

Calluna vulgaris-*Juniperus communis* ssp. *nana* heath**Synonymy**

Juniperus-Arctostaphylos socation Poore & McVean 1957; *Juniperetum nanae* McVean & Ratcliffe 1962 p.p.; *Juniperus nana* nodum Birks 1975 p.p.

Constant species

Calluna vulgaris, *Deschampsia flexuosa*, *Erica cinerea*, *Juniperus communis* ssp. *nana*, *Potentilla erecta*, *Scirpus cespitosus*, *Hypnum cupressiforme* s.l., *Racomitrium lanuginosum*, *Pleurozia purpurea*, *Cladonia uncialis*.

Rare species

Arctostaphylos alpinus, *A. uva-ursi*, *Loiseleuria procumbens*, *Herbertus borealis*, *H. stramineus*, *Plagiochila carringtonii*.

Physiognomy

Prostrate juniper referable to *Juniperus communis* ssp. *nana* occurs as an occasional, sometimes with modest local abundance, in a variety of dwarfed sub-shrub heaths in Britain, notably in the *Calluna*-*Racomitrium* and *Calluna*-*A. alpinus* types. But in the *Calluna*-*Juniperus* heath, it is more or less consistently dominant in the sub-shrub mat and accompanied by a small but distinctive element of oceanic hepatics.

The mat is generally less than 10 cm thick and often severely wind-pruned to much less than this, fairly continuous in the best developed stands, though more fragmentary over erosion surfaces and where there has been burning, to which the dwarf juniper is very sensitive (McVean 1961b, Poore & McVean 1957). A number of other sub-shrubs are well represented, with *Calluna vulgaris* and *Erica cinerea* being especially frequent, and the former often fairly abundant, though not generally assuming dominance. *Arctostaphylos uva-ursi* and *A. alpinus* are somewhat less common and usually of low cover and *Empetrum nigrum* spp. *hermaphroditum* occurs occasionally. *Vaccinium myrtillus* and *V. uliginosum* are scarce and the community provides an occasional locus for *Loiseleuria procumbens*.

Vascular associates are typically rather few in number and occur as scattered and often stunted individuals among the mat. *Deschampsia flexuosa*, *Scirpus cespitosus* and *Potentilla erecta* are constant, with *Huperzia selago*, *Solidago virgaurea* (in its so-called var. *cambrica*), *Dactylorhiza maculata*, *Polygala serpyllifolia*, *Succisa pratensis* and *Antennaria dioica* more occasional. *Carex panicea*, *C. pilulifera*, *C. bigelowii*, *Festuca vivipara* and *Nardus stricta* can also sometimes be found and, more unusually, there can be some *Thymus praecox*.

In some stands, the cryptogam flora seems little different from other kinds of dwarfed sub-shrub heath, as in some of the semi-degraded samples of Poore & McVean (1957) and of McVean & Ratcliffe's (1962) *lichenosum* and, indeed, such vegetation where the juniper cover is lower than usual is best shifted into other communities. In typical *Calluna*-*Juniperus* heath, however, the *Racomitrium lanuginosum*, *Cladonia uncialis*, *C. impexa*, *Sphaerophorus globosus* and *Cornicularia aculeata* common to these communities are frequently accompanied by *Pleurozia purpurea*, *Frullania tamarisci* and *Diplophyllum albicans*, species which are there scarce and of usually low cover. *P. purpurea* in particular is often quite abundant in this kind of heath and in stands on Beinn Eighe, where the community is very well developed, it can be accompanied by prominent tufts of the very rare *Herbertus borealis*, originally noted by McVean & Ratcliffe (1962) and still recorded only from this site and from western Norway (Ratcliffe 1977). Then, there can be occasional records for *Bazzania tricenata*, *Scapania gracilis* and the rare *Plagiochila carringtonii*. *Hylocomium splendens*, *Dicranum scoparium*, *Pleurozium schreberi*, *Rhytidiadelphus loreus* and *Sphagnum capillifolium* also occur at low frequency and, among the lichens, there can be some *Cetraria islandica*, *Cladonia gracilis*, *C. arbuscula*, *C. pyxidata* and *C. leucophaea*. Where the sub-shrub canopy is well developed, however, the total cover of the cryptogams is much less than in the typical moss-heaths of the region.

Habitat

The *Calluna-Juniperus* heath is confined to humic rankers at moderate altitudes in the cool oceanic climate along the western seaboard of the north-west Highlands and some of the western Isles and is best developed on cool, shady slopes which are blown clear of snow. It is readily damaged by burning and its present range may be a remnant of a much wider distribution over suitable substrates in this general part of Scotland. With the geographical shift to the continental climate of the east-central Highlands, the community is replaced at the junction of the sub- and low-alpine zones by the *Juniperus-Oxalis* scrub.

The general climatic conditions favouring the development of the *Calluna-Juniperus* heath are similar to those that pertain over the lower altitudes through the ranges of the *Calluna-Racomitrium* and *Calluna-A. alpinus* heaths, for this too is a vegetation type of those parts of Britain with cool summers, relatively mild winters and very high rainfall. It occurs mostly between 300 and 600 m from just south of Beinn Eighe northwards to Foinaven and Sgribhis Bheinn above Durness, with outlying stands on Skye. Throughout this region, mean annual maxima rarely rise above 22 °C (Conolly & Dahl 1970), but February minima are considerably higher than at equivalent altitudes to the east, so the annual variation in temperature is less than there. Rainfall is also very much higher with often well over 1600 mm yr⁻¹ and more than 220 wet days annually (*Climatological Atlas* 1952, Ratcliffe 1968), such that the atmosphere is more or less constantly humid with much low cloud. It is this combination of montane and oceanic conditions that is reflected in the continuing frequency in this community of the mixtures of plants typical of the other sub-shrub vegetation of the region, with Arctic-Alpines like *Arctostaphylos* spp. and *E. nigrum* ssp. *hermaphroditum* and the Northern Montane *Antennaria dioica* growing alongside species such as *Erica cinerea*. This, and the absence of any boreal associates or great abundance of lichens helps mark off the vegetation from the heaths of the more continental parts of Scotland and also from the juniper scrub centred on that part of the country, where the characteristic taxon is ssp. *communis*.

Compared with the habitat of the *Calluna-Racomitrium* and *Calluna-A. alpinus* heaths, however, conditions here are more sheltered. In the first place, as well as being a community that is generally confined to the lower portion of the altitudinal ranges of these other dwarfed sub-shrub heaths, it occurs only along the western seaboard of the region where the moderating effect of the Gulf Stream waters on temperature fluctuations is greatest. And, second, although the vegetation mat here is typically blown clear of any snow, the *Calluna-Juniperus* heath is not usually found in the kind

of severely-exposed situations of which the other communities are so characteristic. Most often, it marks out level to gently-sloping sites with a northerly to easterly aspect where the prevailing feature of the topoclimate is its cool, shady nature. Compared with the sub-shrub vegetation of wind-blasted spurs and ridges, then, the woody mat, though still very low, is more extensive and the cryptogam element of the flora different. Plants well-adapted to extreme exposures like *Loiseleuria* are poorly represented, whereas the sheltered atmosphere among the bushes is much more congenial for the oceanic element among the bryophytes even if this is not very species-rich compared with the lush mats of the *Calluna-Vaccinium-Sphagnum* heath, characteristic of very humid, sunless corries at much the same altitudes in the region.

Soil development under the *Calluna-Juniperus* heath is typically rudimentary with just shallow accumulations of decaying juniper and bryophyte litter resting directly on bedrock in humic ranker profiles or with a thin intervening mineral A horizon. Generally, the parent material under remaining stands of the community is Cambrian quartzite, a well-jointed and brittle rock that has weathered to scree and fields of jumbled, frost-shattered debris that catch the eye with their sparkling white colour (Whittow 1979). Over such substrates, the soil and vegetation cover is characteristically discontinuous, like a patchwork of islands with very scanty vegetation on the tracts of bare rock between. On Beinn Eighe and Foinaven, where the *Calluna-Juniperus* heath is now best represented, such mosaics cover many hectares (Poore & McVean 1957, McVean & Ratcliffe 1962).

It seems likely, however, that the community was once more widespread: *J. communis* ssp. *nana* occurs scattered throughout the western Highlands (Perring 1968) and suitable localities where it could attain dominance with the typical assemblage here occur throughout the mountains of Cambrian quartzite and Torridonian sandstone running up the coast of north-west Scotland from Skye to Cape Wrath. Burning may have much reduced its distribution over this area because dwarf juniper and the oceanic hepatics associated with it here are very sensitive to fire: indeed, there seem to be some places where the community has perished after a single burning episode (McVean & Ratcliffe 1962). Durno & McVean (1959) traced the history of vegetation of this kind on Beinn Eighe back to Sub-Atlantic times, concluding that remaining stands were but a relic of a formerly widespread cover.

Zonation and succession

The *Calluna-Juniperus* heath typically occurs at the junction of the sub- and low-alpine zones (Poore & McVean 1957) in sequences of mires, other heaths,

chionophilous vegetation and grasslands, where the major lines of floristic variation reflect climatic change with altitude and local exposure, edaphic differences and treatment. The community is a climax but is readily degraded by burning.

Over the long ridge of Foinaven, the characteristic zonation is perhaps better disposed than on the more rugged landscape of the Beinn Eighe massif. Essentially, the *Calluna-Juniperus* heath punctuates the typical regional sequence from mire below to fell-field above where quartzite screes are exposed at moderate altitudes. Immediately beneath it there is generally a mixture of *Calluna-Erica* or *Calluna-Vaccinium-Sphagnum* heaths distributed according to aspect and themselves passing below to *Scirpus-Erica* wet heath and then to *Scirpus-Eriophorum* mire on the low-altitude blanket peats. The downslope boundary is typically marked by a thinning of the cover of juniper among a sub-shrub cover that is generally taller than here, though many of its associates in the *Calluna-Juniperus* heath run on with high frequency and abundance. The same is true above, too, where the community gives way over windswept spurs to the *Calluna-Racomitrium* and/or *Calluna-A. alpinus* heaths or where these vegetation types replace the *Calluna-Juniperus* heath over the more exposed south-western slopes of hills. Indeed, although these are characterised by an increase in the cover of cryptogams among the wind-trimmed mat, juniper itself can continue to have patchy representation in them and, where there is a smear of fine morainic material over the ridges, transitions can be especially gradual. These communities in turn can pass directly to *Carex-Racomitrium* heath or there can be an intervening zone of *Vaccinium-Racomitrium* heath, or a different kind of zonation altogether to high-altitude *Calluna-Eriophorum* mire on the summit blanket peats (McVean & Ratcliffe 1962, Ratcliffe 1977).

Chionophilous vegetation is not well developed among these zonations at Foinaven and, even on Beinn Eighe, there are only moderately late snow-beds but, where north- or east-facing slopes become very shady and cold, the *Calluna-Juniperus* heath passes to *Vaccinium-Rubus* heath or, towards the upper limits of its altitudinal range, *Nardus-Carex* or *Deschampsia-Galium* communities. Similar patterns can be seen in Letterewe Forest, though there the *Calluna-Juniperus* heath itself is rather fragmentary. In some places, too, grassy vegetation is well represented over drier ground above and below the community with *Festuca-Agrostis-Galium* and *Nardus-Galium* grasslands or, where there is some flushing with more base-rich waters, the *Festuca-Agrostis-Thymus* or *Festuca-Agrostis-Alchemilla*swards. At lower altitudes, especially, a variety of sub-shrub vegetation can be converted to such grasslands by

grazing, though the rocky ground characterised by the *Calluna-Juniperus* heath is often more difficult of access. Where the community has been burned, however, the vegetation may be degraded to a very fragmentary cover with substantial erosion of the exposed soil mantle and from such a condition recovery may be very slow (Poore & McVean 1957, McVean & Ratcliffe 1962).

Distribution

Although perhaps once more widespread through the north-west Highlands, the community is now of rather patchy occurrence along the western side of the more northerly mountains, with especially good stands on Beinn Eighe and Foinaven.

Affinities

Vegetation with *J. communis* ssp. *nana* received scarcely a mention in early descriptive accounts (Tansley 1939) and only with the surveys of Poore & McVean (1957) and McVean & Ratcliffe (1962) were the first attempts made to distinguish the *Calluna-Juniperus* heath from other sub-shrub communities and from the juniper scrub typical of eastern Scotland. Very few new data have been added to these original samples, though the diagnosis here is somewhat more precise than McVean & Ratcliffe's (1962) *Juniperetum nanae*, transferring some of their *lichenosum* into the *Calluna-Racomitrium* or *Calluna-A. alpinus* heaths where *J. communis* ssp. *nana* is an occasional but from which the oceanic hepatics are missing. It is that distinctive combination that helps define the *Calluna-Juniperus* heath from these closely-related types of the Caricetea curvulae, though there is sufficient similarity for it to be included with them in the Arctostaphyleto-Cetrarion as Birks (1973) proposed.

An alternative view would be to follow McVean & Ratcliffe (1962) in locating the community in the *Juniperion nanae*, where it might also be possible to place Irish *Juniperus-Arctostaphylos* vegetation. This was seen as part of the *Vaccinio-Picetea* and such an approach would stress the relationships of the *Calluna-Juniperus* heath with the *Juniperus-Oxalis* scrub whose heartland is in the east-central Highlands and where ssp. *communis* is the juniper taxon. In its typical form, this is a distinctly boreal community with strong seral relationships with native pine forest, though in some situations towards its upper altitudinal limit, it could be seen as itself a climax scrub occupying the equivalent position in the zonation to the *Calluna-Juniperus* heath in the west (Poore & McVean 1957). And, distributed across Scotland, there are stands which are floristically and physiognomically intermediate between the two with junipers that can be difficult to assign between ssp. *communis* and ssp. *nana*.

Floristic table H15

<i>Juniperus communis nana</i>	V (4–8)	<i>Cetraria islandica</i>	II (1–2)
<i>Calluna vulgaris</i>	V (3–8)	<i>Carex panicea</i>	II (1–3)
<i>Cladonia uncialis</i>	V (1–3)	<i>Cladonia gracilis</i>	II (1–2)
<i>Racomitrium lanuginosum</i>	IV (2–7)	<i>Cladonia arbuscula</i>	II (1–5)
<i>Scirpus cespitosus</i>	IV (1–3)	<i>Dicranum scoparium</i>	I (1–2)
<i>Erica cinerea</i>	IV (1–6)	<i>Cladonia pyxidata</i>	I (1)
<i>Deschampsia flexuosa</i>	IV (2–3)	<i>Pleurozium schreberi</i>	I (1–3)
<i>Potentilla erecta</i>	IV (1–3)	<i>Carex pilulifera</i>	I (1–3)
<i>Pleurozia purpurea</i>	IV (1–4)	<i>Vaccinium myrtillus</i>	I (1–3)
<i>Hypnum cupressiforme</i> s.l.	IV (1–4)	<i>Rhytidiadelphus loreus</i>	I (1–4)
<i>Huperzia selago</i>	III (1–2)	<i>Nardus stricta</i>	I (2–3)
<i>Arctostaphylos uva-ursi</i>	III (2–6)	<i>Campylopus paradoxus</i>	I (1)
<i>Cladonia impexa</i>	III (3–5)	<i>Herbertus stramineus</i>	I (1–5)
<i>Arctostaphylos alpinus</i>	III (1–4)	<i>Vaccinium uliginosum</i>	I (3)
<i>Sphaerophorus globosus</i>	III (1–2)	<i>Sphagnum capillifolium</i>	I (2–3)
<i>Solidago virgaurea</i>	III (1–2)	<i>Cladonia leucophaea</i>	I (1–2)
<i>Empetrum nigrum hermaphroditum</i>	III (1–5)	<i>Agrostis canina</i>	I (3)
<i>Frullania tamarisci</i>	III (1–2)	<i>Galium saxatile</i>	I (3)
<i>Dactylorhiza maculata</i>	III (1–2)	<i>Viola riviniana</i>	I (3)
<i>Diplophyllum albicans</i>	III (1–2)	<i>Thymus praecox</i>	I (1–4)
<i>Cornicularia aculeata</i>	III (1–2)	Number of samples	14
<i>Polygala serpyllifolia</i>	II (1)	Number of species/sample	23 (17–32)
<i>Succisa pratensis</i>	II (1–2)	Vegetation height (cm)	3 (2–8)
<i>Antennaria dioica</i>	II (1–2)	Vegetation cover (%)	93 (60–100)
<i>Molinia caerulea</i>	II (1–3)	Altitude (m)	400 (77–610)
<i>Festuca vivipara</i>	II (1–3)	Slope (°)	6 (2–28)
<i>Hylocomium splendens</i>	II (1–2)		

