

The slave-making ant *Formica sanguinea* at Bennachie, Aberdeenshire

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Introduction

Slave-making ants such as *Formica sanguinea* (Latr, 1798), exploit workers of other ant species to maintain their colonies (Mori *et al*, 2000) (Figure 1). Nearby nests of related species are raided and the host brood brought back to the parasitic nest where they eclose to produce slaves (Hölldobler & Wilson, 1990). The enslaved ants perform routine colony work, such as nest maintenance and brood care, alongside their slave-making counterparts. But while the foraging and raiding behaviour are well documented (e.g. Mori *et al*, 2000), there are many aspects of the ant's ecology that are not known. We report here the results of a preliminary investigation of *F. sanguinea* at Bennachie Forest in Aberdeenshire.



Figure 1: The slave-maker ant *Formica sanguinea*. Photo: Gus Jones.

Description

The size of this ant, colouration, notched clypeus and nesting habit make it easily distinguishable from the wood ants. A large aggressive ant, *F. sanguinea*, is commonly referred to as the blood-red or slave-maker ant because of its behaviour and colouring. The ant is generally larger than wood ants (*rufa* group) with bright red colouration of the head, legs and thorax. The abdomen is entirely black. Ants belonging to the *Formica sanguinea* group all have a medial notch in the clypeus (Figure 2). *F. sanguinea* is most frequently found nesting in tree stumps.

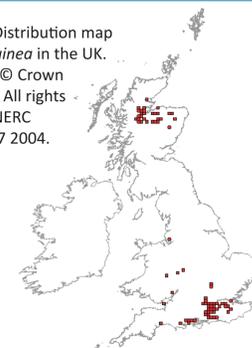


Figure 2: Notched clypeus of *F. sanguinea* (left) with *F. lugubris* as a comparison. Photos: Gabor Pozsgai (www.photogabor.com).

Distribution and status

F. sanguinea is the only Eurasian component of the *F. sanguinea* group of slave-making species. In the UK it has a disjunct distribution (Figure 3), occurring mainly in the central Highlands of Scotland and the south east of England. The colonies within Bennachie Forest, Aberdeenshire, were first recorded in 2008 and represent one of the most easterly populations of the ant in Scotland. Falk (1991) recorded *F. sanguinea* as nationally scarce. However, as the species is almost certainly under-recorded (Hughes, 2006), its true status and distribution are unknown. More recent survey work by the Highland Biological Recording Group has revealed the species is far from rare and in some cases locally abundant.

Figure 3: Distribution map of *F. sanguinea* in the UK. Copyright © Crown Copyright. All rights reserved NERC 100017897 2004.



Habitat

In the central Highlands the ant is strongly associated with native pine forests. In Moray and Aberdeenshire the habitat tends to be plantation forest. A total of seven nests have been found at Bennachie to date (Table 1). Five of these are situated in clearings which have been felled at least five years previously. An additional two nests are alongside paths. The nests are all in moss-covered tree stumps or fallen logs and in relatively wet areas (Figure 4). Other habitat characteristics are typical of early succession woodland such as grass-dominated understorey vegetation and an open canopy with high numbers of young seedlings.

Table 1: Summary of nest characteristics of *F. sanguinea* at Bennachie.

Nest	Location	Slope	Age of stump (years)	Stump diameter (m)	Mean vegetation height (m)	Tree density ¹	Dominant tree species	No. of host nests ²
1	Beside path	E	5+	0.36	0.19	0.20	Sitka	1
2	Beside path	NE	5+	0.20	0.16	0.12	Sitka	1
3	Clearfell	S	5+	0.29	0.67	0.05	Larch	2
4	Clearfell	S	5+	0.44	0.46	0.06	Larch	8
5	Clearfell	N	4	0.52	0.46	0.10	Larch	24
6	Clearfell	NW	2	0.28	0.41	0.02	Larch	12
7	Clearfell	S	5+	0.40	0.35	0.05	Larch	2

¹Calculated as the inverse of the average distance to nearest neighbour north, south, east and west. As a comparison an average density for plantation forest is 0.33, native pine forest 0.06.

²Estimated number of *F. lemni* nests within 25 m. This distance is considered the maximum at which *F. sanguinea* will conduct raids.



Figure 4: Typical *F. sanguinea* nest in rotten tree stump covered with moss. Photo: Hayley Wiswell.

Host species

In the UK, *F. sanguinea* enslaves ants of the genus *Formica*. It is mainly associated with *F. lemni* and *fusca* (Figure 5) although there is anecdotal evidence of *candida*, *rufibarbis*, *cunicularia*, *rufa*, *aquilonia*, *lugubris*, *pratensis* and *exsecta* being used as hosts. At Bennachie the host species *F. lemni* appears to be present in all *F. sanguinea* nests and is itself widespread and abundant throughout the forest.

Figure 5: *Formica lemni* and *F. fusca* are the most common host species for *F. sanguinea* in the UK.



Conservation & management

The lack of knowledge about the distribution and status of this ant in the UK highlights the need for further surveying. Another gap in our knowledge is the extent to which *F. sanguinea* can disperse which may influence metapopulation dynamics.

The provision of dead wood through natural tree deaths, windfalls or routine felling of mature trees is clearly important, in Bennachie Forest at least, in providing nesting habitat for this species. Selective felling of trees in native woodlands and the clearfell of commercial plantations may help maintain populations particularly where this habitat is adjacent to an existing population.

In general, deadwood is a declining but important resource within forests. The provision of suitable habitat for *F. sanguinea*, which could be easily incorporated into woodland management schemes, will not only ensure this species' survival, but that of a wide suite of other deadwood specialists.

Acknowledgements

Hölldobler, B. & Wilson, E. O. (1990) The Ants. Springer, Berlin.

Hughes, J (2006) A review of wood ants in Scotland. Scottish Natural Heritage Commission Report No. 178.

Mori, A., Grasso, D.A. & Le Moli, F. (2000) Raiding and foraging behaviour of the blood-red ant, *Formica sanguinea* Latr. (Hymenoptera, Formicidae). Journal of Insect Behaviour, 13: 421-438.