Worcestershire Entomology Day 2024: Insect Interactions

CHAIR: JOHN COX

REPORT: SUSAN LIMBREY

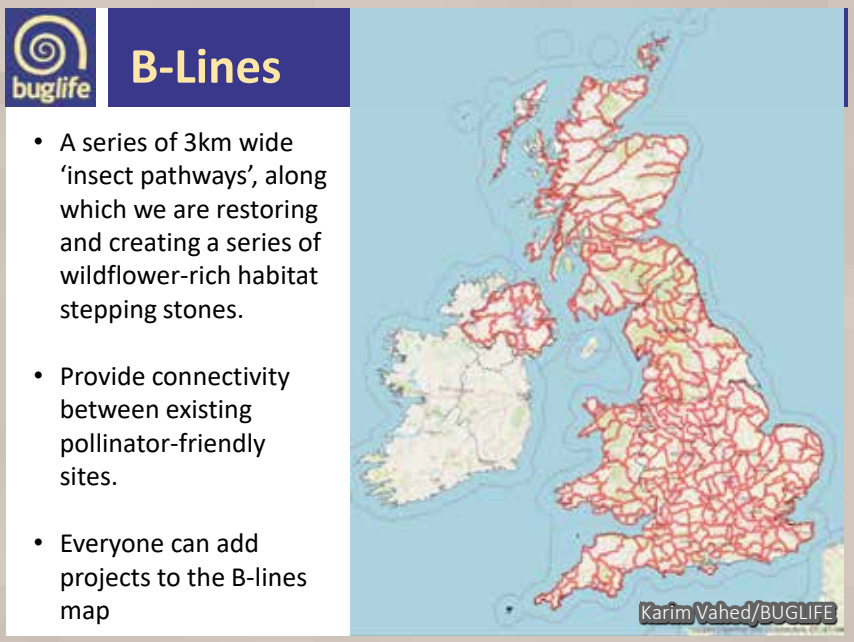
At an invitation from the Chair, **Mike Bloxham** welcomed us to the twenty fifth Worcestershire Entomology Day, celebrating the anniversary by telling us how the committee came up with the idea of holding the first event. He drew our attention to his display of all the programmes, which demonstrate the breadth of topics and the range of speakers, including people who contributed first as beginners and have been invited later as well recognised professionals.

Today's programme showed how studies of insect behaviour and interactions with other components of the natural world have advanced, and facilities for identification have improved. Our attention was drawn to the threats to survival of species that are so vital to our own wellbeing, as well as ways in which the interest and involvement of local people is being developed to improve habitats and their connectivity.

Karim Vahed began the programme with his talk on **'An Introduction to Buglife and Studies of the Scaly Cricket'**. He said that it was George McGavin who encouraged him to leave his academic post and become England Manager of Buglife, the Invertebrate Conservation Trust. Not liking the term 'bug' but stuck with it, he explained that it covered all invertebrates, and was the only conservation body in Europe to do so; covering some 40,000 species makes for a bigger problem than other conservation groups have. From 2025 Buglife will go global. Aims are to stop extinctions and achieve sustainable populations of invertebrates, and Karim focussed first on two of the projects, B-lines and Important Invertebrate Areas, IIAs.

B-lines form a network covering the country with 3km wide pathways along which wildflower-rich habitats are being conserved and created, providing stepping stones and connectivity between pollinator-friendly sites. Everyone can add projects to B-lines via the Buglife website. In our area a B-line loops from the north through the Wyre Forest and Ribbesford Woods to Stourport and Kidderminster and on to the east. Karim showed how B-lines works through the project 'Get the Marches Buzzing', explaining how funding and sponsorship from local and national organisations is obtained and provides staff who work with landowners and teams of volunteers to restore flower-rich habitats at 13 sites, including farms, commons, local nature reserves, a National Trust property and road verges. Base-line vegetation surveys are carried out by staff and by landowners and volunteers. There are community engagement events, talks, pollinator ID walks, training workshops for volunteers and landowners, and involvement of schoolchildren, encouraging people to manage their own green spaces and help foster a connection with nature.

IIAs, Important Invertebrate Areas, are a national framework to direct and focus invertebrate conservation, influence development of future protected area networks, raise the profile of invertebrates with key stakeholders, improve management within IIAs, and inform planning tools to influence outcomes for invertebrates, involving partnerships for diversity and planning. Initial consultation with NGOs and statutory bodies to agree criteria for IIAs is followed by data collection and mapping, with expert consultation leading to



Wyre Forest Study Group

fine-scale maps. More than 80 recording schemes with over 80 million records are being used to identify and map IIAs across Great Britain, and a broad scale hectad map is now live on the IIA Web Hub. Over 100 IIAs have been identified and 65 mapped, with more in progress. Wyre Forest is one of them, the detailed mapping being needed.

Karim then talked about Buglife's contributions to saving sites. More than 35 sites had been saved in the past year in conjunction with local initiatives, including some nationally and internationally protected, covering a wide range of habitats, many of them public open spaces, industrial and brownfield sites, coastal habitats *etc.* Buglife Advocacy and Policy campaigns have included those on light pollution, chemical pollution, invasive non-native species, for example land flatworms, and those dealing with threatened endemic species. The White-clawed Crayfish and the Scarce Yellow Sally *Isogenus nebucula* are examples of species recovery campaigns. The Midlands Crayfish Partnership has a pilot project in the West Midlands and works with Birmingham Sealife centre on a captive breeding project. Conservation work includes mapping, identifying potential donor populations as sources for ark sites, which are then to be identified and their habitat enhanced before re-introduction. Public engagement activities include talks, visits to the Sealife centre, pond dipping, and biosecurity talks. The Scarce Yellow Sally is a stonefly thought to be extinct but rediscovered in two places on the River Dee in Cheshire. Working with Chester Zoo, eDNA and water quality studies are aimed at finding further surviving populations and identifying places for possible re-introduction.

Karim then turned to his own research on Scaly Crickets *Pseudomogoplistes vicentae*. These tiny animals, also known as Atlantic Beach Crickets, are only known from three sites in Britain: Marloes Sands, Branscombe Beach and Chesil Beach. They are nocturnal and live in marine shingle, showing extraordinary adaptations to such an unpromising shifting habitat. Tiny overlapping scales armour their bodies. Karim discovered that they lay their eggs in driftwood, and they presumably survive by rafting, enabling them to re-establish populations after storm events. Karim's fieldwork has involved frequent seaside 'holidays', to the delight of his young son, at all times of year, as he studies their life cycle, monitors populations, and hunts for additional sites.

His life-cycle research has enabled Karim to show that they over winter as eggs and as mid-stage nymphs. His captive population took eleven instars to reach adult stage, then completing the two-year life cycle, with adult males active for twelve weeks before dying off over the next eight weeks, while females showed a more gradual decline from twelve to forty weeks and a few living on to 50 weeks. Threats to the sites include increasing severe storms, such as the ones in 2013/14 and 2015/16 that took away the Marloes Sands shingle



Atlantic Beach Cricket nymph in its natural habitat. A. Hyde

and cut the beach right back at Branscombe, sea level rise and coastal squeeze, and land reclamation and coastal development, such as the threatened waste disposal site on Guernsey. Using pitfall traps along the length of the sites, having shown the crickets' preference for fish and dry cat food as bait, monitoring showed drastic falls in population at Chesil Beach and Branscombe, with partial recovery at all sites since 2016.

Captive breeding has enabled introduction to a new site at Littlecombe Shoot in Devon, and Buglife is being funded by Natural England for further survey and monitoring, while it is working with La Société Guernensiase to raise the profile of the species and oppose development there.

George McGavin asked **'What Have Insects Ever Done for Us?'** saying that there is too much focus on primates, while we are extirpating insects. He blasted us with figures to illustrate the scale of the disparity. In 1982 Terry Erwin of the Smithsonian Institution thought that there might be 30 million species of insects, and since then fogging has raised this to 80 million. However, the current consensus is that there may be around 8 million species, the majority of which are insects but we just don't know, and this ignores soil, 'the poor man's rain forest'. Overall, 20% of species are plants, 3% vertebrates, and the rest are invertebrates, of which 14% have been described and 86% remain undescribed. As an example, George mentioned a species of gall midge from Wytham Woods in Oxfordshire which was found in rotting birch wood by two of his undergraduates two decades ago and has never been seen again. In terms of biomass, 82.4% is plants, and of the animal biomass 42% is arthropods. Humans and their livestock now constitute ten times all other land vertebrates.

So why are insects so successful? George outlined five factors: protective exoskeleton, efficient nervous system, small size, flight, and high reproductive rate. The insect cuticle is waterproof, protective, versatile, and self-repairing. The central nervous system is totally sleeved in a sheath of interlocking glial cells that keeps the fluid that surrounds the nerves ionically separate from the circulating haemolymph.

Small size goes down to the extreme of the smallest able to sit on the tip of the claw of the largest and size matters in terms of surface area in relation to volume. How big you are determines the effects the physical environment will have on you (earwigs and elephants are very different creatures).



George McGavin. Rosemary Winnall

Insects developed flight millions of years before birds and bats, and they achieve flight in a different way: with species such dragonflies, a direct flight motor will do. Muscles attached to the wing bases contract in response to nervous impulses but in small insects such as flies with necessarily high wing beat frequencies, the nerve impulses cannot be supplied fast enough. An indirect flight motor has evolved where the flight muscles are attached, not to the wings but instead control oscillations of the thorax to which the wings are attached. Smaller direct muscles control the wings' angle of attack. When it comes to reproduction, George said that with sex, humans are amateurs in comparison with the versatility of insects, giving an example in the trickery some empid flies use to economise on the gifts the males offer to potential mates, and who can forget his mimicry of the dying honey bee drone fluttering down to earth after mating: 'nobody told us about this bit'.

Why are insects important? Pollination, predation and recycling. Invertebrates accomplish 10 to 20 times the herbivory of vertebrates, and they consume more flesh than vertebrates do, ants being the major land carnivore. George gave the example of the Amazonian ant *Allomerus decemarticulatus*, which lives symbiotically with a host plant and fungi: a colony occupies one tree, with the individual ants living in pockets they construct on leaves and, using fungi for cement, they build platforms on the stems and hide under

Wyre Forest Study Group

holes in their platforms to ambush any insects that land there, protecting the tree from attack. Other carnivorous insects, parasitoids, develop inside their prey and eat it alive.

Insects' enormous contribution to recycling includes providing food for birds and bats, and George emphasised the activities of dung beetles. Other benefits to humans include their role as model organisms for research because of size and high reproductive rate, and George said that he loves the highland midge for keeping large parts of Scotland unexploited.

Moving on to threats to insects, George mentioned the nineteenth century pioneer of agricultural entomology Eleanor Ormerod, who introduced Paris Green, based on Arsenic, as an early insecticide. DDT was the next significant one, but while 15% of crops being lost to pests might be seen to justify insecticide use, that should be compared with the 30% figure for food waste. Neonicotinoids are 10,000 times more powerful than DDT. Being systemic and applied to seeds for uptake by plants, most end up in soil and are leached into the aquatic realm. He also reminded us that 33% of all food grown for human consumption is wasted.

Other threats include climate change and habitat loss. The UK is in the bottom 12% globally of biodiversity intactness, having sunk from the 1970 Living Planet Index base line of 100% to 20%. George also mentioned the loss of pollinators making it necessary in China to pollinate fruit trees by hand, and habitat loss to production of soya for animal feed, saying that banks are funding habitat loss. On population growth, George dismissed as nonsense the concepts of 'sustainable growth' and 'saving the planet', saying we should rather talk about saving ourselves.

John Bingham, in his talk on **'The Ant, the Tree and the Aphid'** examined the behaviour and associations of the Jet Black Ant *Lassius fulginosus*, which in Worcestershire is found in localized hotspots. It is unusual in using the sugars in sap and honeydew to feed fungi to help make its nest. The nests are in the ground, the base of a tree or other enclosed locations and can persist for hundreds of years. These ants take over the nests of other ants, *L. brunneus* for example, by slowly moving in. It is the colour and glossiness of jet, a semi-precious stone, their heart-shaped head, and a citrus smell, that make *L. fulginosa* distinctive.

The Jet Black Ants exploit various aphid species



on trees, typically but not exclusively Oak, and are found in high quality habitats rather than modern farming landscapes, seeming to prefer sandy soil and open, south-facing sites with old trees. They exploit various aphid species, feeding on honeydew in the tree canopy, and whereas the ants aren't dependent on one aphid species, the Giant Oak Aphid *Stomaphis quercus* is only found on oak and is dependent on *L. fulginosus*. These very large aphids, with a rostrum more than twice as long as their bodies, are usually well hidden deep in cracks in tree bark, from which they probe into the wood to feed on sap. The ants can pull them out of the cracks, move them about, and milk them. They take the aphid eggs down into their nest and tend them over the winter, putting them back in the spring. John suggested that there was effective heat exchange, the ants absorbing heat and transferring it to the nest, with the possibility also of heat generation from stored fermenting honeydew.

The Giant Oak Aphid was thought to be extinct, but was re-discovered in the Breckland in 2017, since when it has been found in scattered sites, including now a number in Worcestershire. Locally, the ant is known on several trees on The Devil's Spittleful Nature Reserve, where there are *L. fulginosus* nests in the open, the ants processing across the ground to a nearby Oak.

John went on to mention other aphids that might



Jet Black Ant with *Stomaphis quercus*. John Bingham

cause confusion: the Pale Giant Oak Aphid, *S. wojcieschowski*, but that one is tended by *L. brunneus* on various tree species, and there is also the Giant Maple Aphid, *S. graffii*, found on maple, sycamore *etc.* In his own garden he had found *L. fulginosus* on Geulder Rose milking *Aphis viburni*.

L. fulginosus has its own 'highwayman', the very rare myrmecophile beetle *Amphotis marginata*, which waylays the ants and steals their food by mimicking their begging of food from nest-mates.

John suspects that these ants and their aphids are under-reported, and he ended his talk with a challenge: a quest to find the trees, find the ants, and find the aphids.

John Poland, in discussion with **Brett Westwood**, talked about **'A Special Relationship'** and how the need to identify plants when no flowers were present, using hand-lens features, with his work on the book *The Vegetative Key to the British Flora,* stimulated an interest in the lives of insects via their host plants. Moving from Lancashire to a different environment in Hampshire and local recording there, and the move from botany to insects, led to his becoming a top recorder of Orthoptera and allies, his total being fifty four species. Brett suggested that climate change might be promoting increase in numbers of species, and John gave the example of House Crickets with the possibility of drains and sewage farms supporting their recent resurgence. This led on to a discussion of indoor wildlife ecology, with the example of the Large Tabby Moth *Aglossa pinguinalis* being found in student accommodation apparently feeding on mouse droppings, showing how resilient wildlife can be. John told how he had a House Spider which



John Poland with Brett Westwood. Rosemary Winnall

came through a door at the same time every day.

Brett asked John whether he was a twitcher: he said he wasn't, though he had a hit list, but it was important to record everything: pan-species recording. Asked how he found time for recording alongside other work, he said that it was important to get the most out of any place that one happened to visit, citing the Rainbow Leaf Beetle *Chrysolina cerealis*, in Britain found only on Yr Wyddfa (Snowdon), which he was searching for when he was there studying *Euphrasia cambrica* (Welsh Eyebright) and its relatives.

John said that his hit list included the Land Caddis, *Enoicyla pusilla* which he was hoping to be able to see the next day.

In response to Brett's asking what was needed to further interest in insect recording, John said that different means of access to identification were needed, with keys or without them, and that people were put off by the need to do microscope work on genitalia. He agreed that we are moving to a more friendly relationship with insects, saying improvements in photography were important, this often being a first step, plus modern guides, web sites and blogs. Interest in behaviour and creating stories helped too.

John and Brett finished by talking about attempts in the New Forest to use phone detection to locate Cicadas, not successfully recently. The

Wyre Forest Study Group

curious case of a stick insect found by a Yellow-billed Cuckoo ended the discussion.

Graham Hill completed the programme with his report on **Wyre Forest Crayfish 2024**. He introduced the native White-clawed Crayfish and the alien American Signal Crayfish, and described the stream network of Dowles Brook and its tributaries within the Wyre Forest. The abundance of White-clawed Crayfish in the 1950s and early '60s was illustrated by quotations from two local people: *'it used to take half an hour to collect half a bucket-full for dinner'* and *'every likely stone had one or more under it and they were easy to catch'*.

John Bingham's survey in 1987 showed abundant Native Crayfish in Dowles Brook, whilst most tributaries had occasional, and in places abundant, populations. In 1988 Crayfish Plague arrived, and a county-wide survey in 2000 found no Native Crayfish in Dowles. By 2010 Native Crayfish were known to have persisted in Bell Brook, one of the lower tributaries.

In the context of surveys beginning in 2011, Graham discussed methods used, with their relative effectiveness, and risks. Torch searches are rapid and effective if the water is clear, entail some safety concerns to searchers and have low biosecurity risk. Hand searching is slower, but effective, gives detailed information, and carries both safety and biosecurity risks. eDNA is very rapid, gives only presence/absence data, and has low biosecurity risk. Panpipe survey, which provides crayfish with tubes which they readily adopt as daytime refuges, is effective, detailed, but has some biosecurity risk.

In 2011 surveys as part of the 'Grow with Wyre' programme began. Twenty-three percent of channel length of Dowles and its tributaries was surveyed, and Signal Crayfish were recorded in Dowles Brook and the lower parts of three tributaries and further up in one. Signal Crayfish were present in all the upper tributaries, but the four tributaries which join Dowles below the lowest occurrence of Signal Crayfish had populations of Native Crayfish, these being Kingswood and Longdon streams from the north, and Bell Brook and Forest Lodge Stream from the south. The hypothesis to be explored was that barriers, such as culverts under the old railway embankment, from some of which the stream emerges as a waterfall, and natural high waterfalls kept Signal Crayfish out of some reaches, but these appeared to be effective only in some cases.


Graham Hill. Rosemary Winnall

By 2016, only Forest Lodge stream had Native Crayfish. Signal Crayfish were found in Kingswood stream, and eDNA showed that Crayfish Plague was present there. In Bell Brook a mass mortality event occurred, and it was hypothesised that either Signal Crayfish had been introduced where a culvert had previously kept them out, or that plague spores had got in via walkers, cyclists, dogs, or wild animals. In 2018, eDNA showed that Plague had got into Longdon Stream and by 2019 Signal Crayfish were found there, Signal also being found in Bell Brook in 2023.

The situation in 2024 was demonstrated by panpipe survey in Forest Lodge Stream, 26 Native Crayfish being found, with evidence that it was a breeding population. One Signal Crayfish was found, by hand search in the lower reach below a waterfall barrier. A dead Native Crayfish was found in the carpark above the stream, perhaps brought by a dog let out of a car and scrambling down the steep rough bank into the stream. Otherwise, this stream, above the carpark, with very steep heavily vegetated valley sides, is particularly well protected from intrusion. Graham reported that Natural England have agreed to improve the fencing to protect this stream.

Earlier in the day, Karim Vahed had talked about Buglife's involvement with Birmingham Sea Life Centre, and the Midlands Crayfish Partnership and Graham mentioned also the involvement of

West Midlands Safari Park as a potential breeding site, stressing how the Partnership was bringing together interested parties.

In conclusion, Graham said that White-clawed Crayfish in Wyre should have been safe, in good habitat protected by National Nature Reserve and SSSI status, on land most of which was owned by Natural England and Forest England. He felt that the nationally important population in Bell Brook, with its effective barrier against the invasive species, was let down by policy shortcomings. He said that the future for the native species is precarious, but it is good that the public bodies concerned are now thinking positively.



Worcestershire Entomology Day 2024 - Speakers -
Back row: John Poland, John Cox, George McGavin, Karim Vahed,
Front row: John Bingham, Brett Westwood, Graham Hill.
Steve Horton



Stomaphis quercus and Jet Black Ant.
John Bingham