

U19

Thelypteris limbosperma-*Blechnum spicant* community

Synonymy

Thelypteris oreopteris community McVean & Ratcliffe 1962.

Constant species

Blechnum spicant, *Galium saxatile*, *Oxalis acetosella*, *Potentilla erecta*, *Thelypteris limbosperma*.

Rare species

Athyrium distentifolium.

Physiognomy

The *Thelypteris limbosperma*-*Blechnum spicant* community comprises what are sometimes quite dense stands of *Thelypteris limbosperma* with a variety of herbaceous and sub-shrub associates and a patchy ground cover of bryophytes. The fronds begin to unfurl in May, conspicuous right from the start in the way in which the yellow-green pinnae extend while the croziers are still coiled, and when fully grown they are virtually erect, growing in shuttlecock-like groups from the ends of the stocky, branched rhizomes (Page 1982). The fronds are quickly killed by autumn frosts, though in sheltered gullies they can stand, bleached and papery, well into the winter. On the other hand, the vegetative fronds of *Blechnum spicant*, the other constant fern of this community, persist winter-green, leathery and flattened against the ground, usually until after the emergence of the following season's foliage. It is generally not nearly so abundant as *T. limbosperma*, but it can be locally prominent, growing big and luxuriant with shelter. Very occasionally, there is also a little *Dryopteris dilatata*, *Athyrium filix-femina* or, at higher altitudes, *A. distentifolium*. On drier ground this vegetation is also susceptible to invasion by *Pteridium aquilinum*, though stands in which this is abundant with *T. limbosperma* are best included in the *Pteridium*-*Galium* community.

Some stands have a distinctly heathy aspect, with well-grown clumps of *Vaccinium myrtillus* or *Calluna vulgaris*, less commonly *V. vitis-idaea*, while in others

there is a quite extensive carpet of grasses among the ferns, with *Festuca ovina*, *Agrostis capillaris*, *A. canina* and *Anthoxanthum odoratum* all occurring quite frequently, *Nardus stricta*, *Molinia caerulea*, *Holcus lanatus* and *Deschampsia cespitosa* less often. Scattered throughout are *Potentilla erecta*, *Galium saxatile* and *Oxalis acetosella* with, more occasionally, *Viola riviniana*, *Veronica officinalis*, *Rumex acetosa* and *Luzula sylvatica*. Sometimes there is local enrichment from herbs like *Teucrium scorodonia*, *Cirsium helenioides*, *C. palustre*, *Succisa pratensis* and *Primula vulgaris*.

Bryophyte cover is rather variable, but *Mnium hornum*, *Dicranum scoparium*, *Hylocomium splendens*, *Diplazium albidum* and *Pseudoscleropodium purum* are all very common, *Pleurozium schreberi*, *Rhytidiadelphus squarrosus*, *R. loreus*, *Polytrichum commune*, *Dicranum majus*, *Plagiothecium denticulatum* and *Hypnum cupressiforme* s.l. somewhat less frequent, and these can form quite luxuriant patches over the fern stools and litter.

Habitat

The *Thelypteris*-*Blechnum* community is characteristic of moist base-poor peaty soils on steep, sheltered banks at low to moderate altitudes through the wetter west and north of Britain.

Both *T. limbosperma* and *Blechnum* have a widespread distribution in this country wherever precipitation exceeds 800 mm yr⁻¹ (*Climatological Atlas* 1952), though they are much commoner in the more mountainous west, where there is heavier and more consistent rainfall, often over 1200 mm yr⁻¹ with in excess of 180 wet days annually (Ratcliffe 1968). There, high humidity and more continuous cloud cover enable both species to grow in full daylight, as well as in the shade of scrub and woodland and bushy heath, though for the kind of luxuriance they show here, some degree of shelter from bitter and desiccating winds is required. The most vigorous stands of the community tend to occur where there is local protection from northerly or easterly gales,

as in ravines and along valley sides, though at higher altitudes in the Scottish Highlands, where this kind of vegetation can reach to 800 m or so, the persistence of snow on colder aspects may play some part in providing shelter from frost.

The other essential requirement is for a moist, acid soil. Both *T. limbosperma* and *Blechnum* are strongly calcifuge, and, though the latter will readily colonise bare mineral ground, *T. limbosperma* seems very much to prefer profiles with a distinctly humose top, provided this is neither drought-prone nor waterlogged. It is perhaps a little more tolerant of moist soils than *Blechnum*, but there must be no hint of stagnation around the roots. The community is found over a wide variety of bedrocks and drift but the soils are usually of the brown podzolic type or stagnopodzol intergrades to pure peats, in which there can be some impedence below but where, through the upper horizons, there is free movement of ground water downslope. The high rainfall maintains plentiful supplies of run-off all year round and the steep slopes favoured by the community catch the maximum flow from peaty land above. Very typical situations for this kind of vegetation are on banks above gullies and streams cutting back into hills, and just below the brows of valley sides.

Superficial pH beneath the community is generally between 4 and 5, and the associated flora reflects the moist, base-poor conditions, plants of Nardetalia grasslands and heaths, and the field layers of Quercion woodlands being the most characteristic elements, although the presence together of species such as *Potentilla erecta*, *Viola riviniana*, *Veronica officinalis*, *Oxalis acetosella* and *Pseudoscleropodium purum* suggests that the soils are not always highly impoverished. Indeed, the irrigation typical of the slopes occupied by the community may ensure a modest through-put of nutrients and some stands come close to mesophytic tall-herb vegetation where such enrichment is increased.

The associates also vary according to the amount of grazing the community receives. There is no doubt that stands are most luxuriant where the ground is more inaccessible to stock or deer and it is in such situations that the vegetation has a heathier aspect or persists in close association with scrub or woodland. On grazed slopes, on the other hand, the clumps of *T. limbosperma* may persist among stretches of grassy sward before eventually succumbing to the predations of the animals. *Blechnum* can survive longer but both species are badly affected by fire and the community will not tolerate repeated burning.

Zonation and succession

The *Thelypteris-Blechnum* community is usually found among grasslands, heaths and woodlands in zonation and mosaics which reflect differences in soils, local climate and treatments. In successional terms, this kind

of vegetation is probably seral to oak-birch or pine forest, though many stands persist in an apparently stable condition, particularly towards higher altitudes.

The general context for stands of this community is a patchwork of grasslands and heaths dispersed over stream banks and valley sides. The *Festuca-Agrostis-Galium* grassland, the major plagioclimax sward of base-poor soils through the uplands, is a common element where there is grazing in such mosaics, with the *Festuca-Agrostis-Alchemilla* or even the *Festuca-Agrostis-Thymus* grassland represented where irrigation brings a measure of base-enrichment to the slopes. *T. limbosperma* can persist in such swards but the major element of continuity is among plants like *F. ovina*, *Agrostis* spp., *Anthoxanthum*, *Potentilla erecta*, *G. saxatile*, *V. riviniana*, *O. acetosella* and the bryophytes which can form a matrix in more grassy stands of *Thelypteris-Blechnum* vegetation, then coalesce into a continuous turf with a shift into the grassland.

Similar mosaics and gradations occur where the community is found among heaths occupying base-poor soils that are more sharply draining or ground that is regularly burned. These vary according to the particular region and local climate, the *Calluna-Erica* heath being the characteristic associate at lower altitudes in more oceanic areas, the *Calluna-Vaccinium* heath in more montane settings, and there eventually giving way above to *Vaccinium-Deschampsia* heath. In such situations, it is species like *V. myrtillus*, *Calluna*, *G. saxatile*, *Blechnum*, the grasses and bryophytes which provide continuity among the vegetation types, clumps of *T. limbosperma* again persisting patchily in the transition zones.

Through the sub-montane parts of the uplands, such vegetation types represent treatment-derived replacements for forest and the occurrence among them of the *Thelypteris-Blechnum* community can often be regarded as a transitional stage in succession. Over most of the range of this kind of vegetation, it is Quercion oak-birch woods that represent the climax on the moist, base-poor soils characteristic here, with the *Quercus-Betula-Oxalis* woodland on the less impoverished ground, the *Quercus-Betula-Dicranum* on the more oligotrophic. *Thelypteris-Blechnum* stands can be found in close association with these forest communities, sometimes forming a fringe around their upper margins, and occur with scrubby fragments in ravines and along stream sides. Towards the eastern Highlands, the community is also found among *Pinus-Hylocomium* forest and *Juniperus-Oxalis* scrub which is seral to pine there though often persisting as a perpetually renewed relic. Luxuriant fern-dominated patches are a striking feature of ungrazed enclaves among such juniper scrub in places like Morone (Huntley & Birks 1979a,b) and also, further south, in Upper Teesdale (Graham 1971, Gilbert 1980), and the *Viola-Anemone* sub-community of *Juniperus-Oxalis* scrub can be virtually a *Thelypteris-Blechnum* stand with

an associated juniper canopy. Both *T. limbosperma* and *J. communis* ssp. *communis*, seem to favour the relief from stagnation and extreme base-impoverishment that irrigation brings, though of course a dense fern cover is inimical to establishment of juniper seedlings.

At higher altitudes, or even on lower slopes where seed-parents are in short supply, the *Thelypteris*-*Blechnum* community can persist without progressing further.

Distribution

The community is widespread but local throughout the western and northern uplands, being particularly common in cooler oceanic regions.

Affinities

T. limbosperma stands of this kind have received only incidental mention in previous studies (McVean & Ratcliffe 1962) and further sampling is required to provide a comprehensive account of this kind of vegetation and to relate it to other fern and tall-herb communities. Ecologically, there is little doubt that the *Thelypteris*-*Blechnum* vegetation is in most cases a replacement for Quercion or Vaccinio-Piceetalia forest though, pending further investigation, it seems best to include it among the more oligotrophic Betulo-Adenostyletea communities, which McVean & Ratcliffe (1962) and Birks (1973) placed in the Dryoptero-Calamagrostidion.

Floristic table U19

<i>Thelypteris limbosperma</i>	V (6–9)	<i>Barbilophozia barbata</i>	I (1)
<i>Blechnum spicant</i>	V (1–5)	<i>Holcus lanatus</i>	I (3)
<i>Potentilla erecta</i>	V (1–3)	<i>Teucrium scorodonia</i>	I (3)
<i>Galium saxatile</i>	IV (1–4)	<i>Cirsium helenioides</i>	I (2)
<i>Oxalis acetosella</i>	IV (1–3)	<i>Geranium robertianum</i>	I (2)
<i>Agrostis capillaris</i>	III (1–8)	<i>Prunella vulgaris</i>	I (1)
<i>Festuca ovina</i>	III (1–8)	<i>Succisa pratensis</i>	I (2)
<i>Vaccinium myrtillus</i>	III (1–4)	<i>Cirsium palustre</i>	I (1)
<i>Mnium hornum</i>	III (1–3)	<i>Primula vulgaris</i>	I (1)
<i>Viola riviniana</i>	III (1–3)	<i>Rumex acetosella</i>	I (3)
<i>Dicranum scoparium</i>	III (1–3)	<i>Barbilophozia lycopodiodes</i>	I (3)
<i>Hylocomium splendens</i>	III (1–3)	<i>Athyrium distentifolium</i>	I (2)
<i>Pseudoscleropodium purum</i>	III (1–3)	<i>Hypnum callichroum</i>	I (2)
<i>Diplophyllum albicans</i>	III (1–3)	<i>Deschampsia cespitosa</i>	I (1)
<i>Pleurozium schreberi</i>	II (1–3)	<i>Cladonia coccifera</i>	I (2)
<i>Rhytidiadelphus squarrosus</i>	II (1–3)	<i>Polytrichum alpinum</i>	I (1)
<i>Veronica officinalis</i>	II (1–3)	<i>Nardia scalaris</i>	I (1)
<i>Anthoxanthum odoratum</i>	II (1–3)	<i>Juncus effusus</i>	I (5)
<i>Polytrichum commune</i>	II (1–3)	<i>Agrostis stolonifera</i>	I (4)
<i>Agrostis canina</i>	II (1–3)	<i>Marchantia polymorpha</i>	I (3)
<i>Dicranum majus</i>	II (1–4)	<i>Atrichum undulatum</i>	I (3)
<i>Plagiothecium denticulatum</i>	II (1–3)	<i>Holcus mollis</i>	I (3)
<i>Hypnum cupressiforme</i>	II (1–3)	<i>Erica cinerea</i>	I (2)
<i>Calluna vulgaris</i>	II (1–4)	<i>Dicranella heteromalla</i>	I (2)
<i>Rumex acetosa</i>	II (1–3)	<i>Polypodium vulgare</i>	I (3)
<i>Luzula sylvatica</i>	II (1–4)	Number of samples	7
<i>Lophocolea bidentata</i> s.l.	II (1–3)	Number of species/sample	22 (9–46)
<i>Cerastium fontanum</i>	I (2)	Vegetation height (cm)	26 (12–45)
<i>Nardus stricta</i>	I (2)	Vegetation cover (%)	88 (30–100)
<i>Campanula rotundifolia</i>	I (1)	Altitude (m)	376 (245–762)
<i>Carex pilulifera</i>	I (1)	Slope (°)	41 (20–90)
<i>Luzula pilosa</i>	I (1)		
<i>Ptilidium ciliare</i>	I (1)		

