



## The wood ant

*In keeping with this issue's celebration of the small, Strathspey ant specialist Hayley Wiswell looks at the vital role of the wood ant.*

If you are ever walking in pine forest in north-east Scotland, you may notice some strange mounds of pine needles in a sunny clearing on the woodland floor. Take a closer look and you will notice a hive of activity - these mounds are home to the charismatic wood ant. Wood ants are a group of mound-building ants that are found across Europe. In the UK there are three species, two of which are found in Scotland: the Scottish wood ant (*Formica aquilonia*) and the hairy wood ant (*Formica lugubris*). The third species, the red wood ant (*Formica rufa*), is found in the south of England.

### Habitat

As their name suggests, wood ants inhabit woodland and can be

found in Scots pine forest, birch woodland and even non-native spruce plantation. They are dependent on aphids which feed in the tree canopy. If you study trees close to a nest, you will notice trails of ants wandering towards the tree top. Once aphids are located, they are farmed much like cattle and a sweet liquid that the aphids produce (known as honeydew) is harvested and returned to the nest inside the ant's stomach. When there are larvae in the nest to feed during the summer, protein is essential and one can often observe ants at ground level carrying all manner of insect prey back to the nest. Moth caterpillars are a favourite, but wood ants are capable of over-powering a variety of invertebrates, including spiders and large ground beetles.

One of the main things that make wood ants instantly recognisable is their nest - the wood ant nest is a huge, complex structure. As well as the visible mound, underground tunnels and networks can spread outwards up to three metres away. The pine needle thatch on top of the mound is delicately constructed - the layer of needles acts like an umbrella over the nest, allowing rain water to trickle away and is also a giant solar panel, absorbing the sun's rays which keeps the nest and its inhabitants warm. The nest is always kept scrupulously clean in order to keep bacteria and fungi to a minimum. Wood ants foraging on pine trees collect the sap that exudes from wounds - this resin contains anti-bacterial and anti-fungal agents which aids cleaning.

### Biodiversity

The wood ant's home is also a haven for other insects - some insects actually invade nests and depend upon the wood ants for survival. For example, the shining guest ant (*Formicoxenus nitidulus*) named after its glossy exoskeleton, is a 'guest' inside the wood ant nest, having its own quarters and food supply. Research <sup>[1]</sup> has shown this little ant to be particular about the nest it inhabits, only choosing to live in '5 star' wood ant accommodation and quickly leaves if the nest conditions begin to deteriorate. The shining guest ant has a distasteful coating which prevents the wood ants from devouring it and because they do little harm in the nest, the wood ants ignore them.

There are many other examples of 'guests' in wood ant nests, including specialised wood lice, chafer beetles and even moths. Some are harmless to the ants, feeding on detritus and waste inside the nest, while others such as small predatory rove beetles feed on the larvae and the ants' private food supply.

### Reproduction

Common with most social *Hymenoptera* (the insect group that includes bees, wasps and ants), queens are much larger than her workers and spend most of their time deep inside the nest. A queen starts life much like any other ant larva, but is fed more and of a higher quality of food than ants destined to be workers. When she emerges, the queen has wings which she uses to disperse away from her mother-nest to find a male from a neighbouring nest. Once mated, she finds somewhere to start a new colony and her wings fall off as she will not need them again. This stage is when she really comes into her own - this amazing individual is then responsible for producing all the other ants (the workers) in the colony - all of these ants are female and are her daughters. Males are produced later in the year and are only around for a short while in order to mate with new queens. Wood ant colonies are known to have more than one queen inside a nest at any one time, sometimes several may be present. Queens have been known to survive for up to a decade or more and a single colony can survive 50 years (with one queen

succeeding another) and contain tens of thousands of individuals!

Wood ants are territorial and defend their nests aggressively by biting intruders (including humans that get too close!). They spray formic acid and although not strong enough to be very harmful, it can make the bite area sting and this spray can travel several centimetres.

### Keystone species

Not only are wood ants fascinating and beautiful insects in their own right, but they perform a number of important roles in the forest ecosystem, earning them the status of 'keystone' species. These are species considered to play critical roles in the structure of their ecological community, thus affecting many other organisms belonging to different trophic levels in the food web.

Wood ants interact with organisms in the soil, at ground level and all the way up to the tree canopy, therefore having an impact across the whole of the forest. They could be considered to be the largest predator in the forest due to their biomass - one nest can contain 10,000 individuals and there could be several nests within a hectare of woodland. Because they feed on aphids which in turn feed on tree sap, and predate on herbivores such as moth caterpillars, the ants affect tree growth and are thought to effect predatory insect communities within woodland.

Despite being a top predator, they are themselves a valuable food source for a variety of other animals in the forest including birds, badgers and even capercaillie. Birds are also known to utilise a defence mechanism of the wood ants as a method of removing parasites. Birds can agitate the ants to spray formic acid which helps to repel mites and lice.

If that wasn't enough, ants also distribute the seeds of plants throughout the forest, and influence soil communities and nutrient stores within the soil. Once abandoned, the nest provides a rich source of material to allow new plant growth to establish.



**Protection**

Wood ants need continuous woodland cover to survive, and although they can inhabit non-native woodland, the structure of the woodland is important and dense, commercial plantations are not suitable. An open woodland structure

is key, as the ants are sun-loving insects and require optimal temperatures inside the nest in order for the brood inside to develop successfully. Such temperatures are only achieved through sufficient



Previous page: Wood ant worker. Above: Workers transporting pupa - workers will often bring larvae and pupae to the surface of the nest on sunny days to keep them warm. Opposite: Workers gathering on the surface of the nest thatch on a sunny day to warm themselves - they will transport this heat down into the nest, keeping the nest warm enough for brood development. Photos by Hayley Wiswell.

warmth from the sun. Once shaded out, the colony often abandons the nest and moves to a more suitable area. The Scottish wood ant is considered to be more shade tolerant than its relative the hairy wood ant and can, therefore, survive canopy closure as long as sunny gaps remain. The hairy wood ant is generally found closer to the woodland edge or within younger, early succession forests.

Management of woodland containing wood ants requires careful planning, not only to prevent damage or disturbance to the nests but also to ensure that sufficient trees remain to support each colony. Without aphid-rich trees to provide the 'fuel' for the wood ants, the colony cannot survive.

Wood ants are no longer listed on the Scottish Biodiversity List, although the shining guest ant is. Since this species depends entirely on wood ants for survival, wood ants should receive some kind of protection. Wood ants are present on the Cairngorm National Parks 'Nature Action Plan' as key woodland species. Another species related to

wood ants, the narrow-headed ant (*Formica exsecta*), is also present on this list and the Scottish Biodiversity List. This mound-building species is considered endangered in the UK and is dependent on open woodland and woodland edges and glades.

**References**

1. Ölzant, S. (2001) Freilandökologische untersuchungen an der Gastameise *Formicoxenus nitidulus* (NYLANDER1, 8 46) unter besonderer Berücksichtigung der Nesttemperatur (*Hymenoptera: Formicidae*). Myrmecological News. 4, 1-10.

[www.woodants.org.uk](http://www.woodants.org.uk)

*Hayley Wiswell is an entomologist and Natural Heritage Officer for the Cairngorms National Park Authority and a member of the National Wood Ant Steering Group. A key to wood ants and other ants of the Highlands can be found through the Highland Biological Recording Group website [www.hbrg.org.uk/Atlases.html](http://www.hbrg.org.uk/Atlases.html)*



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