SD3
Matricaria maritima-Galium aparine strandline community

Synonymy
Mertensia maritima localities Scott 1963*c*; *Atriplex glabriuscula-Rumex crispus* Association Birks 1973.

Constant species
Galium aparine, *Matricaria maritima*.

Rare species
Mertensia maritima, *Polygonum oxyspermum* spp. *raii*.

Physiognomy
The *Matricaria maritima-Galium aparine* community consists of generally open and often patchy strandline vegetation in which *Matricaria maritima*, various *Atriplex* spp. and the annual weeds *Galium aparine* and *Stellaria media* are the most frequent and prominent elements. Among the oraches, *A. glabriuscula* is especially common here, but *A. prostrata* and *A. patula* also occur occasionally, and each of these can be found in some abundance. The more local *A. laciniata* is sometimes recorded, too, though usually as sparse scattered individuals, and the rare *A. praecox* can be seen in close association with this vegetation at some of its few localities around sea lochs in western Scotland (Taschereau 1985).

Beta vulgaris ssp. *maritima*, a very characteristic plant of shingle strandlines in southern Britain, is hardly ever found here, and *Honkenya peploides* and *Cakile maritima*, which are a constant feature of sandy foreshore vegetation around our coasts, tend to be only infrequent. *Rumex crispus* var. *littoreus*, however, remains fairly common and it can be conspicuous with its tall flowering shoots, and there may be occasional patches of *Sonchus asper*, *S. arvensis*, *Cochlearia officinalis*, *Chamomilla suaveolens* and *Silene vulgaris* ssp. *maritima*. In some stands, small amounts of *Elymus repens*, *Festuca rubra*, *Agrostis stolonifera*, *Glaux maritima* and *Armeria maritima* bring the vegetation close to salt-marsh strandline assemblages of northern and western Britain.

Ligusticum scoticum, generally speaking a plant of sea-cliff crevices, very occasionally finds a place here and, along the west coast of Scotland, the community can provide a locus for the rare annual *Polygonum oxyspermum* ssp. *raii*. More striking, though, is the occurrence in this vegetation of *Mertensia maritima*, a scarce and declining species, but one which may nevertheless still appear in great abundance in its remaining localities (Randall 1988, Farrell 1989). It is a perennial, dying back above ground each winter to dormant buds, but producing through the spring and summer sometimes very numerous leafy and flowering shoots, fleshy, glaucous and procumbent, spreading to form patches up to 1 m or more across (Scott 1963*c*).

Habitat
The *Matricaria-Galium* community is the characteristic vegetation of sandy shingle strandlines with drift detritus around more sheltered shores in the cooler, wetter north of Britain.

Like the *Atriplex-Beta* community, this assemblage appears to favour periodically-disturbed beach deposits of a mixed nature, rather than pure shingle, being found most often along strandlines where pebbles occur with coarse sand, occasionally with some silt, or with shell fragments, which later can bring a lime-rich element to material that is otherwise frequently completely siliceous. Generally, though, the lithology of the substrate is of little consequence to the vegetation, except in so far as the development of suitable beaches depends on the occurrence of more readily-weathering rocks to feed them.

Of greater importance to the sustenance of the community is the periodic addition of organic detritus, especially masses of seaweed torn off in storms, but also fragments of driftwood and agricultural debris, cast up on winter high tides and then rotting on the surface or becoming incorporated among the pebbles and sand, coating them and the plant roots with a slimy decaying mass (Scott 1963*c*, Birks 1973). Typically, the *Matricaria-Galium* community develops as a patchy strip of

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plants colonising such a driftline, or the topmost of a series of driftlines, or their decaying remains hidden now beneath shifted beach material. Among such generally barren and sharply-draining shingle and sand as accumulate here, the supply of nutrients released from such organic matter, and the moisture that the material helps retain, are of major significance to the development and composition of the vegetation. In particular, among the more persistent plants like *Matricaria maritima* and *R. crispus* var. *littoreus*, they favour the occurrence of nitrophilous ephemerals such as *Atriplex* spp., *Galium aparine* and *Stellaria media*, which are able to capitalise quickly on the enrichment in the summer months.

Species like *Matricaria*, *Rumex* and, more occasionally, *Sonchus* and *Cochlearia* spp., provide strong floristic continuity with the *Atriplex-Beta* strandline, but the ranges of the two vegetation types are largely mutually exclusive, the *Matricaria-Galium* community replacing the other assemblage north of a line running roughly from the Mull of Galloway across to the Forth. Around these northern Scottish coasts, mean annual maximum temperatures fall below 25 °C (Conolly & Dahl 1970) and the climate is generally more humid, particularly in the west, where annual precipitation often exceeds 1200 mm (*Climatological Atlas* 1952) with over 160 wet days yr^{-1} (Ratcliffe 1968). *Beta vulgaris* ssp. *maritima*, which gives much of the distinctive character to strandline vegetation around the warmer, drier coasts of southern Britain, only just extends into this zone, but increasingly northwards the Oceanic Northern *Atriplex glabriuscula*, with the more local *A. laciniata*, replaces *A. prostrata* in the *Matricaria-Galium* community, and conditions become suitable for the Arctic–Subarctic *Mertensia*. There seems little doubt that the southern limit of this plant's range is controlled by climate, although quite precise factors may be involved, such as a dependence on a certain degree or duration of cold for seed germination, or a vulnerability to summer drought of particular severity (Scott 1963*c*).

The moister climate which our northern strandlines experience is also probably important in the frequency and luxuriance in their vegetation of non-maritime plants like *Galium aparine* and *Stellaria media*, species which are typically excluded from the *Atriplex-Beta* community. Often here, too, their vigour is encouraged by relatively sheltered conditions, for the richest and most luxuriant stands of the *Matricaria-Galium* vegetation, sometimes forming a strip 2–3 m wide, are found around the heads of sea lochs and big inlets such as characterise the west coast of Scotland and certain of the Isles, situations where there is some relief from fierce salt-laden winds and more violent tidal inundations. Even in more exposed places, where wind and spray may attenuate the plant cover to just a sparse scatter of more salt-tolerant plants, it is unlikely that the highest winter tides flood stands every year and, since much of the vegetation consists of summer annuals, the effects of this may be minimal anyway.

Among the perennials, the rare *Mertensia* is, in fact, quite well adapted to disturbance of the beach material. It can tolerate inundation by sea-water, its seedlings and new shoots growing from established individuals can push up through a considerable thickness of sand, shingle and drift and, to a lesser extent, plants can withstand excavation of material from around them (Scott 1963*c*). Its robust habit is probably related to a peculiar pattern of root growth, in which the tap root splits each season, the strands becoming secondarily thickened and braided into a massive cable-like structure, often binding pebbles within it, with abundant laterals spreading sideways through the shingle (Skutch 1930). Despite this, however, more catastrophic shifts of beach material in exceptional tides and storms along more exposed shores can obliterate whole colonies of *Mertensia*, and the plant is rather striking in the way it comes and goes at particular stations within its range (Scott 1963*c*, Farrell 1989). Underlying such local changes, the distribution of *Mertensia* also appears to be contracting northwards, both in Britain and elsewhere in Europe, perhaps in response to a continuing movement of temperature zones towards the Arctic pole (Scott 1963*c*, Randall 1988).

Zonation and succession

The *Matricaria-Galium* community often occurs as an isolated strip of vegetation running along the strandline, although it is sometimes contiguous downshore with marine algal swards and, with a shift to finer beach material, can grade to upper salt-marsh vegetation. It is essentially a repeatedly-renewed pioneer assemblage and, even where it occurs on drift thrown high on to beaches, forming a front to dunes or various non-maritime communities, it cannot be seen as a seral precursor to them.

Along very sheltered shores, the lower edge of *Matricaria-Galium* stands can be regularly lapped by high tides and there the community may give way directly below to a zone of fucoids, usually *Fucus vesiculosus* or *F. spiralis*, with *Mertensia* in some of its localities, as on the Treshnish Isles off Mull, extending a little way into the littoral (Jermy & Crabbe 1978). In other places along the north-west coast of Scotland and on Shetland, the rare *Atriplex praecox* is abundant in a zone interposed between the strandline and the marine algae (Taschereau 1985). Elsewhere, with a shift to finer substrates or over the silt- or sand-smeared shingle that often forms a base for salt-marsh development around the hands of Scottish sea-lochs, the *Matricaria-Galium* community can peter out among upper salt-marsh vegetation. The most similar assemblage among these is the *Elymetum*

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repentis, a community of moist, drift-strewn soils around high tide mark, in which *Atriplex* spp., *R. crispus* and *Matricaria* continue to find a place but where the grasses occasionally seen in the *Matricria-Galium* vegetation, such as *Elymus repens*, *Festuca rubra* and *Agrostis stolonifera*, form the more extensive basis of a rank, weedy sward.

A further, very distinctive zonation can be seen around some Scottish sea-lochs where the *Matricaria-Galium* community has developed on drift abutting freshwater seepage zones along the beach top. Here, it can form a low weedy front to the *Filipendulo-Iridetum*, plants like the *Atriplex* spp., *Matricaria* and *Galium aparine* running in as a sparse understorey, together with *Agrostis stolonifera* and *Poa trivialis*, to *Iris pseudacorus*, *Filipendula ulmaria* and *Oenanthe crocata* in the *Urtica-Galium* or *Atriplex* sub-communities of the tall-herb fen.

Distribution

This kind of strandline vegetation is confined to Scotland and is more common along sheltered shores in the west.

Affinities

Apart from the community which Birks (1973) defined from Skye beaches and the rather particular stands with *Mertensia* which Scott (1963*c*) recorded in Arran, this distinctive vegetation has received only rather brief passing reference in the British literature (e.g. Jermy & Crabbe 1978). It is clearly a phytogeographic counterpart around our northern shores to the *Atriplex-Beta* community and similar assemblages have been recorded from Scandinavia (Nordhagen 1940, Dahl & Hadač 1941) and Iceland (Hadač 1970) but the exact affinities of these are disputed. In broad terms, this kind of vegetation is probably best placed among the Cakiletea strandlines, perhaps with the Salsolo-Honkenion communities among which Nordhagen (1940) characterised an *Atriplicetum laciniatae*, or with the Atriplicion littoralis strandlines of more silty substrates (Westhoff & Beeftink 1950, Géhu & Géhu 1969, Beckers *et al.* 1976), but it also has floristic links with the more brackish inundation communities of the Elymo-Rumicion crispi.

Floristic table SD3

Matricaria maritima	IV (1–8)
Galium aparine	IV (1–5)
Stellaria media	III (1–6)
Rumex crispus	III (1–7)
Atriplex glabriuscula	II (2–8)
Elymus repens	II (2–5)
Cakile maritima	II (1–6)
Atriplex patula	II (2–7)
Agrostis stolonifera	II (2–4)
Festuca rubra	II (2–4)
Atriplex prostrata	I (2–6)
Glaux maritima	I (1–4)
Armeria maritima	I (2–4)
Leymus arenarius	I (1–8)
Sonchus asper	I (1–2)
Cochlearia officinalis	I (1–3)
Holcus lanatus	I (1–3)
Honkenya peploides	I (1–3)
Juncus bufonius	I (1–3)
Mertensia maritima	I (1–5)
Poa annua	I (1–3)
Juncus gerardii	I (3)
Ligusticum scoticum	I (1–5)
Chamomilla suaveolens	I (1)
Plantago maritima	I (1–3)
Sonchus arvensis	I (2–5)
Scirpus maritimus	I (6–7)
Triglochin maritima	I (2)
Number of species	23
Number of species/sample	7 (2–15)

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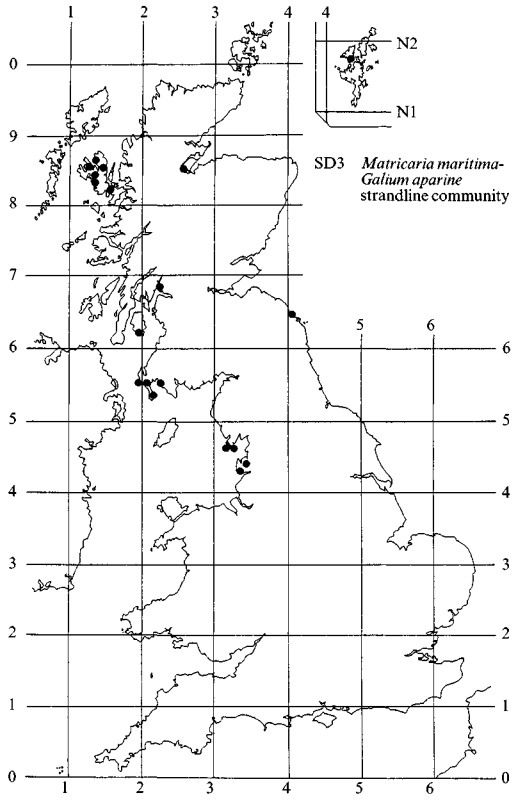

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