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## OV40

# *Asplenium viride*-*Cystopteris fragilis* community *Asplenio viridis*-*Cystopteridetum fragilis* (Kuhn 1939) Oberdorfer 1949

### Synonymy

*Asplenium trichomanes*-*Fissidens cristatus* Association, Limestone facies *p.p.* and Montane facies Birks 1973.

### Constant species

*Asplenium ruta-muraria*, *Asplenium trichomanes*, *Asplenium viride*, *Cystopteris fragilis*, *Festuca ovina*, *Ctenidium molluscum*, *Fissidens cristatus*, *Tortella tortuosa*.

### Rare species

*Polystichum lonchitis*, *Woodsia alpina*.

### Physiognomy

The *Asplenio*-*Cystopteridetum* comprises open vegetation, often fragmentarily disposed in rock crevices on narrow ledges and among screes, in which a variety of ferns can assume prominence. *Asplenium trichomanes* (sometimes, according to Page (1982), ssp. *trichomanes* here, rather than the more widespread ssp. *quadrivalens*) remains quite common in this community but it peters out at higher altitudes. Even more so is this true of *A. ruta-muraria*, which among available samples is constant, but across the range of this vegetation as a whole is largely confined to stands outside the Scottish Highlands. The most characteristic spleenwort, then, is *A. viride*, particularly in the mountains of Scotland and northern England. This fern can occur in considerable abundance here, its rosettes of rather delicate pale green fronds, typically all turned towards the light, persisting into the winter and then dying down (Page 1982).

The other distinctive constant among the ferns is *Cystopteris fragilis*, a gregarious species, the fragile little fronds of which emerge rapidly in spring but which are cut back suddenly by the first frosts of autumn (Page 1988). At lower altitudes, particularly to the west of Britain, *Phyllitis scolopendrium* can occur with some frequency and abundance but more characteristic on higher ground are *Polystichum aculeatum* and, especially in the mountains of Scotland, *P. lonchitis*. Younger specimens of these ferns can be hard to distinguish (and the

species can hybridise to produce *P. × illyricum*: Page 1982), but only the latter extends on to the highest screes and ledges. There, too, very locally, this community can provide a locus for the nationally rare *Woodsia alpina* (Birks 1973, Page 1982, 1988).

Few other vascular plants apart from ferns are common in the community but, particularly in less-shaded crevices, *Festuca ovina* can be seen along with occasional *Geranium robertianum* and *Hieracium* spp. of the section *Oreadea* and scattered plants of calcicolous swards.

The other prominent element in the vegetation is bryophytes found as little tussocks and pads among the rock crevices. *Ctenidium molluscum*, *Fissidens cristatus* and *Tortella tortuosa* are all constant and the first in particular can be abundant. Also occurring are *Neckera crispa*, *Orthothecium intricatum*, *O. rufescens*, *Weissia controversa*, *Plagiochila asplenoides* and *Reboulia hemispherica*. Lichens are generally scarce but *Solorina saccata* is occasional.

### Habitat

The *Asplenio*-*Cystopteridetum* is characteristic of more shaded crevices and ledges among exposures and talus of various lime-rich bedrocks in the cool, wet uplands of western and northern Britain.

Like the *Asplenietum*, this fern vegetation is quite strongly calcicolous but it is not so strikingly confined to sedimentary limestones. Thus, stands can also be found on base-rich shales, calciferous sandstones, schists, rhyolites, andesites and dolerites, all of which can weather to rendziniiform or calcareous brown soils of immature profile. The pH of these rudimentary soils is not necessarily very high (sometimes 6 or below), but release of calcium from the parent materials is steady. Also, though *Cystopteris fragilis*, as well as *A. trichomanes* and *A. ruta-muraria*, can thrive on artificial habitats, where limestones or lime-mortar provide congenial substrates, this assemblage as a whole is characteristic of natural rocky outcrops or their weathering products like screes

and boulder fields. These provide a wide variety of surfaces for colonisation, often so fragmentary as to severely limit potential competitors to the ferns which are themselves well equipped to capitalise on the restricted niches. This is especially well seen in *C. fragilis* which has a small but very extensive wiry root system pushing deeply into tiny cracks.

Another important difference between this vegetation and the *Asplenium* community is that it is more associated with cooler and humid situations. On a small scale, this can be seen in its preference for deeper crevices in rock faces and pavements and among talus, on ledges in gullies, beneath overhangs on cliffs and in cave mouths. Here, shade provides some relief from loss of moisture from the soils and the atmosphere and eliminates more light-demanding competitors, including *A. ruta-muraria* in deep shade. Typically, though, the ferns seem to prefer airy conditions where the humidity does not become stagnant and well-drained pockets of soil with no hint of impedence.

On a geographical scale, the need for lower temperatures and a moister environment is seen in the association of the community with higher altitudes than are typical of the *Asplenietum* vegetation. The *Asplenio-Cystopteridetum* community can be found near to sea-level on lime-rich screes and cliffs in the far north-west of Scotland, where temperatures remain cool and the climate is extremely humid and cloud-ridden. Even the Arctic-alpine *P. lonchitis* can be seen in such situations, though it is *A. ruta-muraria* and, in shadier places, *Phyllitis* which occur preferentially at these lower altitudes. However, it is on higher ground that the community acquires its most distinctive appearance where greater tolerance of winter cold and lower light intensities gives *A. viride* an edge over *A. trichomanes* and provides an opportunity for the appearance of the more upland *Polystichum aculeatum* and the truly Arctic-alpine *P. lonchitis*. This latter is a slow-growing but long-lived species, so it favours older, stable screes and crevices and its fronds do not expand until the late mountain spring weather of May. They can persist into a third growing season but their glossy, leathery texture probably gives some protection against desiccation in the long winter frosts at high altitudes (Page 1982). *Woodsia alpina*, too, though it seems to favour ledges sheltered from too much wind and rain, is well able to tolerate the heavy incrustation with ice characteristic of dripping wet

stands of this vegetation in high mountains (Page 1982).

Even in situations where the climate is milder, such conditions effectively exclude most potential vascular competitors to the ferns, though they are also congenial to the variety of calcicolous bryophytes typical of the community.

### Zonation and succession

On shaded rock outcrops in mountains, the *Asplenio-Cystopteridetum* can often be found growing as isolated fragments in crevices. Where on exposures at higher altitudes there is more opportunity for soil accumulation and where seepage keeps the cliff faces dripping wet, the community can be found with the *Saxifraga-Alchemilla* vegetation, the asplenoid ferns continuing to figure occasionally among the luxuriant herb carpet of that assemblage. On drier ledges and crags, the *Dryas-Silene* community can also figure, with the *Festuca-Agrostis-Thymus* grassland usually occurring over the grazed slopes around. In the Yorkshire Dales, at somewhat lower altitudes on Carboniferous Limestone, the *Asplenio-Cystopteridetum* occurs on crags among the *Sesleria-Galium* grassland and can be seen in the mosaics of vegetation among high level grikes on pavement exposures. In sunnier situations at lower altitudes, the community is replaced by the *Asplenietum*.

### Distribution

The *Asplenio-Cystopteridetum* community is commonest in the Scottish Highlands, north Pennines and Lake District, with more local occurrences further south in the Peak District and Wales.

### Affinities

The *Asplenio-Cystopteridetum* was first described in detail from Britain by Birks (1973) as part of his broad *Asplenium-Fissidens* Association and then by Birse (1984). Stands from this country are generally similar to those described from mountains in Germany (Oberdorfer 1949, Pott 1992). Traditionally, they have been located in the *Cystopteridion fragilis* alliance, containing crevice vegetation of shaded situations, though Segal (1969) characterised a new association, the *Polysticho lonchitis-Asplenietum viridis* from walls in Austrian and French mountains and placed it in the *Cymbalario-Asplenion*, a treatment followed by White & Doyle (1982) in Ireland.

**Floristic table OV40**

<i>Asplenium viride</i>	V (2–8)
<i>Cystopteris fragilis</i>	V (1–5)
<i>Ctenidium molluscum</i>	V (2–6)
<i>Fissidens cristatus</i>	V (2–5)
<i>Asplenium ruta-muraria</i>	IV (2–7)
<i>Asplenium trichomanes</i>	IV (2–7)
<i>Tortella tortuosa</i>	IV (1–6)
<i>Festuca ovina</i>	IV (1–5)
<i>Neckera crispa</i>	III (2–4)
<i>Geranium robertianum</i>	II (2–3)
<i>Solorina saccata</i>	II (1–3)
<i>Orthothecium intricatum</i>	II (1–3)
<i>Reboulia hemispherica</i>	II (1–2)
<i>Weissia controversa</i>	II (1–3)
<i>Plagiochila asplenoides</i>	II (1–5)
<i>Orthothecium rufescens</i>	II (1–3)
<i>Phyllitis scolopendrium</i>	I (2–4)
<i>Plagiobryum zierii</i>	I (1–3)
<i>Hieracium</i> section <i>Oreadea</i>	I (1–2)
<i>Campanula rotundifolia</i>	I (1–3)
<i>Trichostomum crispulum</i>	I (3–4)
<i>Porella platyphylla</i>	I (1–2)
<i>Koeleria macrantha</i>	I (1–2)
<i>Galium sternerii</i>	I (1–3)
<i>Polystichum aculeatum</i>	I (1)
<i>Polystichum lonchitis</i>	I (3–4)
<i>Pohlia cruda</i>	I (2–3)
<i>Pellia endiviifolia</i>	I (1–3)
<i>Isopterygium pulchellum</i>	I (2)
<i>Anoetangium aestivum</i>	I (4)
<i>Arrhenatherum elatius</i>	I (2)
<i>Sanguisorba minor</i>	I (2)
<i>Thymus praecox</i>	I (2)
<i>Encalypta streptocarpa</i>	I (2)
<i>Homalothecium sericeum</i>	I (2)
Number of samples	15
Number of species/sample	18 (9–31)