OV39

Asplenium trichomanes-A. ruta-muraria community *Asplenietum trichomano-rutae-murariae* R.Tx. 1937

Synonymy
Asplenium trichomanes-Fissidens cristatus Association Birks 1973 *p.p.*

Constant species
Asplenium ruta-muraria, *Asplenium trichomanes*, *Homalothecium sericeum*, *Porella platyphylla.*

Rare species
Hornungia petraea, *Silene nutans.*

Physiognomy
The *Asplenietum trichomano-rutae-murariae* comprises generally very open and often fragmentary stands of crevice vegetation in which diminutive ferns and bryophytes are the most distinctive components. The commonest ferns here are *Asplenium ruta-muraria* and *A. trichomanes*, the latter almost always the tetraploid ssp. *quadrivalens* according to Page (1982) although, on Skye, most of the plants examined have proved morphologically intermediate between this and the diploid ssp. *trichomanes* (Wood 1969). Both *A. trichomanes* and *A. ruta-muraria* are more or less evergreen plants whose small rosettes are very frequent here but of low total cover. The bulkier *A. adiantum-nigrum* occurs very rarely in the community but *A. viride* is typically absent. *Ceterach officinarum* is a good preferential but it is only really common in this vegetation towards the south and west of Britain.

Among other perennial vascular plants, only *Festuca ovina*, *Koeleria macrantha*, *Thymus praecox*, *Sedum acre* and *Helianthemum nummularium* occur with any frequency, with *Arenaria serpyllifolia* and *Saxifaga tridactylites* figuring as ephemerals, but all of these species are strongly preferential to one sub-community which is transitional to rocky turf where the cover of plants is greater. Through the community as a whole, the other prominent element in the vegetation comprises bryophytes whose cushions and mats can cram the crevices and spread out a little way over the rock surfaces. Most frequent among these are *Homalothecium sericeum*, *Porella platyphylla*, *Hypnum cupressiforme*, *Fissidens cristatus*, *Tortella tortuosa*, *Weissia controversa* and *Encalypta streptocarpa*. Less common are *Tortula subalata*, *T. muralis*, *Reboulia hemispherica* with *Tortula intermedia* and *Trichostomum crispulum* more preferential to one sub-community. Lichens are much less numerous and *Cladonia pocillum* is the only frequent species throughout.

Sub-communities

***Trichostomum crispulum-Tortula intermedia* sub-community.** The vegetation here is less species-rich and extensive in cover but more consistently dominated by ferns and bryophytes. Particularly towards south-west Britain, *Ceterach* becomes frequent, its stout little heads of rusty-backed fronds sometimes occurring in abundance. However, although there can be occasional tussocks of *Fetuca ovina* and *Koeleria macrantha* in the crevices, scattered mats of *Thymus* and *Helianthemum nummularium* with sparse ephemerals, the more distinctive component is a group of preferential bryophytes and lichens. *Tortula intermedia* and *Trichostomum crispulum* are the most frequent of these but *Targionia hypophylla*, *Dermatocarpon lachnaeum* and *Thalliodema caeruleonigricans* also occur occasionally.

***Sedum acre-Arenaria serpyllifolia* sub-community:** *Asplenium trichomanes-Fissidens cristatus* Association Birks 1973 *p.p.* In this kind of *Asplenietum* vegetation, the overall appearance is more like an open rocky turf in which the ferns and bryophytes of the community provide a consistent element among a variety of other vascular preferentials. Tussocks of *F. ovina* are especially prominent with scattered *K. macrantha*, *Arrhenatherum elatius* and *Aira caryophyllea*. Among mat-formers, *T. praecox* is usually the most frequent and abundant but *H. nummularium* and *Sedum acre* are both common and occasionally extensive among the crevices and over the

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rock surfaces. Also occurring among the perennials are *Sanguisorba minor*, *Teucrium scorodonia*, *Hieracium* spp. of the *Oreadea* section, *Potentilla tabernaemontani*, *Hieracium pilosella*, *Scabiosa columbaria* and *Centaurea scabiosa*. This sub-community also provides an occasional locus for the nationally rare *Silene nutans*. Ephemeral plants can also figure in some variety: *Arenaria serpyllifolia*, *Medicago lupulina*, *Saxifraga tridactylites*, *Acinos arvensis*, *Aira caryophyllea*, *Aphanes arvensis*, *Arabidopsis thaliana* and the national rarity *Hornungia petraea* are all occasional to common. Preferential bryophytes are less prominent but *Tortula ruralis* ssp. *ruralis* and *Grimmia apocarpa* are frequent.

Habitat

This is a community of sunny crevices in lime-rich bedrocks and wall-mortar at low to moderate altitudes, particularly in western Britain.

Both *A. trichomanes* and *A. ruta-muraria*, as well as the less common *Ceterach*, are strongly calcicolous ferns which gain a hold in crevices where other colonisers are limited by the extreme environmental conditions. Generally, it is harder limestones, like those of Carboniferous, Devonian and Jurassic age, more locally, as on Skye, Ordovician, that weather to provide suitable crevices for the ferns and these rocks crop out predominantly in the west and north of the country. There, the community is widespread on crags and occurs more locally where pavements form. Around these regions, too, buildings and boundary walls made of such rocks or, much more widely, lime-rich mortars used in construction with many other, non-calcareous, building materials also provide fissures for colonisation by this kind of vegetation. Lime-mortars in the strict sense date from Roman times in Britain and were in very wide use until well into the 1800s. Carbonisation does not necessarily penetrate very deeply but such mortars are relatively soft and decay quite rapidly so suitable crevices develop easily. The more recent cement mortars are more complex, harder and durable so colonisation by this vegetation tends to be slower and less extensive where these have been used (Page 1988). Nonetheless, in many places, it is buildings and walls that provide a more common substrate for the community than natural outcrops and this vegetation often adds a decorative effect to churchyards, cottages, ruined castles and abbeys, and industrial and railway buildings in country areas.

The extent and disposition of suitable crevices in natural and artificial habitats vary greatly, giving a pleasing diversity to the physiognomy of the community. Always, however, the soils around the roots of ferns and beneath the bryophytes are rudimentary protorendzinas, consisting of the sparse products of the disintegration and weathering of the mineral substrate, together with decaying plant material and wind-blown detritus. Among the rhizomes of *Ceterach*, Page (1982) also observed foraging ants which he presumed brought some enrichment with nitrogen. Even where accumulation is somewhat more substantial, the soils here remain very calcareous. Where there has been acidification of mortars through atmospheric pollution or seepage through walls of water that is not so base-rich, this vegetation has not established at all or has declined.

Both the common species of *Asplenium* in this vegetation show great morphological plasticity with varying exposure in these habitats and they can, in fact, extend into strongly-shaded situations, where they take on a more luxuriant look. Generally, though, they occur in this community in places where there is a combination of some atmospheric humidity or moisture in the substrate together with high illumination. In more shaded habitats and in the cooler, cloudier conditions of higher mountains, this vegetation is usually replaced by the *Asplenio-Cystopteridetum* community. In the more equable climate of south-west Britain, where mild winter temperatures and the absence of desiccating winds are combined with high insolation, the *Asplenietum* community can occur in very sunny situations, where the abundance of *Ceterach* is especially distinctive. The ability of this fern to capitalise on water deep in rock exposures and stonework, together with its fleshy fronds and scales, give it a degree of protection against considerable baking heat (Page 1982, 1988).

Some of the distinctive bryophytes and lichens of this vegetation are also able to survive such strong illumination by using water in the crevices or recovering well from periods of drying. This applies, too, to certain of the vascular perennials, many of which are characteristic of drier grasslands. However, most of these need a more extensive and deeper network of soil-filled crevices to thrive and are characteristic of the *Sedum-Arenaria* sub-community which occurs where local weathering has extended the fissures and soil has accumulated or where outcrops give way to less rocky ground. The periodic exposure of areas of bare soil which get wetted in autumn and spring rains provides opportunities for ephemeral plants to gain a hold and complete their life cycles before the summer drought.

Zonation and succession

In its natural habitats, the *Asplenietum* is found on rocky habitats among other fern and bryophyte communities, calcicolous grasslands, scrub and woodland where zonations and successions are related to the extent of soil development, the degree of exposure to light and wind and the intensity of grazing. Stands in artificial habitats are often more isolated but can sometimes be found with other fern, bryophyte or crevice vegetation depending on the amount of shelter and shade.

Many of the floristic and structural differences

between the two sub-communities of the *Asplenietum* are related to the extent of soil formation and colonisation by vascular plants over limestone outcrops. Quite often, the *Sedum-Arenaria* sub-community is transitional between the *Trichostomum-Tortula* sub-community and some kind of calcicolous grassland on less rocky slopes around. There, more extensive, deeper and somewhat less drought-prone soils are often also accessible to grazing stock which cannot reach the craggier ground. Over much of the range of this fern vegetation in southern Britain, the typical calcicolous pasture swards are the *Festuca-Avenula* grassland and, in the warmer south and east, its analogues dominated by *Bromus erectus* and *Brachypodium pinnatum*. In fact, where the harder Carboniferous and Devonian limestones that provide some of the most congenial substrates for this community crop out, it is usually the *Dicranum* sub-community of *Festuca-Avenula* grassland that forms the bulk of the pasture on rendziniform soils of gentler slopes. In the Mendips, Derbyshire Dales and in north and south Wales, transitions to such grassland involve a rapid loss of the fern and much of the bryophyte contingent and a rise in the extent and number of perennial vascular calcicoles in the vegetation. Some ephemerals may continue to find a place on scuffed areas of sward but in general most are scarce. On the Carboniferous Limestone around Morecambe Bay and in the Yorkshire Dales, the *Sesleria-Galium* grassland replaces the *Festuca-Avenula* grassland in such sequences while on local limestone exposures through Scotland, the community can be found among stands of *Festuca-Agrostis-Thymus* grassland. On the Durness Limestone of Skye, this *Asplenietum* occurs in crevices in close association with the *Dryas-Carex* heath.

More locally, the *Asplenietum* can be found in association with the *Festuca-Carlina* grassland on limestone cliffs around the south-western seaboard of Britain but in the very hot and sunny conditions characteristic of such situations in summer, the fern vegetation often extends only on to somewhat shaded rock surfaces nearby.

In more inland habitats, where the surrounds to rock outcrops are not grazed, the *Asplenietum* may be more isolated among scrub and woodland. Usually, on the limestones characteristic of this fern vegetation, this is *Crataegus-Hedera* scrub or *Fraxinus-Acer-Mercurialis* woodland. Most of the shrubs and trees of these communities show limited ability to colonise rockier ground where soils are very limited so they peter out around the crags in a more open cover of stunted individuals. However, they may cast some shade on the *Asplenietum* which can be inimical to its survival. Where rocky crags occur close to gardens, colonisation of the crevices themselves with *Cotoneaster* and *Berberis* spp. can be extensive and this can shade out the community completely.

Where deeper crevices in limestone outcrops get more shade and shelter, the *Asplenietum* can give way to the *Asplenio-Cystopteridetum* or, in grikes, to fragmentary stands of minituarised woodland. On walls and buildings where mortar-filled vegetation crevices provide the habitat for this the *Trichostomum-Tortula* sub-community can be found in close association with the *Parietarietum* and *Cymbalarietum* communities.

Distribution

The community occurs widely in suitable natural habitats, especially towards the more humid west of Britain with many additional localities on artificial substrates through the drier lowlands of the east.

Affinities

The *Asplenietum* is part of a range of rock-crevice vegetation that, apart from Birse (1984), has previously attracted little interest in Britain except locally, as on Skye (Birks 1973) or within treatments of fern ecology (Page 1982, 1988). The association has been described from other parts of north-west Europe like The Netherlands (Westhoff & den Held 1969), Ireland (White & Doyle 1982; see also Ivimey-Cook & Proctor 1966), Germany (Pott 1992) and Poland (Matuszkiewicz 1984). It has usually been placed in the alliance Potentillion caulescentis Br.-Bl. in Braun-Blanquet & Jenny 1926, typical of calcareous rocks in sunny situations, although some authorities follow Segal (1969) and locate it in a Cymbalario-Asplenion.

Floristic table OV39

	a	b	39
Asplenium trichomanes	V (1–3)	V (1–3)	V (1–3)
Asplenium ruta-muraria	V (2–4)	V (2–4)	V (2–4)
Porella platyphylla	V (1–2)	IV (2–4)	IV (1–4)
Homalothecium sericeum	IV (2–6)	IV (2–6)	IV (2–6)
Tortula intermedia	III (1–3)	I (2)	II (1–3)
Trichostomum crispulum	III (1–3)		II (1–3)
Dermatocarpon lachnaeum	II (1–3)		I (1–3)
Thaliodema caeruleonigricans	II (1–2)		I (1–2)
Ceterach officinarum	II (1–3)	I (2)	I (1–3)
Targionia hypophylla	II (1–3)		I (1–3)
Neckera crispa	I (2)		I (2)
Asplenium adiantum-nigrum	I (2)		I (2)
Festuca ovina	II (4–5)	V (2–8)	III (2–8)
Thymus praecox	II (2–4)	V (2–4)	III (2–4)
Arenaria serphyllifolia	I (2)	V (1–4)	III (1–4)
Sedum acre	I (1–2)	V (2–4)	III (1–4)
Koeleria macrantha	I (2–4)	IV (2–5)	III (2–5)
Helianthemum nummularium	I (4–5)	IV (1–5)	III (1–5)
Medicago lupulina	I (2)	III (1–3)	II (1–3)
Sanguisorba minor	I (2)	III (2–7)	II (2–7)
Saxifraga tridactylites	I (2)	III (1–3)	II (1–3)
Acinos arvensis	I (2)	III (1–3)	II (1–3)
Tortula ruralis ruralis		III (2–4)	II (2–4)
Schistidium apocarpum		II (2–4)	I (2–4)
Hornungia petraea		II (1–3)	I (1–3)
Campanula rotundifolia	I (1)	II (1–2)	I (1–2)
Teucrium scorodonia	I (4)	II (1–4)	I (1–4)
Hieracium section *Oreadea*		II (1–3)	I (1–3)
Arrhenatherium elatius		II (1–4)	I (1–4)
Aphanes arvensis	I (2–4)	II (2–4)	I (2–4)
Arabidopsis thaliana	I (2)	II (1–4)	I (1–4)
Geranium molle	I (2)	II (1–2)	I (1–2)
Potentilla tabernaemontani		II (1–4)	I (1–4)
Hieracium pilosella		II (1–3)	I (1–3)
Galium sterneri		II (1–4)	I (1–4)
Scabiosa columbaria		II (1–2)	I (1–2)
Centaurea scabiosa		II (2–4)	I (2–4)
Silene nutans		II (1–4)	I (1–4)
Aira caryophyllea		I (1–4)	I (1–4)
Bryum capillare		I (2)	I (2)
Squamaria crassa		I (1–2)	I (1–2)
Carlina vulgaris		I (2–4)	I (2–4)
Veronica arvensis		I (1–3)	I (1–3)
Riccia sorocarpa		I (1–3)	I (1–3)

Hypnum cupressiforme	III (2–4)	III (1–4)	III (1–4)
Fissidens cristatus	III (2–4)	III (1–4)	III (1–4)
Cladonia pocillum	III (1–3)	III (1–4)	III (1–4)
Tortella tortuosa	III (1–3)	III (1–4)	III (1–4)
Weissia controversa	III (2–4)	III (1–4)	III (1–4)
Encalypta streptocarpa	III (1–3)	III (1–3)	III (1–3)
Tortula subulata	II (1–3)	II (1–3)	II (1–3)
Tortula muralis	II (1–2)	II (1–2)	II (1–2)
Reboulia hemispherica	II (1–2)	II (2)	II (1–2)
Dermatocarpon miniatum	I (1–2)	I (2)	I (1–2)
Number of samples	18	20	38
Number of species/sample	10 (3–17)	22 (13–30)	16 (3–30)

a *Trichostomum crispulum-Tortula intermedia* sub-community
b *Sedum acre-Arenaria serpyllifolia* sub-community
39 *Asplenietum trichomano-rutae-murariae* (total)

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