

THE ANTS OF THE SOUTH LAKE DISTRICT

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The distribution of ants in the South Lake District was investigated during June and August, 1954. Despite the varied topography and vegetation of the area the ant fauna is relatively poor, only 17 species having been recorded—less than half the total number known to occur in the British Isles. This is probably partly due to the high rainfall, which ranges from an average of 40 in. p.a. at Arnside to over 60 in. p.a. at Windermere. The number of species is, however, greater than that recorded for any comparable area in North Britain. The fauna is of interest in that such common South Britain species as *Formica rufa* L. and *Lasius fuliginosus* (Latreille) reach here their furthest extension northward, while *F. fusca* L. overlaps with its northern and upland congener *F. lemani* Bond., often competing at the same nest sites.

The characteristic woodland of the Carboniferous limestone areas of the S. Lake District is mixed ash wood, containing ash, birch, oak, hazel and sycamore in varying proportions, with yew on the rock outcrops; patches of bare insolated rock are plentiful. This contrasts with the sessile oak woods of the Bannisdale slates, which characteristically comprise virtually pure stands of oak with occasional birch or rowans; where the canopy is open the woodland floor is frequently heavily shaded by bracken.

Most of the lowland pasture consists of *Festuca*—*Agrostis* grassland with heather and *Deschampsia flexuosa* (L.) invading the higher leached areas. On the higher limestone fells *Sesleria caerulea* Ard. and *Briza media* L. are abundant with heather moor occupying the more heavily leached situations. *Molinia* grassland occurs on the coastal peat mosses with heather on the better drained areas.

Table 1 shows the numbers of colonies of each species recorded by two collectors in half an hour at each of a number of representative sites. Details of the geological strata are included because, as previously shown by Satchell and Collingwood (1955), the thermal properties and drainage of the different formations have an ecological bearing quite apart from their associated vegetation.

The woodland sites were somewhat poorer in species and distinctly poorer in numbers of colonies than the grassland and coastal sites. Brian and Brian (1951) found only the 4 species *F. fusca* L. (*lemanii* Bond), *M. rubra* L., v. *macrogyna*, *M. scabrinodis* Nyl. and *Leptothorax acervorum* (Fabr.) common at a variety of sites in the West of Scotland. In the grasslands of the S. Lake District additional species were invariably present. *Festuca*—*Agrostis* grassland on Newton Fell, Lindale, with hawthorn scrub and heather among out-cropping slate, for example, yielded 9 species of ants. *M. rubra* L. was the most widespread species and occurred at over 75% of the sites. *L. flavus* (Fabr.) was the most abundant ant exceeding in numbers of colonies those of any other species. Although very abundant on the lowland pastures it was absent from the *Molinia* mosses except for occasional colonies by the sides of tracks. The mosses presented two main types of site: the drier peat between heather clumps, colonised mainly by *L. acervorum* and *F. lemani*, and the tops of *Molinia* tussocks colonised by *Lasius niger* and *M. rubra*

TABLE I
NUMBERS OF ANT COLONIES RECORDED IN 30 MINUTES

	Woodland														
	Closed Canopy						Open Canopy								
Geology:	L	L	B	B	B	P	B	S	L	L	L	L	L	L	B
Site No.:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>L. niger</i>	-	-	I	-	-	-	-	-	-	-	-	-	-	-	-
<i>L. flavus</i>	-	-	-	-	-	-	2	-	-	-	-	5	25	16	8
<i>F. rufa</i>	-	-	-	-	-	-	-	I	2	3	3	3	I	I	I
<i>F. fusca</i>	-	-	-	-	-	-	-	-	I	3	5	-	5	8	-
<i>F. lemni</i>	4	5	I	I	12	5	3	3	-	-	-	6	-	6	6
<i>M. rubra macrogyna</i> ..	-	I	9	I	9	2	3	2	-	3	3	4	I	I	-
<i>M. rubra microgyna</i> ..	4	-	-	2	3	-	-	-	I	I	-	-	-	I	-
<i>M. laevinodis</i>	-	-	-	I	2	-	I	-	-	-	2	-	-	-	-
<i>M. scabrinodis</i>	-	-	-	-	-	2	2	-	2	-	-	-	2	I	2
<i>M. sabuleti</i>	I	I	-	I	-	-	I	3	-	2	-	3	-	25	-
<i>L. acervorum</i>	-	I	I	-	5	I	2	-	-	-	2	-	-	I	2
Total No. of Colonies	9	8	12	6	31	10	14	9	6	12	15	21	34	60	19

Geology:

B=Bannisdale Slate.
C=Permian Conglomerate.
D=Glacial Drift.
L=Carboniferous Limestone.
P=Peat.
S=Permian Sandstone.

Vegetation: Sites

1, 2, 9-14 Mixed Ashwood.
3, 4, 5, 7, 15 Sessile Oakwood.
6 Pine plantation.
8 Birch scrub.

Sites

1 Cunswick Scar, Kendal.
2 Yewbarrow, Witherslack.
3 Low Wood, Witherslack.
4 Humphrey Head, Grange-over-Sands.
5 Roudsea, nr. Haverthwaite.
6 Cliburn Moss, nr. Penrith.
7 Low Wood, Haverthwaite.
8 Hoff Lunn, nr. Appleby.
9 High Park Wood, Witherslack.
10 Old Park Wood, Holker.
11 Whitbarrow, Witherslack.
12 Middlebarrow, Arnside.
13 Arnside Park.
14 Whitescar, Witherslack.
15 Bigland Hill, Haverthwaite.

TABLE I (continued)
NUMBERS OF ANT COLONIES RECORDED IN 30 MINUTES

Grassland															
Sheep Pastures								Sea Coasts					<i>Molinia</i> Mosses		
B	L	L	L	B	L	L	D	L	L	L	C	B	P	P	P
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
—	—	—	—	6	9	9	10	26	18	6	—	14	7	5	10
13	15	44	40	47	3	29	50	32	22	20	3	16	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2	—	—	8	6	1	—	—	—	—	—	2	20	—	—	6
12	2	—	—	6	—	—	—	—	—	—	—	—	8	9	15
2	1	3	1	1	1	—	—	—	—	—	—	2	4	—	—
—	—	—	—	4	—	2	—	3	1	—	—	4	7	2	9
—	—	—	1	—	12	9	—	2	—	—	5	7	1	2	—
1	—	—	5	2	—	—	—	1	—	2	—	2	2	—	4
—	2	8	15	2	3	9	8	—	4	6	—	1	—	3	1
1	—	—	—	2	—	—	—	1	—	—	—	—	3	1	13
31	20	55	70	76	29	58	68	65	45	34	10	66	32	22	58

Also: Site 17, 1 colony *L. mixtus*; Site 24, 1 colony *M. lobicornis*;
Site 25, 1 colony, *L. umbratus*.

Sites

- 16 Blawith Fell, Coniston.
- 17 Whitbarrow, Witherslack.
- 18 Kendal Fell.
- 19 Winster Valley, Witherslack.
- 20 Newton Fell, Lindale.
- 21 Witherslack Hall.
- 22 Kendal Golf Course.
- 23 Humphrey Head, Grange-over-Sands.
- 24 Roudsea, nr. Haverthwaite.
- 25 Whitbarrow, Witherslack.
- 26 Jenny Brown's Point, Silverdale.
- 27 Rougholme Point, Grange-over-Sands.
- 28 Roudsea, nr. Haverthwaite.
- 29 Ireland Moss, Haverthwaite.
- 30 Foulshaw Moss, Meathop.
- 31 Ellerside Moss, Holker.

microgyna. Both *F. lemami* and *L. acervorum* were significantly less abundant on limestone sites than on the other formations sampled at the 2% and 5% significance levels respectively.

	Mean No. of Colonies		Value of <i>t</i> (29 d.f.)
	16 Limestone sites	15 other sites	
<i>L. lemami</i>	1.44	5.40	2.5995
<i>L. acervorum</i>	0.31	2.07	2.0714

The range of altitude of the sites studied—from sea level to about 600 ft.—was too small for the effects of height to be substantial. *L. niger* and *M. laevinodis* did not appear to nest in such high or exposed situations as *L. flavus* and other *Myrmica* spp. respectively. *F. fusca* abundant in some coastal areas was replaced by *F. lemami* on the coastal fells at about 400 ft

DISCUSSION OF SPECIES

Formicoxenus nitidulus (Nyl.) has been recorded by Day at Keswick and by Bagnall at Grange, in wood ants' nests (Donisthorpe, 1927), but was not seen during the present survey.

Myrmica laevinodis Nyl. was plentiful in the warmer limestone pastures and on the coast.

M. rubra (L.) (= *ruginodis* Nyl.) was abundant in the two varieties *macrogyna* and *microgyna* Brian and Brian (1949). The form *macrogyna* was most characteristic of woodland and upland sites while *microgyna* was noticeably abundant on the mosses. In some woodlands both forms were present with *macrogyna* the commoner of the two.

M. scabrinodis Nyl. occurred over a wide range of habitats.

M. sabuleti Mein. was abundant and widely distributed in the S. Lake District and was also taken near Ullswater, Cumberland (new County record).

M. lobicornis Nyl., a local species, has been recorded for Cumberland by Britten (Donisthorpe, 1927) and was found at Roudsea and in the Winster Valley, Westmorland (new County record).

Leptothorax acervorum (Fab.) was widely distributed.

Lasius fuliginosus (Latr.) has been recorded by J. D. Ward (Neave, 1921) from Yewbarrow, near Grange-over-Sands, its most northerly station in Britain. It was not found during the present survey.

L. niger (L.) was common on pastures, peat mosses and coastal areas but was much less widely distributed than *L. flavus*.

L. flavus (Fab.). This pacific species, although often preyed upon by *M. laevinodis* and *M. scabrinodis* is generally abundant, due perhaps to its habit of constructing earth mounds removing it from competition for stones and tree stumps as nest sites. Brian (1952) has shown that in the West of Scotland *F. fusca* (*lemami*) tends to displace *Myrmica* spp. from favourable nest sites. In this area the local dominance of *Formica* and *Lasius* species which outnumbered *Myrmica* in numbers of colonies on most open sites may have resulted largely from direct aggressiveness.

L. umbratus (Nyl.). A new county record was obtained for this species which was taken on the N. Lancashire coast near Silverdale.

L. mixtus (Nyl.). A new county record was also obtained for this form of which several colonies were found on Whitbarrow, Westmorland, at about 500 ft. on rocky limestone pasture. One colony had runways extending over several square yards, the territory of the colony apparently undermining three *L. flavus* nests. Another colony had a large earth mound through which the grass *Sesleria coerulea* was growing. A large number of males but no females were present in it on 18th August, 1954. *L. mixtus* and *L. umbratus* are doubtfully distinct species as intermediate forms are of frequent occurrence. However, the Whitbarrow specimens were of typical *mixtus* conformation contrasting with the *umbratus* from Arnside, which were large and clear yellow with characteristic pubescence.

Formica rufa L. reaches its most northern distribution in Britain to the north of the Lake District at Caldbeck, in Cumberland. The species was abundant in the open limestone woodlands about Grange, Holker and Arnside where frequently the workers were large, unusually red and less hairy than specimens from other areas. Nest materials were coarse, in ash woods consisting largely of entire ash leaf petioles.

A small mixed *F. fusca* - *F. rufa* colony was discovered on a scree slope on the S.E. face of Whitbarrow. The colony consisted of about a dozen large *fusca* workers, some 30 small *rufa* workers and one dealate *rufa* female. The workers had clear bright colouration compared with normal minor workers from established *rufa* colonies. The nest was among stones with a few bits of leaf litter and was over a mile away from the nearest known established *rufa* colony. Although recorded by various workers in Europe such a mixed colony has only once previously been recorded in Britain (Donisthorpe, 1927).

F. lugubris Zett. has been shown by Yarrow (1955) to be the common wood ant of N. Britain. Formerly referred to by Donisthorpe and others variously as *F. rufa* and *F. pratensis*, this species is readily distinguished in the worker caste from the generally accepted *F. rufa* by the presence of abundant long hairs fringing the back of the head. It occurs in the Lake District only in the Duddon Valley on the Cumberland-Lancashire border and in Ashness Woods, near Keswick, but is very numerous in both places. The distribution of these two species of wood ant in the Lake District is discussed elsewhere (Satchell and Collingwood, 1955).

F. sanguinea Latr. was recorded for Grange-over-Sands by Whitaker (Donisthorpe, 1927) but was not found during the present survey.

F. fusca L. This ant has recently been shown by Yarrow (1954) to be replaced in Central and N. Britain by *F. lemani* Bond., a distinct species occurring generally in N. Europe and on upland areas in mid-Europe. The true *F. fusca* occurs in the Lake District in a restricted area near the coast near Grange-over-Sands and Arnside, penetrating the Winster and Lythe valleys up to Whitbarrow.

F. lemani Bond. is abundant throughout the Lake District. This species overlaps with *F. fusca* in the N. Lancashire coastal areas at Roudsea, Ellerside, Lindale and Arnside, replacing it in woodland and on high ground in those localities. A good example of this was observed near Witherslack where the ground rises from the open pastures of the Winster Valley through wooded slopes and then open scree to the top of Whitbarrow, a limestone fell, at 500-600 ft. In the valley pastures only *F. fusca* was found, while

F. lemami occurred throughout the wooded slopes from 50 ft. to about 250 ft. On the steep well insulated scree above the woodland both species were present often side by side, while on the top of Whitbarrow only *F. lemami* was to be found.

Summary. The distribution in the South Lake District of 17 species of ants is discussed. The relative abundance of the common species in various habitats is compared.

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