MC11
Festuca rubra-Daucus carota ssp. *gummifer* maritime grassland

Synonymy
Armerieto maritimae-Daucetum gummiferi Géhu 1964 *p.p.*

Constant species
Festuca rubra, *Dactylis glomerata*, *Daucus carota* ssp. *gummifer*.

Rare species
Brassica oleracea, *Scilla verna*, *Silene nutans*.

Physiognomy
The *Festuca-Daucus* maritime grassland has a fairly short, rather tussocky sward generally dominated by grasses of which *F. rubra* is usually the most abundant. *Dactylis glomerata* is constant and, though rarely abundant, may be in the form variously described as var. *abbreviata*, var. *maritima* or ssp. *hispanica*, which Tutin (1980*a*) considered to be one of the tetraploid populations within the species. *Daucus carota* ssp. *gummifer* is also constant in generally small amounts and, when flowering, it gives the vegetation a distinctive stamp. The maritime element in the community is small and the only other frequent species throughout are *Plantago lanceolata* and *Lotus corniculatus*. Bryophytes are rare.

Sub-communities

***Bromus hordeaceus* ssp. *ferronii* sub-community:** *Armerieto-Daucetum gummiferi typicum* Géhu 1964 *p.p. B. hordeaceus* ssp. *ferronii* and *Armeria maritima* are additional constants here and *Plantago coronopus*, *P. lanceolata* and *Lotus corniculatus* occur frequently. Although *F. rubra* is often abundant, there is usually no single dominant and the sward is sufficiently open to permit repeated colonisation by *B. hordeaceus* ssp. *ferronii* and other therophytes such as *Desmazeria marina*, *Senecio vulgaris* and *Vicia sativa*.

***Ononis repens* sub-community.** *O. repens* is an additional constant in this sub-community and occasionally it is co-dominant with *F. rubra*. The only other frequent species is *Plantago lanceolata* but the vegetation is distinctive in the occasional occurrence of a variety of species characteristic of open and/or calcareous situations: *Carlina vulgaris*, *Crambe maritima*, *Blackstonia perfoliata*, *Echium vulgare* and *Glaucium flavum*.

***Sanguisorba minor* sub-community.** The generally taller and lusher sward of this vegetation is characterised by the additional constancy of *S. minor* (differential to this sub-community), *Plantago lanceolata* and *Lotus corniculatus*. *Centaurea scabiosa*, *Galium verum* and *Brachypodium pinnatum* are frequent and the last may be co-dominant with *F. rubra*. There are numerous occasional species characteristic of inland calcicolous grasslands, notably *Festuca ovina*, *Helianthemum nummularium* and *Hieracium pilosella*.

Habitat
The *Festuca-Daucus* community is one of the sea-cliff grasslands characteristic of less maritime situations: it generally receives similar amounts of salt-spray an as the *Festuca-Holcus* community. It is, however, virtually confined to cliffs of calcareous rocks with rendziniform soils of high pH and calcium status. The *Bromus* sub-community is the most maritime and both it and the *Ononis* sub-community are especially characteristic of dry south-facing slopes and cliff edges. Where there are excessively-drained soils in such situations, species like *Crambe maritima*, *Plantago coronopus*, *Crithmum maritimum* and *Echium vulgare* are most common and abundant within the *Ononis* sub-community.

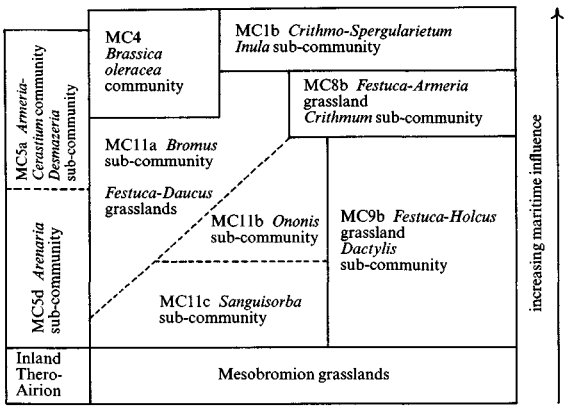
The *Sanguisorba* sub-community is the least maritime of the sub-communities and it occurs in more stable situations where the soils are somewhat moister. Unlike the other sub-communities it is occasionally grazed.

Zonation and succession
The community usually occurs as a fairly narrow zone inland of the *Brassica* cliff-edge community or sometimes the *Crithmo-Spergularietum* crevice vegetation.

On particularly sheltered cliffs, it may be the most maritime vegetation. The three sub-communities may themselves be zoned in relation to maritime influence with the *Bromus*, *Ononis* and *Sanguisorba* sub-communities succeeding one another on moving inland (Figure 24). Above, the *Festuca-Daucus* community usually passes to calcareous grassland or scrub.

The community may occur at the same level on cliffs as the *Festuca-Holcus* grassland and grade to it through the *Dactylis* sub-community of the latter with an increase in soil moisture.

Figure 24. Sequence of vegetation types on a limestone cliff in southern England.



Distribution

The community is most common the chalk and limestone cliffs of the south coast west to Dorset and in south Wales with isolated occurrences in the extreme south-west of England, in north Wales and in Cumbria. Okusanya (1979*c*) suggested that susceptibility to frost may be one of the main factors limiting *D. carota* ssp. *gummifer* to cliffs in the southern part of Britain.

Though the *Ononis* sub-community tends to be the most widespread, there is little difference in the distributions of the sub-communities.

Affinities

The *Festuca-Daucus* grassland forms part of a floristic sequence among the more calcicolous cliff communities running from the maritime *Brassica* community to inland calcareous grasslands. Apart from passing references (e.g. Tansley 1939, Mitchell & Richards 1979) there has been no previous description of the community from Britain. The typical sub-association of Géhu's *Armerieto-Daucetum gummiferi* described from the French Channel coast (1964) is similar to the *Bromus* sub-community described here but his association is much broader than the *Festuca-Daucus* grassland and includes vegetation which is to be better placed within the *Festuca-Holcus* community.

Floristic table MC11

	a	b	c	11
Festuca rubra	V (4–10)	V (3–10)	V (4–9)	V (3–10)
Dactylis glomerata	V (1–5)	V (2–7)	V (2–5)	V (1–7)
Daucus carota gummifer	V (2–5)	IV (1–4)	V (2–4)	V (1–5)
Armeria maritima	V (1–7)	II (2–4)	I (2–5)	III (1–7)
Bromus hordeaceus ferronii	V (2–5)	I (3)	II (2–4)	II (2–5)
Plantago coronopus	III (2–4)	II (1–4)	I (1–3)	II (1–4)
Desmazeria marina	II (2–4)	I (1)	I (1–3)	I (1–4)
Senecio vulgaris	II (1–4)	I (3)		I (1–4)
Silene vulgaris maritima	II (1–7)	I (6)	I (3)	I (1–7)
Vicia sativa	II (2–5)		I (3)	I (2–5)
Ononis repens		V (1–8)	I (2–4)	II (1–8)
Carlina vulgaris		II (1–2)	I (1–3)	I (1–3)
Rumex acetosa		II (2–3)	I (1–4)	I (1–4)
Blackstonia perfoliata		I (1–3)		I (1–3)
Crambe maritima		I (1–5)		I (1–5)
Crithmum maritimum		I (1–6)		I (1–6)
Echium vulgare		I (1–5)	I (1)	I (1–5)

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Glaucium flavum		I (1–4)		I (1–4)
Senecio jacobaea		I (1–3)		I (1–3)
Sanguisorba minor			V (1–7)	III (1–7)
Plantago lanceolata	III (1–4)	III (2–4)	V (2–4)	III (1–4)
Lotus corniculatus	III (3–7)	II (3–6)	IV (2–4)	III (2–7)
Brachypodium pinnatum		I (1–4)	III (3–10)	II (1–10)
Centaurea scabiosa		I (1–3)	III (1–5)	II (1–5)
Galium verum	I (2–4)	I (2)	III (2–4)	II (2–4)
Festuca ovina			II (5–7)	I (5–7)
Helianthemum nummularium			II (2–5)	I (2–5)
Hieracium pilosella			II (2–3)	I (2–3)
Ranunculus bulbosus			II (1–4)	I (1–4)
Carex flacca		I (2–3)	II (1–3)	I (1–3)
Brassica oleracea	I (4–5)	I (1)	II (2–7)	I (1–7)
Achillea millefolium		I (2)	II (2–3)	I (2–3)
Hippocrepis comosa		I (3)	II (1–8)	I (1–8)
Koeleria macrantha	I (3)	I (3)	II (2–5)	I (2–5)
Thymus praecox		I (2–4)	II (2–6)	I (2–6)
Sedum acre			I (2–3)	I (2–3)
Silene nutans			I (1–6)	I (1–6)
Carex caryophyllea			I (1–4)	I (1–4)
Centaurium erythraea			I (2–3)	I (2–3)
Cirsium acaule			I (1–2)	I (1–2)
Cynosurus cristatus			I (2–3)	I (2–3)
Avenula pratensis			I (2–4)	I (2–4)
Ranunculus acris			I (1–2)	I (1–2)
Scilla verna			I (2–3)	I (2–3)
Stachys officinalis			I (2–4)	I (2–4)
Teucrium scorodonia			I (2–3)	I (2–3)
Anthyllis vulneraria	I (1–3)	II (1–4)	II (2–5)	II (1–5)
Festuca arundinacea	I (1)	II (1–4)	I (2–3)	II (1–4)
Taraxacum sp.	I (2)	I (1)	II (1–2)	I (1–2)
Leontodon taraxacoides	I (1–3)	I (1–3)	I (2–4)	I (1–4)
Trifolium repens	I (2–4)	I (3)	I (2)	I (2–4)
Agrostis stolonifera	I (3)	I (2–3)	I (3)	I (2–3)
Cirsium vulgare	I (1)	I (1–2)	I (1)	I (1–2)
Holcus lanatus	I (3)	I (3–5)	I (3–4)	I (3–5)
Sonchus oleraceus	I (1)	I (2–3)	I (2)	I (1–3)
Agrostis capillaris	I (3–4)		I (1–5)	I (1–5)
Convolvulus arvensis	I (2)		I (3)	I (2–3)
Lolium perenne	I (2–3)		I (2)	I (2–3)
Arenaria serpyllifolia	I (3)		I (2–3)	I (2–3)
Potentilla reptans	I (3–4)	I (3)		I (3–4)
Medicago lupulina	I (2)	I (2–4)		I (2–4)
Bellis perennis		I (1–2)	I (1–4)	I (1–4)
Euphorbia portlandica		I (2–3)	I (2–3)	I (2–3)
Hypochoeris radicata		I (1–3)	I (2)	I (1–3)

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Floristic table MC11 (*cont.*)

	a	b	c	11
Centaurea nigra		I (1)	I (1)	I (1)
Leucanthemum vulgare		I (2–3)	I (2–3)	I (2–3)
Number of samples	15	25	23	63
Number of species/sample	10 (6–16)	11 (5–17)	18 (11–27)	13 (5–27)
Vegetation height (cm)	10 (2–50)	14 (3–50)	16 (2–50)	14 (2–50)
Total vegetation cover (%)	94 (60–100)	86 (40–100)	98 (80–100)	92 (40–100)
Altitude (m)	31 (6–45)	40 (3–150)	48 (3–100)	41 (3–150)
Slope (°)	16 (0–30)	25 (5–70)	15 (2–40)	19 (0–70)
Soil depth (cm)	19 (6–47)	36 (6–51)	14 (3–30)	23 (3–51)
Number of soil samples	2	5	3	10
Superficial pH	7.5	7.0 ±0.5	7.2	7.2 ±0.3
Water content (% soil dry weight)	19	20 ±5	49	29 ±8
Loss on ignition (% soil dry weight)	17	8 ±1	27	16 ±3
Sodium (mole g^{-1})	27	21 ±5	27	24 ±5
Potassium (mole g^{-1})	15	8 ±2	9	10 ±2
Magnesium (mole g^{-1})	30	20 ±4	27	24 ±4
Calcium (mole g^{-1})	197	102 ±23	148	135 ±17
Phosphorus (mole g^{-1})	2.1	1.0 ±0.9	0.5	1.1 ±0.6
Sodium/loss on ignition (mole g^{-1})	138	260 ±59	96	186 ±41

a *Bromus hordeaceus* ssp. *ferronii* sub-community
b *Ononis repens* sub-community
c *Sanguisorba minor* sub-community
11 *Festuca rubra-Daucus carota* ssp. *gummifer* maritime grassland (total)

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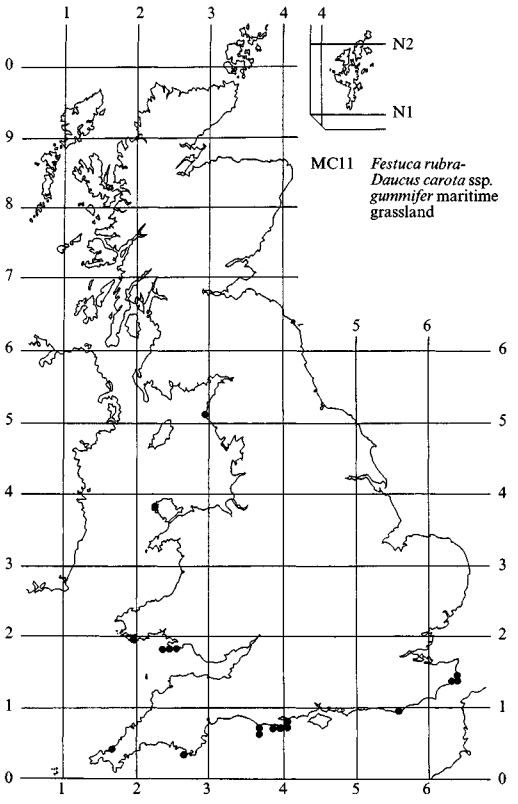

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