coloured, B horizon such that the soils could be termed brown earths. Often, however, the profiles are more obviously lithomorphic with but a thin layer of humus or sparse organic detritus overlying or intermixed with weathered bedrock particles. The crumbly, sparkling soils of this kind developed over mica-schist are especially distinctive (Poore 1955*b*, McVean & Ratcliffe 1962, Elkington 1964, Coker 1966). Even on gentle slopes, where there is no pronounced solifluctional creep, the soils may be kept permanently immature by cryoturbational churning. Seasonal snow-melt may also disrupt the profiles and contribute some finer material and, around rills, there may be more substantial deposition of silt with periodic flooding. Occasionally, rock falls and landslips occur (Poore 1955*b*).

Over these calcareous bedrocks, some of which, like the schists, are very soft and easily weathered, these processes help keep the soils moderately base-rich by continually renewing the supply of raw mineral material and the surface pH is usually between 4.5 and 6 (Poore 1955*b*, McVean & Ratcliffe 1962). 'Dry flushing' is especially marked in the creep soils and beneath outcrops from which weathered fragments of rock fall on to the vegetation below. Where snow-melt, springs or diffuse drainage over shedding slopes irrigate the soils with calcareous waters, a common phenomenon here, there is a further enrichment. Though usually free-draining, the soils are often kept very moist by such flushing, probably never fully drying out even in summer and being all the more exposed to cryoturbation in colder weather.

In response to these climatic and edaphic conditions, there is in this vegetation a waning of the important contribution made to sub-montane calcicolous swards by Nardo-Galion species such as *Potentilla erecta*,

*Galium saxatile*, *Luzula campestris*, *Carex pilulifera*, *Anthoxanthum odoratum* and the ericoids. *Nardus stricta*, tolerant of the shorter growing season and the moister soils, persists and *Deschampsia cespitosa* becomes constant. The presence of these species, together with *Sibbaldia procumbens* and, more occasionally, *Salix herbacea* and *Omalotheca supina*, give the vegetation something of a chionophilous feel, especially in stands with a northerly aspect, and this suggests that snow-lie may play some part, along with the generally wet climate, in influencing the distribution and composition of the community (McVean & Ratcliffe 1962).

Some of the other members of the community (such as *Alchemilla alpina* and *Luzula spicata*) are widely-distributed montane species of fairly broad edaphic tolerance but the really distinctive feature of this vegetation is the abundance of species which find the combination of a harsh montane climate and moderately calcareous soils congenial: *Selaginella selaginoides*, *Polygonum viviparum*, *Thalictrum alpinum*, *Saxifraga oppositifolia*, *Silene acualis*, *Minuartia sedoides*, *Myosotis alpestris*, *Cerastium alpinum* and *Sagina saginoides*.

For some of these rarer species, as well as for plants like *Thymus praecox*, the maintenance of a relatively open, short sward is probably of considerable importance in their survival. In very exposed situations, the climatic and edaphic conditions may play a major role in keeping the vegetation stunted and the surface of the soil disturbed and here the community could perhaps be considered as a climax (McVean & Ratcliffe 1962). Often, however, it seems to be grazing by sheep which has helped give rise to the vegetation (perhaps from something like the *Dryas-Silene* community, now largely confined to inaccessible ledges) and which now maintains it in its characteristically rich, varied and close-cropped state. In contrast to sub-montane swards, there is here no marked response to grazing among Cynosurion species. In the extreme climate, these remain at most occasional.

**Zonation and succession**

The community occurs as part of vegetation mosaics which are related primarily to geological and edaphic variation and in altitudinal sequences which reflect climatic differences. Variation in grazing intensity is also important in influencing some zonations.

Where the exposures of calcareous rocks are more restricted, as among the gneisses of the north-west Highlands and the Moine metasediments, the community occurs, sometimes as very small and fragmentary stands, in patchworks of calcicolous vegetation which provide a spectacular local enrichment on and around crags which intrude into more calcifugous communities over acidic rocks and drift. This kind of pattern is very characteristic of parts of Ben Nevis, Ben Alder and Beinn Dearg (Ratcliffe 1977). Where exposures are more extensive, notably on the Dalradian mica-schists around Breadalbane, stands are larger, sometimes of several hectares, and form a major part of considerable expanses of calcicolous vegetation in which the influence of variables such as the extent of snow-lie and the amount of flushing can be more clearly seen.

In such sites this community may give way, in more sheltered positions and on cooler, north-facing slopes, to the more chionophilous vegetation of the *Alchemilla alpina-Sibbaldia procumbens* community. In other cases, and perhaps on sites where there is only a moderate influence of snow-lie but where the moist soils are somewhat less base-rich, there may be transitions to more species-rich types of *Deschampsia-Galium* grassland and, towards lower altitudes, *Nardus-Galium* or *Juncus-Festuca* grasslands.

Where soligenous flushing becomes more pronounced at higher altitudes, the *Festuca-Alchemilla-Silene* community can give way to montane Caricion davallianae mires such as the *Caricetum saxatilis* or the *Carici-Saxifragetum* and, where dripping rock faces protrude, there may be more abrupt transitions to *Saxifraga-Alchemilla* banks. Complex mosaics of all these vegetation types, together with soligenous mires characteristic of flushing with less base-rich waters, are a prominent feature of Ben Lawers.

Here, too, where calcareous rocks extend over considerable altitudes, there are some good sequences from the community to sub-montane vegetation types, down through the *Festuca-Agrostis-Alchemilla* grass-heath to the *Festuca-Agrostis-Thymus* grassland or, where decreasing altitude is accompanied by some lessening of flushing with base-rich waters or increasing contamination with drift, to *Nardus-Galium* and *Juncus-Festuca* grasslands.

A further, common zonation, probably mediated primarily by the intensity of grazing, occurs where the community gives way, over the inaccessible ledges and crevices of cliffs, to stands of the *Dryas-Silene* community and in the often fragmented transitions between the two, vegetation with intermediate floristics is often found.

**Distribution**

The *Festuca-Alchemilla-Silene* community is confined to the higher peaks of the Scottish Highlands. Its centre of distribution is around Breadalbane with more isolated and usually smaller stands on the Moine and Lewisian rocks to the north-west.

**Affinities**

Opinions have differed as to the affinities of the community. Poore (1955*b*) stressed its similarity to the *Potentilla crantzii-Polygonum viviparum* sociation described by Nordhagen (1928) from the Sylene Mountains of Norway and suggested that it could be seen as a member of the same alliance, the Potentilleto-Polygo-

nion of the Elyno-Seslerietea, the class of montane calcicolous dwarf-shrub heaths. Such an allocation would stress the possible derivation of this vegetation by grazing from the high-altitude *Dryas-Silene* community. McVean & Ratcliffe (1962), on the other hand, preferred to follow Dahl (1956) in placing the community in the Ranunculeto-Oxyrion digynae of the Salicetea herbaceae, which would emphasise its floristic similarity to certain vegetation types influenced by long snow-lie or marked exposure and solifluction.

## Floristic table CG12

| | | | |
|---|---|---|---|
| *Festuca ovina* | V (1–7) | *Rhytidiadelphus squarrosus* | II (1–3) |
| *Thymus praecox* | V (1–4) | *Viola riviniana* | II (2–3) |
| *Alchemilla alpina* | V (1–8) | *Euphrasia officinalis* agg. | II (2–3) |
| *Agrostis capillaris* | IV (2–6) | *Carex bigelowii* | II (1–5) |
| *Luzula spicata* | IV (1–3) | *Huperzia selago* | II (1–2) |
| *Deschampsia cespitosa* | IV (1–4) | *Cerastium fontanum* | II (1–2) |
| *Sibbaldia procumbens* | IV (1–4) | *Cladonia uncialis* | II (1–3) |
| *Silene acaulis* | IV (2–8) | *Vaccinium myrtillus* | I (1–2) |
| *Selaginella selaginoides* | IV (1–3) | *Carex pilulifera* | I (1–4) |
| *Hylocomium splendens* | III (1–4) | *Dicranum scoparium* | I (1–2) |
| *Polytrichum alpinum* | III (1–3) | *Thuidium tamariscinum* | I (1–3) |
| *Nardus stricta* | III (2–4) | *Deschampsia flexuosa* | I (3–5) |
| *Racomitrium lanuginosum* | III (1–6) | *Festuca rubra* | I (2–3) |
| *Pleurozium schreberi* | III (1–5) | *Hypnum cupressiforme* | I (1–3) |
| *Minuartia sedoides* | III (1–8) | *Geum rivale* | I (1–2) |
| *Viola palustris* | III (1–3) | *Vaccinium vitis-idaea* | I (1–3) |
| *Racomitrium canescens* | III (1–6) | *Luzula sylvatica* | I (1–2) |
| *Armeria maritima* | III (1–4) | *Empetrum nigrum hermaphroditum* | I (2–4) |
| *Saxifraga oppositifolia* | III (1–4) | *Carex pulicaris* | I (2–5) |
| *Salix herbacea* | III (1–3) | *Alchemilla filicaulis vestita* | I (3–5) |
| *Pogonatum urnigerum* | III (1–3) | *Rhytidiadelphus triquetrus* | I (1–3) |
| *Omalotheca supina* | III (1–2) | *Campanula rotundifolia* | I (2–3) |
| *Polygonum viviparum* | III (1–4) | *Peltigera canina* | I (1–3) |
| *Rhytidiadelphus loreus* | II (1–3) | *Rumex acetosa* | I (1–2) |
| *Potentilla erecta* | II (1–3) | *Ditrichum flexicaule* | I (2–3) |
| *Festuca vivipara* | II (1–4) | *Carex panicea* | I (1–3) |
| *Agrostis canina* | II (1–5) | *Tortella tortuosa* | I (1–4) |
| *Ranunculus acris* | II (2–4) | *Thuidium delicatulum* | I (2–3) |
| *Thalictrum alpinum* | II (1–5) | *Plagiochila asplenoides* | I (1–2) |
| *Succisa pratensis* | II (1–2) | *Diplophyllum albicans* | I (1–2) |
| *Nardia scalaris* | II (1–3) | *Veronica serpyllifolia* | I (1–2) |
| *Cerastium alpinum* | II (1–3) | *Achillea millefolium* | I (1–4) |
| *Juncus trifidus* | II (1–3) | *Taraxacum officinale* agg. | I (1–2) |
| *Euphrasia frigida* | II (2–3) | *Drepanocladus uncinatus* | I (1–3) |
| *Epilobium anagallidifolium* | II (1–3) | *Leontodon autumnalis* | I (1–3) |
| *Sagina saginoides* | II (1–3) | *Botrychium lunaria* | I (1–2) |
| *Luzula multiflora* | II (1–3) | *Saxifraga hypnoides* | I (1–3) |
| *Ptilidium ciliare* | II (1–2) | *Cladonia pyxidata* | I (1–2) |
| *Ctenidium molluscum* | II (1–5) | *Diphasium alpinum* | I (1–4) |
| *Antennaria dioica* | II (1–2) | *Tritomaria quinquedentata* | I (1–2) |
| *Alchemilla filicaulis filicaulis* | II (2–4) | *Racomitrium fasciculare* | I (1–3) |
| *Anthoxanthum odoratum* | II (1–4) | *Saxifraga aizoides* | I (1–2) |
| *Galium saxatile* | II (1–3) | *Viola lutea* | I (1–3) |
| | | *Cetraria islandica* | I (1–3) |

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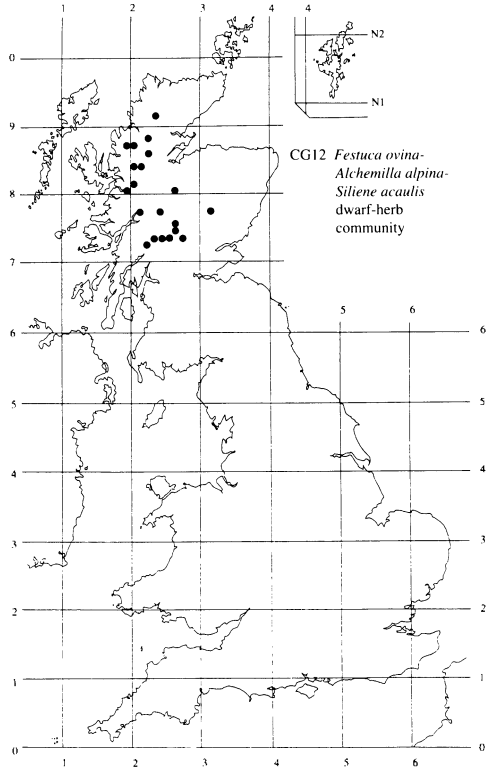
## Floristic table CG12 (*cont.*)

| | |
|---|---|
| *Hypnum callichroum* | I (1–3) |
| *Aulacomnium turgidum* | I (1–4) |
| *Cladonia arbuscula* | I (1) |
| *Galium boreale* | I (1) |
| *Trollius europaeus* | I (1) |
| *Rhodiola rosea* | I (1–2) |
| *Loiseleuria procumbens* | I (1–3) |
| *Mnium hornum* | I (1) |
| *Barbilophozia hatcheri* | I (1) |
| *Carex demissa* | I (1) |
| *Plantago maritima* | I (2) |
| *Calluna vulgaris* | I (1) |
| *Veronica officinalis* | I (1) |
| *Pseudoscleropodium purum* | I (3) |
| *Veronica alpina* | I (1–2) |
| *Poa alpina* | I (1–2) |
| *Scapania subalpina* | I (1) |
| *Oxalis acetosella* | I (1) |
| *Luzula campestris* | I (1) |
| *Hieracium* spp. | I (2) |
| *Bartramia ithyphylla* | I (1) |
| *Myosotis alpestris* | I (1–3) |
| *Draba norvegica* | I (1) |
| *Potentilla crantzii* | I (1–3) |
| *Lescuraea incurvata* | I (1–2) |
| *Saxifraga stellaris* | I (2) |
| *Juncus triglumis* | I (1) |
| *Andreaea alpina* | I (2–7) |
| *Breutelia chrysocoma* | I (1) |
| *Anemone nemorosa* | I (1) |
| *Linum catharticum* | I (3) |
| *Filipendula ulmaria* | I (1) |
| *Frullania tamarisci* | I (2) |
| *Cardamine pratensis* | I (2) |
| *Cladonia gracilis* | I (1) |
| *Solidago virgaurea* | I (1) |
| *Barbilophozia lycopodioides* | I (1) |
| *Hypnum hamulosum* | I (2) |
| *Saxifraga nivalis* | I (1) |
| Number of samples | 21 |
| Number of species/sample | 33 (19–46) |

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