H20
Vaccinium myrtillus-Racomitrium lanuginosum heath

Synonymy
Rhacomitrio-Vaccinietum Smith 1905 *p.p.*; *Rhacomitrium-Carex bigelowii* nodum, *Empetrum hermaphroditum* facies Poore & McVean 1957; *Empetrum*-hypnoid moss community Poore & McVean 1957, *Rhacomitreto-Empetretum* McVean & Ratcliffe 1962, Birks 1973; *Empetrum*-hypnaceous moss heath McVean & Ratcliffe 1962; *Alchemilla alpina-Vaccinium myrtillus* nodum Birks 1973.

Constant species
Carex bigelowii, *Deschampsia flexuosa*, *Empetrum nigrum* ssp. *hermaphroditum*, *Festuca ovina/vivipara*, *Galium saxatile*, *Vaccinium myrtilus*, *Hylocomium splendens*, *Pleurozium schreberi*, *Racomitrium lanuginosum*, *Rhytidiadelphus loreus*, *Cladonia uncialis*.

Rare species
Anastrophyllum donianum, *A. joergensenii*, *Bazzania pearsonii*, *Mastigophora woodsii*, *Plagiochila carringtonii*, *Scapania ornithopodioides*.

Physiognomy
The *Vaccinium myrtillus-Racomitritum lanuginosum* heath brings together a variety of vegetation types in which *Vaccinium myrtillus* and/or *Empetrum nigrum* ssp. *hermaphroditum*, occasionally with other sub-shrubs, are co-dominant with *Racomitrium lanuginosum* or, in some stands, hypnaceous mosses. *V. myrtillus* is the commonest woody plant overall, although it is quite often subordinate in cover to *E. nigrum* ssp. *hermaphroditum*, the two forming a low mat, generally less than 1 dm thick, which has the appearance of a patchy mosaic of bushes growing among the moss carpet. *V. vitis-idaea* also occurs commonly in most types of *Vaccinium-Racomitrium* heath, though usually at low cover, and there is very occasionally some *V. uliginosum*. *Calluna vulgaris* is typically scarce throughout, though it becomes a little more common at lower altitudes, where the vegetation can approach the *Calluna-Racomitrium* heath (as on Skye: Birks 1973); *Juniperus communis* ssp. *nana* and *Erica cinerea* can also show local prominence in such stands. In other cases, *Alchemilla alpina*, which is quite a frequent plant through the *Vaccinium-Racomitrium* heath, attains co-dominance among the sub-shrubs. As well as these floristic differences, there is also considerable variation in the total cover of the woody mat, with vegetation at one extreme looking very obviously heathy, other stands resembling *Carex-Racomitrium* moss-heath with a local abundance of sub-shrubs (Poore & McVean 1957).

Floristic continuity in that particular direction is strengthened by the high frequency here of such vascular associates as *Carex bigelowii*, *Festuca ovina/vivipara*, *Deschampsia flexuosa* and *Galium saxatile*, although these plants are not generally as abundant as they can be in the *Carex-Racomitrium* heath: *C. bigelowii* sometimes occurs as scattered, quite large, clonal patches and *F. ovina/vivipara* can be sub-dominant but, quite often, they and the others are sparse or distinctly patchy. Also, *Juncus trifidus*, which was locally prominent in some of McVean & Ratcliffe's (1962) *Rhacomitreto-Empetretum*, is of no quantitative importance in this revised *Vaccinium-Racomitrium* heath.

Other common herbs are few, although the grass flora is sometimes a little richer with *Nardus stricta* quite frequent throughout and *Agrostis canina*, *A. capillaris*, *Anthoxanthum odoratum* and *Deschampsia cespitosa* occasional, and where these increase their cover somewhat, the vegetation approaches what Poore & McVean (1957) termed a *Nardus*-facies of moss-heath. In other stands, *Huperzia selago* and *Potentilla erecta* become more frequent than usual and, where these are accompanied by such plants as *Thymus praecox*, *Viola riviniana* and *Carex pilulifera*, of only occasional occurrence overall, a very distinctive composition results. Then, there are sometimes records for *Diphasium alpinum*, *Luzula sylvatica*, *L. multiflora*, *Euphrasia officinalis* agg. and *Armeria maritima*.

But much of the distinctive character of this veg-

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etation and variation within it depends upon the cryptogams, for this is essentially a moss-heath in which *R. lanuginosum* in particular plays a very important role, quite often covering half the ground or more in a rough woolly carpet among the sub-shrubs. Additionally here, though, and this is one good contrast with the *Calluna-Racomitrium* heath, there are frequent records throughout for a variety of other bulky mosses. As well as *Hypnum cupressiforme s.l.* (often *H. jutlandicum*), *Hylocomium splendens*, *Rhytidiadelphus loreus* and *Pleurozium schreberi* are constant in this community and, though of somewhat variable abundance, each can be prominent. Indeed, it is sensible to include here vegetation in which these species locally replace *R. lanuginosum* in an extensive moss mat among *E. nigrum* ssp. *hermaphroditum* and *V. myrtillus*, a feature which both Poore & McVean (1957) and McVean & Ratcliffe (1962) noted at scattered sites through the Scottish Highlands. Some other mosses occur at lower frequencies throughout the *Vaccinium-Racomitrium* heath, *Polytrichum alpinum* and *Dicranum scoparium* being found in small amounts in many stands. Then, among hepactics, *Ptilidium ciliare* and *Diplophyllum albicans* are characteristic of some sub-communities. But greater richness in this element is very much restricted to particularly cool and shady situations, where the *Vaccinium-Racomitrium* heath is one of the vegetation types providing a locus for what Ratcliffe (1968) called the 'mixed northern hepatic mat', a group of Northern Atlantic and more widely-distributed oceanic liverworts which can grow together here in great profusion and luxuriance (see below).

Compared with the *Vaccinium-Cladonia* heath, lichens are much less important in this community, though quite a few are common throughout and locally this element can attain modest abundance. *Cladonia uncialis* and *C. arbuscula* are most frequent overall, with *C. gracilis* and *Cetraria islandica* fairly common but more patchy in occurrence. *Cladonia coccifera*, *C. bellidiflora* and *C. impexa* may show local frequency.

Sub-communities

***Viola riviniana-Thymus praecox* sub-community:** *Rhacomitreto-Empetretum* Birks 1973; *Alchemilla alpina-Vaccinium myrtillus* nodum Birks 1973. This vegetation preserves the general features of the community but the sub-shrub mat is more varied than usual: *E. nigrum* ssp. *hermaphroditum* and *V. myrtillus* can both be abundant but *Alchemilla alpina* is sometimes co-dominant and more locally there can be some *J. communis* ssp. *nana* or *Erica cinerea*, with sparse shoots of *Calluna* also quite common. Community herbs such as *Festuca ovina/vivipara*, *Carex bigelowii*, *Deschampsia flexuosa* and *Galium saxatile* remain very frequent and the first can show modest abundance, but more striking here is the preferential occurrence among this element of *Huperzia selago* and *Potentilla erecta* with, even more distinctive, *Viola riviniana*, *Thymus praecox* and *Carex pilulifera*. Less common, but still characteristic, are *C. binervis*, *Succisa pratensis*, *Scirpus cespitosus*, *Hypericum pulchrum*, *Antennaria dioica*, *Salix herbacea* and *Selaginella selaginoides*.

The cryptogam flora is poor: *R. lanuginosum* is the typical dominant, but even the other bulky pleurocarps of the community are a little less frequent than usual and *Diplophyllum albicans* is the only common hepatic. *Breutelia chrysocoma* is a quite prominent feature of some stands but no other distinctive characteristics are seen.

***Cetraria islandica* sub-community:** *Rhacomitrium-Carex bigelowii* nodum, *Empetrum hermaphroditum* facies Poore & McVean 1967; *Rhacomitreto-Empetretum* McVean & Ratcliffe 1962 *p.p.* Mixtures of *E. nigrum* ssp. *hermaphroditum* and *V. myrtillus* with abundant *R. lanuginosum* usually dominate here, though some stands with reduced sub-shrub cover make a close approach to the *Carex-Racomitrium* heath. Grasses like *F. ovina/vivipara*, *Deschampsia flexuosa*, *Nardus*, *Agrostis canina* and *Anthoxanthum* tend to be rather more prominent than usual in such vegetation and there can also be a little *Alchemilla alpina*, but the richness of the vascular element typical of the *Viola-Thymus* sub-community is not found.

The bryophytes, too, are not numerous here, although *Rhytidiadelphus loreus*, *Hylocomium splendens* and *Pleurozium schreberi* all occur very commonly together with frequent *Hypnum cupressiforme s.l.* and *Polytrichum alpinum*, and occasional *Ptilidium ciliare*, *Diplophyllum albicans* and *Anastrepta orcadensis*. The lichen flora, though, is a little richer than usual with, in addition to the community species, preferentially frequent *Cladonia gracilis*, *Cetraria islandica* and *Cornicularia aculeata* and, less commonly, *Cladonia leucophaea*, *C. pyxidata*, *Sphaerophorus globosus* and *Alectoria nigricans*. Even then, however, the cover of this element of the vegetation is generally small.

***Bazzania tricrenata-Mylia taylori* sub-community:** *Rhacomitreto-Empetretum* McVean & Ratcliffe 1962 *p.p.*, Birks 1973 *p.p.* In this sub-community, the general floristic features remain very much as above, though *Blechnum spicant* and *Juncus trifidus* figure frequently in the sampled stands. More distinctive, however, is the cryptogam element. *R. lanuginosum* is still the usual dominant, with the other community mosses well represented and, additionally, frequent records for *Dicranum scoparium*, *Plagiothecium undulatum*, *Sphagnum capillifolium* and *Diplophyllum albicans*. But the real richness comes from the occurrence together of the generally

oceanic *Pleurozia purpurea*, the Western British *Bazzania tricrenata*, the Sub-Atlantic *Anastrepta orcadensis* and *Scapania gracilis* and the North Atlantic rarities *S. ornithopodioides*, *S. nimbosa*, *Plagiochila carringtonii*, *Bazzania pearsonii*, *Mastigophora woodsii*, *Anastrophyllum donianum* and the very local *A. joergensenii* (Ratcliffe 1968). Mixtures of these species, together with *Mylia taylori*, *Anthelia julacea*, *Tritomaria quinquedentata* and *Dicranodontium uncinatum* can form dense, luxuriant cushions among the sub-shrubs, being especially abundant between the bushes, particular species showing local dominance and imparting a mosaic of yellow, brown and purplish colours to the mat. In such a ground, lichens are sparse, though *Cladonia impexa* shows a notable preference for this kind of *Vaccinium-Racomitrium* heath.

***Rhytidiadelphus loreus-Hylocomium splendens* sub-community:** *Empetrum*-hypnoid moss community Poore & McVean 1957; *Empetrum*-hypnaceous moss heath McVean & Ratcliffe 1962. Although *R. lanuginosum* is much reduced in cover here, the general features of this kind of vegetation accord well with the community as a whole. *E. nigrum* ssp. *hermaphroditum* is usually the dominant sub-shrub with smaller amounts of *V. myrtillus* and, preferentially common here, though usually of low cover, *V. vitis-idaea*. Then, there is frequent *C. bigelowii* and *D. flexuosa*, the latter sometimes quite prominent, with more occasional *Galium saxatile* and *F. ovina/vivipara*.

The really distinctive component, though, is the moss mat where *R. loreus* and *H. splendens*, less abundantly *Pleurozium schreberi*, make up the bulk of the cover. *Hypnum cupressiforme s.l.* is only occasional but *Ptilidium ciliare*, *Dicranum scoparium* and *Anastrepta orcadensis* are all common. *Sphagnum capillifolium* can also be found but the rich assemblages of Atlantic hepatics characteristic of the *Bazzania-Mylia* sub-community do not occur.

Habitat

The *Vaccinium-Racomitrium* heath is characteristic of humic, base-poor soils on fairly exposed slopes and summits at moderate to high altitudes in the cool oceanic mountains of north-west Scotland. Climatic differences and some modest variation in edaphic conditions influence the floristics of the community but this is essentially climax vegetation.

The geographical range of the *Vaccinium-Racomitrium* heath is very similar to that of the *Calluna-Racomitrium* heath, centred firmly on the north-west Highlands of Scotland and extending on to Skye, though with a rather more frequent spread of stands through the Grampians (McVean & Ratcliffe 1962, Birks 1973, Ratcliffe 1977). And the two communities overlap altitudinally, both being well represented in the low-alpine zone (Poore & McVean 1957), although the *Vaccinium-Racomitrium* heath consistently extends to higher levels than its heather counterpart, occurring mostly on slopes and summits above 600 m and frequently extending over 750 m. Indeed, in its scattered localities south of the Great Glen, it is quite often found up to 1000 m, though along the extreme north-western seaboard and on Skye, its lower limit drops to around 250 m.

The summer climate throughout this zone is cool, with mean annual maxima almost everywhere less than 21 °C and, over the higher peaks of the north-west, below 20 °C (Conolly & Dahl 1970), so *Calluna* itself, *Erica cinerea* and *Carex pilulifera* characteristic of lower-altitude heaths through this part of Scotland, make but a sparse appearance here in the *Viola-Thymus* sub-community which takes the *Vaccinium-Racomitrium* heath to its lowest levels on Skye and around the Forest of Letterewe. More obviously, it is Arctic-Alpines such as *E. nigrum* ssp. *hermaphroditum*, *V. vitis-idaea* and *C. bigelowii*, *Alchemilla alpina*, *Diphasium alpinum* and *Polytrichum alpinum* which give the vegetation its essentially montane character.

Compared with the east-central Highlands, however, where the *Vaccinium-Cladonia* heath is the typical bilberry/crowberry vegetation of the low-alpine zone, the winter climate through much of the range of the community is relatively mild, so the overall temperature regime is fairly equable. Moreover, the climate is very much more humid than through the Grampians, with annual precipitation always over 1600 mm (*Climatological Atlas* 1952) with usually more than 220 wet days yr^{-1} (Ratcliffe 1968) and a high percentage of daytime cloudiness over the higher ground (Chandler & Gregory 1976, Page 1982). And, as in the two corresponding heather communities, the geographical switch to this cool oceanic climate is strongly reflected in the move here from lichens to mosses as the dominant cryptogam element of the vegetation mat. Again, it is *R. lanuginosum* that exerts its formidable competitive power to often exceed the sub-shrubs in cover, though other bulky pleurocarps figure more often here than in the *Calluna-Racomitrium* heath, perhaps reflecting the somewhat more sheltered conditions compared with the typically wind-blasted knolls and summit ridges occupied by that vegetation. The *Rhytidiadelphus-Hylocomium* sub-community, where these other species attain their maximum representation, is not a common vegetation type but at scattered sites through the range of the *Vaccinium-Racomitrium* heath it seems to be associated with slight hollows where modest snow accumulation affords some protection from the worst of the winter cold. In such situations, the shift from *R. lanuginosum* to pleurocarps like *R. loreus*, *H. splendens* and *P. schreberi* can be seen

as a floristic transition to the mildly chionophilous *Vaccinium-Deschampsia* heath of more sheltered slopes and snow-bed surrounds.

Topoclimate also plays a part in determining the floristics and distribution of the *Bazzania-Mylia* sub-community. This is confined within the wettest parts of the north-west Highlands, where, with over 220 wet days yr^{-1}, total rainfall approaches 2400 mm yr^{-1} (Chandler & Gregory 1976) but, even there it is found only locally on ledges and among boulders on north- or east-facing slopes where sunless and especially humid conditions favour the luxuriant development of the 'northern hepatic mat'. This suite of Atlantic liverworts can extend to altitudes below those characteristic of this community: many of the same species figure prominently in the *Calluna-Vaccinium-Sphagnum* heath which occurs commonly down to 300 m or so, though more montane plants such as *Anastrophyllum donianum* and *Scapania nimbosa* peter out there, with *Herbertus aduncus* ssp. *hutchinsiae* becoming correspondingly more prominent. The switch from *Calluna* to *V. myrtillus* and *E. nigrum* ssp. *hermaphroditum* in the heaths of the north-west Highlands does, in fact, show particularly well in the shady situations which encourage the development of these hepatics where, at around 600 m, the generally increasing snow cover tips the balance towards dominance of bilberry and crowberry (Ratcliffe 1968).

Less sheltered situations, on slopes of all aspects and with little snow-lie, favour the occurrence of the central and most widely-distributed type of *Vaccinium-Racomitrium* heath, the *Cetraria* sub-community which is found not only among boulders and on ledges but over open slopes with blocky talus, on summit detritus and on gently-sloping ridges, though even in these latter habitats, a rough rocky surface seems to be characteristic. And, as with the other sub-communities, the soils here are typically strongly humic, sometimes shallow, well-developed peaty podzols but often fragmentary rankers with raw and sometimes rather greasy organic matter resting directly on rock debris. The humidity of the climate keeps the soils moist but they are free-draining.

Almost always, the bedrocks underlying the *Vaccinium-Racomitrium* heath are siliceous in character, with Torridonian sandstone being an especially important substrate in the hills between the Kyle of Lochalsh and An Teallach, Cambrian quartzite and acidic Lewisian gneiss extending north from there to Foinaven, and Moine rocks of various kinds supporting stands south-eastwards into the Grampians. On Skye, intrusive rocks and Tertiary basalts occur beneath the *Vaccinium-Racomitrium* heath, and there, in the *Viola-Thymus* sub-community, there can be slight extension on to mildly basic substrates, particularly where, in that vegetation, *Alchemilla alpina* becomes prominent with *Thymus praecox*. Even in such circumstances, however, the profiles remain relatively base poor, with a superficial pH of 4–4.8 (Birks 1973).

Zonation and succession

The *Vaccinium-Racomitrium* heath is typically found at the transition between the sub-shrub vegetation of the low-alpine zone and the moss-heaths and fell-field communities of the higher slopes and summits of the mountains of north-west Scotland, the general zonation reflecting the increased harshness of climate with the move to upper slopes. Local variations in exposure over the intermediate slopes commonly result in gradations from the community to wind-blasted heaths and snow-bed vegetation.

The characteristic altitudinal pattern in which the *Vaccinium-Racomitrium* heath occurs is well seen over the upper slopes of mountains like those of the Letterewe Forest, Beinn Dearg and Am Faochagach in Ross and Ben More Assynt and Foinaven in Sutherland, where the community occurs towards the lower limit of the *Carex-Racomitrium* heath. This vegetation is particularly extensive over the more rounded summits in the north-west Highlands, often as the distinctive *Silene* sub-community with its suite of cushion herbs, or in its Typical form with overwhelming dominance of *Racomitrium*, or grading into more open fell-field on active ablation surfaces. Floristic continuity between these kinds of vegetation and the *Vaccinium-Racomitrium* heath is strong, with the *Cetraria* sub-community here looking very much like a sub-shrub facies of Typical *Carex-Racomitrium* heath: indeed in many situations, the former occurs as small patches in hollows or over blocky detritus among the lower reaches of the latter, picked out from a distance by the close canopy of *E. nigrum* ssp. *hermaphroditum* and *V. myrtillus*, but otherwise showing great qualitative similarity among the vascular associates and cryptogams. Usually, the hypnoid mosses are more frequent in the *Vaccinium-Racomitrium* heath and, of course, in the *Rhytidiadelphus-Hylocomium* sub-community, their abundance is very striking. Where this kind of vegetation replaces the *Cetraria* sub-community in mosaics of this sort, as can be seen on Ben Klibreck in Sutherland and locally elsewhere, the contrast between the elements of the pattern is that much greater.

In other situations, the *Vaccinium-Racomitrium* heath forms a more extensive zone below the summit vegetation, becoming especially prominent where the increase in slope is also marked by a shift to rough, bouldery ground on screes. Here, it can be seen as a transition to the *Vaccinium-Deschampsia* heath, the *Hylocomium-Rhytidiadelphus* sub-community of which is very close in its general composition, but where there

is a move to more consistent eclipse of *R. lanuginosum* by the hypnaceous mosses with increased shelter and moisture.

Alternatively, decreasing altitude can be marked by a replacement of the *Vaccinium-Racomitrium* heath by sub-shrub vegetation in which *Calluna* plays a more prominent role. This can be seen over both sheltered and exposed slopes. In the former case, where a northerly or easterly aspect results in an especially cool, shady and humid environment, the *Vaccinium-Racomitrium* heath is typically represented by the *Bazzania-Mylia* sub-community and this usually passes to the *Plagiothecium-Anastrepta* sub-community of the *Calluna-Vaccinium-Sphagnum* heath at levels where the snow cover becomes less appreciable: bilbery and crowberry decrease in vigour with some slight shifts in the composition of the luxuriant hepatic mat that characterises both these vegetation types with the move to a less montane environment.

In other places, where a drop in altitude is accompanied by increasing exposure to harsh winds that blow away any snow that does fall, the *Vaccinium-Racomitrium* heath is replaced by the *Calluna-Racomitrium* heath. In general composition and physiognomy, these two are quite similar but the latter usually displays little contribution from *V. myrtillus* and the hypnoid mosses of the former have a limited role there. Nonetheless, the communities can come very close in their suites of vascular associates, especially where both extend to their lowest altitudes along the north-western seaboard of Scotland and on Skye, where the *Viola-Thymus* sub-community here and the *Festuca* sub-community of the *Calluna-Racomitrium* heath show a floristic convergence. At higher altitudes in the hinterland of north-west Scotland, it is usually the *Cetraria* sub-community of the *Vaccinium-Racomitrium* heath and the *Empetrium* sub-community of the *Calluna-Racomitrium* heath that occur together in these altitudinal zonations, sometimes with the *Calluna-A. alpinus* heath, another dwarfed sub-shrub community of wind-blasted spurs, complicating the pattern, as on Foinaven.

In the middle reaches of the low-alpine zone on such mountains, these vegetation types can be disposed not so much in an altitudinal pattern as in patchworks over the slopes reflecting retention of snow in less or more sheltered situations. The *Calluna-Racomitrium* and *Calluna-A. alpinus* heaths represent the most exposed extreme at these levels, with the *Vaccinium-Racomitrium* heath transitional to early snow-bed vegetation. Sometimes, indeed, it can be seen as a surround to more chionophilous communities, though it often forms an element of complex and extensive mosaics with, for example, certain kinds of *Nardus-Carex* vegetation. Patchworks of the *Empetrum-Cetraria* sub-community and the *Cetraria* sub-community of the *Vaccinium-Racomitrium* heath are especially well seen on the Letterewe Hills, the Affric-Cannich Hills, Foinaven, Beinn Dearg and Ben Klibreck, where sometimes quite gentle transitions between the components depend on the proportions of the sub-shrubs and *Nardus* against a ground of abundant *R. lanuginosum* with frequent hypnoid mosses and lichens. In some sites, other grassy chionophilous vegetation like the *Deschampsia-Galium* community, can also occur in these patterns with *V. myrtillus* and hypnoid mosses running on with some frequency and local abundance. Or there may be sharper transitions to late snow-bed communities.

Distribution

Although stands of the *Vaccinium-Racomitrium* heath, particularly the *Cetraria* sub-community, can be found scattered through the Grampians, the distribution of this kind of vegetation is strongly centred in north-west Scotland. The *Cetraria* sub-community is the most widespread and common type overall, with the *Rhytidiadelphus-Hylocomium* sub-community local throughout the range. The *Bazzania-Mylia* type is strongly confined to the wettest regions and even there is very much restricted to suitably cold and damp aspects. The *Viola-Thymus* sub-community extends the range into the milder foothills of the western seaboard and Skye.

Affinities

The core of the *Vaccinium-Racomitrium* heath as defined here, the *Cetraria* sub-community, is based on the earliest descriptions of this kind of vegetation by Poore & McVean (1957) and McVean & Ratcliffe (1962), distinguishing as a separate *Bazzania-Mylia* sub-community the hepatic-rich stands first noted in detail in Ratcliffe (1968). The stands with hypnaceous mosses, which these authors saw as bearing some relation to their *Empetrum* heaths, can be readily incorporated here and serve to emphasise the relationship between the community and the mildly chionophilous sub-shrub vegetation which extends to lower altitudes. The *Viola-Thymus* sub-community also links the *Vaccinium-Racomitrium* heath with the oceanic heaths of the coastal regions of north-west Scotland. In general, though, the floristic relationships of the community are with the moss-heaths and fell-field vegetation of the high-montane zone. Following McVean & Ratcliffe (1962), it seems best to separate the *Vaccinium-Racomitrium* heath from the *Carex-Racomitrium* heath, though both can be readily located in the Loiseleurieto-Arctostaphylion (Nordhagen 1943) or Arctostaphyleto-Cetrarion (Dahl 1956), where the community can be seen as a bilberry/crowberry analogue to the *Calluna-Racomitrium* heath.

Floristic table H20

	a	b
Vaccinium myrtillus	V (1–6)	V (1–6)
Racomitrium lanuginosum	V (4–10)	V (4–10)
Empetrum nigrum hermaphroditum	IV (1–3)	IV (1–8)
Carex bigelowii	IV (1–4)	IV (1–3)
Deschampsia flexuosa	IV (1–3)	IV (1–4)
Cladonia uncialis	V (1–3)	V (1–4)
Festuca ovina/vivipara	V (1–4)	IV (1–4)
Galium saxatile	IV (1–6)	IV (1–4)
Rhytidiadelphus loreus	III (1–4)	IV (1–6)
Hylocomium splendens	III (1–4)	IV (1–4)
Pleurozium schreberi	III (1–4)	IV (1–4)
Huperzia selago	IV (1–4)	II (1–3)
Potentilla erecta	V (1–4)	II (1–3)
Thymus praecox	IV (1–4)	II (1–3)
Viola riviniana	IV (1–3)	
Carex pilulifera	III (1–3)	II (1–3)
Calluna vulgaris	III (1–3)	I (1–2)
Succisa pratensis	II (1–3)	I (1)
Salix herbacea	II (1–3)	
Scirpus cespitosus	II (1–3)	
Carex binervis	II (1–3)	
Hypericum pulchrum	II (1)	
Erica cinerea	II (1–4)	
Antennaria dioica	II (1–3)	
Breutelia chrysocoma	II (4–5)	
Selaginella selaginoides	II (1–3)	
Juniperus communis nana	II (1–6)	
Plantago maritima	I (1–3)	
Cetraria islandica	II (1–3)	V (1–4)
Cladonia gracilis	I (1–3)	IV (1–3)
Cornicularia aculeata	I (1–3)	III (1–4)

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c	d	20
V (1–4)	V (1–8)	V (1–8)
V (4–10)	V (1–4)	V (1–10)
V (4–8)	V (4–10)	V (1–10)
V (1–3)	V (1–3)	IV (1–4)
IV (1–3)	V (1–4)	IV (1–4)
V (1–3)	II (1–3)	IV (1–4)
V (1–4)	II (1–3)	IV (1–4)
IV (1–4)	III (1–3)	IV (1–6)
V (1–4)	V (1–8)	IV (1–8)
V (1–3)	V (1–8)	IV (1–8)
III (1–3)	V (1–6)	IV (1–6)
IV (1–3)		III (1–4)
II (1–3)	I (1)	III (1–4)
		III (1–4)
I (1)		II (1–3)
	I (1–3)	II (1–3)
I (1–3)	I (1–3)	II (1–3)
	I (1–3)	II (1–3)
		I (1–3)
		I (1–3)
		I (1–3)
		I (1)
		I (1–4)
		I (1–3)
		I (4–5)
		I (1–3)
		I (1–6)
		I (1–3)
III (1–3)	III (1–3)	III (1–4)
III (1–3)		III (1–3)
	I (1–3)	II (1–4)

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Cladonia leucophaea	I (1–3)	II (1–3)
Sphaerophorus globosus		II (1–3)
Cladonia pyxidata		II (1–3)
Alectoria nigricans		II (1–3)
Diplophyllum albicans	IV (1–3)	II (1–4)
Anastrepta orcadensis	I (1–3)	II (1–3)
Dicranum scoparium	I (1–3)	II (1–3)
Bazzania tricrenata	I (1–3)	I (1–3)
Mylia taylori	I (1–3)	
Sphagnum capillifolium		
Pleurozia purpurea	I (1–4)	I (1–3)
Cladonia impexa		I (1–3)
Scapania ornithopodioides		
Plagiochila carringtonii		
Blechnum spicant	II (1–4)	I (1–3)
Scapania gracilis	I (1–3)	II (1–3)
Juncus trifidus	I (1–3)	I (1–3)
Anthelia julacea	I (1–3)	
Tritomaria quinquedentata		I (1–3)
Plagiothecium undulatum		I (1–3)
Anastrophyllum donianum		
Scapania nimbosa		
Bazzania pearsonii		
Dicranodontium uncinatum		
Hymenophyllum wilsonii	I (1)	
Mastigophora woodsii		
Sphagnum tenellum		
Vaccinium vitis-idaea	I (1–3)	III (1–3)
Ptilidium ciliare	I (1–3)	III (1–3)
Oxalis acetosella		
Hypnum cupressiforme s.l.	III (1–4)	III (1–3)
Cladonia arbuscula	II (1–3)	III (1–6)
Polytrichum alpinum	II (1–3)	III (1–4)
Nardus stricta	III (1–3)	III (1–6)

I (1–3)	I (1–3)	II (1–3)
		I (1–3)
		I (1–3)
		I (1–3)
V (1–4)	I (1–3)	III (1–4)
IV (1–4)	IV (1–4)	III (1–4)
IV (1–3)	III (1–3)	III (1–3)
V (1–3)	I (1)	II (1–3)
V (1–3)		I (1–3)
IV (1–4)	II (1–4)	I (1–4)
IV (3–4)		I (1–4)
IV (1–3)		I (1–3)
IV (1–3)		I (1–3)
IV (1–3)		I (1–3)
III (1–3)	I (1)	I (1–4)
III (1–3)		I (1–3)
III (1–3)		I (1–3)
III (1)		I (1–3)
III (1–3)	I (1)	I (1–3)
III (1–3)	I (1–4)	I (1–4)
III (1–4)		I (1–4)
III (1–4)		I (1–4)
III (1–4)		I (1–4)
III (1–3)		I (1–3)
II (1)		I (1)
II (1–3)		I (1–3)
II (2)		I (2)
III (1–3)	IV (1–4)	III (1–4)
III (1–3)	IV (1–3)	III (1–3)
	I (1–3)	I (1–3)
III (1–3)	II (1–3)	III (1–4)
III (1–3)	III (1–5)	III (1–6)
III (1–3)	III (1–3)	III (1–4)
II (1–3)	II (1–6)	III (1–6)

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Floristic table H20 *(cont.)*

	a	b
Alchemilla alpina	III (1–8)	II (1–4)
Agrostis canina	I (4)	III (1–4)
Diphasium alpinum	II (1–3)	II (1–3)
Agrostis capillaris	II (1–4)	II (1–4)
Vaccinium uliginosum	I (1–3)	II (1–4)
Cladonia coccifera	I (1–3)	II (1–3)
Cladonia bellidiflora	I (1–3)	I (1–3)
Deschampsia cespitosa	I (1–3)	II (1–4)
Anthoxanthum odoratum	I (1–3)	II (1–4)
Luzula sylvatica	I (1–3)	I (1–4)
Armeria maritima	I (1–3)	I (1–3)
Dicranum majus	I (1–3)	
Barbilophozia floerkii	I (1–3)	I (1–3)
Euphrasia officinalis agg.	I (1–3)	I (1–3)
Cladonia rangiferina	I (1–3)	I (1–2)
Luzula multiflora	I (1–3)	I (1–3)
Campylopus paradoxus	I (1–3)	I (1–3)
Thuidium tamariscinum	I (1–3)	I (1–3)
Polytrichum piliferum	I (1–3)	I (1–4)
Nardia scalaris	I (1)	I (1–3)
Agrostis stolonifera	I (1–3)	I (1–3)
Thelypteris limbosperma	I (1–3)	
Tetraplodon mnioides	I (1)	
Thelypteris phegopteris	I (1)	
Jungermannia atrovirens	I (1–3)	
Plagiochila spinulosa	I (1–3)	
Pohlia nutans		I (1–3)
Sphagnum quinquefarium		
Number of samples	17	14
Number of species/sample	26 (14–35)	22 (12–36)

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c	d	20
III (1–4)	II (1–3)	II (1–3)
II (1–3)	II (1–3)	II (1–4)
II (1–3)	I (1–3)	II (1–3)
I (1–3)	I (1)	II (1–4)
II (1–6)	I (1–3)	II (1–6)
I (1–3)	I (1–3)	I (1–3)
II (1–3)	I (1–3)	I (1–3)
	I (1–3)	I (1–4)
	I (1–3)	I (1–4)
II (1–3)		I (1–4)
II (1–4)		I (1–4)
II (1–4)	I (1–4)	I (1–4)
I (1–3)	I (1–3)	I (1–3)
I (1–3)		I (1–3)
	I (1)	I (1–3)
	I (1–3)	I (1–3)
		I (1–3)
		I (1–3)
		I (1–4)
		I (1–3)
		I (1–3)
I (2)		I (1–3)
I (1)		I (1)
I (2)		I (1–2)
I (1)		I (1–3)
I (1–3)		I (1–3)
I (1–3)		I (1–3)
I (4)	I (1–3)	I (1–4)
7	15	53
36 (27–47)	20 (10–29)	24 (10–47)

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Vegetation height (cm)	5 (1–8)	4 (1–8)
Vegetation cover (%)	100	89 (30–100)
Altitude (m)	583 (246–823)	754 (560–915)
Slope (°)	15 (3–45)	17 (0–40)

a *Viola riviniana-Thymus praecox* sub-community
b *Cetraria islandica* sub-community
c *Bazzania tricrenata-Mylia taylori* sub-community
d *Rhytidiadelphus loreus-Hylocomium splendens* sub-community
20 *Vaccinium myrtillus-Racomitrium lanuginosum* heath (total)

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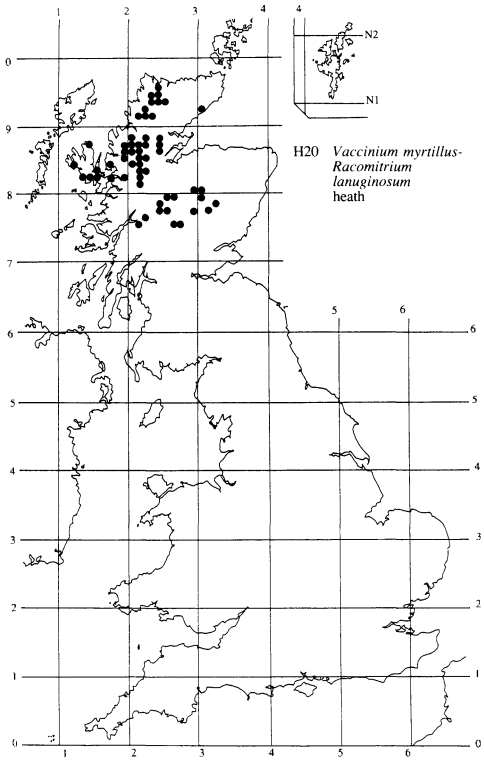
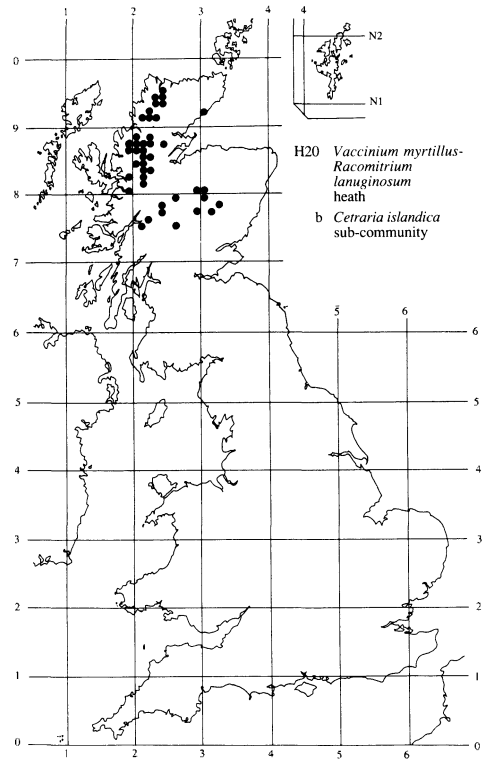
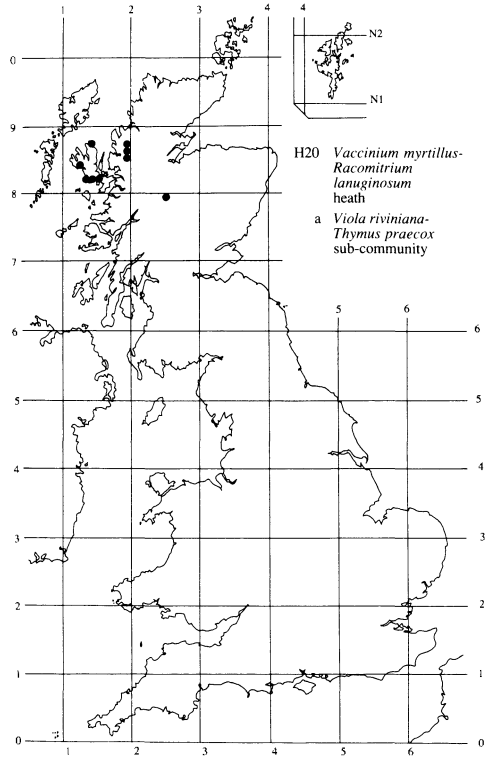
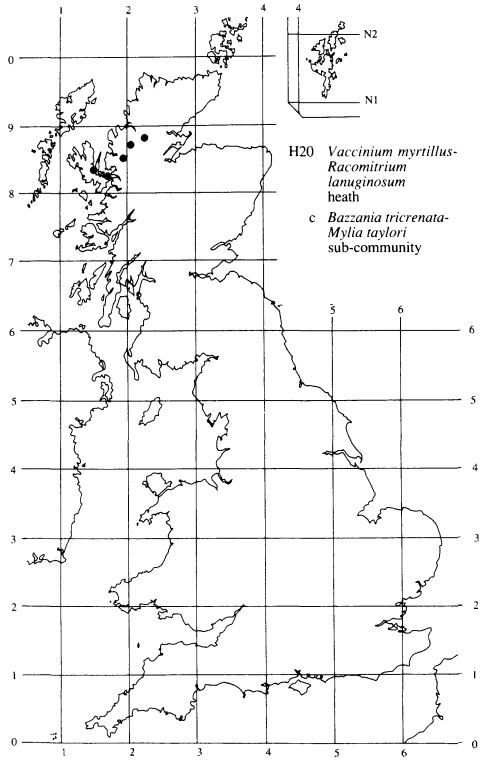
	10 (5–27)	7 (1–27)
89 (50–100)	99 (95–100)	95 (30–100)
691 (579–838)	814 (640–1174)	718 (246–1174)
17 (0–35)	25 (2–45)	19 (0–45)









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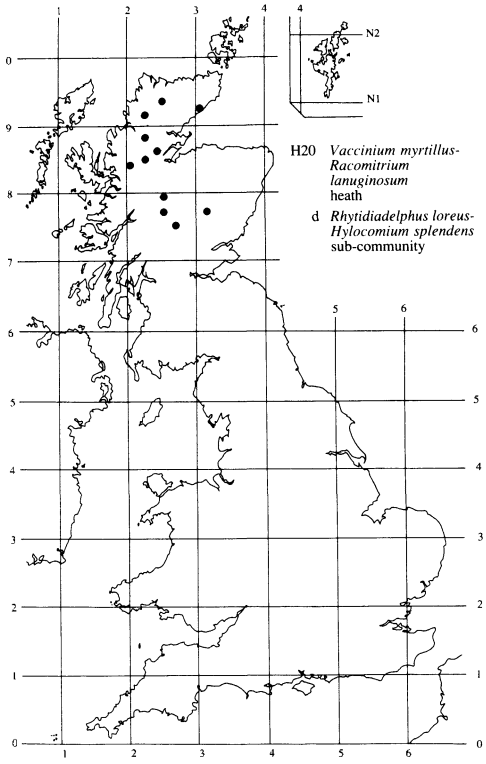

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