Country-*Side*

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The Magazine of the British Naturalists' Association

Gilbert White – Metamorphosis – Stag Beetles – Yorkshire's Nature
Seahorses – Amber – Wasps – Sir David Attenborough

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Photo: Andrew Taylor

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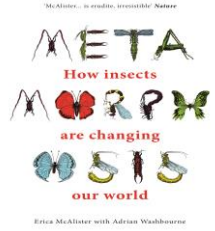

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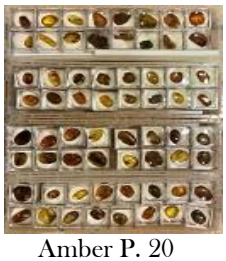
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Notes for Contributors

The Editor is always glad to receive articles, photographs or drawings for inclusion in the magazine. Contributors are reminded that:
(1) Manuscripts should be submitted in electronic form, by disc or email with accompanying photos & drawings as separate attachments;
(2) Common names should be capitalised and should include taxonomic names in italics;
(3) British Naturalists' Association (BNA) reserve the right to publish any contribution or part thereof received on its website;
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Deadline for next issue: September 15th 2026

Editorial

Pauline Rutherford

I am sure there are a lot of members who have huge numbers of natural history field guides and books? I mention this as the Hon. Chairman Steve has recently had three visits to Tom Thomas FBNA who lives in Bedfordshire. He wanted help clearing out his own collection of books built up over several decades. Tom is known as "Spider Man" within the BNA, as he has led natural history walks mainly on spiders and other invertebrates at National Conferences and Field Days. This genera of books are extremely important to us as naturalists and we don't go far without taking specific ones with us to every field activity we attend, despite the weight involved in carrying them! However, now we are in the 'modern' age of technology, and most field guides are available in digital format; this makes life so much easier as we need only load them to our Ipads, phones or other devices, making "light" work of it as we go!

I am pleased with the content for this issue as I managed to secure articles from naturalists in their field of expertise, including two from the 2025 Encaenia held at the Natural History Museum, London, and a special article on the 100th birthday of Hon. FBNA Sir David Attenborough. My thanks go to all of the contributors for taking the time from their busy schedules to write them.

Up the Zig-Zag Path and along the Hanger

Stephanie Holt FBNA

View from the top of the Zig-Zag

With my new position as Trustee of the Gilbert White House and Garden, this year's Book Day at the museum (alongside some impending writing deadlines) was the perfect excuse to take a few days off and hide myself away in Selborne, the once home of the naturalist Rev Gilbert White (1720-1793). Of course it couldn't all be writing, and what a weekend I managed to pick for a bit of natural history, it felt like the first sunshine of the year!

For those of you who haven't yet had the chance to visit Selborne, it remains a quiet rural village in north-east Hampshire, surrounded by commons, fields, and to the north, heathland. The village thrums with the memory of White and his *Natural History of Selborne*, not just due to the presence of his home, but in place names which for those of you who have read the book will pop immediately to mind for the records he made there – "Gracious Street", "St Mary's", and "The

Plestor" all feature frequently as White made his way through the village noting the presence of plants, birds, mammals, and insects as he did so.

I had the chance for three of my favourite morning walks while I was there, getting up early to enjoy the quiet morning air, and surprisingly loud birdsong!

The village, and The Wakes (Gilbert White's home), is tucked up against the Selborne Hangers, (a steep beech-clad wooded chalk slope). White's brother Rev John White (1727-1776), clearly disinclined to do battle with the woodland and wanting an easier route to the top, in 1758 started to build a pathway up the hill. The Zig-Zag as it became known is a winding stair edged with laid hedges (and convenient benches!). My first morning walk took me up here, to the wonderful views and my first spots of a number of pre-vernal species popping into flower with Wood Anemone just opening and even the odd early Bluebell threatening to delight with its appearance. But the very best part about the walk up the Zig-Zag is the magnificent view back across the village and out towards the northeast Hampshire heathlands that White and his family would have recognised so well (albeit without the military radar station in the way!).

Walk two the next day took me along the Short and Long Lythes (two wooded valleys). The start of the walk is St Mary's Church, where White was a curate on multiple occasions (although never the Vicar, that was previously held by his grandfather, White went to the wrong Oxford college for that!). After a moment visiting White's grave and placing an offering of Primroses, I dropped down the hill at the back of the churchyard towards the stream and joined the footpath. This short route initially winds along the base of the hill, following the stream. And here I got to see Bluebells in full flower, my first of the year! But what struck me most here was the cacophony of bird song. I'd headed out early and mist was still rising from the ponds as I approached – the Long Lythe path opens out onto a large meadow, once the site of the Selborne Priory, long gone by White's time and barely remembered today. The only remnants of the building are fragments in St Mary's, but commemorating the site is a series of ponds: fishponds for the once busy monastery. The white head patches of the Coots on the ponds reminded me momentarily of the tonsured heads of the monks, right up until three of them fell to fighting: I would hope the monks were far less fractious! The meadow here was a delight however with a joint harmony of the songbirds, thrushes, pigeons and Rooks of the woodland hillscape combining with the sounds of wetland ducks, geese, Moorhen and Coots. This choral performance certainly set me up for a day of writing about Whites ornithology!

White's grave

My final walk of my short break took me along a route I don't often have time to do. Although starting the same way, I took a sharp right across a bridge over the stream and made my way onto a gently sloping forest path running in parallel to yesterday's jaunt. Heavily wooded now, in White's time most of this hillside either side of the Lythes was open and grazed, as shown in the frontispiece to his book by the artist Samuel Grimm. Today however forestry and secondary woodland have claimed these otherwise unprofitable slopes, meaning that once again I found myself in a very different habitat. Gone were the open glades with Bluebells, instead dense woodland and understorey dripping with lichens and moss concealed the morning songsters. But the canopy above me opened just enough to reveal Buzzards swooping with each other, perhaps finding a mate or looking for a nesting site in the canopy. But the highlight of the whole exploit was to greet me as I turned for home with one of my favourite birds. While I thought I'd heard a little corner of sound from one yesterday, this morning I was met by the unmistakable "cronk" of Ravens, and I headed back to my desk inspired to be as curious as White about these incredible birds, and to forget my connection to nature.... nevermore.

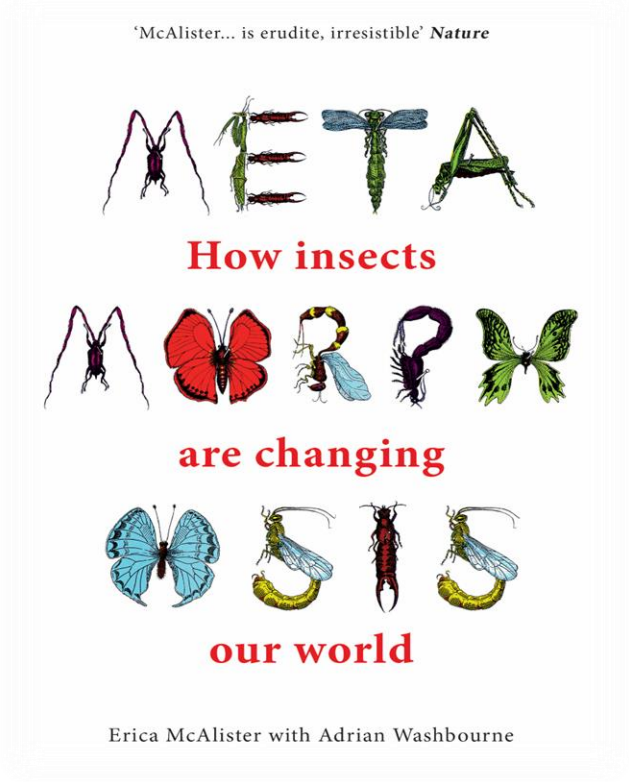
Stephanie Holt FLS is UK Biodiversity Training Manager for the Natural History Museums Centre for UK Nature. She is a BNA Fellow and current BNA trustee and council member, and Trustee of the Gilbert White House and Gardens.

Metamorphosis: how flies and other insects are changing our planet

Dr Erica McAlister Hon. FBNA

Insects have been around for a while: a lot longer than us. The earliest insects are estimated to have evolved 480 million years ago whereas *Homo sapiens* is just 300,000 years old. Since their tarsi first pounded footprints into the Cambrian soils, insects have been changing to suit their environment, honing their skills as hunters, developing camouflage to avoid their enemies, and in doing so have become absolute specialists in their field. In their billions, they have taken to the air, dived into the sea and climbed mountains. They truly are the planetary explorers, and now, thanks to our desire to explore further, they have been going up into space with us. Their presence has shaped our cultures for thousands of years. Many people dwell on their negatives, their perceived filth or their very important role in disease transmission but insects have led to extraordinary discoveries from robotics to genetics to forensics, transforming our knowledge of agriculture, medicine, aerospace, artificial intelligence, biodiversity, and ourselves. And one group within this rich and diverse fauna, a group that truly splits public opinion, are the flies (Diptera).

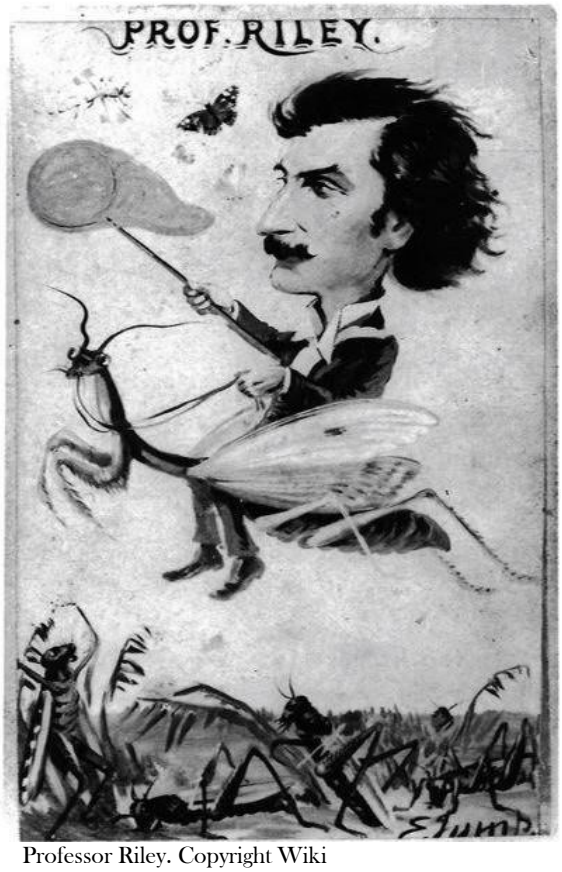
Flies first started appearing on the global scene around 260 million years ago (Wiegmann & Yeates, 2017) and are one of the groups that got everywhere (Courtney et al., 2017). For millennia we have been researching and cataloguing flies yet to date have only described around 160,000 species. That number may seem a lot, but we know that there are many, many more species yet to be discovered. 'Why is this important?' you may ask. Well, flies are predators, parasites, parasitoids, herbivores, sanguivores, fungivores, decomposers and pollinators - they get their tarsi into everything and as such are exceptionally important components of ecosystems. Flies have often been ignored by pollinator researchers but now we are beginning to understand the true impact of pollinating flies, not just the well-known species such as the hoverflies but also the more maligned species including the mosquitoes and houseflies. Those stabby mouthparts of mosquitoes enable them to reach to the base of long-tubed flowers, covering themselves in pollen in the process, which their pass on during their next flower visit. It is those long stabby mouthparts that are inspiring scientists to develop needles that can be manipulated in the same way, with the hope of one day manufacturing surgical needles for very sensitive procedures.



Front cover from Erica's book published in 2024

Smart needles for medical applications may be new but flies have been helping us with forensic investigations for hundreds of years. Back in 1247, Chinese magistrate Sung Tz'u (=Song Ci) published *Collected Cases of Injustice Rectified (the Washing Away of Wrongs)*, the first book on forensics based on both his own and historical cases (Sung & Knight 1981). Amongst his many wise words and helpful accounts, he wrote about a case where a local peasant met a vicious death from a commonly used agricultural tool, the sickle. But who was the murderer? Many people owned sickles: whose sickle had been the murder weapon? Though all the suspects' sickles appeared clean to the naked eye, in the afternoon sun, one soon began to attract numerous metallic green Blow Flies (*Calliphoridae*). These flies, enticed by the scent of microscopic traces of blood and tissue invisible to humans, swarmed the murder weapon. The owner of the fly-covered sickle became nervous and, when confronted with the evidence, broke down and confessed to the murder. Over the next 800 years, the science of forensic entomology grew; we now have a greater understanding of which fly species arrive at the cadaver in different regions and situations and understand the time line of their arrival after the dastardly event.

The first murder case in the UK that utilised the power of the fly was in 1935, where the accused, the Lancaster surgeon Dr Buck Ruxton (the 'savage surgeon' as he would become known), killed both his common-law wife Isabella Ruxton and the unfortunate housekeeper, Mary Jane Rogerson - the latter it was thought because she accidentally witnessed the murder of the former. The two victims were transported across the border to the small Scottish town of Moffat, where the remains lay undisturbed for a few days until the weather turned inclement and a walker spotted the Disturbed limbs, now exposed to the elements. A Scottish physician, Alexander G. Mearns, was subsequently passed some of the maggots that had been collected at the scene, having already become known as someone who understood the value of Diptera especially those within the family *Calliphoridae*. Although forensic entomology (as it was to become known) was still a fledgling science, he was able to provide a species name and date, and the age of the maggots, thus providing a time frame for the police. Although the maggots were only used as evidence for the pre-trial, the information that they provided was enough to ensure that the trial proceeded and the doctors' dastardly deeds did not go unpunished. Forensic entomology has come a long way since then and now involves methods such as image analysis including Micro CT, molecular techniques into DNA incrimination, and reliable environmental data. Getting away with murder is not as easy as it once was.



Professor Riley. Copyright Wiki


Ruxton Maggots – provided vital forensic evidence

The immature stages of a fly's life cycle are often the dominant feeding stages, hence their value in forensic entomology. It is during this period that they often will accumulate disproportionally large amounts of protein and fats to sustain themselves during their adult lives, where reproduction and dispersal is more important than feeding. Many do feed as adults but mostly just sugars as they no longer need to grow and develop. Big, juicy larvae are the topic of the next bio-inspired story and this time our protagonist is *Hermatica illucens* (Stratiomyidae) (first described by Linnaeus in 1758), the Black Soldier fly (BSF). It was first thought of as a pest species, and indeed even though the hero of this story, Charles Valentine Riley, had long extolled this species' virtues, it was not until the 1950s that the rest of the world stopped regarding it as such and started paying attention to its many merits (Tomberlin & van Huis, 2020).

Charles Valentine Riley was a prolific writer, a talented artist and a great entomologist especially in the field of economic entomology. Riley was born in London but spent his working life in the United States, first in Missouri and then Washington, where he was to become the first Curator of Insects at the Smithsonian Institute in 1885 – an excellent career choice! Riley's first encounter with this species was brought about by complaints about it being a pest living in the hives of bees. His research showed that this was incorrect, in fact this species was most beneficial in removing waste that accumulated within the hives. This species was not confined to these habitats but was found wherever waste accumulated, be it in the natural environment or in agricultural settings. A build-up of sewage is not pleasant, and in fact may be detrimental by enabling harmful bacteria to breed and then spread via mechanical vectors such as the house fly, *Musca domestica* (Muscidae) (first described by Linnaeus in 1758). The BSF outcompetes these nuisance vectors for the waste and in processing the waste, makes itself a viable alternative food source for the livestock that it is living alongside.

Black Soldier Fly. Copyright Wiki

BSF larvae are a superfood – they are approximately 40% protein and 30% fat and can be locally grown and sourced! Across the world, humans are developing factories that feed waste to BSF larvae. At the moment, we use these maggots for feeding our animals, whether in petfood or as food for chickens, pigs and fish. Farmers can breed BSF on-farm, using organic waste, and then feed the larvae to their fish, creating a closed-loop system. The idea is to develop this further by producing food directly for us. The idea of eating maggots may not initially seem appealing, but they are but land prawns and would massively help us to reduce our carbon footprint by reducing our dependence on cows. In Britain alone, we consume 2.5 million beef burgers a year. Add to that the love of bolognese and lasagne (not to mention a steak or two) and the quantities add up. All in, Britain's beef consumption is the carbon equivalent of driving one car 43.5 billion kilometres, or a thousand times round the planet every year. Cows need 15.8 gallons of water to produce one gram of protein. Insects can obtain all their water from the waste products that they are eating. Good for the global and the domestic environment and producing free protein, what's not to like? Well, there still is an issue and it's back to the maggots and their lack of appeal. To counter this, insect protein sold for human consumption is converted into flour – very protein rich flour which you can make into whatever takes your fancy. In the future, maybe all of us across the globe will have our own maggot factories in our kitchens converting our household waste.

Flies are great at getting everywhere and BSF have successfully spread all over the planet recycling as they go. The adults are pollinators to boot – both parts of the life cycle being beneficial. And this is often the case. Unlike many of the other insects, there is, in the main, a separation between the juvenile and adult stages in flies, with differences in habitats and food sources resulting in some interesting morphological changes. The larvae range from worm-like with distinct heads to the more familiar almost-formless maggots, the external mouthparts all but retracted into the head and the most diagnostic features being their abdominal spiracles that we use to determine both age and species of many a forensically important species. And as for the adults, well, this is the stage where the interactions between the sexes occurs, and over time this has led to much morphological variation away from the original blueprint. Eyes on stalks, flags on abdomens, combs on legs – it is all happening. All in all, you may think that flies are very different from humans, what with the wings and extra limbs and so on, and that's before considering the modifications away from the norm across the flies. But in some ways flies are remarkably similar to humans, and we have been studying them to learn about ourselves for a while now.

Drosophila melanogaster (Drosophilidae) (first described by Meigen in 1830) is a fly known to many millions of individuals who would never consider themselves a dipterist. For this fly has been used as a model organism, a non-human species that has been studied and manipulated by us to understand how many different processes work – in this case, how our own body forms, functions and adapts - for over a century (Mohr, 2018; Tolwinski, 2024). But how did this happen?

For thousands of years before flies were thought of as laboratory models, humans had been studying other animals to understand form, function and relationships. For centuries this study was observational, but as our knowledge grew, it also became experimental. We started not only trying to understand relationships between species based on their outsides (their morphologies) but also on their insides (their genetics). And for this we have to thank (amongst others) a monk. Austrian Gregor Mendel was a many faceted man – a meteorologist, a mathematician, a monk, and a meddler with peas. We as a species had been meddling with genetics for a long time – selecting and breeding animals and plants to give us many of the agricultural species that we recognise today. But Mendel wanted to understand what exactly was going on. And the answers lay in his potting shed with *Pisum sativum*. Mendel was a contemporary of Charles Darwin, and very much influenced by the latter's 1859 work on the theory of natural selection, but unlike Darwin, Mendel was to be ignored by the wider scientific community for many decades. But it was Mendel who identified the basic mechanisms of heredity, by crossing peas repeatedly to see which traits (e.g. wrinkling or colour) were passed on. He was to establish the laws of classical genetics in his 1865 paper in which he notes the changes seen in

Experiments into metamorphosis of flies including sending them into space. Photo credit: NASA

the offspring from that of the parents brought about by reproduction. It was in 1900 that Mendel's work was rediscovered, and the theory of natural selection and Mendel's laws on inheritance were later combined into a mathematical framework that birthed the modern synthesis which would become evolutionary biology. Meanwhile, across the pond in a laboratory in Colombia University which he had joined in 1904, Professor Thomas Hunt Morgan was studying development and heredity. Initially, Morgan was sceptical of both Darwin and Mendel and set out to disprove their findings. He had used many an animal model but breeding large animals took time, money and facilities, all of which were in short supply. It was on the insistence of entomologist Dr Frank Lutz from the American Museum of Natural History and author of all things Drosophila that Morgan enlisted the aid of this species. Flies breed quickly, they are very small, and it turns out share very similar genetics.

For two years working with these flies Morgan gained no useful insights – countless experiments in crossbreeding yielding no meaningful results - until one day in 1910, amongst the normally red-eyed flies a white-eyed male was born. Finally, he had a mutant. Morgan and the flies were to subsequently show that new species were not created in a single step: rather, within a population mutations increased the genetic variation which would eventually allow for speciation to occur. In showing this, he was able for the first time to link chromosomes, genes, and mutations and conclude that Mendelism supported Darwinism. Thousands of flies were used in Morgan's experiments, and millions more were later to help us answer many other questions in the fields of genetics, developmental biology, bioengineering, medicine, and even space travel (Tolwinski, 2024).

In 1947, on the 20th of February, securely fastened onboard a V2 rocket fired from a New Mexico (USA) missile range, an undisclosed number of flies were shot into space and thus became the first animals exposed to cosmic radiation at 108 km above the planet's surface. They were parachuted back down again, alive and kicking and thus paving the way forward for us larger animals to follow in their small (but giant) tarsal-prints. And we have learnt a lot from the 'melanogastranauts'. For example, flies raised in space have shorter lifespans than their earthbound relatives, they have a reduced immune system and weakened hearts. By understanding what is happening to the flies, we can understand what will happen to our own bodies as we hurtle through space. And knowing the impact it has on them, I am very happy to remain earthbound.

These are just three examples of the millions of ways that flies help us and inspire us to help ourselves. Humans have spent but a short time on this planet and yet our impact has been immeasurable. Maybe it's time for us to look properly at these smaller inhabitants, to take note of how important they really are and start to take care of this planet for all of the species, for although many of them will be able to survive our reckless behaviour, we may not. Let us be bio-inspired by their adaptability and develop innovative techniques and technology to live more in tune with nature.

Dr. Erica McAlister is an entomologist and Principal Curator for Diptera and Siphonaptera at the Natural History Museum in London.
Her book "Metamorphosis how insects are changing our world" co-written with Adrian Washbourne, was published in 2024 and is available to buy in most book stores. It was based on two BBC radio 4 series presented by Erica and produced by Adrian.
This article was given as a talk at the 2025 National BNA Encaenia.

The Stag Beetle: the facts and fables surrounding the 'giant of the undergrowth'

David C. Wareham FBNA

The Stag Beetle: the facts and fables surrounding the 'giant of the undergrowth'.

The Stag Beetle, our biggest and most striking terrestrial insect, is also one of our rarest, with its numbers now thought to be at an all-time low. Today, the ancient woodlands, parks and gardens of southern and south-eastern England provide some of the last remaining strongholds of this iconic insect, offering the perfect refuge for this endangered giant. Here, we look at its natural history, and examine the reasons for its decline and the efforts currently being made to conserve it.

A Giant of the Insect World

Stag Beetles are distributed across the temperate and tropical regions of the world and are members of a family of insects known as the Lucanidae with some 1200 species. They are medium to large insects and while most average about 5 centimetres in length including their impressive mandibles, some species can reach over 12 centimetres. Although a very few tropical species have bright metallic colours, their predominant colouration tends to vary from brown through all the shades of leather to black. Patterns are either absent or very basic.

Our native species, familiar throughout much of Europe, is known as the European, or Greater Stag Beetle *Lucanus cervus*. Its English name has been derived from the male's sizeable and characteristic mandibles, or jaws, which resemble the antlers of adult male deer. They typically occur in broad-leaved parks, woodlands – especially oak – and gardens, indeed wherever there are fallen trees, old stumps, and rotting logs.

The adult beetles are black with violet-brown to dark chestnut-brown wing cases. Males have reddish-brown antlers and can reach 7.6 centimetres in length, although there is much variation in size and some individuals may only reach half this length. Females are smaller, measuring 5.7 centimetres, and have shorter jaws.

The males' mandibles can also vary in size, and the strongest beetles are those with the biggest, a reflection of the quantity and quality of food that they ate as larvae. They are of sexual significance only and, despite their size, are not nearly as strong as they look. Males will use These appendages to wrestle with one another should

Male Stag Beetle

Female Stag Beetle

they come into contact, particularly when competing for a female. The contest is normally head to head, female. The contest is normally head-to-head, again much like that between two rutting deer, with both grasping their rival with the mandibles. The stronger of the two overturns its weaker opponent which then makes its retreat. Such encounters are more a show of dominance and strength rather than a life-threatening fight, and injuries are uncommon.

Although it has a somewhat fearsome appearance, the Stag Beetle is not aggressive towards humans and completely harmless since it is unable to close its jaws with any force. However, the smaller jaws of the female, while looking relatively inoffensive, are more powerful and can actually inflict a much stronger pinch.


The larvae can grow to the size of a man's thumb


Deciduous woodland is preferred with plenty of ground cover and dead wood

Adult Stag Beetles emerge during warm days in May or June, often after rain. The males are generally first to appear and almost immediately begin their nocturnal searches for the females which surface a short while later. On finding a potential mate the male will raise his head, open his mandibles, and strut around her before finally mating.

Life beneath the soil

To complete their lifecycle, the beetles need access to dead wood and, after mating, the female crawls into the undergrowth to locate a close-to-dying or fallen tree, log, or stump – indeed any form of damp rotting wood – in which to deposit her up to two dozen eggs. The adults do not overwinter and once egg laying is over the female will die. By the end of August the male will also be dead.

When the eggs hatch the larvae, commonly known as grubs, are blind and creamy white with an orange, head and set about devouring the decaying wood which they masticate with pincer-like jaws. They feed on the rotting timber of a variety of trees, but since they do not feed on living ones they are not considered pests. Fully grown, they can reach the size of a man's thumb.

The decaying timber that the larvae devour is extremely poor in nutritional terms so they must consume enormous amounts of it to reach the next stage in their development – the pupa. As with many wood-devouring insects, Stag Beetle larvae cannot digest cellulose on their own. However, beneficial bacteria break down the cellulose elements of the food enabling them to be processed by enzymes in their digestive tracts. Stag Beetle larvae are particularly reliant upon this partnership with these organisms – a collaboration known as symbiosis.

It can take six years or more before the larvae are fully grown, when they then leave the rotting wood and burrow deep into the soil where they metamorphose into adult beetles inside their pupal cases. They remain hidden below ground throughout the winter before emerging when the temperatures rise again in the spring. The lives of the adult beetles which don't feed (although they readily drink the juices of decomposing fruits and tree sap) are comparatively brief and last only three or four months.

Although the male Stag Beetle has strong wings underneath its wing cases (elytra), its flight is comparatively slow and erratic. Consequently, it frequently bumps into things and crash lands. Being attracted to light, it will occasionally enter buildings through open doors or windows on warm summer evenings. As it whirrs through the air with wing cases open and legs outstretched, its silhouette is reminiscent of a miniature drone with its associated propellers, antenna, and landing gear.

Its distribution in the British Isles

Although the Stag Beetle is distributed widely across Europe, England has more of them than any other country on the continent with healthy numbers inhabiting the gardens, parks, and woodlands of the south and south-east. The counties of Kent, Surrey, Sussex, and Hampshire host stable populations, and east Dorset and parts of Wiltshire are home to good numbers. Scattered sightings have also been recorded from East Anglia but undoubtedly the strongest population is to be found in London and the Thames Valley, now considered a global hotspot for the species. In northern England and Wales, it is extremely scarce with only occasional, isolated, or unconfirmed sightings, and it is effectively absent in Scotland. It is not naturally present in Ireland.

The flight of these amazing beetles is most likely to be witnessed on warm evenings at or soon after dusk, as the males search out the smaller females. Attracted to light, they can be seen sometimes flying in a seemingly aimless fashion round and round street lamps. The more sedentary female Stag Beetles are most often encountered on the ground, particularly in the early morning, as they seek out suitable places in which to deposit their eggs. These days, however, catching a glimpse of a Stag Beetle is becoming a rare privilege.

Up until sixty or so years ago, such sightings were commonplace in many parts of central and southern England and, in some areas, children would enjoy beetle

evenings or 'stag nights' as they were then known. These events were the town-dweller's equivalent of catching crabs at the seaside. Several beetles would be collected in as little as an hour, often simply by picking them up off a garden lawn or whilst walking in a park. The males would then be placed together in a bucket or old galvanised bath to see if they would wrestle each other before later being released, unharmed, and watched in silent awe as the insect gladiators spread their wings and took off noisily into the night.

Threats in a modern landscape

The Stag Beetle has dramatically decreased in numbers both here and across Europe over the past century. Like so much of our fauna and flora, it faces many threats – floods and wildfires; being crushed under foot or by traffic; predation by birds, bats, foxes, and domestic cats; climate change; continued persecution through ignorance and fear; pressures from development; pesticides; and habitat loss due to the clearance of tree stumps, dead wood, and fallen trees reducing their breeding sites.

Although it is still comparatively abundant in the areas mentioned above, unless we halt the Stag Beetle's present and continuing decline, summer stag nights will be just a fading memory. These magnificent, fascinating, and harmless insects play a crucial role in forest ecology by reprocessing decaying wood and returning it to the earth in the form of nutrients that are essential for growth.

Myths and superstitions

The Stag Beetle has a surprisingly rich folklore, often linked to fire, thunder, and even the Devil. Myths and superstitions gave this insect a reputation far beyond its ecological role. In medieval Britain, people feared them as creatures of the Devil believing they emerged from Hell itself, accompanied by flames and sparks.

Legends claimed they could carry burning coals in their jaws, setting houses and barns alight, and their sudden summer appearances were thought to summon thunderstorms. Consequently, many were killed on sight. Ironically, Stag Beetles also carried positive connotations. Their strength made them signs of protection, transformation, and power, and their long underground larval stage followed by their dramatic emergence was seen as a symbol of rejuvenation.

Conservation in action

Recognised as a globally threatened/declining species, the Stag Beetle is protected under Britain's Wildlife and Countryside Act of 1981. It is also listed as a priority species under the UK Post-2010 Biodiversity Framework and is being given special help to increase its numbers. In areas known to have a population of Stag Beetles, and even in some that do not, gardeners, and owners and managers of parks and woodlands, are being encouraged to leave a certain amount of dead or dying timber in place instead of clearing it away. By so doing, the Stag Beetle, and indeed all the animals, plants, and fungi that rely upon this important resource will benefit.

In 1998 the People's Trust for Endangered Species (PTES) commenced an ongoing national survey – the Great Stag Hunt – and are using the collected sightings data to identify where in the country the beetles remain and where they're extinct. To report sightings, or for further information, contact them at 15 Cloisters House, 8 Battersea Park Road, London SW8 4BG, telephone 020 7498 4533, or email enquiries@ptes.org. Their website can be found at www.ptes.org

How we can help our Stag Beetles:

We can all help conserve this wonderful insect by, for example, making a log pile in a corner of our garden. We can also leave the odd dead or fallen tree in place and not be so quick, as perhaps we have been in the past, to remove old tree stumps but allow them to rot away naturally. If necessary, these can be covered with decorative ivies or other plants which will then provide additional habitats for other creatures such as bumblebees and amphibians.

For those who do not have a large garden with a lawn, trees, and shrubs, an artificial site can be created in which the female Stag Beetles can lay their eggs. Obtain a large plastic box or bucket and make some holes about three centimetres in diameter in its sides and bottom. Select an undisturbed and concealed place in your garden (beneath a hedge is ideal) and bury it to a depth where its rim is just below the surface, loosely packing any holes around it with soil. Place a few pieces of broken slate, tile, or flower pot in the base of the container and then fill it with bark chippings from deciduous trees, along with a small amount of compost.

The contents of the container will gradually decompose and will require topping up occasionally with fresh chippings. As an alternative, or indeed in addition to bark chippings, excavate some crumbly, damp, raw wood from a decaying stump elsewhere in your garden or bring some back from your local deciduous wood. The more decomposing wood we make available, the more places there will be for female Stag Beetles to lay their eggs. By providing such a habitat, natural or artificial, we will be helping to safeguard not only the Stag Beetle but all the other organisms that contribute to maintaining a green and healthy environment.

David C. Wareham lives in Dorset and is best known for his work with reptiles and amphibians although he has an avid interest in all living things.
Photos: David C. Wareham.

What State is Yorkshire's Nature in?

Alastair Fitter Hon FBNA

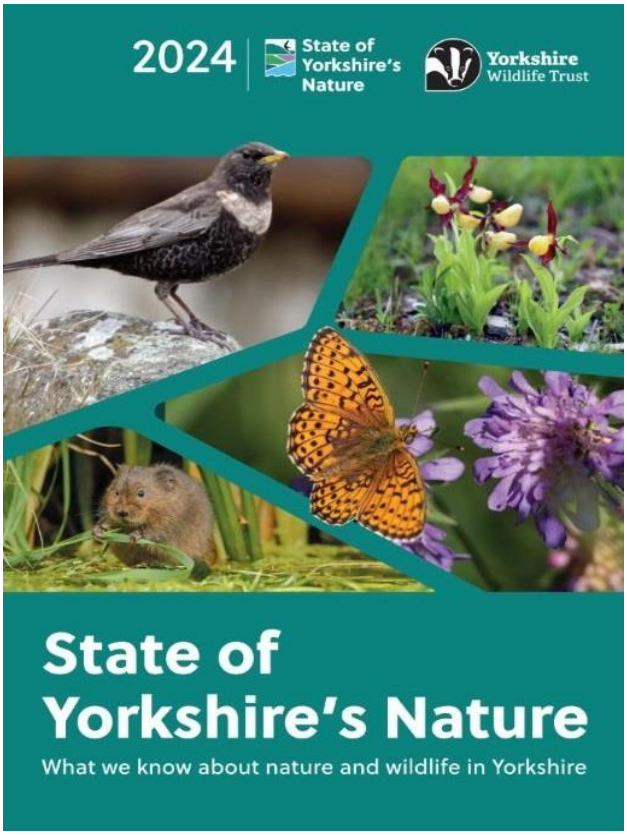
Every few years a national report called *The State of Nature* is published. It is produced by the big national conservation bodies and gets much publicity, generating gloomy headlines ("*1 in 6 species at risk of extinction*"). The report is influential in deciding on national policies, but Yorkshire Wildlife Trust (YWT) wanted to know whether the national conclusions could be transplanted to our county and used in the same way here. To address that challenge, YWT started the *State of Yorkshire's Nature* project in 2022.

In collaboration with many others, including the British Trust for Ornithology, the Botanical Society of Britain and Ireland, Butterfly Conservation Yorkshire and the Yorkshire Naturalists' Union, we gathered records of plants and animals across Yorkshire going back 200 years. We focussed on birds, plants, butterflies and moths and mammals, because those were the groups where there were enough naturalists making records to give us sufficient data to work on.

We looked into whether those species were becoming more or less widespread and more or less abundant, and tried to understand why. We also looked at the habitats favoured by the species that were of most significance in Yorkshire. The results published last year were remarkable, visit this link:- (https://www.ywt.org.uk/StateofNature)

As a starter: how many species are found in Yorkshire? When we began the project, I had no idea and I doubt most people did. The answer is around 45,000 – a huge number. We know this because there are around 70,000 species recorded in the UK as a whole, according to the Natural History Museum, and the project established that we have two-thirds of them in our county (Figure 1) and, rather surprisingly, that the two-thirds figure is quite consistent across many different groups of plants and animals.

The best-represented groups are non-marine molluscs (slugs and snails), butterflies and caddisflies; that is probably because we have some national experts in two of those groups in Yorkshire, though the figure for butterflies is boosted by quite a few introductions made by enthusiastic butterfly folk. The low figure for fungi is almost certainly down to under-recording, while the low figures for dragonflies and grasshoppers is likely to be because these are warmth-loving species that have historically been much more widespread in southern England – but that is changing and many species are



The first ever region-wide State of Yorkshire's Nature report

spreading north: in a few years' time we will probably have reached two-thirds for those as well.

Two-thirds of all British species sounds to be a very large proportion, but Yorkshire is a big place – 5% of Britain and 12% of England – and good ecological theory could have predicted that number, as shown in Figure 2: there is a robust ecological rule (the species-area relationship) that the bigger the area, the more species are in it, though there is a strong effect of diminishing returns. If you double the area, you increase the number of species by a much smaller amount, but you go on adding species at a predictable rate until you get to very big areas indeed.

Another remarkable finding was the extent to which Yorkshire's nature is in flux. For example, around a quarter of Yorkshire's plants (238 species) have declined by at least 25% since the period before 2000, but slightly more than that (270 species) have increased by as much, and 22 species have been recorded for the first time. That pattern is true whichever group we looked at. At first sight, it seems that all may be well: we're losing some but gaining others and the net effect is that biodiversity stays much the same.

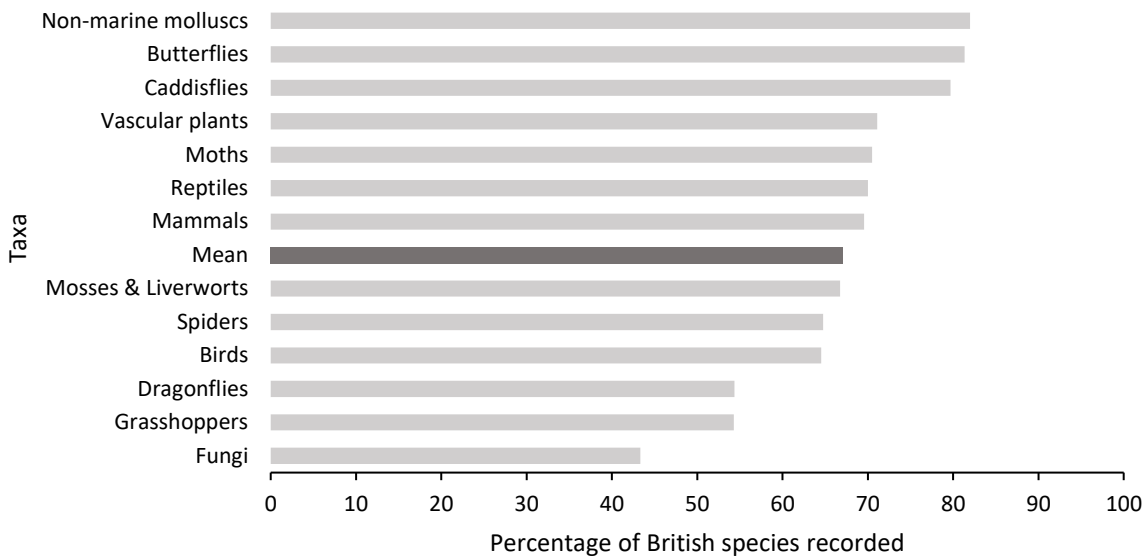


Figure 1. The percentage of British species recorded from Yorkshire for a selection of groups. Two-thirds of all British species sounds to be a very large proportion, but Yorkshire is a big place – 5% of Britain and 12% of England – and good ecological theory could have predicted that number, as shown in Figure 2: there is a robust ecological rule (the species-area relationship) that the bigger the area, the more species there will be in it, although this relationship is subject to the law of diminishing returns: as the area increases, the rate of species increase gets smaller.

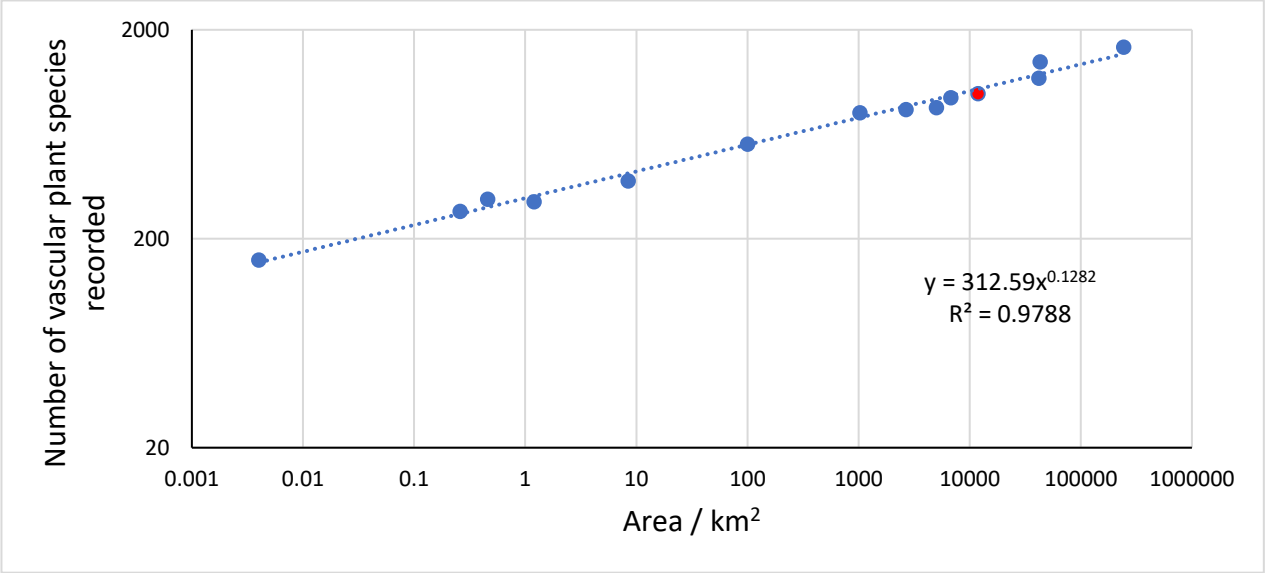


Figure 2. Species-area relationship for native vascular plant species using data for selected northern European countries (The Netherlands, Denmark, Britain, Groombridge 1992; BSBI database, courtesy of Dr K Walker; counties and districts in northern England (Harrogate, Durham, Northumberland, Cumbria, Yorkshire; BSBI database); and other areas and nature reserves (Fishwick LNR Preston, Askham Bog, Alderley Edge, Thorne Moors SSSI; data from Pan-species Listing: https://psl.brc.ac.uk/location-rankings, except Askham Bog – author's own data). The point for Yorkshire is shown in red. In each of the lists above, sites are listed in order of increasing area. The smallest area represents the author's garden in York (0.004 km^2), and the point at 100 km^2 represents the mean total species number for the 10% of hectads (10 x 10 km squares of the National Grid) in Yorkshire with the highest species totals (BSBI database).

The details, however, show that the losses are serious. Firstly, in the case of plants we have lost over 40 species from Yorkshire in the last 200 years, but more worryingly the species that are declining fast are much rarer nationally than those that are increasing. In other words, we are gaining weedy species and losing the specialist ones, so that our nature will become less distinctive and more like everywhere else in the country. This worrying effect is true for plants and moths (see Figure 3) and to a lesser extent for birds.

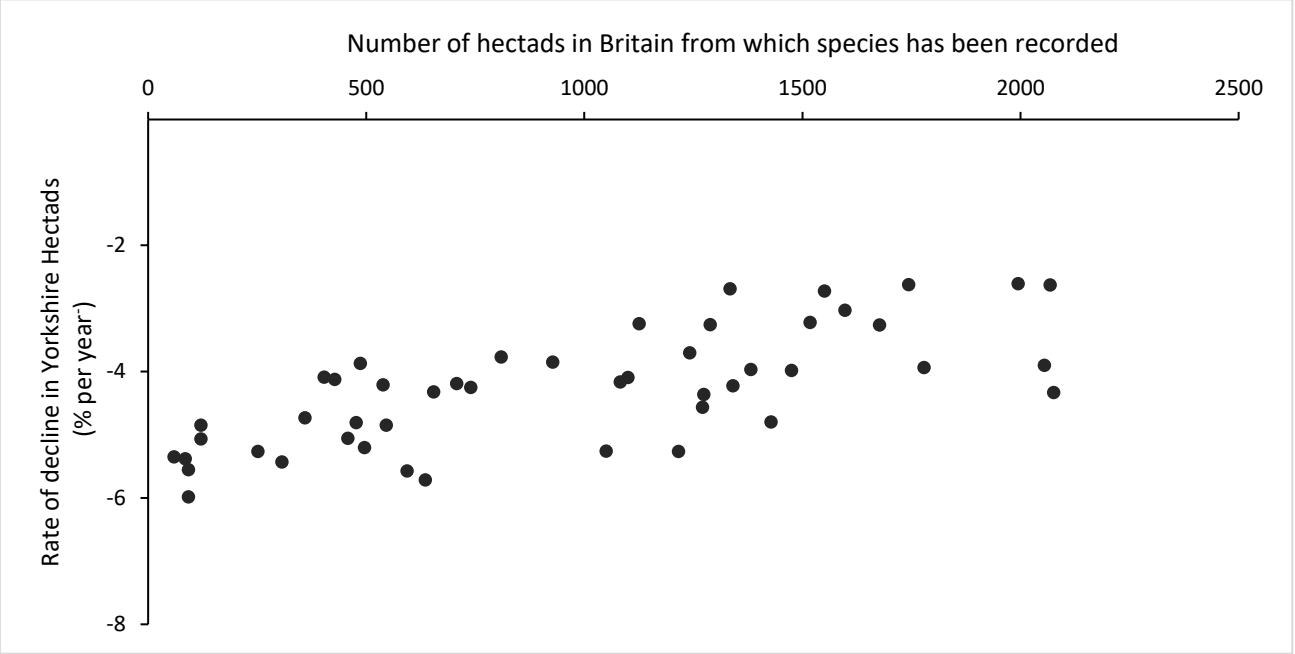


Figure 3. The rate of decline (% per year) of moth species in Yorkshire over the period 2000-2020 as a function of their national distribution (in hectads, i.e. 10x10 km squares of the National grid) in 2000. Species are only included where the rate of decline is highly significant (P<0.001). A rate of decline of 5% per year over 20 years equates to near-extinction in Yorkshire.

Figure 4. Thistle broomrape – sometimes called Yorkshire broomrape – *Orobanche reticulata* is parasitic on thistles and found nowhere else in Britain: it is a 'Yorkshire Stronghold' species.

Another important finding was that Yorkshire is home to hundreds of species that are commoner here than in Britain as a whole; we call these Yorkshire Stronghold species. A good example is the Thistle (or Yorkshire) broomrape (*Orobanche reticulata* Figure 4), a parasite on thistles, that is found nowhere else in the country.

Using all this information we developed an index that we called Yorkshire Species of Concern (YSC) – the species of plants and animals which are particularly threatened or important in our county - and the YWT will use this index to prioritise and measure the success of their work in nature recovery in Yorkshire. Examples of species that score highly on this index are Lady's Slipper orchid (*Cypripedium calceolus* Figure 5), once reduced to a single plant in Britain; the Dark Bordered Beauty moth (*Epione vespertaria* Figure 6), whose only English population is at Strensall Common near York, Willow Tit (*Poecile montanus* Figure 7), a rapidly declining bird for which Yorkshire is an important stronghold.

Figure. 5 (top) Lady's Slipper orchid *Cypripedium calceolus* and Fig. 6 (above) Dark Bordered Beauty *Epione vespertaria* (photo, Richard Baker) were the highest scoring plant and moth on the Index of Yorkshire Species of Concern.

Figure 7. Willow Tit *Poecile montanus.* Photo: D. Farrar

Once we knew which species were most significant for nature conservation in Yorkshire, we then asked where they were to be found. Unsurprisingly they favour a very wide range of habitats, and so one lesson is that all habitats matter and we must ensure that Yorkshire remains a diverse landscape. However, closer examination revealed that wet and limestone habitats were especially significant: indeed, half of all plant YSC grow on limestone and half of the extinct plants in Yorkshire were wetland species. "The importance of wetlands should not perhaps be a surprise: we know that we have lost over 80% of Yorkshire's wetlands (Fitter 2024), often to create what is now very low grade agricultural land and restoring some of them must be a conservation priority.

Species-rich limestone grassland at Leyburn Old Glebe, a Yorkshire Wildlife Trust reserve.

This sort of information is crucially important for developing conservation strategies, and that is what the Yorkshire Wildlife Trust has just done: its recently published blueprint for nature recovery see this link - https://www.ywt.org.uk/bringing-yorkshires-nature-back which sets out just how we can meet the national and international 30x30 target, to have 30% of land and seas managed with nature in focus by 2030. When that was first proposed as a goal only a few years ago, many people felt that it was very optimistic. What the blueprint shows is that we can really do this in Yorkshire - and actually everywhere else in Britain too!

Further reading

There is a set of papers in a special issue of the Yorkshire Naturalists Union journal 'The Naturalist', published in August 2024, including the overview paper referred to above (Fitter 2024) and accounts of the state of Birds, Plants, Lepidoptera, Mammals and (briefly) Other Taxa).

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Professor Alastair H. Fitter CBE PhD FRS HonFBNA is President of the Yorkshire Wildlife Trust and Emeritus Professor of Ecology at the University of York. He is an Honorary Vice President of the BNA and became an Honorary FBNA in 2008. He is author of several books including 'Wild Flowers of Britain and Ireland' (first published in 2003), co-written by Marjorie Blamey and his father Richard Fitter.

This article was given as a talk at the 2025 National BNA Encaenia.

Seahorses of the River Thames

Neil Garrick-Maidment Hon FBNA

British Seahorses

The British Isles has two species of seahorse, the Short Snouted *Hippocampus hippocampus* and the Spiny Seahorse *H. guttulatus* (sometimes wrongly called the Long Snouted Seahorse).

The Seahorse Trust achieved recognition for seahorses as a native species and full legal protection for both species on the 6th of April 2008 and they are protected under the *Wildlife and Countryside Act 1981* (as amended) as a schedule 5, section 9 species.

Data from the National (now World) Seahorse Database allowed us to present the species as native, and as a permanent resident, as opposed to being a transient, temporary visitor as previously thought. We have records dating back to 1721 proving the species is indeed a native species, and surveys conducted by the trust under the British Seahorse Survey (https://www.theseahorsetrust.org/conservation/british-seahorse-survey-2/) at 6 sites in England have shown presence, breeding, pairing and territoriality. All this has helped to confirm that the two species are indigenous and have been present for a very long time: going even further back, the Romans and Picts recorded seahorses in their art back in the first and third centuries respectively.

The Seahorse Trust
Working in partnership with nature

Seahorses can be found all around the UK, Ireland and out into the North Sea. They are also found in the seas off all of the other nations surrounding the North Sea as well as those further south: these include Norway, Sweden, Denmark, Germany, the Netherlands, Belgium, France, and Portugal amongst others.

Short Snouted Seahorse

Spiny Seahorse

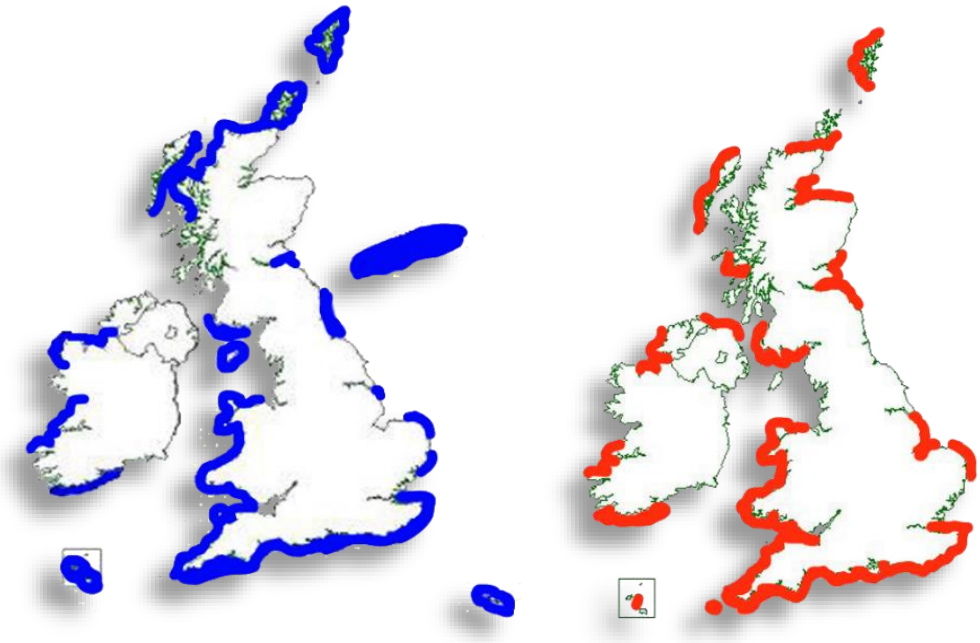


Figure 1: Seahorse distribution around the UK. Please note an absence of records in the maps above does not mean an absence of seahorses in an area. It is just they have not been proven to exist or not exist there at the present time.

Pair of Short Snouted Seahorses, photo: John Newman

Pair of Spiny Seahorses, photo: Seahorse Trust

Suitable Habitat

The two seahorse species fall into distinct categories when it comes to habitat. The Spiny Seahorse really should be renamed the Seagrass Seahorse as this is its preferred habitat, and it is highly adapted to seagrass and similar algae. The Short Snouted Seahorse is a generalist and can be found anywhere from man-made objects, marinas, rocks, and sandy areas to (rarely) seagrass meadows.

What is interesting about the Thames sightings referred to in this article is that due to the flow of water, the habitat is challenging, and at various times of year can become very extreme. There is also little visibility, which for a species that is usually reliant on its eyesight to hunt for food and to find a mate adds to the difficulties. In this environment, the seahorse's amazing olfactory senses come into play to allow it to find both food and mates.

Freshwater Seahorses

Both species are found in coastal areas, at depths ranging from 1 metre to over 70 metres depending on the time of year (average in the winter 20 to 30 metres), as they have a seasonal migration, depending on where they live in the shallows.

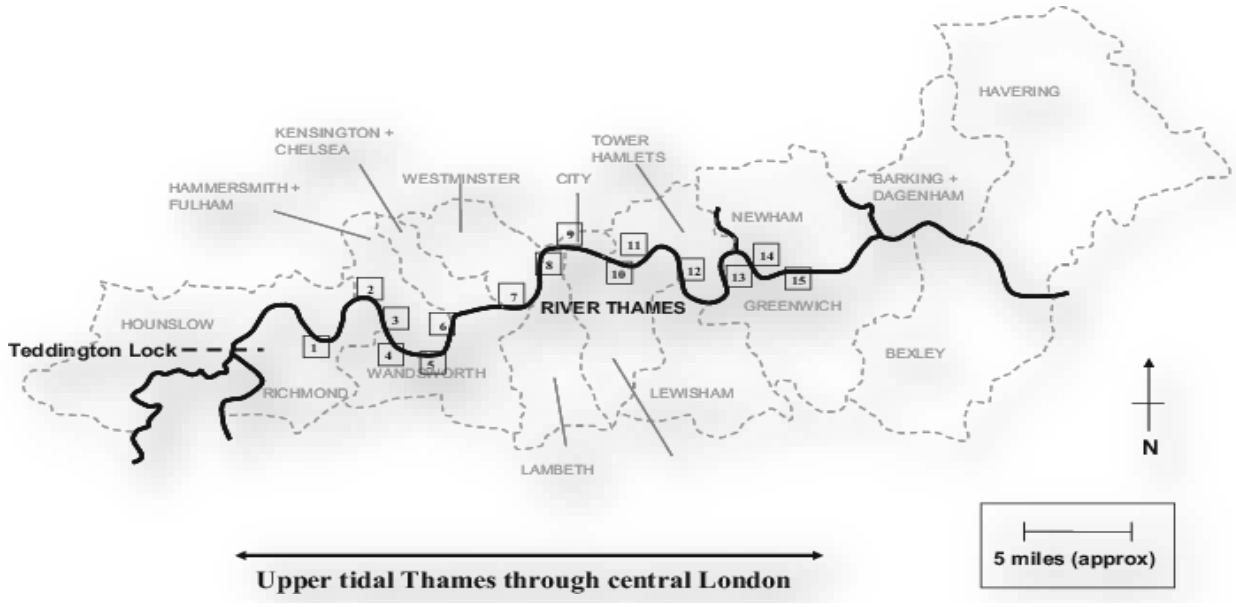
Seahorses in enclosed areas such as Torbay and Poole Harbour are thought not to migrate, as the reason for them migrating, includes strong storms and waves crashing into the shallows (which could kill them, either directly or by strandings) and these do not happen as violently in protected, sheltered sites. It also takes a great deal of energy, loss of condition and risk of predation to migrate into and out of the depths; so, if migration can be avoided, they will do.

During the winter months for those that do migrate, they are both found in the same weedless habitats at depth (average in the winter 20 to 30 metres) to avoid the devastating storms that can wash them onto the beach and kill them. The exception to this is on Dogger Bank in the North Sea that is a shallow area (up to 20 metres) just to the east of the British Isles. Within the last few thousand years this was farmland and formed a large plateau and an eastern extension to England, covering some 25,000 square kilometres, that was subsequently submerged as sea levels rose.

Surprisingly, seahorses are also found fairly commonly in estuaries and tidal river systems, at least as far upriver as the brackish areas where fresh water meets salt water. There have even been a few reports of seahorses being found in fresh water. One such report by the Marine Biological Association in 2004, found a seahorse in the River Tamar above a site called Cargreen, which is fully freshwater, but it is assumed that this was just a temporary visitor. It is not thought that seahorses live in fresh water for any prolonged period of time here in the UK. Interestingly, there is thought to be a freshwater seahorse species in the Mekong River, although no live specimens have ever been found. However, there are freshwater pipefish in river systems in Asia, and these are the closest relatives to seahorses, so it could be that seahorses have actually evolved in some areas to live in freshwater. Until evidence is shown either way, we need to keep an open mind on this.

Thames Seahorses

So, what is happening with seahorses in the River Thames, where they are found some 11 to 13 miles inland from the Thames estuary? We have records from Battersea all the way down to the estuary mouth between Essex and Kent.



The Thames is an unusual river for the UK, in that the seawater penetrates a long way inland - some 55 to 68 miles. The river itself is 235 miles long from its source in the Cotswolds at Thames Head, and the tidal stretch of the Thames is approximately 95 miles long. As such, a variety of marine-based creatures are found in this busy waterway. Over the years there have even been whale species sighted in the centre of the city of London.

Seahorses are commonly thought not to live in busy rivers, due to noise, disturbance, pollution and sheer flow of water. However, conditions in the Thames do support the Short Snouted Seahorse, while the conditions in the estuary mouth support both the Spiny and Short Snouted species.

It is likely that one of the main reasons for this is the abundance of shrimp and small crustacea in the river. This is probably because of all the human habitation which creates a nutrient-rich water system. This abundance of food would encourage a voracious predator such as the seahorse into the river system and if there were also copious amounts of plankton then this would provide a steady supply of food for seahorse fry as they breed.

Seahorses have huge appetites, due to a basic digestive system that does not include a stomach in which food can sit and be digested. Lacking a stomach, they have to constantly be eating to get enough nutrition from their partially digested food. An adult seahorse will eat up to a hundred or more 2 cm long shrimp (such as Mysis Shrimp) per day and the seahorse fry in excess of 3,000 pieces of plankton in a 24-hour period. Any site that satisfies this requirement would be perfect for seahorses as long as there are suitable holdfasts so they can hold on in the tidal stream and not get washed away.

Mysis Shrimp

Seahorse fry of a Spiny Seahorse, photo: Francis Apesteguy

Tail of a Spiny Seahorse holding onto seagrass

Adult seahorses have a phenomenal prehensile tail that can curl around objects and weeds – even single blades of seagrass leaves - and hang on in the most extreme conditions: the strong flows of the Thames would be no problem for them.

However, there is a difference in the growth rate of male and female seahorses, and this is reflected in the higher number of females than males stranded on the river banks in the Thames. One of the reasons for this difference is that male seahorses grow faster and have stronger tails and so can grip on in harsher conditions than females. When a flood occurs, the males have a better chance of holding onto the holdfast, while the females will be washed away down the river to possibly be stranded, sadly, leading to death in a lot of cases.

Seasonal changes

During the calmer, warmer periods of the year the adult seahorses find mates, possibly pairing for the breeding season. Breeding involves passing eggs from the female into the male, via an ovipositor, where he self-fertilises and then, depending on the species, gives birth 25 to 28 days later. As exchange takes place very quickly, eggs are often spilled onto the seabed where they end up as food for other fish species. Depending on how successful the egg exchange has been, a fully grown male Short Snouted Seahorse can produce up to 500 fry at a time, sometimes more in large individuals.

Unfortunately for seahorse fry, they are the ideal bite-sized food for many fish species, resulting in only one or two in a thousand surviving to any size, possibly more if predation is not high. Lots of species are known to eat the fry including fish and crabs. We even have records of seagulls and other bird species eating seahorses. Despite the high level of predation of the fry, seahorses are successful species, and their unique breeding cycle means that fry are born every month, especially in the warmer months of the year.

Parental care is non-existent and once born, the fry are entirely on their own. They feed in the plankton zone until they are big enough to settle on the seabed and hold on to something with their prehensile tails. Holding on stops them being washed away, but they also hide in algae and amongst other objects to avoid predation.

We do not have records for seahorses in the Thames during the winter and so at present we do not know what is happening the whole year round. They may migrate down the river to the estuary in winter, and then follow the shrimp up the river as they return in the spring. Over time, and as more information comes in, we hope to piece together an accurate year-round pattern of seahorse movements in the Thames. We also hope to eventually work out how high up the Thames they go and whether they spend much time in the brackish area of the river.

Seahorse eggs, photo: Gaynor Rosier

Flooding of the River Thames

During the spring, and especially in the early summer months in hot years, the level of water drops in the Thames, and the river is calmer because there are not the heavy rains of autumn and winter. This calm allows the seahorses to breed in large numbers and with the heat of the sun there is plenty of food around to feed the adults and the fry. The phytoplankton is eaten by the zooplankton, and the seahorse fry eat the zooplankton. Seahorses do not eat plant life directly as they are carnivores, but phytoplankton is vital to a seahorse's diet and wellbeing.

By the time the early autumn comes and the weather changes we tend to have lots of rain. A long, relatively narrow river like the Thames floods quickly. In the past this flooding would have been able to spread over the extensive flood plain, but this has now been built on, so the floodwater has nowhere to go except downstream. For most fish species this is not a problem: they can cope with the ebbs and flows of water volume as they are free swimming and able to go with the flow or tidal state, or can hide under rocks and other objects. However, sedentary species like the seahorse have to hold tight with their prehensile tails. As powerful as the seahorse tail is, it is not always enough to stop the younger, smaller fry being washed down the river with a number of them being washed onto the river banks where frequently they die.

As a result of global warming we are also now having more frequent flash floods in the mid to late summer which catch the seahorse fry/juveniles (who aren't strong enough to hold on) unaware. This sudden flow of large quantities of water results in mass strandings and it is assumed that a large number of fry are washed down the Thames. This assumption is backed up by similar sized fry (mainly female) being caught in scientific fish traps that are monitoring the Thames at

all times. You do not see large numbers of fry being washed onto river banks and beaches during the winter or spring and early summer.

Even if they are not forced off their holdfasts as the fresh water from upriver comes down, the seahorses tend to react by heading downstream into salt water. The lucky ones are caught by the current and are carried down the Thames to the estuary.

How far up the Thames are they?

The highest stranding record we have to date is at Battersea (11 to 13 miles inland from the estuary mouth); however, seahorses must be breeding further upriver to for them to be carried down to these lower areas. Tidal fluctuations mean that the extent of brackish water versus fresh water does vary by some miles in this part of the river. We do not know exactly how far up the river seahorses breed, but the highest point will probably lie somewhere between Battersea and perhaps 10 or so miles upriver. Without doubt further research is needed to fully understand what is going on in the area.

We have 41 records in the river up as high as Battersea but there are probably a lot more strandings than this: the problem being that stranded seahorses can be extremely hard to see, with some of them measuring only 3 to 4 cm from the top of the coronet to the end of the tail. As you progress further down the river into the estuary and the surrounding areas like the Medway, we do have a lot more records. These relatively sheltered areas are obviously good for seahorses, and they are most likely in them for a greater part of the year. It is assumed that seahorses also inhabit the tidal tributaries that feed into the Thames, especially the bigger ones that have larger bodies of water. Numbers of seahorses in the estuary are much higher than in the river, as expected, and they are spread out fully around and out into the estuary, with both species being represented.

Final Thoughts

Seahorses are generally not expected to be found in fresh water. However, observations and findings - not just on the River Thames but in other river systems here in the UK - show that seahorses do things we don't expect them to do. We know that they are capable of surviving in fresh water because the construction of their gills – resembling a bunch of grapes - allows it; and we know they actually do go into fresh water for short periods of time. However, seahorse research tends to have concentrated on the coast and not inland, so we need to do more to understand them.

One of the problems that we have with the River Thames is that over the centuries the river system has changed quite dramatically. Water no longer spills into the floodplains over the banks of the Thames because now it is constrained by man-made barriers and walls. By constraining the water, the flow and volume within the river are increased, raising the danger of everything in the water being carried away. If species like seahorses are to be preserved these things need to be taken into account when designing the river banks and planning development along the river, and mitigation needs to put into place to try and avoid the mass of water that just floods down through the estuary.

There are lots of myths and legends surrounding seahorses and people sometimes assume they do not actually exist in our waters: this is the first barrier to understanding them. Seahorses are certainly very cryptic in their way of living and ecology – they are creatures that it would take several lifetimes to understand. A lot more research needs to be undertaken, and this is one of the things that The Seahorse Trust needs to concentrate on the future, working in collaboration with other scientists who do surveys of various fish species along the river networks. Only then can we get a better understanding of the distribution of seahorses around the British Isles.

Thanks to:

One group of people we'd like to give massive thanks to are the mudlarkers who spend all their time looking for artefacts, for historic items and for fish and plant species along the River Thames. These amazing volunteers are out there in all sorts of weather and are constantly walking up and down the river banks and the beaches on the River Thames. They are the ones with their sharp eyes finding the seahorses, which allows us to understand more about seahorses and their ecology. I would like to give a massive shout out to all the mudlarkers and the volunteers that report in their records to us. Thank you.

I would also like to give thanks to the various scientists that work along the River Thames and into the estuary that have kindly given us the information, records, and data about the seahorses, some of them are commercially sensitive so they cannot be shared but having that data has allowed us to understand the seahorses of the Thames better. However, a lot more needs to be done to fully understand their ecology in this complex river system. Thank you to all involved.

Neil is the Founder and Executive Director, of the Seahorse Trust, and a Visiting Fellow to the faculty of science and technology, Bournemouth University. He received the David Bellamy Award for distinction as a field naturalist in 2023 and became Hon. Fellow in 2025.
More information on the Seahorse Trust can be found on their website: www.theseahorsetrust.org

Photos: Neil Garrick-Maidment unless indicated.

Amber: nature's precious time capsule

Andrew Taylor FBNA and Stephanie Holt FBNA

In this article in our series on specimens in the Andrew Taylor Collections, we investigate the amber collection, which comprises several thousand pieces of amber from across the globe. The specimens contain a vast array of 'inclusions'; fragments of plant, seeds, insects, and other invertebrates, trapped for millions of years in this ancient resin.

What is Amber?

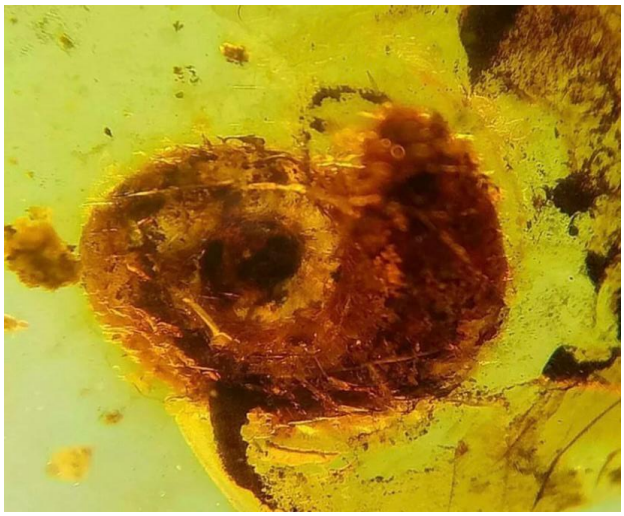
Amber is a hardened resin exuded from trees, predominantly pine species, usually at the site of a wound. For example, Baltic amber, one of the most commonly found ambers, was produced from conifer trees of the *Sciadopitaceae* family. Around 1% of ambers are produced from tree fern resin; ambers from Myanmar for example were produced by the extinct tree fern *Thyrsopteris cretacea*. The resin-producing tree species, environmental conditions, inclusions, impurities, and age of the resin can all impact on the colour and opacity of the resulting amber. This can range from almost entirely transparent to dark opaque blacks and blues, as well as the green and orange ambers popular in the jewellery trade. Often darker ambers are older as the material can darken and become more opaque with age, although 'black amber', typically from Sumatra, is relatively young and does not fit this trend. 'Blue amber', found in Indonesia and the Dominican Republic, is also not old, at around 15-20 million years, but glows blue under UV light, including in direct sunlight. This strong fluorescence occurs mainly in certain ambers (especially rare blue Dominican amber) from the resin of the extinct tree *Hymenaea protera*. The extinct tree's resin chemistry enabled the right compounds for intense, surface only fluorescence under UV – not replicated in living resins today.

Black Amber from Borneo

Miscellaneous ambers in the Andrew Taylor Collections

The tree resin when it emerges from the tree is thick and spreads slowly. As it does so small invertebrates, plant material, and even vertebrates can become trapped in the sticky substance. Once encased, the object is preserved and incorporated into the amber as it hardens and is then known as an 'inclusion', which can become visible once the amber is cut or polished. These inclusions give an incredible insight into ancient biodiversity and ecosystems, with preservation levels making identification even to species level possible. These inclusions have told us stories of the evolution of species including insects, gastropods, spiders, plants, and vertebrates. Amber has even changed our understanding of dinosaurs; the incredible feathered dinosaur tail found preserved in Myanmar amber in 2016 dramatically changing our understanding of the appearance of feathering in dinosaur species (Xing et al, 2016).

Amber has been found in almost every continent. However the vast majority of specimens that can be found for sale come from the Baltic region and the Dominican Republic, which together make up about 90% of the market. Recently amber from Myanmar has started st to become much more available, and at around 100 million years old, this can be some of the oldest amber regularly available. The Andrew Taylor



Myanmar amber with gastropod inclusion

Collection contains hundreds of examples of Myanmar amber, the majority of which contain inclusions from this time period, including millipedes, spiders, assassin bugs, and moths. Amber can be dated through the geological deposits in which it is found, for example in the extensive amber mines in the Dominican Republic. It is also often retrieved from coastal locations such as the shores of the Baltic Sea. Ages usually range between around 20-140 million years old, but one extraordinary piece was found in a coal seam in Southern Illinois dating from 320 million years ago! (Sargent Bray, P. & Anderson, K., 2009).

Amber is notable as it is hard, although fragile and liable to shatter. Hardening is a process which takes many millions of years. However, before it becomes completely hardened (although no longer a resin), it can still be soft enough to be used as a varnish or burnt as an incense. At this stage it is known as a 'copal' and typically dates from a few thousand to a few million years old. Although not as valuable as amber, copal can still contain many interesting inclusions, and being younger is often pale and transparent, making those inclusions easy to see. Typically, copals are formed from the Copal tree *Protium copal*, a species native to Mexico, East Africa, Central, and Southern America, although a number of other tree species also produce a resin which can form into a copal. Other resins such as Frankincense are younger still. These are usually more strongly aromatic and softer. These can be taken fresh from a resin-producing tree, which may even be deliberately harvested for its resin. Estimates vary considerably as to the point at which a resin becomes a copal, or indeed a copal an amber.

The incautious amber collector can also be taken in by 'fake ambers'. These are artificial resins dyed to look like amber, often including tantalising inclusions, usually modern species, sometimes even plastic models. There are a few tests that can be done to help to identify real amber from modern fakes, or indeed

Fake amber with giant Japanese hornet

British Firestorm

amber from softer copals. These include testing with a hot needle – amber will only permit the needle to go in a short way, or create a crack, whereas plastic will melt and the needle will enter the specimen fully. Similarly, amber is electrostatic. It can therefore be 'charged' by rubbing it with a soft cloth (much like a balloon!), then held near a strand of hair. If the hair is attracted to the amber, it is most likely genuine.

British Amber

Britain is home to some of the oldest amber in the world. Dating from over 100 million years ago, British Firestorm Amber is extraordinary. Found in the Hastings Beds in Sussex, it is extremely rare and usually only found in tiny pieces, just 3-5mm across. Its name comes from the dark mottled red/brown colouration. While its rarity and age is impressive in itself, Firestorm Amber has also been found to have some of the rarest inclusions trapped within its resin – including the impossibly rare spider silk. Discovered in 2008 in Bexhill in East Sussex by Professor Martin Brasier from the University of Oxford, this inclusion is thought to be

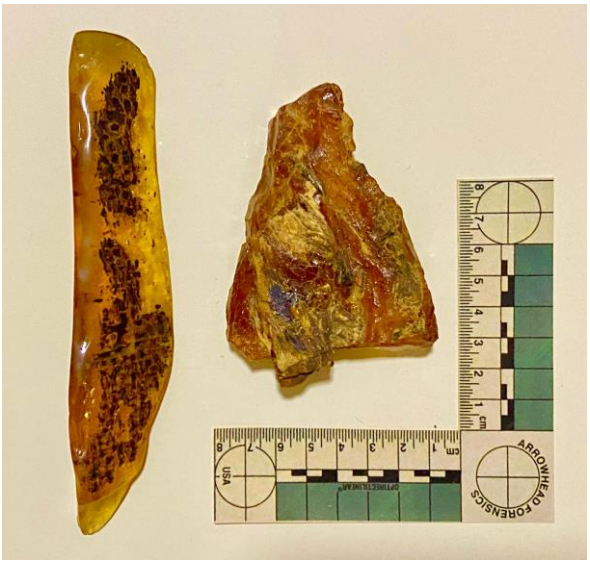
the oldest spider web known, dating to over 140 million years old ((Brasier et al, 2009) Finding inclusions in amber of this age is particularly difficult, as pieces are very dark to almost completely opaque, making spotting any inclusion a real challenge, let alone something as delicate as spider silk.

Amber in the Andrew Taylor Collections

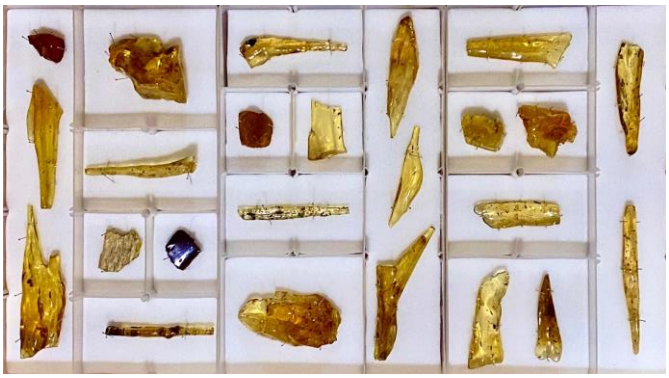
The Andrew Taylor Collections include 10 pieces of British Firestorm amber from Sussex, and although sadly none contain spider silk, the largest piece is an impressive 125mm across.

Other ambers in the collection include ambers from Lebanon, Kalingrad (Russian Baltic amber), the Dominican Republic, New Jersey (USA), Ukraine, Myanmar, Indonesia (Sumatra & Sawarak), Columbia, Madagascar, Kenya, and Ethiopia, making it a truly global representation of amber form, age, and distribution. The largest piece is a specimen of Baltic amber bought in Brazil which is around the size of a fist. What makes this piece even more impressive is that it was broken from a far larger specimen! This piece alone contains more than 60 inclusions, including around 20 species of invertebrates (gnats, flies, ants, termites, and crawling insects), and many fragments of plant material – an entire ecosystem preserved for somewhere between 28-38 million years.

The Collection also contains examples of textural amber, known as Schlaube. This is amber which shows the impression of the tree trunk it was attached to, giving a pitted or 'goose skin' appearance from the imprint of the tree bark. One of the specimens in the Collection even contains a fragment of the trunk it was attached to encapsulated in the amber! The Collection also contains numerous examples of copals and resins, examples of blue and black amber, and a number of fake plastic ambers for comparison purposes.



Textural amber right has a tree trunk impression, left shows 'goose skin' appearance



Madagascan ambers

Other miscellaneous amber

In total the collection includes many thousands of pieces, all of which have been selected as they contain inclusions of botanical or invertebrate material. As yet no piece contains a vertebrate example, but hopefully this may come in time. Invertebrates represented include moths, gastropods, spiders, true bugs, beetles, flies, wasps and ants, mites, isopods, and myriapods; a representation of life on earth over millennia.

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The amber collection, alongside the wider natural history collection and its associated library (located in North Staffordshire) is available to BNA members for study and research. For more information contact Andrew at andrew4040@hotmail.com or Stephanie at stephanieholtnaturalhistory@outlook.com.

Stephanie Holt FLS received FBNA in 2009 and was awarded the David Bellamy award at the 2024 National Encaenia.

Andrew Taylor FLS received his FBNA in 2024. His article "The Taylor Collection" was published in Country-Side: Volume 36 no. 5, Winter 2024. This article is the second in a series focusing on particular areas of the Andrew Taylor Collection.

Andrew and Stephanie jointly run the BNA Staffordshire Branch.

What is the point of a wasp?

George McGavin Hon. FBNA

I have been asked this and similar questions many times over the years. How I reply depends as much on my mood as on the way in which the question was asked, not to mention how much time or energy I have to address it. Sometimes it's clear that the questioner (typically a male) likes the sound of his own voice and thinks he's being clever. In these cases, I usually say that the 'point 'of a wasp or a fly or indeed of a human being, biologically speaking at any rate, is to make more wasps, flies or human beings.

The subject of the question is very likely to be a social wasp (Vespidae; Vespinae) often known as yellow jackets in the USA or just simply wasps in the UK. These are the familiar black and yellow striped wasps that buzz around picnic tables in the summer, as opposed to the many thousands of species of other small wasps that lay their eggs in other insects and whose activities go largely unseen.

What is meant by 'what's the point?' is usually anthropocentric - do they do anything useful for us? The view that the value of any species depends on whether or not they are of benefit to humans shows a deep lack of understanding about the natural world. I once saw a van belonging to a pest control company the side of which was emblazoned with a very good graphic of a honey bee. I pointed this out to the driver with as much nonchalance as I could muster, and was told, very firmly, that it was a wasp - nasty, aggressive and therefore a proper scourge. Of course, many of us have been stung by wasps, even so, this was not the time or the place for Entomology 101.

Social wasps are major predators and hunt a very large range of insects such as aphids, caterpillars, beetle and flies. To be honest, there's not much wasps won't have a go at. I once filmed an outbreak of Ermine moths, the larvae of which had spun an extensive area of protective silk sheeting over the vegetation of an entire roundabout near Croydon. They were not, however, completely safe from wasps, which could be seen cruising about picking off any individuals that appeared too close to the surface or near a tear on the communal webbing. Estimates of exactly how much prey is captured and fed to developing larvae by worker wasps is rather sketchy. Some have estimated that even a small colony of around 500 workers may kill 5,000 caterpillars in a season, others suggest that in a good year a single colony might consume up to 40 kilograms of prey. We really need to get much more accurate figures for these basic data.

Worker wasp scraping wood fibres from a post © G. McGavin

We don't even know the number and size of colonies that exist in the UK in a single year. The number will, of course vary widely from year to year. A cold, wet Spring will depress the number of queens that survive the Winter and are able to establish a new colony. A dry, warm Spring will have the opposite effect and long spell of warmer weather later on in the year will favour an abundance of prey species.

I can think of no better subject for a full-scale natural history documentary than a year in the life of a social wasp colony. It would be a superb piece of factual theatre. Not only would it have an engaging narrative arc, it would have all the drama and jeopardy loved by television audiences. If done well, it could reveal some novel details of their natural history. It is surprising how much we still don't know about the lives of these very familiar and often much maligned insects. By providing a queen, just woken up from her hibernation, with the ideal place to make her nest it should be able to film the entire life of the colony over a whole year. We may be able to film things rarely seen such as mating, the death of the old queen and the emergence of new queens. It might be possible to observe novel behaviours such as interactions between workers.

There are seven native social wasp species in the UK:

The Common Wasp (*Vespula vulgaris*). This is a widespread and frequently encountered species, commonly nesting in the ground or cavities.

The German Wasp (*Vespula germanica*): Very similar to the common wasp, often nesting in buildings or hedges.

The Red Wasp (*Vespula rufa*): A smaller species that often has red-tinted abdominal markings.

The Tree Wasp (*Dolichovespula sylvestris*): This species builds nests in trees, bushes, or eaves.

The Norwegian Wasp (*Dolichovespula norwegica*): Common, particularly in Scotland, often building nests in trees.

The European Hornet (*Vespa crabro*): The UK's only native hornet, which is larger than other social wasps and often nests in tree holes.

The Cuckoo Wasp (*Vespula austriaca*): A specialised species that does not have its own workers and lays eggs in the nests of the Red Wasp.

Two additional species are recent colonists:

The Median Wasp (*Dolichovespula media*): Nests in bushes and is now widespread. This is a relatively recent colonist from Europe having arrived around 1980.

The Saxon Wasp (*Dolichovespula saxonica*): Another recent arrival, becoming more common in the south since the 1980s-90s.

Not yet established:

The Yellow-legged or Asian Hornet (*Vespa velutina*). This invasive species, with an alarming taste for honey bees, arrived in France around 2004. It seems likely that a queen wasp was transported from China in a shipment of pottery. The species has since spread to Spain, Portugal, Germany and Italy. It first turned up in the UK in 2016. There is little doubt that this species will become established in the UK given the difficulty of locating and destroying all the colonies that appear and the fact a warming climate will greatly favour their survival and spread.

See https://bwars.com/

The story begins in Spring when the rising temperatures wake a fertilised queen from her long months of hibernation. Her first job is to find a suitable nest site and make a small umbrella-shaped nest suspended from a shot stalk. She will lay eggs, feed and raise perhaps as many as twenty-five workers on her own. This is a risky time for the queen as these incipient nests do not always make it and can often be abandoned. If successful, the new workers of the colony will take over the job of enlarging the familiar paper carton nests - elegant papier-mâché structures made from a mixture of chewed wood fibres and saliva.

Vespula vulgaris worker and brood: © G. McGavin

Volucella inanis larva entrering a cell. © R. Soskin

The author (left) and Dr Bob Brown examine a *Dolichovespula media* nest in Hampshire. © P. Brock

Sometime workers collect coloured fibres from wallpaper and other sources. Here they have used a blue tarpaulin. © G. McGavin

To film this process in detail we would need to build a hut or custom-built structure made of untreated wood. It would need to be rigged with microphones and multiple remote cameras and lit with infra-red or low light. A long time-lapse camera sequence could reveal the colony as it grows from a tiny umbrella-shaped structure to a huge carton nest. With luck they might build up against a glass sheet allowing us to see the interior. Alternatively, when the nest was fully established, probe cameras could be inserted through the paper envelope of the nest.

The difficulty, of course, would be getting a queen to start a nest inside the film set. A newly emerged queen could be brought and if this failed, it might be possible to carefully translocate a starter nest. A few weeks later, with new workers to forage, feed their sisters and build more cells, the queen will now devote herself to egg laying.

The nest becomes bigger and bigger with several layers of tough paper combs with hexagonal cells. Each comb is spaced and anchored by short pillars and the whole structure is sheathed by a multilayered paper envelope to provide protection and maintain an internal temperature of just over 30° centigrade - ideal for rapid larval development.

By the middle of Summer, the wasp factory is in full swing and the growing army starts at first light and works through until darkness falls. Hundreds of wasps per hour stream out of the nest entrance to go hunting for prey. If the prey is small they will either bring it back whole or if larger it will be butchered on the ground to reduce the weight - heads, legs and wings will be snipped off leaving just the nutritionally-valuable meaty parts. The foraging workers are like stormtroopers and able to overpower even quite large prey and will also scavenge food from dead animals.

It is known that many social insect species produce signals that lead foragers to a specific food source or simply encourage more workers to look for food. This makes good evolutionary sense as it will enhance the exploitation of time-limited resources. In the case of wasps, returning foragers allow nest mates to assess the quality of food brought back to the colony, and if the quality meets or exceeds a certain threshold the foragers will be familiarised with the odour of the food resource before they leave to seek it out. There seems to be no communication as to the actual location of the resource as with the honey bees, whose famous waggle dance conveys clear instructions on the heading and distance from the colony where food can be found.


Worker wasp chewing a fly to take back to the nest. © A. Riley

Abdominal drumming has been shown to occur in several vespid species and it seems likely that these signals serve to recruit more workers to forage for food. Once outside the nest workers may just look out for where other wasps are going - but might we be missing something? It is true that while honey bee food sources are stationary, wasp food is generally mobile. Nevertheless, as wasp nests have their paper combs arranged in horizontal layers this should make directional signalling a lot more straightforward.

Nests can reach an enormous size with as many as ten thousand workers. Eventually towards the end of Summer the queen will lay haploid and diploid eggs destined to become either males or new queens respectively. The latter are deposited in special, larger cells and are treated differently to worker larvae. This is when the old queen dies and nest building stops. A typical colony can produce anything form several hundred to over one thousand new queens, and in September the new queens and males leave the nest and mate (each queen will mate with more than one male). The males die and the fertilised new queens must find a sheltered place to hibernate before it gets too cold and wet.

All summer, worker wasps get sugary rewards from their larvae in exchange for the meat they bring back, but in late summer, when the queen stops laying eggs and there are fewer larvae to feed, the workers lose their main food source and go searching for any sugar they can find. This is the time when worker wasps come into conflict with humans as they are attracted to sugar-rich food source such as fallen apples, sugary drinks and cream teas. This is when people get stung, often by flailing their arms about and panicking if any wasps come near them. Why not simply let the wasps have a bit of your picnic? Watch them feeding up close or take a bit of what they are attracted to a little distance away - they'll soon find it and you can all eat in peace. I am always sad to see baited wasp death traps in use even in places that pride themselves on being wildlife-friendly.

The first frosts signal the death of the colony which has seen a steady decline since the new queens left.

Workers die off as the food supply dwindles and it gets colder. There is no regulation to colony size except the coming of Winter. Without falling temperatures, the colony would keep going if there was enough food. The simple imperative is just to keep making more wasps. In warm temperate countries where winters are not cold the colonies may simply keep on growing, some attaining a very great size. It remains to be seen how long UK nests will survive as temperatures continue to rise.

Old nests are not re-used but I have heard contrary opinions. A neighbour who had a nest inside the roof space of her porch was assured by a pest controller that the nest needed to be completely removed or it would be reused the following year. Wasps may well be attracted to the same sheltered location but nests are definitely single-use structures.

We might moan about the unwelcome arrival of the Asian Hornet but think about the plight of New Zealand, which had no vespine social wasps until the accidental introduction of two European species, the German wasp (*Vespula germanica*) and the Common Wasp (*Vespula vulgaris*). The German Wasp, which has also spread to North America and North Africa, is thought to have arrived in New Zealand in 1945 in a cargo of aircraft parts. More than likely, a queen wasp crawled into a crate to hibernate only to wake up and find herself on the other side of the world. The Common Wasp, which has now spread to Australia and South America, was another accidental introduction, having established itself in New Zealand in 1983. New Zealand has a mild climate, an abundance of things for them to eat and nothing that will eat them, so upon their arrival the wasps spread widely and multiplied to become a significant threat to the survival of many native and endemic species. In the beech forests of South Island, higher densities of these wasps have been recorded than anywhere else in the world and it has been calculated that the biomass of the wasps is now greater than that of all the birds and small mammals combined. The wasps eat such huge numbers of insects that their populations are reduced considerably and their survival and that of species higher up the food chain is critically endangered. The whole ecology and natural balance of the forest has been very seriously disrupted and may never fully recover. Biocontrol may offer a solution and the hope is that one or more of the species that naturally control the wasps 'numbers in their home range might be used in countries affected by their invasion. One of the reasons that invasive species do so well is that they do not have any predators and parasites wherever they happen to end up. Biocontrol, which can be very effective, requires great care to ensure that any introduced species does what it is supposed to do and doesn't become a problem.

Sphecophaga vesparum female. © R. Soskin

Specimens of *Sphecophaga vesparum,* an ichneumonid wasp that is a specialised ectoparasitoid of social wasps, especially *Vespula vulgaris* and *Vespula germanica* have been collected under licence from nests in the UK and transported to New Zealand for rearing. *Spehcophaga* females enter the wasps' nests and, disguised from attack by chemical mimicry, are able to get past the guard wasps to lay eggs in capped cells containing fully developed larvae and pupae. Early this year, Dr Bob Brown of the Bioeconomy Science Institute in New Zealand, who is researching the potential of biocontrol against the introduced European wasp species, did a release of these parasitoids in the northern part of the South Island, right in the heart of a major wasp-affected area. At the time of writing he has not yet returned to see if there is any evidence that they have successfully attacked his semi-captive wasp nests.

Another potential biocontrol agent being evaluated is the hover fly *Volucella inanis*. The adult females are very cautious, often laying their eggs just outside or near the entrance of the wasp nest. Once hatched, the larvae crawl inside the nest to feed on the young wasp larvae and pupae. They slither up the side of each cell (the cells are orientated horizontal, facing downwards) and begin to feed from the rear end of their helpless prey.

If anyone would like to assist this research, they might email me in the Autumn me to tell me of wasp nests (preferably in the south of England) that could be harvested for their predators and parasitoids.

It's up to naturalists try to encourage people to take a much more enlightened view of these captivating and consequential creatures.

Essential Reading:

Sumner, S, (2022) *Endless Forms: Why we should love wasps.* 375pp Collins.

Dr George McGavin is a well-known scientist and presenter in the UK and a leading authority on all things bug related.
He became BNA Hon Fellow and was the recipient of the 2017 Peter Scott Memorial Award.

Sir David Attenborough at 100

Steven Rutherford FBNA Honorary Chairman

"... we all have a responsibility to try and help spread understanding of the natural world, to our fellow members of the human race. If we do not, if people do get out of touch, if people don't study and talk about it and tell our children about it and tell television viewers about it, the Homo sapiens is going to get out of touch with his roots, is going to lose understanding of what the natural world is about and is going to lose perhaps the most important thing in life."
"The most rewarding thing in life – an understanding of the intricacy, complexity, the importance and beauty of the natural world which not only sustains us, but keeps us sane."
Sir David at the BNA Encaenia (Country-Side 2007)


Sir David giving his talk at 2007 Conference © Liz Artindale

Sir David celebrated his 100th birthday on the 8th May this year and has a close connection with the BNA. When he was Guest of Honour at the Encaenia held in Forest School, set in Epping Forest in 2007 he was granted Honorary Fellowship (*Honoris Causa*) and became a recipient of the Peter Scott Memorial Award, the BNA's highest award. In Roger Tabor's address when presenting the award he stated *"there could be no more suitable recipient of the Peter Scott Memorial award than Sir David Attenborough."*

Zoo Quest 1954 – 1963 © BBC

Sir David started work on radio but his natural history broadcasting career began with the TV program Zoo Quest 1954 – 1963. The series was the most popular wildlife programme of its time in Britain and established Attenborough's career as a nature documentary presenter. In each series, he travelled with staff from the London Zoo to a tropical country to capture an animal for the zoo's collection. His early radio and TV work is well documented in his book Life on Air (Attenborough 2002), as are his fledgling work with the newly formed BBC Natural History unit along with Sir Peter Scott. It was Sir David's work in front of the camera, however, especially with the 1979 series Life on Earth that changed the way audiences were introduced to the connections in all life. It also became the benchmark of quality in wildlife film-making and influenced a generation of documentary film-makers and naturalists by bringing together the world's best researchers and TV makers. His clear diction and thoughtful delivery while bringing solid facts has helped to achieved a much greater understanding of the natural world to people, not only of Britain, but worldwide. I can close my eyes and hear his storytelling that is matched perfectly with the beautiful film work that sets his productions so high for others to follow. The "Life" series continued with The Living Planet (1984), The Trials of Life (1990), Life in the Freezer (1993), The Private Live of Plants (1995), The Life of Birds (1998), The Life of Mammals (2002), Life in the Undergrowth (2005) and concluded with Life in Cold Blood (2008) establishing many of the hallmarks of the BBC's natural history output. By treating his subject seriously and researching the latest discoveries, Attenborough and his production team also gained the trust of scientists, who responded by allowing him to feature their subjects in his programmes. And Sir David continues in his latest series, Secret Garden, that was released just before his 100th birthday, as he continues to bring us more as he enthrals, inspires, educates and entertains with the dramas of the wildlife in our own gardens.

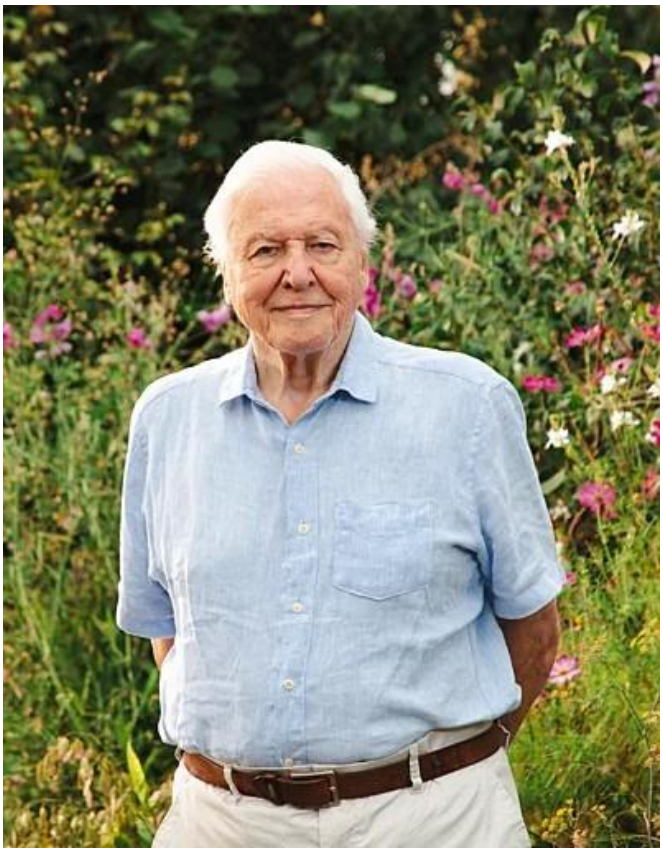
Within the Life books and films, man's recent arrival and influences on the world giving pressure to living nature that includes us, Attenborough rings the alarm bells of the fact that we face irreversible damage to the natural world and the collapse of our societies with the burning of fossil fuels and the unprecedented

Sir David speaking at COP26 © UNFCCC/Kiara Worth

biodiversity losses associated. In 2021, he was the People's Advocate at COP26 where he urged world leaders to reduce emissions for the benefit of the planet. "*Ultimately the emergency climate comes down to a single number – the concentration of carbon in our atmosphere*," he said in his address. "*The changes in that one number are the clearest way to chart our own story, for it defines our relationship with our world.*" "*We are already in trouble. Today, those who've done the least to cause this problem, are being the hardest hit.*" "*If we have not taken dramatic action within the next decade*," he says in the 2021 series Climate Change – The Facts, "*We could face irreversible damage to the natural world and the collapse of our societies.*" His message is clear, but it is also hopeful: "*We must recapture billions of tons of carbon from the air, and fix our sights on keeping one and a half degrees within reach. A new industrial revolution, powered by millions of sustainable innovations, is essential, and is indeed already beginning.*" He has been clear and consistent in this message.

To help with the celebrations for Sir David's 100th birthday, the BNA young naturalists sent a specially designed card with individual messages from our student and young naturalist members. Within most of the messages the dominant theme ran through their responses was to thank Sir David for inspiring them by being the true guardian of the natural world. And I would also like to add my birthday wishes to Sir David and thank you for helping to inspire me too.

Happy birthday Sir David Attenborough.


Sir David as he films his latest series "Secret Garden" © BBC/Plimsoll Productions

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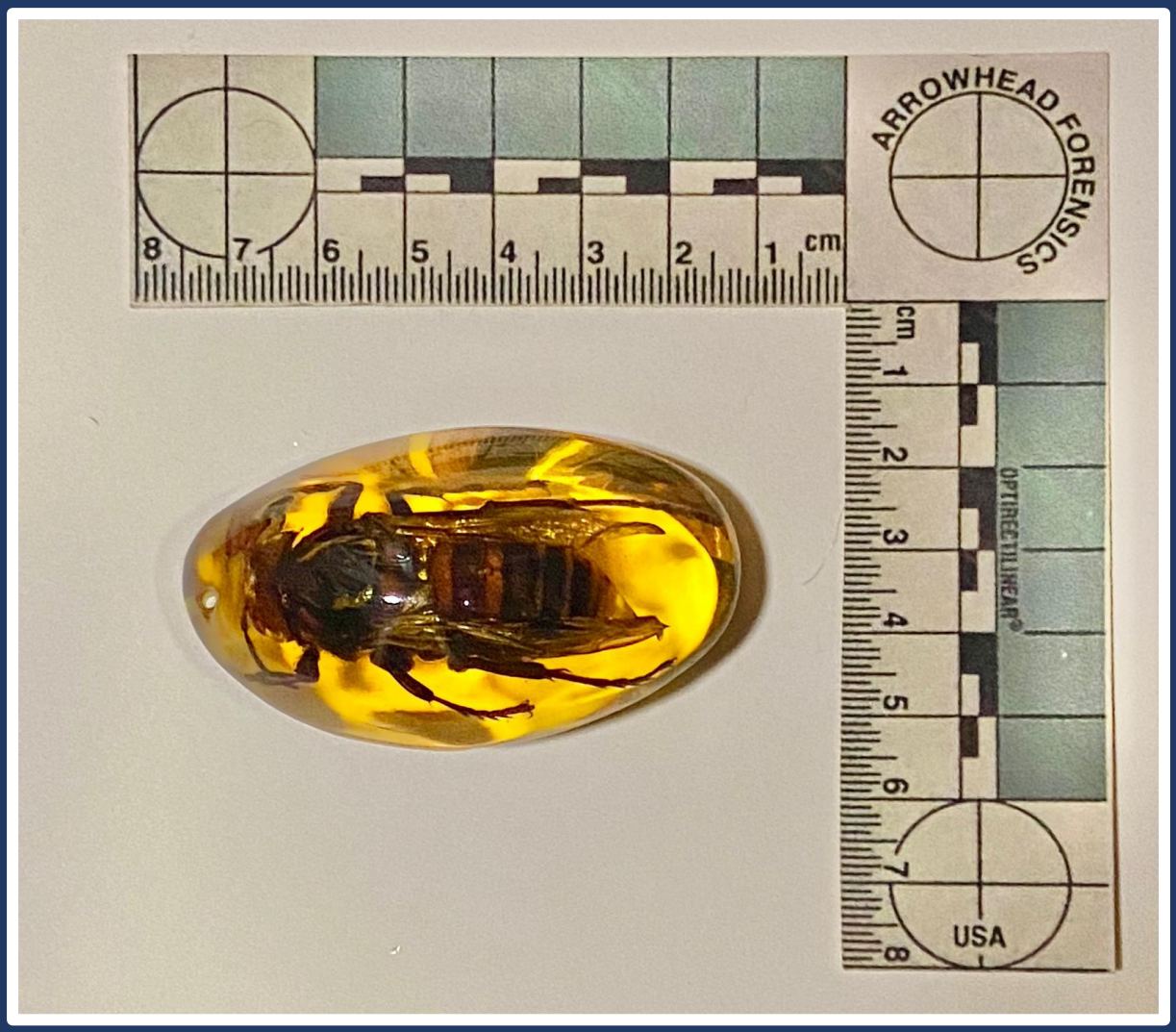

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