Observations of Jet-Black ants and Giant aphids at Besford.

Jean Young.

Several years ago I attended a talk by Harry Green about the 'Wildlife of Worcestershire'. Many species were featured and one that Harry asked the audience to look out for was the Jet-Black Ant, *Lasius fuliginosus*. While gardening to create a 'pollinator patch' I had been regularly encountering ants that fitted Harry's description. At the centre of my patch a standing dead Silver Birch tree provided a valuable habitat for invertebrates and a useful nesting site for birds. Streams of relatively large shiny black ants were constantly coming and going in the area of the tree. I suspected they may be *L. fuliginosus* and was keen to get them checked out.

The ideal opportunity arose in 2014 when the tree fell down leaving just a fractured stump which revealed the ant nest at the base. As the collapse of the tree left the nest exposed to the elements, I covered it with a large stone and the ants remained active in the area. Harry came to examine the construction of the nest and was pleased to confirm the identification (01).

01. Harry Green inspects exposed *Lasius fuliginosus* ant nest 17th October 2014.

At the time of John Partridge's April 2001 Worcestershire Record article (Partridge 2001), *L. fuliginosus* were only recorded on 10 sites within the county. Although there are now just under a hundred records covering approximately 30 sites, any additional records will help give a valuable insight into how this species is doing. These glossy ants are sometimes known as Shining Black Ants and are fairly distinctive due to their size (Queens 6-6.5mm, workers 4-6mm, males 4.5-5mm) and the shape of their head. Viewed from above the head is fairly broad and concave at the back making it look rather heart shaped (02).

02. Well fed *Lasius fuliginosus* ant with distended abdomen showing heart shaped head 23rd October 2019. Jean Young.

Although I have not noticed it, some people are able to detect a distinctive citrus smell from the ants. The Routledge 'Handbook of Sustainable Food and Gastronomy' describes them as 'having an aroma of Kaffir Lime'! They use hind gut secretions to lay down a pheromone trail which they travel along in narrow lines from their nest to a food resource. This behaviour makes them easy for interested entomologists to spot. The ants ascend trees where they tend aphids and feed on their honeydew. Harry spotted a trail of ants travelling up and down a lime tree close to the stump nest site and pointed out that the ants going up were thinner than the ones coming down, as the abdomens of the well-fed ants were visibly distended (02).

It was fascinating to see the construction of the nest, the structure of which is described as 'carton', a meshwork made from chewed up wood fibres stuck together with saliva and honeydew and supplemented with soil or sand particles at the base (03). It is also said to be strengthened by the hyphae of a symbiotic fungus, although opinions vary as to whether the fungus is used as a stabilising part of the structure or a potential food source. Seifert, 2018 notes that it is soaked with approximately 30% of honeydew solution as a nutrient for the fungal hyphae which gives the construction elastic stability. Lüttge, Beyschlag & Cushman, 2014 reported that 'small drops of liquid secreted by the fungi are taken by the ants'. The nests can be found inside or at the base of old rotting trees, logs, stumps and sometimes in hedge banks, sand dunes or walls and they can be long lasting (up to 20 years or more, Donisthorpe, H. 1938). Harry Green's 2007 Worcestershire Record article detailing a nest in Mike Southall's beehive shows that the ants are opportunistic and may be found in unexpected places. The article also mentions a press release about the association between *L.fuliginosus* and Giant aphids, more about that later!

03. Carton construction of *Lasius fuliginosus* nest 16th October 2014. Jean Young.

The nesting biology of these ants is complex as the queen does not found her own colony but is a temporary parasite of another species of ant. She will enter the nest and having gained acceptance the host queen will be killed. *Lasius umbratus* is generally the host but *Lasius mixtus* has also been recorded. The host ants are themselves temporary parasites of various other Lasius ant species including *Lasius niger*. The combination of their habitat requirements and reliance on other ant species helps explain why *L. fuliginosus* are uncommon.

L. fuliginosus colonies can be polycalic, with more than one focal nest and several queens (Collingwood, 1979). As the site where my nest is found is part of an old country estate there is a good amount of dead wood and mature trees with varying levels of decay. Although it appears that the base of the fallen tree is no longer being used as a nest site the lime tree just across the path is still used by a stream of ants ascending into the canopy to feed. A significant

number of ants can be seen at another large dead tree stump 15 metres away from the original site which suggests that this stump is being used as a nest.

Another likely nest site was brought to my attention in 2015 in a cavity at the base of a mature Ash tree *Fraxinus excelsior* located in a copse of mixed deciduous trees, approximately 140 metres away from the original nest (04). There were streams of ants going up and down the tree and a lot of activity at the base of the tree, where there is a large hollow. Within the same copse on 23/07/19 about 40 metres from the Ash I spotted another potential nest site as there was a lot of activity around a dead *Acacia* tree stump (05). I followed a trail of ants from the stump across the ground which led to a lime tree 9 metres away. Part-way up the trunk there was a collection of about 100 ants circled around something. Intrigued I investigated to see what was going on. It wasn't obvious what they were centred around but there was a lot of antennae-waving and I thought it may be a queen so I tried to get some photos and videos.

04. *Lasius fuliginosus* nest in cavity at base of Ash tree 10th April 2015. Jean Young.

05 *Acacia* stump site of *Lasius fuliginosus* ant nest 23rd July 2019. Jean Young.

Unfortunately the photos were poor, but I was able to make out what appeared to be one of the *Stomaphis* giant aphids. I confirmed this using the photos and species details available on the Influential Points website, an excellent resource for information about aphids. It was a revelation to me that there were such things as Giant Aphids! I returned to the scene a couple of days later and was surprised to find there was still a cluster of ants around an aphid at the same spot.

Stomaphis are large aphids (up to 7mm) that feed on the roots and stems of various trees. The females have an exceptionally long rostrum, twice as long as their body which helps them to probe through bark crevices. However, having such a long rostrum means that they can't escape easily if disturbed while feeding so they benefit from a mutualistic relationship with several species of ants, mainly *Lasius*. The ants help protect them while they feed in bark crevices (06) or create shelters for them with soil cover (07) and are rewarded with a sweet treat of honeydew.

06. *Lasius fuliginosus* and *Stomaphis graffii* aphids 23rd August 2020. Jean Young

07 Possible shelter created for *Stomaphis* aphids by *Lasius fuliginosus* 09th September 2020. Jean Young.

Having checked the Influential Points website I wasn't sure which species of Stomaphis I'd found. The Pale Giant Oak aphid, *Stomaphis wojciechowskii* had been recorded feeding on lime but is usually attended by *Lasius brunneus*, but a photo of an alate (adult, winged dispersive form) on the website looked similar to my aphid. The Giant Oak aphid, *Stomaphis quercus* is generally attended by *L. fuliginosus* but had not been recorded on lime. Bob Dransfield and Bob Brightwell of Influential Points kindly checked my video and confirmed that I had a *Stomaphis* alate and larva and supplied the following information:-

'The only Stomaphis so far recorded on lime is Stomaphis wojciechowskii - and that was on small leaved lime, Tilia cordata. (Stomaphis graffi has only been recorded from maple spp.. Stomaphis quercus has only been recorded from oak, silver birch and alder).

However (as far as I know) Stomaphis wojciechowskii is always attended by Lasius brunneus. It produces few alates, and usually feeds well hidden in deep bark crevices covered by soil.

Stomaphis quercus is the species usually attended by Lasius fuliginosus (although in Sardinia they are attended by Lasius brunneus). It produces more alates and feeds on the bark surface, not usually covered with soil.

Given all of which Stomaphis quercus is the most likely, even though it has not been recorded on lime before.

The only way to be certain would be to collect some specimens for molecular analysis - assuming you can find anyone prepared to do it. If you can collect some adults (winged or wingless), and send them to us, we will try to identify them by morphometric analysis. (All winged forms are adult. Wingless Stomaphis quercus adults are dark and shiny).

The aphid had by this time disappeared so although I wasn't able to put in a record at least I had gained an awareness of the existence of Giant Aphids. This proved useful when I spotted a Giant Willow Aphid, *Tuberolachnus salignus* on a tree trunk on 11/12/19 (08).

08. Giant Willow aphid *Tuberolachnus salignus* 11th December 2019. Jean Young.

Again the identification was confirmed by Influential Points with the following information:-

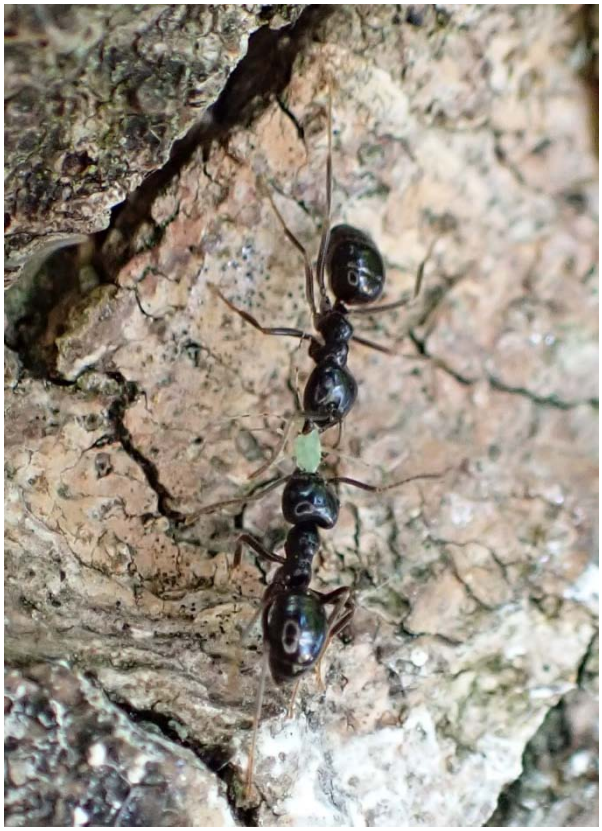
'It is, in fact, an immature alate (winged form) of this species. However, I have no idea why they are developing alates in December - it doesn't seem a good time of year to disperse. But as you will see from our page on this species, they are still many unanswered questions about the life cycle of this species - like what happens between March & July when it is almost impossible to find them.'

While looking for information about giant aphids I came across an article in the Guardian (Barkham, 2020) which mentioned that some ants create shelters, 'barns' to protect the aphids and also move them around to better feeding spots. *L. fuliginosus* may transport young *Stomaphis quercus* fundatrices (adult females which developed from an overwintered fertilised egg) from the base to the upper branches and guard them if food is scarce (Way, 1963).

On 01/05/20 I began hunting for a 'barn' starting where I found my original Stomaphis aphid, but as this was unfruitful I returned to the acacia stump where I had begun following the ants previously. A sycamore next to the stump had a steady flow of *L. fuliginosus* going up and down the trunk (09). A few of the ants coming down the tree were carrying small green aphids, I couldn't be sure if the aphids were prey or whether the ants were moving them to new feeding areas. I had difficulty keeping track of the ants but at the base of the Sycamore *Acer pseudoplatanus* there were several small 'sucker' branches where *L. fuliginosus* were attending to aphids on the small new leaves at the tips of the branches.

09. *Lasius fuliginosus* trail up Sycamore tree 01st May 2020. Jean Young.

Although the ants feed mainly on honeydew they sometimes take dead aphids and other prey back to the nest. The aphids I saw being transported appeared to be alive although the odd tug of war between ants probably didn't help, one aphid I spotted had escaped and was 'on the run' (10). As I didn't manage to follow any of the ants with aphids back to the nest or ends of branches I was unable to reach any conclusions as to the fate of the aphids I saw being transported.



10. *Lasius fuliginosus* tug of war over aphid 01st May 2020. Jean Young.

A cluster of *L.fuliginosus* ants around a raised area of bark on the sycamore caught my attention and after examining my photos I discovered the rear end of a Stomaphis aphid sticking out, I had found my first 'barn' (11 & 12). The aphid was being dutifully attended by ants in the hope of a drop of honeydew. The mass of ants made photographing the aphid difficult but I was able to get a good enough record shot for 'Influential Points' to confirm that it was almost certainly a Giant Maple aphid, *Stomaphis graffii* and they made the following comments:-
'The only other Stomaphis on sycamore is Stomaphis acquerinoi which as far as we know does not occur in Britain. Stomaphis graffii has been reported from Worcestershire before - in fact until recently that was its only known location in Britain. The attendance by Lasius fuliginosus is interesting. It is more commonly attended by Lasius brunneus, but L. fuliginosus has been recorded before.'
S. graffii (Whitehead, 1995) was first observed in Britain in 1993 by Paul Whitehead on Bredon Hill being attended by *Lasius brunneus* on *Acer campestre*. By 2013 it had been found at 2 other sites, one in Worcestershire and one in Gloucestershire on ancient, open-grown, not woodland field maples (Whitehead, 2013). Since then they have been found in Cambridgeshire on sycamore and field maple and possibly In Middlesex on sycamore.

11. *Lasius fuliginosus* at first barn 09th May 2020. Jean Young.

12. Well fed *Lasius faluginosus* ant and *stomaphis* aphid first barn 01st May 2020. Jean Young.

Over the next 10 days of fine warm weather whenever I checked the Stomaphis aphid it was surrounded by ants. However when the weather cooled although there were still some ants around the raised area of bark they seemed less frantic and I could not see the aphid. I also noted that the trail of ants going up and down the tree had moved 180° around the tree. On 13/05/20 I found a cluster of ants around a raised area of bark on the opposite side of the tree from the original barn (13). Over the next few days the ants at this new site were so industrious that it was impossible to get sight of the aphid but I was eventually able to confirm that there was an aphid at the centre of attention. The number of ants around the original area had dwindled significantly. Had the Stomaphis aphid been moved to a second barn or was it another aphid?

13. *Lasius fuliginosus* ants and *Stomaphis* aphid at second barn 22nd May 2020. Jean Young.

On 29/05/20 there were just a few ants and no sign of an aphid at the second barn but lower down the tree I discovered a cluster of ants attending an aphid, again the aphid may have been moved to a third barn or it could have been another aphid (14). It was still there the next day but had disappeared by 31/05/20 and I could not find any further clusters of ants. The ants lay down trail pheromones all the time the food resource is there but stop when it has run out (Morgan, 2009). It was interesting to observe the number of ants exploring the deserted barns gradually dwindling. The trail pheromones must linger but weaken when not reinforced by workers finding food. It seems to take a while to disperse totally as a few stragglers were still exploring the first barn 12 days after the last sighting of an aphid.
In the copse containing the ash and acacia nests although I was unable to spot any other giant aphids with attendant ants I found several trees with trails of *L.fuliginosus* ants going up the trunk into the canopy. Measuring from the acacia stump they were a sycamore 15 metres away, three oaks at 19, 22 and 27 metres and a lime 10 metres away.

14. *Lasius fuliginosus* with *Stomaphis graffi* aphid at third barn 30th May 2020. Jean Young.

Various other trees within the copse had smaller ants moving up and down them but as my ant identification skill are limited to big black shiny ones I left them to go about their business. I wonder how many more ants nests, feeding trees and giant aphids are around the site yet to be discovered?
On 24/05/20 the *Acacia* stump was crawling with *L. fuliginosus* including several with wings (15). Over the next couple of months I came across winged ants on several occasions and was interested to see what appeared to be a mixture of species on a couple of occasions:-

24/05/20	*Acacia* stump	Mass of *L. fuliginosus* several winged
26/05/20	*Acacia* stump	Mass of ants many winged *L. fuliginosus* and several winged smaller black ants
31/05/20	Ash nest	Many winged *L. fuliginosus*
08/06/20	*Acacia* stump	Winged *L. fuliginosus*
13/06/20	*Acacia* stump	Mixture of winged *L. fuliginosus* and winged smaller black ants
23/06/20	Ash nest	Many winged *L. fuliginosus*
01/07/20	Ash nest	Several winged *L. fuliginosus*
17/07/20	Ash nest	A few winged *L. fuliginosus*

Table 1. Appearances of winged *L. fuliginosus.*

15. *Lasius fuliginosus* on *Acacia* stump some with wings 24th May 2020. Jean Young.

There was an increasing amount of activity with the *Stomaphis graffii* aphids from mid-June onwards, including several alates seen in the last two weeks of June sometimes with a juvenile (16). From mid-June through mid-August I observed several juveniles (17). Some were tucked in bark crevices with wingless adults, others were wandering the tree trunks with a retinue of ants who occasionally nudged them in what appeared to be an attempt to dissuade them from venturing in the direction they were heading. Although I saw juveniles on the move on several occasions, the only time I came across an adult exposed was on the tree trunk at night. The ants' antennae were always very active while attending the aphids but it was interesting to note that the aphids' antennae were also extremely active when they were on the move and being shepherded by the ants. From the end of June to the end of September I spotted numerous clusters of *L. fuliginosus* attending wingless adults tucked away in bark cracks on three Sycamore trees. The aphids had just their rear end protruding and were producing honeydew for their guardians.

16. *Lasius fuliginosus* with *Stomaphis graffii* alate and juvenile at base of Sycamore 21st June 2020. Jean Young.

17. *Lasius fuliginosus* with juvenile *Stomaphis graffii* rostrum folded under 23rd June 2020. Jean Young.

I found clusters of ants at varying heights up the tree trunks from within a few centimetres of the ground to a couple of metres above ground: they may have been further up too but that was as far as I could see. On the tree trunks I noticed several small areas of soil and vegetation, which may have been placed there by the ants as protection for the aphids while feeding. The last *Stomaphis* aphid I photographed in 2020 was on 24/09/20, it will be interesting to follow their progress during 2021. No doubt there are more *Stomaphis* aphids out there to be found so if you see any clusters of ants on a tree trunk, they are well worth investigating.

Although the identification of the aphids as *S. graffii* seemed likely, due to their presence on Sycamore, a specimen was required for confirmation as they are generally attended by *Lasius brunneus.* A specimen was collected by tickling one of the feeding aphids with a leaf which caused the attending ants to try to move the aphid. This was a fairly slow process as it takes a little while for the withdrawal of the rostrum (18 & 19). The specimen was examined by Bob Brightwell and Bob Dransfield of Influential Points who confirmed that it was *S. graffii.*

18. *Lasius fuliginosus* extracting *Stomaphis graffii* aphid 05th September 2020. Jean Young.

19. *Lasius fuliginosus* moving *Stomaphis graffii* aphid showing underside 05th September 2020. Jean Young.

Worcestershire Record No.32 featured an article by Rosemary Winnall about Extra Floral Nectaries (EFN) and the species of ants she had noted feeding from them. It would appear that *L. fuliginosus* also make use of them as I spotted one on 23/04/19 feeding at a nectary on the underside of a Cherry Laurel leaf. Rosemary would be interested to hear of any other ants that you've come across feeding on EFN, details of species and plant, location and date would be helpful.

I observed *L. fuliginosus* interacting with a selection of invertebrates, swarming over and around a Harlequin Ladybird larva, another larva, a Lesser Stag beetle and another small beetle and carrying a weevil down the tree towards the nest area (20 to 24). Collingwood, 1979 commented that 'the mandibles are relatively weak but small insects may be taken as food'. However BWARS (Bees, Wasps and Ants Recording scheme) comment that they are rarely seen to take insect prey. I could not be sure if they'd killed or scavenged what they'd collected or whether the beetles and larvae were just being investigated.

One *L. fuliginosus* that I came across had something white on its back. Unfortunately as it was so active I wasn't able to get good enough photos to establish what it was (25). I initially thought that it may have been some form of parasitic larva or fungus, but looking at a short video I took, there appears to be segmentation, so a larva seems more likely. I'd be interested to know if anyone has seen anything similar.
I am fortunate to have such fascinating species on my doorstep and have come to realise while checking out facts relating to them that there is still much to discover about both *L. fuliginosus* and *Stomaphis* aphids.

If you are lucky enough to find a colony of *L. fuliginosus* there are several other species of invertebrate that are thought to have some form of association with them that are worth looking out for:-

- Dotted chestnut moth – larvae, pupa and freshly emerged adults have been found in *L.fuliginosus* nests (Henwood, Sterling & Lewington, 2020)
- Various Aleocharin staphylinids scavenge, predate and prey rob along the trails. (Hölldobler & Kwapich 2017)

The following 3 species are rarely found with few records reported, but is that because they don't occur in this area or because we're not looking for them?

- *Mastigusa macrophthalma* - a rare spider that has been recorded in nests (Pendleton & Pendleton, 2018)
- *Milichia ludens* – a fly that has been found sitting on bark just above entrance hole of ants nest on cool overcast days just after emergence (Webb, 2015)
- *Amphotis marginata* – a beetle found on the foraging trail. (Hölldobler & Kwapich, 2017)

I'd love to see the interactions between *Amphotis marginata* and *L. fuliginosus* but will have to get my torch out as it feeds at night. It is known as 'the highwayman' as the adults get their food on the ant trails by copying the food begging signals the ants use to solicit regurgitation.

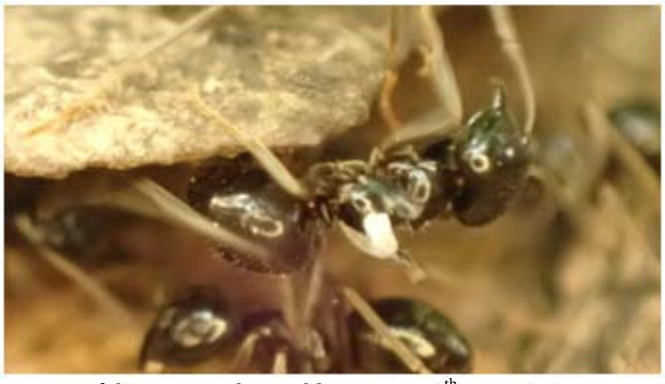
20 Lasius fuliginosus with Harlequin ladybird larva on ash tree 20th June 2020. Jean Young.

21 Lasius fuliginosus with larva 29th August 2020 Jean Young.

22 *Lasius fuliginosus* with weevil prey 29th May 2020. Jean Young.

23 *Lasius fuliginosus* with prey 30th May 2020. Jean Young.

24 *Lasius fuliginosus* with prey 07th May 2020. Jean Young.



25 *Lasius fuliginosus* with possible parasite 13th May 2020. Jean Young.

Acknowledgements

Many thanks to Bob Brightwell and Bob Dransfield for their help identifying my *Stomaphis* aphids and supplying all the supporting information, to Simon Wood for the extract of records and Paul Whitehouse for supplying his papers covering *Stomaphis* aphids. Many Thanks also to Harry Green and all the other recorders who have helped and shared my fascination as I've explored the world of Jet-black Ants and giant aphids, it has been and continues to be a fascinating journey with so much more to learn.

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Images

All copytight Jean Young.All taken at Besford, all images of *Stomaphis graffii* are on sycamore trees.
01 Harry Green inspects exposed *Lasius fuliginosus* ant nest 17Oct14
02 Well-fed *Lasius fuliginosus* ant with distended abdomen showing heart shaped head 23Oct19
03 Carton construction of *Lasius fuliginosus* nest 16Oct14
04 *Lasius fuliginosus* nest in cavity at base of ash tree 10Apr15
05 Acacia stump site of *Lasius fuliginosus* ant nest 23Jul19
06 *Lasius fuliginosus* and *Stomaphis graffii* aphids 23Aug20
07 Possible shelter created for *Stomaphis* aphids by *Lasius fuliginosus* 09Sep20
08 Giant Willow aphid *Tuberolachnus salignus* 11Dec19
09 *Lasius fuliginosus* trail up sycamore tree 01May20
10 *Lasius fuliginosus* tug of war over aphid 01May20
11 *Lasius fuliginosus* at first barn 09May20
12 Well-fed *Lasius faluginosus* ant and *stomaphi*s aphid first barn 01May20
13 *Lasius fuliginosus* ants and *Stomaphis* aphid at second barn 22May20
14 *Lasius fuliginosus* with *Stomaphis graffi* aphid at third barn 30May20
15 *Lasius fuliginosus* on acacia stump some with wings 24May20
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