H14
Calluna vulgaris-Racomitrium lanuginosum heath

Synonymy
Rhacomitreto-Callunetum McVean & Ratcliffe 1962, Birks 1973; Dwarf mountain heaths Gimingham 1972 *p.p.*; *Calluna vulgaris-Arctostaphylos uva-ursi* nodum Prentice & Prentice 1975 *p.p.*; *Alectorio-Callunetum*, *Agrostis canina* ssp. *montana* subassociation Birse 1980 *p.p.*

Constant species
Calluna vulgaris, *Deschampsia flexuosa*, *Hypnum cupressiforme s.l.*, *Racomitrium lanuginosum*, *Cladonia arbuscula*, *C. uncialis*.

Rare species
Arctostaphylos alpinus, *A. uva-ursi*, *Loiseleuria procumbens*.

Physiognomy
The *Calluna vulgaris-Racomitrium lanuginosum* heath consists essentially of a dwarfed sub-shrub mat, with *Calluna vulgaris* usually predominating as in the *Calluna-Cladonia* heath, but with *Racomitrium lanuginosum* occupying the prominent role which lichens have in that community. As there, the cover of woody plants is typically far from complete, with the heather, severely wind-trimmed to prostrate bushes just a few centimetres thick, often occupying less than half of the ground. Other sub-shrubs generally play a subordinate part, but a number are quite common, sometimes showing local abundance, partly replacing *Calluna* or supplementing its cover, and helping to distinguish the different sub-communities. The most frequent of these woody associates throughout is the Arctic-Alpine *Empetrum nigrum* and, again as in the *Calluna-Cladonia* heath, the two sub-species tend to characterise opposite extremes of the altitudinal range of this community, with ssp. *nigrum* being preferentially common and moderately abundant towards lower levels, ssp. *hermaphroditum* largely confined to the higher. But *Erica cinerea* is frequent too, much more so than in the continental *Calluna-Cladonia* heath and especially at lower altitudes where, with *Arctostaphylos uva-ursi* and *A. alpinus*, it helps give the *Arctostaphylos* sub-community its distinctive character. Both species of bearberry can show quite high covers here and this kind of heath includes much of the vegetation in north-west Scotland where these two rare Arctic-Alpines occur together. Another rarity occasionally represented in the community is *Loiseleuria procumbens*, and scattered throughout are scarce records for *Juniperus communis*, generally clearly of ssp. *nana*. *Vaccinium myrtillus* is never more than occasional and typically present as sparse shoots, and *V. vitis-idaea* and *V. uliginosum* are rare.

Among the open patchwork of flattened bushes, other vascular associates are few and far between, with usually scattered and stunted individuals, but this element of the flora can be a little more varied than in the *Calluna-Cladonia* heath. As there, *Deschampsia flexuosa* and *Huperzia selago* can be frequent and *Carex bigelowii* becomes common at higher altitudes, but *Scirpus cespitosus* is found more often and there is frequently some *Carex pilulifera* and *Potentilla erecta*. Then, there can be some *Solidago virgaurea*, in its very diminutive form sometimes called var. *cambrica*, and tiny rosettes of *Succisa pratensis*, and in certain stands grasses can make a modest contribution to the cover.

Much more noticeable than these, however, and helping mark off this community not just from the *Calluna-Cladonia* heath but from other dwarfed sub-shrub mats, is the abundance of *Racomitrium lanuginosum*, typically forming an extensive woolly carpet up to 5–10 cm thick between the sub-shrubs and among their barer branches. Rarely it is the only bryophyte, but *Hypnum cupressiforme s.l.* is also very frequent and it, too, can show some local abundance. Then, in some stands, there can be patches of *Dicranum scoparium*, *Pleurozium schreberi*, *Hylocomium splendens* and *Rhytidiadelphus loreus* with, less commonly, scattered plants of *Campylopus paradoxus* and *Sphagnum capillifolium*.

A notable feature of sheltered crevices and lower altitudes is the occasional occurrence of oceanic hepatics such as *Diplophyllum albicans*, *Scapania gracilis* and *Frullania tamarisci*.

Among this mat, lichens are common and sometimes quite varied, but they do not usually occur with any great abundance and species such as *Cetraria nivalis* and *Alectoria ochroleuca*, characteristic of the bleakest ridges and summits in the *Calluna-Cladonia* heath, are characteristically absent. *Cladonia arbuscula* and *C. uncialis* are the most frequent members of this element and each can be found at moderately high cover. *Sphaerophorus globosus* and *Cornicularia aculeata* are also common throughout, with *Cladonia impexa* making a frequent appearance at lower altitudes, *C. gracilis*, *C. bellidiflora*, *Cetraria islandica* and *Ochrolechia frigida* occurring often at higher levels. *Cladonia coccifera* and *C. rangiferina* are very occasional.

Sub-communities

***Festuca ovina* sub-community:** *Rhacomitreto-Callunetum* Birks 1973 *p.p.*; *Alectorio-Callunetum*, *Agrostis canina* ssp. *montana* subassociation Birse 1980 *p.p. Calluna* or *R. lanuginosum* or mixtures of the two dominate the vegetation mat here with other plants usually relegated to a minor role. *Empetrum nigrum*, both ssp. *nigrum* and ssp. *hermaphroditum*, and *Erica cinerea* occur occasionally, though hardly ever in any abundance, and in some stands *Loiseleuria* can be quite prominent, though *Arctostaphylos* spp. are normally absent. More striking here is the variety of herbaceous associates. *Deschampsia flexuosa* is actually rather less common than usual but, along with frequent *Carex bigelowii*, there is very often some *C. pilulifera*, *Huperzia selago* and *Potentilla erecta*. More strongly preferential still is *Festuca ovina* (including *F. vivipara*) with *Agrostis canina* (mostly recorded as ssp. *montana*), and *Antennaria dioica* also quite frequent. Less common, but also diagnostic, are *Carex panicea*, *Thymus praecox* and *Salix herbacea* and, on Skye, this vegetation provides a locus for the diminutive Northern Montane orchid *Pseudorchis albida*. *Polytrichum piliferum* occurs occasionally and, again on Skye, Birks (1973) recorded *Racomitrium fasciculare*, *R. heterostichum*, *Andreaea rothii* and *Campylopus atrovirens* in some stands. Lichen cover tends to be lower than in other kinds of *Calluna-Racomitrium* heath but *C. uncialis* is very common and there is occasionally some *Sphaerophorus globosus*, *Cornicularia aculeata* and *Cladonia arbuscula*.

***Empetrum nigrum* ssp. *hermaphroditum* sub-community:** *Rhacomitreto-Callunetum*, *empetrosum* facies McVean & Ratcliffe 1962. *Calluna* is generally the most abundant plant in this sub-community with *R. lanuginosum* sometimes co-dominant but quite often subordinate in cover. *Empetrum nigrum* ssp. *hermaphroditum* is very common, too, and it can be fairly extensive in the mat, occasionally with *Erica cinerea*. The variety of herbs typical of the *Festuca* sub-community is not found here, though the community species *Deschampsia flexuosa* and *Carex bigelowii* are very frequent and *Potentilla erecta*, *Huperzia selago* and *Carex pilulifera* remain quite common. *Nardus stricta* is also often found, though not in any abundance, and *Diphasium alpinum* is strongly preferential. But most distinctive here are the associated cryptogams. In addition to *R. lanuginosum*, there are occasional records for *Dicranum scoparium*, *Pleurozium schreberi*, *Rhytidiadelphus loreus* and *Hylocomium splendens* and the lichen flora typical of the community is supplemented by a variety of species. *Cladonia gracilis* and *C. bellidiflora* occur commonly among the *C. uncialis* and *C. arbuscula* and the combined cover of these bulkier species can be quite considerable. Then, there is very often some *Cetraria islandica* and *Ochrolechia frigida*, with occasional *Cladonia pyxidata*, *C. coccifera* and *Cetraria glauca*.

***Arctostaphylos uva-ursi* sub-community:** *Rhacomitreto-Callunetum*, *arctostaphyletosum* facies McVean & Ratcliffe 1962; *Rhacomitreto-Callunetum* Birks 1973 *p.p.*; *Calluna vulgaris-Arctostaphylos uva-ursi* nodum Prentice & Prentice 1975. *Calluna* and *R. lanuginosum* retain the kind of contribution here that they show in the previous sub-community, with the former generally the more abundant, the latter varying from somewhat sparse to predominant. But the sub-shrub mat is considerably more varied, with *Empetrum nigrum* ssp. *nigrum* and *Erica cinerea* showing their peak of frequency in this kind of *Calluna-Racomitrium* heath with, more strikingly preferential, *Arctostaphylos uva-ursi* and, rather less common but likewise locally abundant, *A. alpinus*. Among the vascular associates, *Scirpus cespitosus*, *Molinia caerulea* and *Carex binervis* become quite common, along with *Deschampsia flexuosa*, *Potentilla erecta* and *Carex pilulifera*, but *C. bigelowii* is very scarce. There are very occasional records for *Dactylorhiza maculata*, *Dryopteris abbreviata* and *Hymenophyllum wilsonii*. In the bryophyte mat, *Dicranum scoparium* and larger pleurocarps such as *Hypnum cupressiforme s.l.* and *Pleurozium schreberi* make their maximum contributions with *Rhytidiadelphus loreus* and *Hylocomium splendens* occasional. Hepatics, too, can be frequent with *Scapania gracilis*, *Diplophyllum albicans* and *Frullania tamarisci* strongly preferential and giving a particularly distinctive feel when occurring together in more sheltered stands included here. The lichen flora has some peculiarities too, with *Cladonia impexa* common among the frequent *C. arbuscula*, *C. uncialis* and *Sphaerophorus globosus*.

Habitat

The *Calluna-Racomitrium* heath is the typical sub-shrub community of base-poor soils on windswept plateaus and ridges at moderate to fairly high altitudes in the cool oceanic climate of the mountains of north-west Scotland. It can be grazed by sheep and deer, but this is probably not ultimately important in maintaining the characteristic composition and physiognomy and this vegetation can be regarded as the natural climax in such exposed situations in this part of Britain.

Like the *Calluna-Cladonia* heath, the counterpart of this community in the eastern Highlands, this is essentially a vegetation type of the low-alpine zone (Poore & McVean 1957), running up to the limit of heather dominance but also including frequent records for a variety of Arctic-Alpine plants tolerant of the generally cold montane climate: *Empetrum nigrum*, *Arctostaphylos uva-ursi*, *A. alpinus*, *Loiseleuria* and *Carex bigelowii*. However, with the shift towards the north-west of Scotland, where summer temperatures at identical altitudes become progressively cooler, the actual upper altitudinal limit of this general kind of vegetation drops (Poore & McVean 1957, McVean & Ratcliffe 1962). Thus, although the *Calluna-Racomitrium* heath can be found up to the same levels as the *Calluna-Cladonia* heath, around 1000 m, this is very exceptional and usually confined to the eastern limits of its range, where the community has a few scattered stations in the central Grampians. For the most part, the upper reaches of this kind of vegetation are around 750 m and, particularly towards the seaward side of the north-west Highlands, within which range of mountains it has its centre of distribution, and on those islands where it is represented, such as Skye, Orkney and Shetland, it can extend down to 250 m or less.

Through this zone in this part of Britain, mean annual maximum temperatures are between 21 and 23 °C (Conolly & Dahl 1970), very much as over the upper reaches of the eastern Highlands. But, particularly towards lower altitudes, the winter temperatures through the north-west Highlands are noticeably milder than to the east, such that the annual fluctuations are considerably reduced and the growing season at equivalent altitudes lengthened. Also very important is the fact that the precipitation is very much higher than in eastern Scotland, with well over 1600 mm annually through much of the range of the community (*Climatological Atlas* 1952) and, more particularly, over 220 wet days yr^{-1} (Ratcliffe 1968). The potential water deficit over most of the region is thus at or very near to zero, with high relative humidity throughout the year and, on the upper slopes, a high percentage of daytime cloudiness (*Climatological Atlas* 1952, Ratcliffe 1968, Chandler & Gregory 1976, Page 1982).

It is this combination of a relatively equable temperature regime and a more or less constantly humid atmosphere that characterises the regional climate of the *Calluna-Racomitrium* heath and determines its general composition, marking out the geographical and floristic boundaries with the *Calluna-Cladonia* heath. By and large, the eastern limits of the former run from Ben Klibrech in Sutherland, down to Ben Wyvis and then to Ben Alder in Inverness, although most of the stands are in fact to the north of the Great Glen (McVean & Ratcliffe 1962). The *Calluna-Cladonia* heath can be found west of this line but, increasingly with the shift into the region of more oceanic climate, the important role of the large *Cladonia* and *Cetraria* spp. among the sub-shrub mat is occluded by the greater competitive power of *R. lanuginosum* and, to a lesser extent, of other bulky bryophytes like *Hypnum cupressiforme s.l.*, *Dicranum scoparium* and *Pleurozium schreberi*, such that the general character of the low-alpine heather-dominated vegetation in this part of Britain becomes that of a 'moss-heath' rather than a 'lichen-heath'. But intermediates between the extreme types are common and, in the area of geographical overlap of their ranges, the large proportion of the flora shared by both kinds of heath is very obvious and separation of stands is sometimes a matter of the pattern of dominance among the cryptogam element of the flora.

Very often, though, the more oceanic character of the *Calluna-Racomitrium* heath is confirmed by the occurrence, too, of *Erica cinerea* and *Carex pilulifera*, plants of very restricted occurrence in the *Calluna-Cladonia* heath. Here, these find their best representation in the *Arctostaphylos* sub-community which takes the *Calluna-Racomitrium* heath to its lowest altitudes and where the most sheltered extremes colonised by the community are reflected in the occasional occurrence of *Molinia*, the Oceanic West European *Carex binervis*, the Atlantic ferns *Hymenophyllum wilsonii* and *Dryopteris abbreviata* (Page 1982), and oceanic hepatics like *Diplophyllum albicans*, *Scapania gracilis*, *Frullania tamarisci* and, more rarely, *Pleurozia purpurea*, *Anastrepta orcadensis* and *Plagiochila spinulosa*. This kind of vegetation brings the community close to some types of *Calluna-Erica* heath, the sub-shrub vegetation which often replaces it in the sub-montane zone.

At the opposite extreme is the *Empetrum* sub-community which extends up to the highest levels occupied by the *Calluna-Racomitrium* heath, with a mean altitude 400 m above that of the *Arctostaphylos* sub-community. Here, ssp. *hermaphroditum* becomes the dominant crowberry taxon, with the preferential occurrence of the montane lichens *Cetraria islandica* and *Ochrolechia frigida* also reflecting the harsher conditions. It is here that the community becomes most similar to the *Calluna-Cladonia* heath, although lichens

such as *Cetraria nivalis* and *Alectoria ochroleuca*, which are characteristic of the bleakest situations among the continental heaths, are still absent.

As with the *Calluna-Cladonia* heath, physiography can locally enhance or ameliorate the kind of exposure which favours the optimal development of this vegetation. Generally, it is found over similar gentle to moderately steep slopes as its eastern counterpart, open to the blast of fairly constant and strong winds and blown clear of snow that might provide some shelter in the coldest months. Where spurs or ridges provide locally exposed situations at lower altitudes, where gales can still be frequent and strong in this part of Scotland (Shellard 1976), then the *Calluna-Racomitrium* heath can extend down further than usual whereas, with some degree of shelter higher up within the low-alpine zone, it may be replaced by more chionophilous vegetation where shallow snow can settle.

With the general shift to lower altitudes of the dwarfed sub-shrub heaths in the north-west Highlands, the *Calluna-Racomitrium* heath is excluded from many mountain tops in this part of the country, being more characteristic of plateaus and ridges below the highest summits. In such situations, the moraines which are very widespread over gentler slopes often provide a suitable substrate for the development of the base-poor rankers and podzolic soils typical here, but the community is also frequently found over drift-free granulites and schists of the Moine series, Torridonian sandstone, Lewisian gneiss, the Tertiary basalt of Skye and Devonian Old Red Sandstone on Orkney. The profiles seem generally similar to those of the *Calluna-Cladonia* heath, with a superficial pH of between 4 and 5, but are perhaps more consistently humic above, sometimes amounting to little more than accumulations of raw organic matter over rock fragments.

In the *Festuca* sub-community, with its preferentially frequent *Carex pilulifera*, *Festuca ovina*, *Agrostis canina* ssp. *montana* and occasional *Thymus praecox* and *Carex panicea*, it seems likely that the *Calluna-Racomitrium* heath extends some way on to less humic and perhaps less base-poor soils where there may be some mild influence of calcareous bedrocks, like some mica-schists. But it seems possible, too, that this vegetation is more influenced by grazing than the other sub-communities, although even here the effects are not pronounced. For, in general, this is a climax vegetation type, the essential composition and structure of which are controlled by climate.

Zonation and succession

The *Calluna-Racomitrium* heath characteristically occurs in zonations and mosaics with other sub-shrub vegetation and montane heaths, snow-bed communities and mires where variation is mainly influenced by differences in climate and soils with altitude and local topography. Shifts on to more base-rich profiles derived from less siliceous parent materials can complicate these patterns and treatments have sometimes affected the lower reaches of zonations. The move south-eastwards sees a gradual geographical replacement of the more oceanic vegetation types in these sequences by their continental equivalents and, in the transition zone, intermediate patterns can be found.

The typical altitudinal zonation in which the *Calluna-Racomitrium* heath occurs is well seen in the north-west Highlands over the slopes of Ben More Assynt and Foinaven (McVean & Ratcliffe 1962, Ratcliffe 1977). Here, the community is found on broad, windswept ridges cut into Cambrian quartzite, generally passing downslope into some other kind of sub-shrub vegetation. Locally, in more sheltered situations at lower altitudes, but where the soils remain relatively free-draining, the *Calluna-Racomitrium* heath is replaced by the *Calluna-Erica* heath, the *Arctostaphylos* sub-community of the former and the *Racomitrium* sub-community of the latter representing an almost continuous transition. Generally, however, such a sequence is better seen in the more oceanic conditions found on Skye (Birks 1973) and Orkney (Prentice & Prentice 1975), where the *Calluna-Erica* heath is much more frequent. And, through the north-west Highlands, too, the move downslope often involves a further shift on to less well-drained ground where some sort of wet heath is the more natural development. Usually, in this part of the country, it is the *Scirpus-Erica* heath that occurs in this position in the zonation, where shallow peat is beginning to accumulate over gleyed podzolic soils on the gentle slopes of the low-altitude plateaus. Here, the major floristic change is the marked increase in frequency of *Scirpus cespitosus* and *Molinia* and the appearance of *Erica tetralix* but the pattern of dominance in this kind of vegetation is very varied and, in its *Cladonia* sub-community, the cryptogamic flora is very similar to that of the *Calluna-Racomitrium* heath and, again, the *Arctostaphylos* sub-community can form a gentle transition to it. The usual continuation of this kind of zonation is to *Scirpus-Eriophorum* blanket mire over the deeper and wetter peats of the waterlogged lower ground.

Even where there is some strong element of floristic continuity between the *Calluna-Racomitrium* heath and the vegetation which replaces it downslope, there is usually an obvious physiognomic change from a markedly dwarfed character to a taller, bushier cover in which the vascular associates can make more luxuriant growth. Sometimes, though, as on Foinaven, the community gives way below to prostrate vegetation in which *Juniperus communis* ssp. *nana* becomes very common and often co-dominant with the stunted

heather but where such plants as *Erica cinerea*, *Arctostaphylos uva-ursi*, *A. alpinus* and *Empetrum nigrum* remain quite frequent with usually sparse shoots of *Racomitrium lanuginosum* and lichens. Such *Calluna-Juniperus* heath is, like the *Calluna-Racomitrium* heath, chionophobous but it is really a transitional community on the junction of the low-alpine and sub-alpine zones (Poore & McVean 1957) and it has fairly common *Pleurozia purpurea*, *Frullania tamarisci* and *Diplophyllum albicans*. It can be seen as the north-west Highland equivalent of the *Juniperus-Oxalis* scrub of the east-central Highlands, though there it is ssp. *communis* that colonises up to the limit of the forest zone.

One other community that can be found at levels which are generally below those of the *Calluna-Racomitrium* heath, but which is also strongly dependent on cool and very humid conditions associated with sheltered, sunless slopes, is the *Calluna-Vaccinium-Sphagnum* heath. Here, some measure of floristic continuity is provided by *R. lanuginosum* and the bulky pleurocarp associates, but the oceanic hepatic component of the *Calluna-Vaccinium-Sphagnum* heath is so distinctive and its luxuriance so pronounced that there is never any real doubt as to where the transition occurs and, typically, it marks an obvious shift in aspect, from southerly or westerly slopes to those facing east or north. But both this vegetation and the *Calluna-Juniperus* heath can be badly damaged by burning so more diffuse mosaics can sometimes develop.

Moving upslope on to ground that remains equally exposed to high winds as that carrying the *Calluna-Racomitrium* heath, the community is usually replaced by some kind of *Carex-Racomitrium* heath, a more compendious community in this scheme than previously understood and taking in much of the summit moss-heath and some fell-field vegetation of the north-west Highlands. Again, the floristic transition can be a gradual one with *R. lanuginosum* in particular retaining high cover, indeed generally increasing its extent to overwhelming dominance of the ground carpet, and *Carex bigelowii*, *Deschampsia flexuosa*, *Diphasium alpinum* and certain of the lichens continuing in frequency. But *Calluna* is typically unable to survive at the higher altitudes occupied by this vegetation and, in sites like Ben More Assynt and Foinaven, there is often additionally a suite of cushion herbs in the *Carex-Racomitrium* heath that gives the vegetation a very distinctive appearance. An alternative zonation over higher ground can be seen in parts of Foinaven where the *Calluna-Racomitrium* heath passes on summit blanket peat to the *Calluna-Eriophorum* mire.

Two other complications to the basic pattern of communities deserve note. First, where there is some increase in shelter within the low-alpine zone and a little above it, such that a modest amount of snow can accumulate during the winter in shallow hollows, among block scree and over lee slopes, the *Calluna-Racomitrium* heath can give way to the *Vaccinium-Racomitrium* heath. Many species run on into this vegetation, but *Calluna* itself becomes very patchy and dominance generally passes to *Vaccinium myrtillus* or *E. nigrum* ssp. *hermaphroditum* which can thus extend the abundant representation of sub-shrubs to 100 m or more above the upper limit of heather.

In other cases, a zone of the *Vaccinium-Racomitrium* or *Vaccinium-Rubus* heath forms a transitional belt around snow-beds proper, in cold and sheltered hollows among *Calluna-Racomitrium* heath. Such patterns are not well developed on Ben More Assynt and Foinaven, but they can be seen on Beinn Dearg where various types of *Nardus-Carex* vegetation mark out areas of late snow-lie over slopes cut into siliceous granulites, and also on the Lewisian gneiss of the Letterewe hills, though in this range the *Calluna-Racomitrium* heath itself is reduced to a rather fragmentary zone between *Scirpus-Eriophorum* blanket mire and the *Carex-Racomitrium* vegetation of the summits.

The other variation involves the occurrence of dwarfed sub-shrub heath in which *Arctostaphylos alpinus* is a consistent component, generally without *A. uva-ursi*, though often with *Loiseleuria* and various other of the *Calluna-Racomitrium* species. This, too, is a chionophobous vegetation type, characteristic of situations which are, if anything, even more exposed than those typical here and thus sometimes running on upslope from the *Calluna-Racomitrium* heath a little way over blasted brows. But *A. alpinus* is also associated with soils in which the humus is more like a moder than a mor, so there may be some subtle edaphic differences involved in patchworks of these vegetation types, such as can be seen on Foinaven and Ben Wyvis.

As far east as Ben Wyvis, however, the *Calluna-Racomitrium* heath has almost petered out as a component of the low-alpine zone which, with increasing continentality of climate, extends to higher altitudes and has the *Calluna-Cladonia* heath as the prevailing dwarfed sub-shrub vegetation. Indeed, this already figures along with the *Calluna-Racomitrium* heath in low-alpine mosaics on Beinn Dearg in Ross and over the Affric-Cannich hills but, beyond the line between Ben Klibreck to the north and Ben Alder in the south, the shift away from the oceanic pattern is visible at all levels in the altitudinal zonation.

Distribution

The *Calluna-Racomitrium* heath is very much a community of the north-west Highlands with scattered occurrences in the central Grampians. In this latter region and at its higher stations through the north-west, the *Empetrum* sub-community is the typical form, with

the *Arctostaphylos* and *Festuca* types extending the range to lower levels and on to the western Isles, Orkney and Shetland.

Affinities

Although heath vegetation with sub-shrubs and abundant *R. lanuginosum* figures in some early descriptive accounts of Scottish vegetation (e.g. Smith 1911*a*), such categories were rather compendious and centred mainly on the higher-altitude moss-heath and fell-field vegetation, most of which falls into the *Carex-Racomitrium* heath. Again, it was not until the studies of McVean & Ratcliffe (1962) that this community was clearly distinguished from that kind of heath and from the lichen-rich vegetation of the continental *Calluna-Cladonia* heath. Subsequent work has further clarified their suggestion of different facies and added what is here defined as the *Festuca* sub-community (Birks 1973; Birse 1980, although he includes this as part of his *Alectorio-Callunetum*, along with much *Calluna-Cladonia* heath).

McVean & Ratcliffe (1962), Birks (1973) and Birse (1980) all agree in including this vegetation in the Arctostaphyleto-Cetrarion or Loiseleurio-Arctostaphylion, although, in the *Arctostaphylos* sub-community, it is difficult to draw a sharp dividing line between this vegetation and the sub-montane Calluno-Ulicetalia community, the *Calluna-Erica* heath. Corresponding associations to the *Calluna-Racomitrium* heath have not been described from the sub-Arctic or Scandinavia and this is very much a vegetation type of the extreme oceanic fringe of the European low-alpine zone.

Floristic table H14

	a	b	c	14
Calluna vulgaris	V (1–8)	V (4–8)	V (4–8)	V (1–8)
Racomitrium lanuginosum	V (1–10)	V (1–6)	V (1–10)	V (1–10)
Cladonia uncialis	V (1–4)	V (1–6)	IV (1–4)	V (1–6)
Hypnum cupressiforme s.l.	IV (1–4)	III (1–4)	IV (1–4)	IV (1–4)
Cladonia arbuscula	II (1–3)	V (1–6)	IV (1–4)	IV (1–6)
Deschampsia flexuosa	II (1–4)	V (1–4)	IV (1–4)	IV (1–4)
Potentilla erecta	V (1–4)	III (1–3)	III (1–2)	III (1–4)
Huperzia selago	IV (1–3)	III (1–3)	II (1–3)	III (1–3)
Carex pilulifera	IV (1–4)	III (1–3)	III (1–3)	III (1–4)
Festuca ovina/vivipara	IV (1–5)	I (1–3)	II (1–4)	II (1–5)
Antennaria dioica	III (1–3)	II (1–3)	II (1–3)	II (1–3)
Agrostis canina	III (1–4)	I (1–3)	II (1–3)	II (1–3)
Alectoria nigricans	II (1–3)	I (1–3)		I (1–3)
Polytrichum piliferum	II (1–3)	I (1–3)		I (1–3)
Carex panicea	II (1–3)			I (1–3)
Euphrasia micrantha	II (1–3)			I (1–3)
Thymus praecox	II (2–3)			I (2–3)
Racomitrium fasciculare	I (1–5)			I (1–5)
Andreaea rothii	I (1–3)			I (1–3)
Campylopus atrovirens	I (1–3)			I (1–3)
Cetraria islandica	II (1–3)	V (1–3)	II (1–3)	III (1–3)
Empetrum nigrum hermaphroditum	II (1–4)	V (1–4)	I (1–3)	III (1–4)
Cladonia gracilis	I (1–3)	IV (1–3)	II (1)	II (1–3)
Ochrolechia frigida	II (1–3)	III (1–3)	I (1)	II (1–3)
Nardus stricta	II (1–4)	III (1–6)	I (1–3)	II (1–6)
Diphasium alpinum	I (1–3)	III (1–4)		II (1–4)
Cladonia bellidiflora	I (1–3)	III (1–3)		II (1–3)
Cladonia pyxidata		II (1–3)	I (1)	I (1–3)
Ptilidium ciliare		II (1–3)		I (1–3)
Cetraria glauca		II (1)		I (1)

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Floristic table H14 *(cont.)*

	a	b	c	14
Erica cinerea	II (1–3)	III (1–4)	IV (1–4)	III (1–4)
Arctostaphylos uva-ursi			V (1–6)	III (1–6)
Dicranum scoparium	I (1–3)	II (1–3)	IV (1–3)	III (1–3)
Scirpus cespitosus	II (1–3)	II (1–4)	III (1–3)	III (1–4)
Pleurozium schreberi	I (1–3)	II (1–3)	III (1–4)	III (1–4)
Empetrum nigrum nigrum	II (1–3)	I (1)	III (1–4)	III (1–4)
Diplophyllum albicans	II (1–3)	I (1–3)	III (1–3)	II (1–3)
Cladonia impexa	I (1–3)	I (1–3)	III (1–6)	II (1–6)
Arctostaphylos alpinus	I (1–3)		III (1–7)	II (1–7)
Frullania tamarisci		I (1–3)	III (1–4)	II (1–4)
Scapania gracilis	I (1–3)	I (1)	II (1–3)	I (1–3)
Molinia caerulea	I (1–3)	I (1–3)	II (1–3)	I (1–3)
Carex binervis	I (1)		II (1–4)	I (1–4)
Dactylorhiza maculata		I (1)	II (1–3)	I (1–3)
Hymenophyllum wilsonii			I (1–2)	I (1–2)
Dryopteris abbreviata			I (2)	I (2)
Sphaerophorus globosus	III (1–3)	III (1–3)	III (1–3)	III (1–3)
Cornicularia aculeata	II (1–3)	III (1–3)	II (1–3)	III (1–3)
Carex bigelowii	III (1–4)	III (1–3)	I (1–4)	III (1–4)
Vaccinium myrtillus	II (1–3)	II (1–4)	II (1–4)	II (1–4)
Cladonia coccifera	II (1–3)	II (1–3)	I (1–3)	II (1–3)
Solidago virgaurea	II (1–4)	II (1–3)	I (1–3)	II (1–4)
Rhytidiadelphus loreus	I (1–3)	II (1–3)	II (1–3)	II (1–3)
Hylocomium splendens	I (1–3)	II (1–3)	II (1–3)	II (1–3)
Cladonia rangiferina	I (1–3)	I (1–3)	I (1–3)	I (1–3)
Campylopus paradoxus	I (1–3)	I (1–3)	I (1–3)	I (1–3)
Succisa pratensis	I (1–3)	I (1–2)	I (1–3)	I (1–3)
Juniperus communis	I (1–3)	I (1–3)	I (4–7)	I (1–7)
Alchemilla alpina	I (1–3)	I (1–3)		I (1–3)
Sphagnum capillifolium	I (1–3)	I (1–3)		I (1–3)
Polygala serpyllifolia	I (1–3)	I (1–3)		I (1–3)
Galium saxatile	I (1–3)	I (1–3)		I (1–3)
Agrostis capillaris	I (1–3)	I (1–3)		I (1–3)
Juncus squarrosus	I (1–6)	I (1–3)		I (1–6)
Luzula multiflora	I (1–3)		I (1–3)	I (1–3)
Hypogymnia physodes		I (1–3)	I (1–3)	I (1–3)
Number of samples	21	17	23	61
Number of species/sample	20 (14–30)	21 (13–31)	22 (12–35)	21 (12–35)
Vegetation height (cm)	2 (1–2)	6 (2–20)	8 (3–20)	6 (1–20)
Shrub/herb cover (%)	70 (40–100)	93 (50–100)	88 (60–100)	83 (40–100)
Ground layer cover (%)	30 (20–40)	75	35 (5–40)	44 (5–75)
Altitude (m)	408 (185–615)	670 (457–1067)	259 (31–795)	429 (31–1067)
Slope (°)	5 (1–10)	13 (0–30)	16 (0–45)	13 (0–45)

a *Festuca ovina* sub-community
b *Empetrum nigrum hermaphroditum* sub-community
c *Arctostaphylos uva-ursi* sub-community
14 *Calluna vulgaris-Racomitrium lanuginosum* heath (total)

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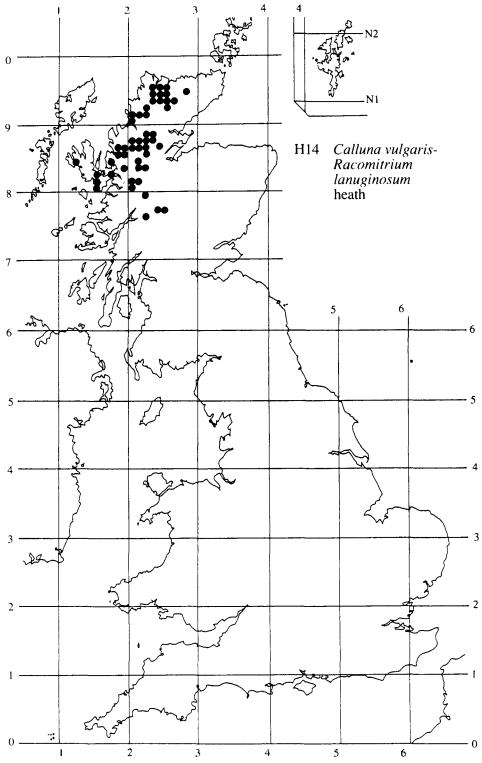

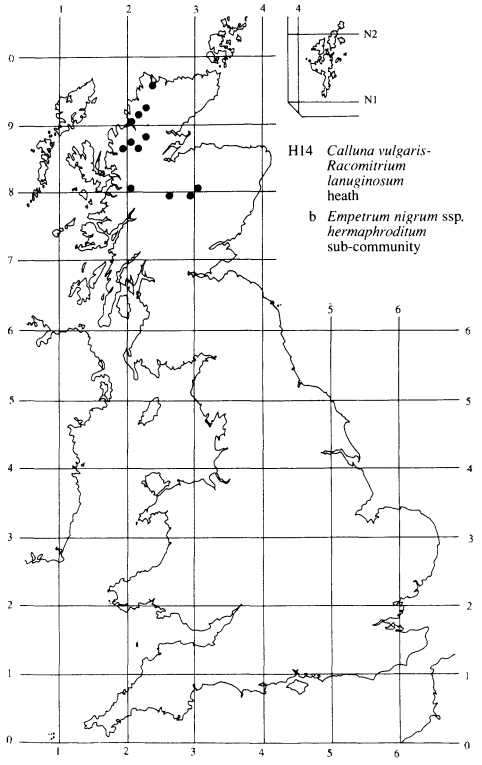

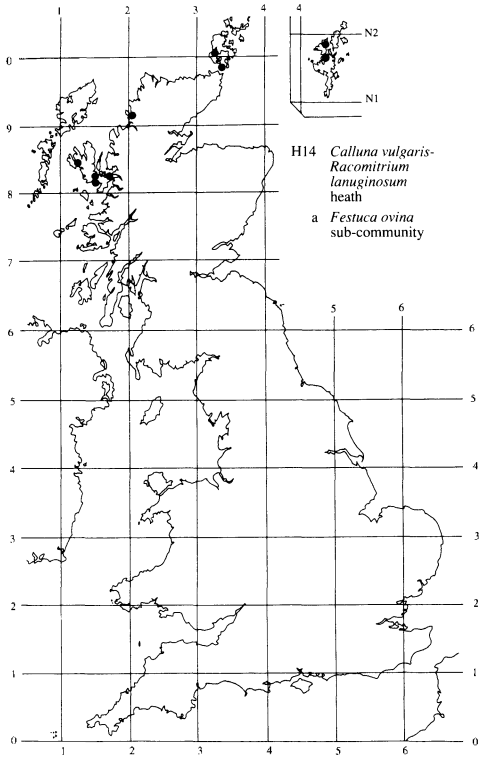

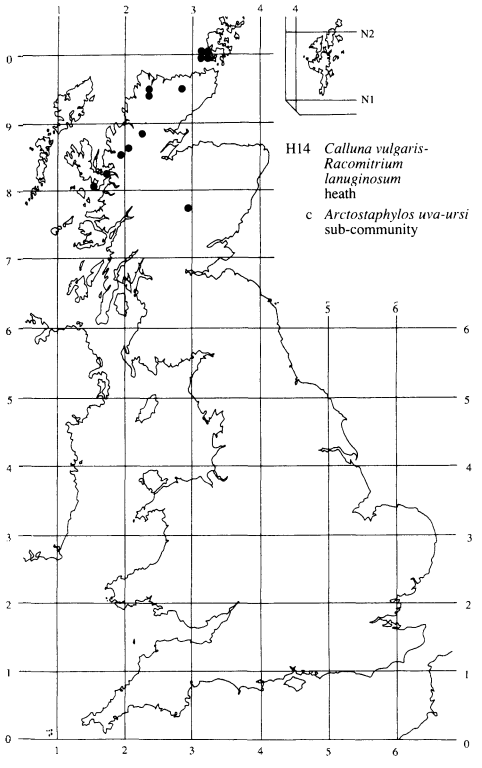

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