

ANTS IN THE SCOTTISH HIGHLANDS

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Received 2nd August 1959

SINCE my earlier paper (Collingwood 1951) much fresh information has accumulated on the distribution of ants in Scotland. In addition, important changes in nomenclature in the *Formica fusca* and *F. rufa* groups by Yarrow (1954, 1955) and the correction of earlier misidentifications render a fresh discussion of the subject desirable. Eighteen species have now been recognised from the area north of the Clyde and Forth considered in this paper.

The four most generally distributed species are *Myrmica ruginodis* Nyl., *M. scabrinodis* Nyl., *Leptothorax acervorum* Fab. and *Formica lemani* Bond. *Formica lemani* was formerly referred to as the similar *F. fusca* L. which it replaces in most of North Britain (Yarrow 1954). These four species are found throughout moorland Britain as far south as Dartmoor in Devon. Their ecology in West Scotland has been studied by Brian & Brian (1951, 1952, 1955). In sheltered areas other species such as *Lasius niger* L., *Myrmica sabuleti* Mein. and *M. rubra* L. may be locally dominant. *Lasius flavus* Fab. is rare in the north but becomes abundant in the South Perthshire Highlands. *Myrmica sulcinodis* Nyl. is frequently common on the drier heather moors. *M. lobicornis* Nyl. is a more occasional species but widely distributed. Many areas of old forest, especially in the Eastern Highlands, are dominated by one or other species of the *Formica rufa* group. In Scotland these are *F. aquilonia* Yarrow and *F. lugubris* Zett. They have similar habits to *F. rufa* which does not occur further north than Northumberland in Britain (Collingwood 1956). Other species occasionally found in these forests include *Formica exsecta* Nyl., *F. sanguinea* Latr., and the inquiline *Formicoxenus nitidulus* Nyl.

Tetramorium caespitum L., *Formica fusca* L. and *Lasius umbratus* Nyl. have all been found fringing the Highlands but they are very local in Scotland and not typical of the area. *Myrmica schencki* Em. was recorded in an earlier paper (Collingwood 1951) but this was a misidentification of a form of *M. sabuleti* with a pronounced antennal lobe. True *M. schencki* has not been found further north than the English Midlands or Galway in Ireland.

The climate, vegetation, topography and other features are similar to those of parts of West Norway to which the Highland

ant fauna can be most closely compared. Accounts of the distribution and behaviour of many species in Norway (Holgersen 1944) apply well to the same species in Scotland. There are however additional species in Norway that have not been found in Britain. Chief of these is *Camponotus herculeanus* L. which is common and conspicuous throughout the coniferous forests of North Europe and the Alps. Yasumaştu and Brown (1951) note that it is found throughout the natural ranges of the spruce and fir genera *Picea* and *Abies*. While by no means confined to these trees, it is a curious fact their neither fir nor ant appear to have spread to Britain in post-glacial times. Another ant *Formica gagatoides* Ruzs. is abundant in Norway on tundra and upland woodland, but has not been found in comparable areas in Scotland. The inquiline *Harpagoxenus sublaevis* Nyl. is another widely distributed Scandinavian species which has not been found here despite the abundance of its host *Leptothorax acervorum* in Scotland. The comparison with Ireland is less close in that three Irish species *Stenammina westwoodii* West, *Myrmica schencki* Em. and *Lasius fuliginosus* Latr. are unknown in Scotland while *M. sulcinodus*, *M. lobicornis*, *F. nitidulus*, *F. sanguinea* and *F. exsecta* have not been found in Ireland (Collingwood 1958).

NOTES ON THE SPECIES

Leptothorax acervorum Fab.

This is common throughout the Highlands and has been found in every vice-county. It is recorded from the Orkneys (Weatherill 1939) but is not yet known from Shetland or the Outer Hebrides. It nests under stones, bark, in rock clefts and in bare peat. A small ant of pacific habits, it scarcely comes into direct competition with the larger *Formica* and *Myrmica* among which its nests are often found. The Highland forms are frequently very dark coloured and correspond to the description of the variety *nigrescens* Ruzs. These colour variations are too inconstant however to be regarded as distinct as Holgersen (1944) found in Norway.

Tetramorium caespitum L.

This is probably an adventive species in the area. Its distribution north of the heathlands of South England is almost entirely coastal and is very scattered in Scotland. It has occurred in several localities in the East Lowlands — Edinburgh, Haddington,

Berwickshire — and on Ailsa Craig. Haddow (1939) recorded a small colony on Canna. A single male was found among a number of males of *Myrmica ruginodis* taken near Scourie in West Sutherland in July, 1949.

Formicoxenus nitidulus Nyl.

This interesting little inquiline is never found outside nests of one or other species of wood ant. Donisthorpe (1913) first discovered it in the Highlands at Nethy Bridge, Easternness, after much search. J. F. X. King found it at Bridge of Gairn, South Aberdeen (Donisthorpe 1927), and I found it in some numbers in a nest of *F.aquilonia* at Invercauld in the same area in July 1952. The only other known Scottish locality is Ellory in Cantire where I found it also in nests of *F.aquilonia* in June 1956.

Myrmica rubra L. (= *laevinodis* Nyl.)

This ant tends to occur rather locally on the coast in Scotland but has also been found inland in sheltered river valleys. I have found it as far north as the Oyke river and at Brora in East Sutherland. It is very local in West and East Ross, Moray and South Aberdeen but not uncommon on the coast in Fife and Angus and inland in Argyll and the three Perthshire vice-counties.

Myrmica ruginodis Nyl.

This ant occurs in two forms (Brian & Brian 1949). The form *macrogyna*, which has colonies with single large queens, is the most eurytopic of all North European ants. It is widespread in Scotland from Shetland and St. Kilda southward. The other, *microgyna*, with many small queens, is often abundant on the western seaboard but also occurs throughout the Highlands. The status of these two forms is discussed elsewhere (Collingwood 1958). Their separate behaviour patterns entitle them in some respects to be regarded as distinct species, but they do not differ morphologically and anomalous colonies belonging neither to the one nor the other occur in some areas. *Microgyna* is common in Ireland and West Britain but rare or absent from much of south-east England whereas *macrogyna* is abundant throughout.

Myrmica sulcinodis Nyl.

This distinctive species is characteristic of well drained moorland in the Eastern Highlands. It is common in North, Mid and South Perth, North and South Aberdeen, Easternness, Banff and Moray. It is local in the North Highlands where it has been taken

in East and West Sutherland, and East and West Ross, ~~and from the West Highlands.~~ Brian (1952) has recorded it only from Dunbartonshire. Nests are usually under shallow stones on bare moorland, but in the North-West, solaria of heather fragments and peat are sometimes constructed.

Myrmica lobicornis Nyl.

This is widely distributed but much less common than *M. sulcinodis* in the Highlands. It has been taken on the north coast of Sutherland at Bettyhill by A. W. Stelfox and at Lothbeg, Skibo, Brora, Golspie and Lairg in East Sutherland by L. Christie and others. It has also occurred in East Ross, Easternness, Moray, South Aberdeen, Fife, South and Mid Perth, Mid Ebudes, Dunbarton and Cantire. It is common to find single nests with this species and often only odd foraging workers are seen.

Myrmica scabrinodis Nyl.

This is almost as common as *M. ruginodis* in the area but has not yet been recorded from Shetland, Orkney or the Outer Hebrides. In the West Highlands colonies of large dark workers are frequent.

Myrmica sabuleti Mein.

The Highland form of this species is dark coloured with a large rather abrupt lobe on the antennal scape. Weatherill (1939) first drew attention to this character from examples seen in Glen Affric. This species is numerous in the Fleet valley of East Sutherland, and at Garve in East Ross, and has also been found in many other areas including Altnaharra in West Sutherland, Loch Maree in West Ross, and all the vice counties of the Eastern Highlands except Stirling. It is known in the West Highlands only from Tulla in Argyll, Dunbarton (A. W. Stelfox) and Canna (Haddow 1939).

Formica sanguinea Latr.

This is the red slave-making ant of Europe. Its Highland locations are widely separated from those in England where the nearest verified locality is the Wyre Forest about 400 miles to the south. Donisthorpe (1927) recorded this species nesting under large stones at Rannoch, Aviemore and Nethy Bridge. Weatherill (1939) took it in Glen Affric and I have found it on stony banks fringing woodland at Carrbridge, Abernethy, Aviemore, Loch Ness

and at Kincardine O'Neil in South Aberdeen. In the Highlands this ant pillages the nests of *F.lemani* carrying away pupae of the latter which are then reared in the *F.sanguinea* nest.

Formica exsecta Nyl.

Donisthorpe took this species at Braemar, Rannoch, Aviemore and Nethy Bridge and Hudson Beare took it at Boat of Garten (Donisthorpe 1927). Benson found it in the Lairig Ghru in 1952 (Yarrow 1954) and I have taken it in recent years at Carrbridge, Loch Morlich and Rannoch, usually in small isolated nests. L. Christie found it in 1954 in Amat forest in East Ross, an interesting discovery suggesting that although uncommon, the ant is probably widely distributed in the Highlands. It builds mound nests of heather fragments, usually on the open moor but in the neighbourhood of trees. An aggressive species, it attacks larger ants by climbing on to the back of the opponent ant which it then decapitates. Its distribution in Britain is markedly discontinuous since outside the Highlands it is known only from Hampshire, Dorset and Devon.

Formica lugubris Zett. and *F.aquilonia* Yarrow

These are the two large wood ants of Scotland and are discussed together since they have similar habits and are often found in the same localities in the larger forest areas. Workers of both species differ from the more southern *F.rufa* by the presence of hairs round the back of the head which are lacking in *F.rufa*. *F.lugubris* is more robust than *F.aquilonia* and considerably more hairy over the head and thorax. *F.lugubris* in Scotland was usually known as '*pratensis*' before Yarrow's revision (1955).

Yarrow found that *F.lugubris* usually nested in more open sites than *F.aquilonia* which dominates in high forest in North Scandinavia. However nests of *F.aquilonia* have been found at Drumrunie in West Ross up to 50 yards from the nearest scrub birch with only the protection of the surrounding heather. This contrasts with the drier warmer Rothiemurchus area where nests may be found under fairly close canopy, and undoubtedly reflects the need for the fullest possible sunshine in the cooler North-West. Where there are still areas of relatively undisturbed natural forest, nests of both species but particularly *F.aquilonia* may reach a great size consisting of large mounds of carefully arranged twigs and leaf litter.

Both species usually have many queens in the same nest. Yarrow found the sexuals of one species maturing earlier than those of the other at Rannoch so that hybridisation in nature

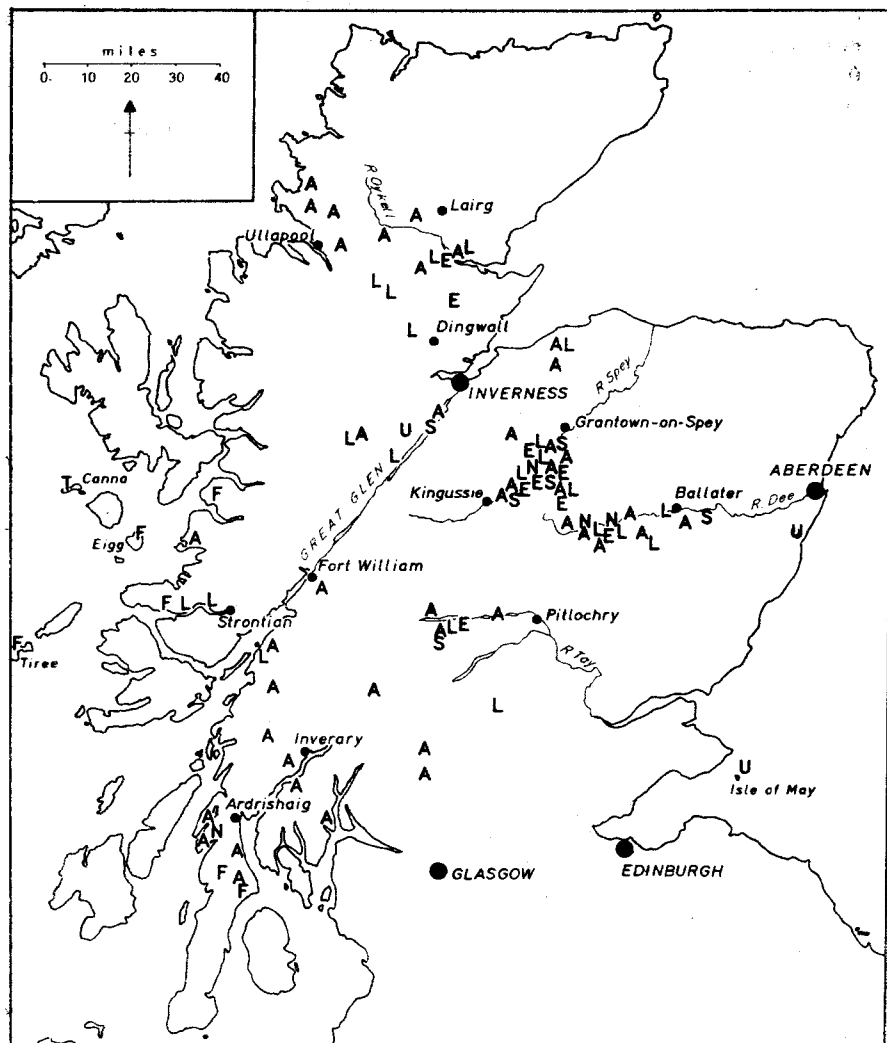


Fig. 1. Map of the Scottish Highlands, showing distribution of *Formica aquilonia* Yarrow, *F. lugubris* Zett. and certain other species.

A....*Formica aquilonia*
 L....*Formica lugubris*
 E....*Formica exsecta*
 S....*Formica sanguinea*

F....*Formica fusca*
 U....*Lasius umbratus*
 T....*Tetramorium caespitum*
 N....*Formicoxenus nitidulus*

would be improbable. However much depends on the siting of individual nests and I found sexuals in all stages of development in various nests of the two species in Abernethy forest on 13th June 1956. Nevertheless there is no record of hybridisation between the different species of wood ant, although this was assumed to occur by Donisthorpe and others so as to explain colour gradations between the opposed species '*rufa*' and '*pratensis*'.

F. rufa L. occasionally starts fresh colonies through the adoption of a fertilised female by a nest of one of the species of the *F. fusca* group. I have seen small mixed colonies of *F. rufa* and *F. fusca* and of *F. lugubris* and *F. lemani* on four occasions but such instances are comparatively rare. In the main, both *F. lugubris* and *F. aquilonia* spread by colony proliferation which can be temporarily accelerated by minor disturbance. Dissemination of these species is therefore very localised and, from all available evidence, wood ants are losing ground in Britain largely through woodland clearance. Burning and clear felling result in the greatest harm to these species which are most unlikely to return to areas from which they have been exterminated. Thus wood ants abound in the interwoven plantations and old forest along the upper Dee down to Ballater but appear to be completely absent from the extensive and long established plantations to the east of this area.

The known vice-county distribution is as follows :

FORMICA AQUILONIA

E. Sutherland	: Invershin*, Inveran, Glenrossal.
W. Ross	: Inverpolly, Baddagyle, Drumrunie, Rhiddoroch, Glen Einig.
E. Ross	: Amat, Loch Garve (L. Weatherill).
Westerness	: Loch Oich (L. Weatherill), Loch Laggan, Beasdale (A. W. Stelfox), Nevis* (Thornley, 1896).
Easternness	: Affric, Glen Strathfarrar (L. Weatherill), Plodda (L. Weatherill), Loch Ness, Slochd. Carrbridge, Abernethy, Glenmore, Rothiemurchus, Kingussie, Glen Tromie (R. L. Joseph), Kincaig.
Nairn & Moray	: Darnaway Forest, Dunphail.
S. Aberdeen	: Glen Tanar (A. Carlisle), Ballochbuie, Invercauld, Mar, G'len Lui, Derry.
Mid-Perth	: Dunan, Rannoch, Tummel.
S. Perth	: Trossachs, Aberfoyle, Leny, Chuallaich, Coninish, St. Fillans, Brig O'Turk, Loch Ard*.
Argyll	: Tvndrum, Loch Awe*, Taynuilt, Appin, Ardentinny (L. Weatherill), Loch Sween (L. Weatherill).
Cantire	: Artillagan, Ellory, Corranbuie.

FORMICA LUGUBRIS

E. Sutherland	: Inveran.
E. Ross	: Inchbae, Strath Vaich, Garve, Amat (L. Christie), Corrievallighan (E. Nelmes).

Westernness	:	Glen Garry (L. Weatherill).
Easternness	:	Affric, Plodda (L. Weatherill), Moriston, Carrbridge, Abernethy, Glen More, Rothiemurchus.
Nairn & Moray	:	Culbin, Brodie, Grantown*.
S. Aberdeen	:	Ballater, Bridge of Gairn*, Ballochbuie, Invercauld, Glen Lui.
Mid-Perth	:	Rannoch, Comrie*.
Argyll	:	Port Appin (E. C. Pelham-Clinton), Glen Borrodale, Rispond.

* Specimens in Royal Scottish Museum, seen by courtesy of A. R. Waterston.

Formica lemani Bond.

This is the common black ant of Scotland. Weatherill (1939) first appreciated the differences in pilosity between this and *fusca* to which the species had been referred before the revision of this species group by Yarrow (1954). *F. lemani* workers have stiff bristles on the back of the thorax which is bare in *fusca*, and they are more coarsely sculptured. The petiole scale of male *lemanii* and the mid femora of queen *lemanii* have long hairs which are absent in *fusca*. The habits and general appearance of the two species are much alike but they are easily distinguished by the above and other characters (Yarrow 1954). *F. lemani* abounds throughout the Highlands and has now been found in every vice county in Scotland as well as from the Outer Hebrides and the Orkneys but not Shetland.

Formica fusca L.

This is local to the north of the English Midlands and has only been found in Scotland in a few localities in the west. Yarrow (1954) identified it from Donisthorpe's collection from Tiree. In addition I found it in Cantire in 1956 at Rockfield and at Dunmore on Loch Tarbert. In 1958 it was discovered on the shore of Loch Sunart in Argyll and on a steep sheltered bank on the north shore of Loch Hourn in Westernness. Outside the Highland region, it has been taken very locally in the Mull of Galloway (Collingwood 1956) and there is a queen in the Royal Scottish Museum labelled "Midlothian, 1858, Greville" that appears to be this species.

Lasius niger L.

This is common in sheltered river valleys as far north as the Oykeell in Sutherland. It is abundant in parts of Argyll and Westernness and has been taken up to 1000 ft in Glen Nevis. It has not yet been recorded from Caithness, North Aberdeen, Angus and Kincardine.

Lasius flavus Fab.

This ant was discovered very locally on a small limestone outcrop near Berriedale in Caithness. The workers here were large and dark and one was a pterergate; they compare with similar examples taken high up on Dartmoor in Devonshire. The species has not been found in Sutherland and is very local in Ross. It has been taken in all the other vice-counties in the region and is abundant on the east coast and in many parts of Perth.

Lasius umbratus Nyl.

Wilson (1955) synonymised the form previously known as *L. mixtus* Nyl. under *umbratus* as he found it impossible to distinguish between them in cases where their diagnostic characters appeared to intergrade. In the Highlands, *umbratus* has been taken on the coast near Stonehaven and '*mixtus*' on the Isle of May (Donisthorpe 1927). I found workers of '*mixtus*' in Glen Urquhart in September 1955 in dry sandy pasture under deep boulders, and L. Weatherill took a worker in Strath Glass in the same district in 1958. These captures are well to the north of previous records.

ACKNOWLEDGEMENTS

I am grateful to Messrs L. Christie, E. C. Pelham-Clinton, A. W. Stelfox and L. Weatherill for sending specimens and information about them from the Highlands. Further information on other wood-ant localities would be particularly welcome.

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