W23
Ulex europaeus-Rubus fruticosus scrub

Synonymy
Scrub associations Tansley 1911 *p.p.*; *Ulicetum* Tansley 1939 *p.p.*; *Ulex europaeus* scrub Grubb *et al.* 1969 *p.p.*; Cliff Scrub Nodum Malloch 1970 *p.p.*; *Pteridium aquilinum-Ulex europaeus* Association (Birse & Robertson 1976) Birse 1984.

Constant species
Rubus fruticosus agg., *Ulex europaeus*, *Agrostis capillaris*.

Physiognomy
The *Ulex europaeus-Rubus fruticosus* agg. scrub has a fairly low woody cover, usually between 1 and 2 m high, in which *U. europaeus* is generally the dominant plant. Its physiognomy is very variable: where the scrub is browsed (the young gorse shoots providing a palatable bite), the bushes can be kept trimmed to rounded hummocks, sometimes with a central tuft of inaccessible branches; where the gorse grows free of browsing or has not been recently burned, the bushes grow tall and leggy, with their foliage out of reach of any herbivores that get access subsequently; where there is regeneration after burning from basal or buried stems, there can be a low sward of young shoots. Quite often, gorse is accompanied here by *Cytisus scoparius*, particularly on the more acid soils, and in some stands this can be the sole dominant.

U. europaeus figures widely as a component of various kinds of heath in Britain, where it can accompany *U. gallii* to the west and/or *U. minor* in the south, as well as *Calluna vulgaris* and *Erica cinerea*. Apart from *Calluna*, which makes a very occasional contribution, all these species are typically absent here. Usually, the only other members of the scrubby cover are Rubi: *Rubus fruticosus* agg. is very frequent, though its cover is generally low, and *R. idaeus* occurs occasionally.

In dense *Ulex-Rubus* scrub, there is next to no vegetation beneath the bushes, the ground being bare or covered with a layer of the cast spiny shoots, and herbaceous plants being limited to areas between the gorse; where the growth is more open and leggy, the herbage can be more or less continuous, especially where animals graze beneath the bushes. Strictly speaking, the associated plants can hardly be called a field layer: by and large, the vegetation presents the appearance of a grassland with gorse and broom, and the affinities of the herbaceous element are clearly with the more mesotrophic forms of *Festuca-Agrostis-Galium* grassland. *Agrostis capillaris* is usually very common and *Festuca rubra* frequent with *Holcus lanatus* and *Dactylis glomerata* represented a little more unevenly. Other grasses found occasionally include *Deschampsia flexuosa*, *Holcus mollis*, *Poa pratensis* and, on somewhat less acid soils, *Arrhenatherum elatius* and *Brachypodium sylvaticum*. The commonest dicotyledons in the community are *Galium saxatile*, *Potentilla erecta*, *Rumex acetosa*, *Silene dioica* and *Digitalis purpurea*. *Viola riviniana*, *Cerastium fontanum* and *Achillea millefolium* are recorded very occasionally but there are none of the intimate mixtures of calcicoles characteristic of the occurrences of *U. europaeus* in what has generally been called 'Chalk-' or 'Limestone-heath'. Neither are markedly eutrophic plants like *Urtica dioica* or *Galium aparine* represented, although disturbed or burned areas within the *Ulex-Rubus* scrub may have dense patches of *Epilobium angustifolium*. *Pteridium aquilinum* occurs quite frequently but only exceptionally does it have high cover, being found more usually as sparse scattered fronds.

In the grassy sward, bryophytes can be quite abundant but the species involved are few. *Rhytidiadelphus squarrosus* is the most frequent and characteristic but *Eurhynchium praelongum* and *Pseudoscleropodium purum* also occur occasionally.

Sub-communities

***Anthoxanthum odoratum* sub-community:** *Pteridium aquilinum-Ulex europaeus* Association (Birse & Robertson 1976) Birse 1984. *U. europaeus*, sometimes with or

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occasionally replaced by *Cytisus*, dominates here in rather open and sometimes tall covers with patchy *R. fruticosus* agg. and infrequent *R. idaeus*. The herbaceous component is usually extensive and quite rich with *Agrostis capillaris*, *Festuca rubra* and *Holcus lanatus* being especially prominent among the grasses and here frequently accompanied by small amounts of *Anthoxanthum odoratum* and *Poa pratensis* and, more occasionally, by *Deschampsia flexuosa*. Among the dicotyledons, *Potentilla erecta* is preferentially common, occurring as scattered plants with *Galium saxatile*, *Cerastium fontanum*, *Viola riviniana* and *Rumex acetosa*. Very occasionally, there can be a little *Calluna*.

***Rumex acetosella* sub-community:** Cliff Scrub Nodum Malloch 1970 *p.p.*; *Pteridium aquilinum-Ulex europaeus* Association (Birse & Robertson 1976) Birse 1984 *p.p.* The general features of the vegetation here are much as in the last sub-community with rather patchy covers of gorse and/or broom, a little *Rubus fruticosus* agg. and a grassy ground cover in which *Festuca-Agrostis* grassland species figure prominently, *Agrostis capillaris* being especially frequent and abundant. However, *Anthoxanthum odoratum* and *Potentilla erecta* are noticeably less common and there is a marked enrichment with species characteristic of light and/or disturbed soils. *Rumex acetosella* and *Hypochoeris radicata* are the most frequent among these but *Senecio jacobaea*, *Crepis capillaris*, *Jasione montana* and *Aira praecox* also occur, sometimes as scattered plants in little breaks in the swards, often on more extensive patches of open ground in disturbed places, on ant-hills or around rock exposures.

***Teucrium scorodonia* sub-community:** Cliff Scrub Nodum Malloch 1970 *p.p.* Fairly dense covers of *U. europaeus* and *Rubus* provide the usual canopy here and there is a marked reduction in the cover and variety of the grassy element. *Festuca rubra* and *Agrostis capillaris* both still occur occasionally and *Dactylis glomerata* and *Brachypodium sylvaticum* are preferential at low frequencies but, generally, these occur as scattered tussocks among the gorse and bramble cover. More characteristic, in open places, is *Teucrium scorodonia* along with a little *Silene dioica*, *Digitalis purpurea* and *Pteridium*. A patchy cover of *Hedera helix* can extend beneath the gorse.

Habitat

The *Ulex-Rubus* scrub is characteristic of moderately to strongly acid brown soils, free-draining though not always dry and not markedly oligotrophic. It is probably a fairly natural colonising vegetation on such profiles throughout the British lowlands and in the upland fringes, though its establishment and spread are much encouraged by disturbance and agricultural neglect. It can be a seral precursor to or, in coppice plots and clearings, a temporary replacement for more calcifugous woodlands but many stands seem to be stable or, in pasture, to show a cyclical pattern of development and run-down.

The community seems most consistently associated with base-poor brown earths of pH 4–6, without any drainage impedence, though often quite deep and relatively moist, at least when compared with those over which *U. europaeus* occurs with ericoid sub-shrubs. Such soils have developed naturally over wide areas of lowland Britain, being especially associated with more pervious arenaceous bedrocks, like sands and sandstones, and lighter-textured superficials including some aeolian deposits, more free-draining material among glacial and peri-glacial deposits, colluvium and head. Very frequently, the profiles have been subject to some measure of improvement in association with low-intensity and often sporadic arable cultivation or pastoral agriculture. And, in some places, such activities have brought more extreme podzolised profiles into the more fertile state characteristic of low base-status brown earths, as around agricultural enclaves within lowland heaths and along the fringes of the uplands.

The *Ulex-Rubus* scrub is most often found on such soils in places which are of marginal value in the agricultural landscape: where tractable slopes are broken by banks and rocky areas, around the limits of enclosures and near settlements and farms and along pathways and hedgebanks. With this kind of association, *U. europaeus* is very much a more calcifugous equivalent of *Juniperus communis* ssp. *communis*.

In less intensive agricultural economies, gorse has played some part as a provider of fodder. Its young shoots are soft and nutritious and, in the past, older, harder shoots were cut and ground for feeding to cattle (Tansley 1939). It has been maintained (Roberts in Tansley 1939) that gorse was deliberately introduced into some parts of Wales for cutting as feed and it has certainly been planted to provide fox cover in central and southern England and perhaps elsewhere as hedges. Then, where it has been an impediment to agriculture, it has frequently been burned back, though it sprouts readily from undamaged basal or buried shoots and fire stimulates germination of its seed (and that of *Cytisus*).

U. europaeus is well adapted to maintain itself in such situations where exploitation comes and goes. As well as an explosive mechanism of seed-dispersal, the pods ripening and bursting in mid-summer, it is probably spread along paths by ants which carry the seeds away to devour the oily caruncle. Once established, it is very resistant to grazing, persisting as low hummocks in mixed swards and getting away to form leggy bushes if there is any relaxation of herbivore pressure: the demise of rabbits in myxomatosis was widely followed by

upgrowth of *U. europaeus*, as at Lullington Heath in Sussex, where stands of this kind of scrub developed from *Calluna-Erica* heath (Grubb *et al.* 1969). Rabbits can undermine and kill *U. europaeus* where bushes provide shelter for warren entrances in open grassland, but the disturbance which the animals create itself provides further ground for re-establishment (Duffey *et al.* 1974).

Two further features of *U. europaeus* may be of particular importance in certain situations. First, although it seems to favour soils which are initially not very impoverished, it can itself enrich its environment through the activity of root-nodule nitrogen-fixing bacteria, an activity whose consequences are often most marked after gorse is cleared when eutrophic weeds frequently spring up on the disturbed ground. *Cytisus* also has such root nodules. Second, as Grubb *et al.* (1969; see also Grubb & Suter 1971) showed, *U. europaeus* can acidify its root environment, probably not by the accumulation of mor and enhancement of podzolisation, as under *Calluna*, but by the immobilisation of bases in the standing crop and litter. This can enable it to thrive on initially quite base-rich and calcareous soils, such as develop from more limy superficials, thus giving the plant an advantage when grazing is relaxed, when it can spread and extinguish many elements of the previous sward.

There is one other particular situation where the clear association of the community with moderately acid and moderately enriched soils and disturbance is very evident, and that is within woodland coppice plots or clearings. The *Ulex-Rubus* scrub frequently develops after underwood or canopy have been removed from stands of the *Quercus-Pteridium-Rubus* woodland on more free-draining soils or from the *Quercus-Betula-Deschampsia* woodland on profiles that are not too strongly podzolised and impoverished. Such occurrences give some clue as to the possible seral successions in which the community is involved (see below).

Even within a woodland context, the *Ulex-Rubus* scrub has its characteristic suite of calcifuges and more mesophytic herbs, strongly indicative of the typical balance of edaphic conditions here. But it is where the community develops among a pastoral or heathy landscape that this element is most prominent. Usually, in such situations, it is represented by either the *Anthoxanthum* or *Rumex* sub-communities. The former is more characteristic of undisturbed places where the scrub is well developed among pasture or along wood margins or hedges. The latter very typically has some measure of disruption of the ground surface, either through the scuffing of grazing animals or the activities of mound-building ants, or where rock crops out; this kind of *Ulex-Rubus* scrub also developed at Lullington in places where gorse had been cleared and mowing imposed (Grubb *et al.* 1969). The *Teucrium* sub-community sometimes occurs as a dense fringe to mature woodland but it is also common on some sea-cliffs, where it occupies an edaphically intermediate position between the *Prunus-Rubus* scrub of deeper, moister soils and the maritime heaths of shallow, drier profiles.

Zonation and succession

Most commonly, the *Ulex-Rubus* scrub occurs as small stands in mosaics with grasslands, heaths, underscrubs and other kinds of scrub on marginal agricultural land. It is also widespread as a fringe to certain kinds of woodland and can occur in hedgerow sequences.

The former kinds of pattern are very diverse and often related to complex histories of land use but the range of communities involved is fairly small and distinctive. The grasslands most frequently encountered with the *Ulex-rubus* scrub, and forming the ground where the community occurs in pasture, are the more mesotrophic forms of the *Festuca-Agrostis-Galium* grassland and the more calcifugous types of improved swards in the *Lolio-Cynosuretum* and *Centaureo-Cynosuretum*. In all these communities, the characteristic herbs of the *Ulex-Rubus* scrub figure prominently and, in zonations, there is often a strong floristic continuity between the open grassland and the vegetation beneath and among the gorse. In sea-cliff sequences, these communities are replaced by their maritime equivalents in the *Festuca-Holcus* and *Festuca-Plantago* grasslands. Where grazing is less intense, transitions from scrub to grassland may be marked by a zone with bracken, either the *Pteridium-Galium* community or the *Pteridium-Rubus* underscrub, invariably of the *Teucrium* sub-community on these soils.

Where there is some diversity in the soils, the *Ulex-Rubus* scrub can be found colonising alongside other kinds of scrub or with heath. On less base-poor soils, which are sometimes moister than the profiles characteristic here, the community may give way to the *Crataegus-Hedera* scrub or, commonly on exposed sea-cliffs, to the *Prunus-Rubus* scrub, where mixtures of *U. europaeus* and *Prunus spinosa* can sometimes be found over a rather similar field layer to that typical of this community. Where there is a switch to more acidic and impoverished profiles, the *Ulex-Rubus* scrub can be found among heaths: on commons, the community often forms a zone around enclosures and settlements and linear strips running along tracks through the heath. The particular heath communities involved vary according to the geographic region: to the south of England, the *Calluna-Ulex minor*, *Ulex minor-Agrostis curtisii* or *Ulex gallii-Agrostis curtisii* heaths usually provide the context, to the west the *Calluna-Ulex gallii* or *Calluna-Erica cinerea* heaths, and on the more maritime parts of sea cliffs, the *Calluna-Scilla verna* heath. *U. europaeus* continues to be a local dominant in some of these

communities and there is often a considerable overlap in the associated herbaceous floras of both the heath and the scrub.

Both *U. europaeus* and *Cytisus* are naturally rather short-lived species (individuals lasting ten years or so) and imposition of grazing or periodic burning may prevent any successional developments beyond the establishment of *Ulex-Rubus* scrub so that, in many cases, there may be a cyclical alternation of the community with grassland or heath, perhaps with a phase of dominance by eutrophic tall herbs where burning and disturbance expose rich soils. In exposed places, too, as on sea-cliffs, the *Ulex-Rubus* scrub may represent an end point in the development of woody vegetation. But where there is shelter from winds and some freedom from grazing and burning, trees can invade more open stands of the community: like juniper, gorse itself may provide some measure of protection from herbivores, saplings growing up inside more leggy bushes or within enclosed enclaves of herbaceous vegetation.

The commonest invaders are birch and oak, *Betula pendula* and *Quercus robur* predominating but *B. pubescens* and *Q. petraea* becoming more frequent to the north and west and *Q. petraea* locally frequent even in the south-east. *Pinus sylvestris* is also a prominent coloniser where it is able to seed in from nearby plantations and there can be some *Sorbus aucuparia* and *Ilex aquifolium*. Scattered saplings of all these species and locally dense stands of young birch among patches of the *Ulex-Rubus* scrub with heaths, open grassland areas and tracts of bracken have become a characteristic feature of many lowland commons with the decline in their traditional uses as a source of grazing and mown crops.

Successions in such situations as these have never been followed in detail but it seems likely that the usual replacements for the *Ulex-Rubus* scrub in uninterrupted seres are the *Quercus-Pteridium-Rubus* woodland on more fertile brown earths (perhaps the *Holcus* sub-community with its grassy field layer lacking slow-spreading herbs like *Hyacinthoides non-scripta*), itself perhaps succeeded within the natural British range of beech by the *Fagus-Rubus* woodland, and the *Quercus-Betula-Deschampsia* woodland on somewhat more acidic and oligotrophic soils. Where this kind of scrub extends into the upland fringes, the oak-birch climax forests may be represented by the north-western *Quercus-Betula-Oxalis* and *Quercus-Betula-Dicranum* woodlands.

The *Ulex-Rubus* scrub is also found in close spatial association with woodlands, generally the *Quercus-Pteridium-Rubus* woodland, where underwood or canopy has been cut and, in the absence of cleaning or careful attention to planted saplings, it may herald a run-down of the woodland. The community also occurs widely as a more or less permanent fringe to this kind of woodland, kept in check by intensive use of the neighbouring land.

Distribution

The *Ulex-Rubus* scrub has a widespread distribution on marginal land throughout the lowlands and upland fringes.

Affinities

The community includes most of the vegetation dominated by *U. europaeus* (or *Cytisus*) in the absence of other species of *Ulex* and ericoid sub-shrubs and it is therefore somewhat narrower than the *Ulicetum* of early British accounts (e.g. Tansley 1939), forming part of the general scrub associations described from more acidic soils (e.g. Tansley 1911). Similar communities have been described from France (Géhu 1964), and The Netherlands (Doing 1962, Westhoff & den Held 1969): the former preferred placing the community within the Nardo-Callunetea because of the heathy affinities of the associated flora, the latter favoured the erection of a Ulici-Sarothamnion alliance within the Quercetea to contain stands in which gorse or broom were dominant with bramble and bracken. This view echoes Tansley's (1939) remark that *U. europaeus* cannot be considered a proper member of the heath formation.

Floristic table W23

	a	b	c	23
Ulex europaeus	V (5–9)	V (2–9)	V (5–10)	V (2–10)
Rubus fruticosus agg.	V (1–6)	IV (1–6)	V (3–9)	V (1–9)
Cytisus scoparius	II (1–10)	II (1–6)		II (1–10)
Rubus idaeus	II (1–3)	I (2–3)		II (1–3)
Agrostis capillaris	V (1–6)	V (2–8)	II (3–4)	IV (1–8)
Holcus lanatus	IV (1–4)	IV (1–3)	I (3)	III (1–4)
Galium saxatile	III (1–3)	III (1–3)		III (1–3)

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Floristic table W23 *(cont.)*

	a	b	c	23
Rhytidiadelphus squarrosus	III (1–5)	III (1–5)		III (1–5)
Holcus mollis	II (2–8)	II (1–6)		II (1–8)
Eurhynchium praelongum	II (1–7)	II (1–4)		II (1–7)
Cerastium fontanum	II (1)	II (1–2)		I (1–2)
Viola riviniana	II (1–6)	II (3)		I (1–6)
Pseudoscleropodium purum	II (1–5)	II (1–4)		I (1–5)
Anthoxanthum odoratum	IV (1–4)	I (1–5)	I (2–3)	III (1–5)
Potentilla erecta	III (1–2)	I (2–4)		II (1–4)
Poa pratensis	III (2–4)	I (2–4)		II (2–4)
Deschampsia flexuosa	II (2–5)	I (4)		I (2–5)
Calluna vulgaris	II (2)	I (1)		I (1–2)
Kumex acetosella	I (1)	IV (1–3)		II (1–3)
Hypochoeris radicata		IV (1–3)	I (1)	II (1–3)
Senecio jacobaea		III (1–2)		I (1–2)
Plantago lanceolata		III (1–3)		I (1–3)
Crepis capillaris		II (1–2)		I (1–2)
Jasione montana		II (1–2)		I (1–2)
Aira praecox		I (1)		I (1)
Teucrium scorodonia		I (3–5)	V (2–5)	II (2–5)
Hedera helix			II (2–6)	I (2–6)
Brachypodium sylvaticum			II (2–4)	I (2–4)
Pteridium aquilinum	III (2–5)	III (1–7)	III (1–4)	III (1–7)
Festuca rubra	III (1–4)	II (2–4)	II (3–4)	II (1–4)
Dactylis glomerata	I (1)	II (1–3)	II (2–4)	II (1–4)
Rumex acetosa	II (1–3)	I (1)	I (3)	I (1–3)
Achillea millefolium	I (1)	I (1)	I (2)	I (1–2)
Silene dioica	I (1–3)	I (1–2)	I (3–4)	I (1–4)
Digitalis purpurea	I (1)	I (1)	I (1–3)	I (1–3)
Campanula rotundifolia	I (1–2)	I (1)		I (1–2)
Rhytidiadelphus triquetrus	I (1–8)	I (1)		I (1–8)
Veronica officinalis	I (1)	I (1–2)		I (1–2)
Veronica chamaedrys	I (1–4)	I (3)		I (3–4)
Arrhenatherum elatius		I (1–2)	I (3–4)	I (1–4)
Number of samples	14	9	9	32
Number of species/sample	18 (15–23)	23 (17–30)	9 (4–14)	16 (4–30)
Vegetation height (cm)	177 (30–250)	140 (80–250)	108 (60–220)	143 (30–250)
Vegetation cover (%)	98 (92–100)	97 (90–100)	100	99 (90–100)
Altitude (m)	34 (6–50)	62 (32–105)	33 (3–60)	41 (3–105)
Slope (°)	8 (0–16)	10 (3–16)	19 (4–45)	13 (0–45)

a *Anthoxanthum odoratum* sub-community
b *Rumex acetosella* sub-community
c *Teucrium scorodonia* sub-community
23 *Ulex europaeus-Rubus fruticosus* scrub (total)

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