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Country-side

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Mistletoe Gall – Greenland Icecap – Orchids – Essex Coast – Get Carder! – Rare Invertebrates in the Cairngorms – True Morels – Curlew Recovery – The Wasps Less Noticed

Country-*Side*

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Front cover: Eurasian Curlew
Photo: M. Hayward Smith
Back cover: Northern Silver Stiletto Fly
Photo: G. Tompkins

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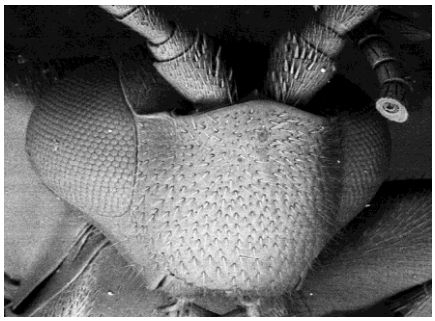
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Notes for Contributors
The Editor is always glad to receive articles, photographs or drawings for inclusion in the magazine. Contributors are reminded that:
(1) Manuscripts should be submitted in electronic form, by disc or email with accompanying 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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Editorial

Pauline Rutherford

This is my first issue as the new Editor of Country-*Side* which I have taken on with great enthusiasm and as this issue goes to print, we are in the middle of the COP26 Summit – the UN Climate Change Conference. The climate is already changing and will continue to do so, with devastating results world-wide. Sir David Attenborough, a BNA Hon. Fellow has been actively involved saying *"There could not be a more important moment that we should have international agreement. But the problems that await us within the next 5 - 10 years are even greater. It is crucial that these meetings in Glasgow, COP26, have success, and that at last the nations will come together to solve the crippling problems that the world now faces."* As naturalists we can all help, let's work together and make natures recovery a reality for generations to come. My thanks go to all the contributors for their articles.

The BNA would like to thank Mo Norrington as previous editor and Bryan Sherwood as previous typesetter, for their work and support over the years, and wishes them both well in their future ventures.

Natural History Observations

Mistletoe: A Gall Causer

June Chatfield OBE PhD FBNA

Mistletoe (*Viscum album*) is a hemi-parasite mostly on apple, hybrid poplar and hybrid lime and is usually growing high in the branches. It has yellow-green leaves so makes some of its own sugars by photosynthesis but also taps into the phloem and xylem vessels that conduct food, mineral salts and water through the tree. It usually starts from a sticky seed introduced to the bark of an upper branch by a bird cleaning its bill after eating the white fruit.

Where it enters the tissues of the tree a swelling is formed by the proliferation of host tissue in reaction to the foreign material and thus is classified as a gall. It is unusual to have a gall formed by a flowering plant, most being caused by invertebrates. Mistletoe is popularly associated with Christmas decorations and mistletoe used to be cut from apple orchards for sale at Christmas, bringing in a second cash crop.

One usually has to wait for a windblown clump of mistletoe to examine the plant close up and it normally detaches without the thickened wood from the branch. On a roadside verge in Alton, Hampshire, in December 2020, I fortuitously came across a large clump of mistletoe with fruits and also the branch attachment. I suspect that it had fallen off a tree surgeon's open truck as there was no mistletoe growing on the roadside trees nearby. The photograph shows clearly the swelling in the branch that constitutes the gall.

Mistletoe stem gall *Photo: J. Chatfield*

This bunch was duly collected and put on display at Haslemere Museum that was open to the public in December 2020 between the lockdowns.

The New Naturalist Book *Plant Galls* by Margaret Redfern refers to North and Central America where the galls of some mistletoes are so intricate that they are made into "wood roses" and sold as ornaments to tourists.

Mistletoe fruit *Photo: J. Chatfield*

What shapes an animal, why does it do what it does and are actions just books in a library?

Tony Thorn MSD FLS FRSB FBNA

Many years ago, before I became fully aware of the extensive ethology publications of authors such as Tinbergen, Morris and others, I did a thought experiment to see if I could reason from first principles why animals are what they are and do what they do. Darwinism was accepted as a given. Because it was an experiment there are no references to other specific works either from the internet (which on my i486 PC was then so slow it almost went backwards) or the University Library. Although it was never completely finished, the discourse ran as follows.

All life shares a core of common characteristics, the components of which are listed in text books or available via the internet so are not discussed here. My interest is in animal form and activity and why animals look like they do and do what they do.

It is obvious that animals differ in form and that the form they take is a response to the environment. That is, they have evolved to fit in with their surroundings such that their basic survival as a species is continuous and involves the minimum expenditure of effort. Environmental pressures, which include inter and intra specific competition, are the driving forces of evolution and the reason that animals occupy specific niches. In their niches, animals undertake these "activities of survival", some of which may be common to several, or indeed all species, others of which may be unique to themselves.

Activities are limited by the form of the animal, that is the form defines the function and *vice versa*. By observation, we know that a cat cannot fly, despite its best efforts, and therefore cannot mimic the action of a hawk in its attempts to catch a sparrow. Both cat and hawk have similar objectives but their capacities are different, despite the pressures evolution. Evolution has limited their overall capacity for activity, but channelled their form towards that which is most efficient for survival in their particular niche.

It follows that form determines what an animal can do and where it can survive. An obvious example is the comparison of the anatomies of a Blue Whale *Balaenoptera musculus* and a Leopard *Panthera pardus*. They are different because they have been shaped by their environment or have slipped into an environment that is most suitable to their very different shapes i.e., their physical structure. But animals that are apparently more closely related, such as Felidae, say the Leopard and the Cheetah *Acinonyx jubatus*, may also have quite significant physiological differences. They are both cats, but the Leopard is much more muscular and stockier than the Cheetah, and uses the tactic of ambush and brute strength to overcome its prey. In contrast, the Cheetah is an open plains animal with a long body and flexible spine which allows not only speed but rapid directional changes. It is therefore perfectly adapted to chase and capture its prey over short distances.

In the case of the spine and legs, the skeletal and muscular differences of these animals are the result of evolution. The spine has a form-limited range of movements and each appendage has a different range of movement and a maximum rate of activity. Both of these are species specific. Hence, despite having similar carnivorous objectives, the activities of the Leopard and the cheetah are both imprisoned and separated by the limitations of their physiology. Land animals also have environmental constraints, for example the heat of the day, the need to sleep, and their geographical location, (which is determined by the availability of both prey and water).

Having considered the physical limitations of activity, how do we describe the way animals move as a result of the way their limbs (if they have them) articulate? Groups of possible movements can be identified and described as activity patterns. These activity patterns are a series of movements following motivation that achieve an objective. The movements themselves will only form a pattern if they combine as an identifiable group, which must be repeatable. Being repeatable it is also possible that activity can be predictable. But this will only be practical if the causation is known and the pressures that determine the pattern are constant. A pattern may be illustrated by the actions of a bird that, in seeking food, hops from branch (a) to branch (b) and then to branch (c). If it does so on a regular basis, this becomes habit and the flight between the various branches is a predictable activity pattern. An introduced branch (d) may be ignored, even if it offers advantages.

The next consideration is motivation, i.e., what makes an animal do what it does. In higher animals, motivation may be considered the outcome of one or all of three drivers. The first is innate (i.e., instinct), the second is experience (i.e., a learned component), and the third is reasoning. In lower animals such as worms or bivalves, the driver may be purely innate in that a specific set of circumstances fires a set of neurons that produce a specific action. If movement is not spontaneous and random, it must be initiated by a cause (although it should be accepted that even spontaneous and random movements have causes). This causation is the stimulus.

My thoughts are that all basic activities may be regarded as books in a library of activities that are activated or stimulated by motivational triggers.

Books of the innate components are inherited as instinct, but in higher animals' experience may result in new books being added to supplement and compliment the innate. If a child places a hand into hot water for the first time, the stimulus of pain (the trigger) causes an instinctive reflex action and the hand is removed from the water. The experience is imprinted in memory, which reduces the risk of recurrence. This is a combination of innate and learned components that we simple refer to as learning. Some books may exist in the library of instinct, but are never read.

Experiences and their resulting books may also be added to the mental library of other animals, usually of the same species, by their observations, even though they have not been experienced directly by the observers, which is learning by copying.

Activity patterns have been investigated in a wide range of animals such as wolves and platypuses. Wolves of course are social pack animals and hunt as such, so their activity patterns are the resultant of those of each individual wolf. Patterns will vary according to the number of wolves in the pack, their interaction, the time of day or night, the proximity of humans and the type of prey. The wolf pack may shift its collective behavioural patterns in response to external pressures such as the movement of a herd of deer or the approach of a human hunting party. This introduces the concept of flexible activity patterns due to variations in the manner of integration of the innate and learned components of the wolves' hunting behaviour, but more significantly, the change is a response to external pressures.

This isn't found in the Platypus *Ornithorhynchus anatinus*, which tends to leave its burrow, at night, and spends half of that time foraging for invertebrates. The activities of both animals can be tracked by electronic tagging and any activity patterns thus identified. In both cases the stimulus is apparently the biological drive of hunger. But care is needed here and we cannot jump to conclusions. Hunger as a driver, may or may not be universal. Animals may feed not because they have a sense of hunger but because the act of feeding is induced by another stimulus. That is the root stimulus may be something different. We can only interpret hunger and other sensations in terms of our own senses and experiences.

Activity patterns may change due to the pressures of geographical season, breeding season, climatic variation and the population densities of both predators and prey. Or they may change spontaneously. My studies of a small cyprinid fish, the Bitterling *Rhodeus amarus* showed that feeding alternated between feeding on algae on a vertical surface, and feeding on the river bed. The whole shoal appeared to change activity following the change of one "leader". The questions raised are firstly why did the leader change its feeding activity and secondly why did the rest of the shoal follow? Certainly, there was no obvious observed cause for the change and we must assume that the rest of the shoal were copying the activity of a leader. This raises further questions such as why should one individual influence the activities of others? And how does a genetic sequence containing only A and T and C and G hold the data of such a huge range of innate activities? The bitterling/mussel relationship is symbiotic in that the Bitterling female lays her eggs in the excurrent siphon of the mussel and they develop within the mussel, eventually emerging as small juveniles. The Bitterling appears to have developed immunity to the parasitic larvae of the mussel. The activity of the Bitterling can be grouped into several activity patterns mainly exhibited during the breeding season. As a species, the Bitterling cannot survive without the mussel, but the reverse is not true. How this symbiotic relationship and the associated activity patterns evolved is of interest. It is also mysterious.

Activity patterns may also be identified as rituals, for example the mating displays of the peacock or stickleback. The activity of the male induces a suitable response from the female. But an alien observing humans dancing, in whatever form it takes, would probably be amazed at the variety, complexity, or in deed the purpose of such activity.

Climate change, and in particular global warming, can impact on all aspects of animal activity, for example the temperature related gender-determination of turtles and other reptiles, is now of increasing concern. Unrestricted seasonal migration (which is a form of activity pattern) of certain animals, such as polar bears or wildebeest, to more favourable environments may no longer be predictable.

Why animals do what they do is determined by what they must do and this is governed by what they can do. Form and function are integrated and evolution acts on any imbalance. Systems that are in balance result in little or no physical or anatomical change over vast time periods. The form of a shark or whale, which is in harmony with its environment, is stable. (The whale can never evolve legs. Why?). The anatomy of the human, which is definitely *not* in harmony with the environment, has in contrast, changed in a very short time. Unbalanced systems are dynamic and in such conditions the form of an animal and its activities are in a long-term state of flux. Activity patterns evolve to increase survival of the species and may be innate or learned, integrated or not integrated, but they can change in response to environmental pressures.

In the years since writing the bulk of the above I have become more aware of the many publications that describe animal activity. Some are in general agreement with parts of what I have written. Others perhaps less so. Most offer a far deeper view of the subject Probably many would make my non-statistical arguments look rather primitive and if I rewrote this article today, it may look very different. Whatever the reader's opinions on the accuracy and relevance of the contents, I hope it is of some interest and that, as a thought experiment, any rough edges can be forgiven.

Tony Thorn was awarded FBNA this year and is an active member with the Essex branch.

A Tale of Ice

Cliff Jones JP FRGS M Inst TT FBNA

I first visited Greenland 26 years ago as part of a BBC Natural History Radio team to do a program entitled 'Wildlife in the Arctic". I had recommended the visit mainly because I had been fascinated by the country since a boy after watching Peter Scott's efforts to protect the Greenland White-fronted Goose *Anser albifrons* and subsequently, I was intrigued as to why it had such a name since 80% of the land is covered in ice! I have since established that the last time it was green was 2.5 million years ago! It is known as the world's largest island – Australia is a continent.

Even at 30,000 feet the Greenland Icecap was clearly visible on the horizon and at that distance it appeared awesome in is enormity. An old travellers' saying is *'When you've seen the world there's always Greenland'* and I've waited until my 135th country to visit it! The approach, to the airfield at Kangerlussuaq is bleak and rocky; placed as it is at the end of the country's third largest fjord. It looks for all the world like a military airbase which is exactly what it was and I suspect still is!

I wrote in my journal at the time: 'Greenland was very important and strategic place during the second world war and indeed throughout the so called 'Cold War' when the areas around the island bristled with nuclear submarines, hence the presence of numerous US bases. There is also a concern in Thule, in the north west of the island, which has strained relations between Greenland/Denmark and the USA regarding the secrecy surrounding a B52 bomber air crash in 1968. As recently as 2000 the US admitted that, following the clean-up operations, only three of the four hydrogen bombs it was carrying had been recovered! Our base was Ilulissat which means 'iceberg', it is the third largest town in Greenland, and noted for having more sled dogs than humans!

The schedule was pretty tight and we only had 4 days to complete our assignment, so it was down to work immediately and plan our itinerary.

Our first quarry was to be the Musk Ox *Ovibos moschatus* (in Latin "musky sheep-ox") from the sub family Caprinae, which includes ibex, goats and sheep. The only other ungulate in this sub family is the Takin *Budorcas taxicolor* found in the Himalayas. *O. moschatus* has a prominent bony shield on the forehead not dissimilar to the "Boss" on an African Cape buffalo. Strangely, it is neither an ox, (since it is closely related to goats and sheep hence its Latin name) nor has it any musk glands! Nevertheless, it presented a pretty formidable and handsome creature on the snowy wastes of the Greenland Ice sheet.

We had a tip-off that there was a small herd just below the summit which our driver quickly found for us and positioning ourselves looking down on the herd some 200 metres away (they are an extremely nervous species) with howling wind whistling around our faces, Mark Stephen, currently the presenter of the regular BBC Radio Scotland programme *'Out of Doors'*, prepared to interview me to describe the scene. He began by shouting over the freezing wind, *"Cliff what are we looking at now?"* as I attempted to make myself heard. Whilst directing my remarks at the herd, when suddenly I was unable to speak because my jaw had literally frozen! We stopped everything and found shelter and warmth in the vehicle to recover and Mark said *"I never thought I would ever see the day when Cliff Jones was speechless".* This unpleasant experience was not surprising since the temperature was minus 40°C! The record for the Greenland ice sheet is minus 69°C. Happily, we did eventually record a satisfactory piece which was broadcast.

Early the following morning we received a message from our hosts in Ilulissat that a very large Polar Bear *Ursus maritimus* (our second quarry), had been observed on an equally large iceberg floating down from the north towards the town. We immediately set off in a blizzard and thick snow but before we reached the area where the bear had been seen, we received a mobile phone call informing us that the person who had first spotted it, claimed the local tradition namely; *'the first person to spot a bear in the new season melt, has the right to take the first shot at it'* and this he did and consequently killed it. What a tragedy that such a magnificent endangered animal should become a victim of a sporting competition. Sadly, we didn't see any more, therefore our second quarry had to be abandoned. To make matters worse the only evidence we saw during our stay of our third quarry, a whale, was on a butcher's slab in Ilulissat.

Polar Bear killed on the ice flow

Enjoying martini on 10,000-year-old rocks!

Photos: C. Jones

By now we were struggling for content for our broadcast and we had to resort to covering the annual dog sled race which was taking place at the time of our visit. Thereafter, I promised myself that I just had to return to this fascinating country and this I did in 2004.

My return visit was enabled by an invitation to join the Fred Olsen MV Black Prince as Guest Lecturer to do five lectures on the subject, "An Introduction to the Birds and Cetaceans of the Arctic". The Black Prince was not new to me because I had travelled previously been on it in 1962 when it was in service as a ferry/car on the Newcastle / Stavanger route, as the Venus, notoriously known as the 'Vomiting Venus' due to its flat bottom stability on this part of the North Sea. I remember clearly it living up to its reputation, fortunately not affecting me but it certainly did my companion. He was extremely grey looking on disembarking!

I was accompanied on this occasion by my wife, Val and we flew in to Ummannaq to join the Black Prince which was anchored in the fjord. Due to tedious immigration formalities, it was dark by the time we boarded so it was an early dinner and bed! If yesterday was an early start, then today, I went one better because I was on deck at 05.00 along with several other guests all armed with binoculars and who, like me, wanted to enjoy the hours daylight sail before the arrival in Ilulissat. As we navigated through the many icebergs, marvelling at the skill of the 'ice pilot' who had been on board since the beginning of our voyage, we stood open mouthed and speechless as the scene before us constantly changed in the awakening dawn light. The area is noted as a 'hot spot' for Humpback Whale *Megaptera novaeangliae* but not this time. Soon, recognisable shapes in the form of the Arctic Skua *Stercorarius parasitcus*, Fulmar *Fulmarus glacialiscode*, Ivory Gull *Pagophila eburnea* and Iceland Gull *Larus glaucoides* floated by and the melt-water ice brushed noisily against the bows. It was truly an unforgettable and awesome sight.

Musk Ox *Ovibos moschatus*

Humpback Whale 'flukeing' Illulissat
Photos: C. Jones

I am often asked on such occasions why an announcement from the Bridge couldn't be made that a whale is approaching since, if their size, their image appears on the radar screen? Well, I fear I may be responsible for the discontinuing of this practise. I was lecturing on the MV Ocean Majesty on a cruise to Iceland when two Orca's *Orcinus orca* surfaced less than 100 metres from the ship on the starboard side, midships so I immediately alerted the Bridge who promptly made the announcement. Unfortunately, it was in the middle of lunchtime and everyone in the dining room got up and went and to look with the result the vessel tipped steeply to starboard and all the meals, cutlery and glasses went crashing to the floor. I was not the flavour of the month with the dining room staff!

Both Val and I booked a mid-morning "Iceberg Experience" boat trip so whilst the ship was at anchor at the entry point to Ilulissat harbour (a hot spot for whale watchers) I was able to spend a very profitable and enjoyable couple of hours on deck, armed with camera and binoculars. During this time, I had fairly close sightings of two Humpback Whale *Megaptera novaeangliae* as they circled around the vessel and at one point, they were joined by the second

largest whale, the Fin Whale *Balaenoptera physalus*, which came even closer!

At 11.00 am we boarded a small fishing boat and for the following two hours we sailed amongst the icebergs. To see these floating polar leviathans at such close quarters has to be a rare privilege. It would not be overstating the matter if I said they were indescribably beautiful. Much has been written and said about icebergs and their impact upon the human psyche when these breath-taking natural structures are first encountered, yet despite this I can truthfully say that nothing can adequately describe the experience. Of all the adjectives I have ever heard or read I think the nearest one to getting a true feel of the moment when one first sees the enormity and grandeur of them is the one used by my wife Val when she said *"It's like fairyland".* A childlike description yet at the same time capturing perfectly that true moment of awe and wonder so well known in the very young. For one used to travelling the world and seeing some exotic places I have no hesitation in saying that to sail amongst nature's beautiful and monolithic ice sculptures is a sight and an experience which will forever be indelibly imprinted on my memory. We were fortunate to be allocated to the vessel "Esle" skippered by Thorvald Jensen, a Dane but now a resident Greenlander. His discourse on the origin of the icebergs and their effects upon the geology of the land was both enlightening and humorous. He briefly touched upon climate change and global warming but was reluctant to engage in any meaningful discussion fearing, one assumes, that any conclusions might seriously damage the lucrative tourist trade he currently enjoys. However, he did say that when he first started taking tourists to the icebergs and the glaciers, trawling for halibut he would have to sail 29 miles (46 kms) to the glacier face now that sail is only 19 miles (30 kms)! The encroaching melting ice, as it approaches the sea, could have devastating effects upon the sea level with some predicting a global rise of 6 metres, which would put most of Essex and London under water! A standard tourist gimmick on the voyage is the novelty of having 'Martini on 10,000-year-old rocks.' Thorvald sailed the boat within touching distance of a large iceberg and with a grappling iron hacked off large lump of ice which he proceeded to chop it into manageable pieces with a sharp knife. The chopped pieces of ice were placed in a clear plastic glass and the martini poured on top. The noise of the releasing air between the ice flake layers as the martini mixed with ancient ice was very audible even without the necessity of putting the glass to one's ear. Ordinarily this unique experience would have been a suitable climax to the occasion but all was not finished. Throughout our 2-hour sail, we had been blessed with an excellent sunny day, clear blue skies, no wind and calm seas and as the ship's engine idled and we sipped our martini to the occasional call of a gull there was an almighty thunderous roar as ice from a nearby iceberg began tumbling into the sea (called calving) causing a considerable tidal wave.

Simba's Head *Photo: C. Jones*

Despite the bright sunshine the atmosphere around the icebergs is extremely cold; to be likened to standing in front of an open butcher's freezer room such was the radiated cold!

We sailed noiselessly in and out of the icebergs, and for much of the time a sepulchral silence descended on the assembled deck watchers as we gazed, open-mouthed at the drifting icebergs. Between the gasps of amazement an observer would liken a particular iceberg to a familiar structure such as church or bridge. Just as one is often drawn to a flaming fire and sees so many different images within the flickering flames so too it is with the outlines or structure of the iceberg "*It's just like a cathedral*" says one, "*A small village with a country church*" says another; each one having its own character and appeal.

The temptation to say one is better than another is inevitable since they are all equals in their magnificence but, for me at least, my primus inter pares has to be the one I christened "Simba's Head". A more realistic lion would be hard to find.

Cliff Jones became a Fellow in 2020. His career involved leading nature tours, bird watching cruises in Africa and India and giving lectures on board cruise ships.

An Abundance of Orchids

Pauline Rutherford MBNA

Wild flower meadow in Cairngorm National Park *Photo: P. Rutherford*

The abundance of a species is an important factor for understanding the ecology of an area and for assessing the land management for it; when done correctly, the risk of species declining or becoming endangered is lowered.

NatureScot is the Scottish Government body which sets out the guidelines, and plays a major role in protected. A way of protecting these vulnerable area or species, is to give them a designated status; therefore, preventing or reducing any disturbance or renovations which can cause harm. Two of these designations are "Area of Outstanding Natural Beauty (AONB)" and "Site of Special Scientific Interest (SSSI)". Other designations are decided by local authorities; such as "Site of Nature Conservation Interest" (SNCI) or "Site of Importance for Nature Conservation" (SINC), which gives these sites 'Statutory Protection', covered by legislation in recognition of its biodiversity value.

Many counties in Scotland have systems of non-statutory sites of importance for nature conservation which is in addition to the statutory National Nature Reserves, Sites of Special Interest and Local Nature Reserves.

There are 52 species of wild orchid in the UK, many are extremely rare and can only be found in a few locations within the British Isles; and some carry special protection from Natural England, coming under Section 13 of the Wildlife and Countryside Act 1981. All these species are quite vulnerable and have a preference for low fertility soil with poor nutrition.

I have been following the species of orchids in two areas within the Cairngorm National Park, for several years now. Both areas are wild flower meadows, of roughly the same size and have high numbers of a single individual species, in each of the two areas.

The first area is a meadow in private ownership, where great care has been taken to maintain the site by minimum intervention. Whilst there are no public footpaths across the site, the orchids can be seen from a roadside stock fence, allowing excellent views of them, whilst minimising losses due to trampling. The dominant species in this meadow is Lesser Butterfly Orchid *Platanthera bifolia*, followed by Small White *Pseudorchis albida*, with lower numbers of Heath Spotted *Dactylorhiza maculata* and Northern Marsh *D. purpurella.*

The site has been methodically counted in late June for quite a few years now to monitor the natural fluctuation in numbers of flower spikes and how they react to some of the extremes of weather in recent years. As an example of how delicate these flowers are regarding weather, this year (2021) has been no exception. On the night of 22nd June, just as the orchids were mostly in full flower, there was a light frost (-1°C) which caused the Lesser Butterfly Orchids to collapse making this year's count, (due a few days later) impossible.

The very hot summer in 2019, also affected all the species, reducing the numbers considerably, thankfully with a recovery the following year.

The management is non-intensive, casual grazing by cattle, annually between May and December, with the main grazing period from late summer through to winter so as not to encroach on the orchid flowering season. Some management has also started to remove invasive broom and birch, which hopefully will continue for the future. This ad-hoc grazing arrangement and management seems to be working for the benefit of the orchids with numbers holding up and species like small whites and northern marsh increasing in numbers year on year.

The Second area is on a National Nature Reserve – Tromie Meadow, part of RSPB Insh Marshes. The main species here is Heath Fragrant Orchid *Gymnadenia borealis*, followed by Heath Spotted *Dactylorhiza maculata*. Low numbers of Small White *Pseudorchis albida*, Greater Butterfly *Platanthera chlorantha* and Northern Marsh *Dactylorhiza purpurella* are also recorded. It is interesting to see the fluctuation in numbers over the years (see graph), with possibly changes to the management as the main factor responsible. There were large numbers of Heath Fragrant recorded in 1986 and 1988, then no records until 2013 when numbers were quite low. From 2014, however high numbers were found again. The reason for this could be down to traditional grazing from sheep, ponies or cattle through the autumn and

winter. In 2016 this management was changed from livestock to mechanical means, (due to a lack of available livestock from local farms), the numbers in 2017 were poor. In 2018, with the reserves own herd of Konic Ponies and no problems with livestock grazing, the high numbers returned but, unfortunately, there are no recent records as the Coronavirus lockdowns prevented this. This year (2021) it looks like it could be another good year for records, providing the counts go ahead.

It would be interesting to know more about the first site in ecological terms, and whether the Cairngorm National Park Authority (CNPA) or NatureScot, have any plans to consider further study of the area. Both organisations do help with the counts there, which helps them to build up a picture of the importance of the site nationally.

The owners of both areas work closely with CNPA, NatureScot and Plantlife; and work with local farmers to retain the sites as part of a wider agricultural holding whilst maintaining its wildflower importance.

If there was to be a change of ownership for the privately owned meadow, then these vulnerable species could be lost; therefore, the importance of regular recording ensures a base-line record is available indefinitely.

We as naturalists can only continue what we do and hope that is enough to ensure these important sites and species remain for many years to come.

Greater Butterfly orchid

Lesser Butterfly orchid

Small White with Heath Fragrant orchids

Greater Butterfly orchids in abundance

Tromie Meadow *Photo: P. Rutherford*

Heath Spotted orchid
Photos: S. Rutherford

Acknowledgements
Data supplied by: Pete Moore, (Warden of RSPB Insh Marshes) who provided information on Tromie Meadow; and Stewart Taylor, who is involved with the annual counts for the private meadow.

Species	1986	1988	2013	2014	2015	2016	2017	2018
Heath Spotted			886	916	2875	3104	492	n/c
Heath Fragrant	5961	9710	297	3262	1049	1552	275	4290
Greater Butterfly			3	2	4	14	8	17
Small White			3	2	1	30	8	15
Northern Marsh			4	4	3	11	4	n/c

Tromie Meadow - Whole Meadow Count NN785996 *Graph supplied from P. Moore Warden – RSPB Insh Marshes*

Getting Under the Skin of the Essex Coast

Dr. Chris Gibson FBNA

Many of us took on special projects during the Covid lockdown. For Jude and me it was a mental perambulation of the entire Essex coastline, some 600km long if it is taken, as we did, as being the whole tidal frontage from Manningtree in the north right to the boundary of the former lands of the East Saxons, the River Lee, barely six kilometres from Tower Bridge.

Our mind walk became eighty thousand words and, as a prelude to hopeful publication, we have since then been exploring some of the hidden corners, taking photos to illustrate its essence, from the windswept outer marshes to the tendrils of tide that creep into industrial backwaters in the heart of east London, all with stories to tell and wildlife on show. What follows is a few of those stories, of the tenacity of nature, its ability to surprise (not least us, after 35 years and a lifetime respectively, living and working in the county), and hopeful signs of improvement in uncertain times.

Barking Creek

Barking Creek

Starting in the south-west, Barking Creek was new to us and a genuine delight. In days long past, home to England's largest fishing fleet, it is now known for its huge, 40m-high drop-down tidal barrage at Creekmouth, one of the numerous ancillary structures to the main Thames Barrier and flanked by Europe's largest sewage treatment works at Beckton. The meandering creek is tidal into Barking, bringing Reed Warbler *Acrocephalus scirpaceus* and Cetti's Warbler *Cettia cetti* and Hemlock Water-dropwort *Oenanthe crocata* to within easy reach of the town centre, with its historic quay and abbey. Nearby, Cuckold's Haven nature reserve has all sorts of interesting plants from chalk-loving Hoary Plantain *Plantago media* and Greater Knapweed *Centaurea scabiosa* to natives of the Mediterranean, like Greek Dock *Rumex cristatus* and Bladder Senna *Colutea arborescens*, a multicultural mix worthy of our capital city.

Thameside Nature Discovery Park

Thirty kilometres downstream, the Thames starts to broaden out. Along Mucking Reach lies a tract of land which more than any was transformed by history. History in this case is rubbish, domestic refuse brought here from London by barge and lorry, and landfilled into former gravel pits. Now full, the refuse is being capped and transformed into extensive wildlife habitats in conjunction with the Essex Wildlife Trust as the Thameside Nature Discovery Park. The first 50ha is complete, and a further 300ha will follow; the excellent visitor centre sits atop the restored refuse mountain with panoramic views over the river and Mucking Flats, of migrating seabirds and feeding waders, Avocet *Recurvirostra avosetta* and Black-tailed Godwit *Limosa limosa* reaching more than a thousand each. Rare insects such as Shrill Carder-bee *Bombus sylvarum* and Phoenix Fly *Dorycera graminum* thrive in the extensive grasslands, while Corn

Greek Dock

Buntings *Emberiza calandra* sing alongside numerous Skylarks *Alauda arvensis*; to me, the place in high summer has very much the feel of nothing less than the extensive grassy steppes of eastern Europe.

Wallasea wild coast project

Wallasea Island

Further east still we reach the delta-like complex of low islands between the mouths of the Thames, Roach and Crouch. One of the largest is Wallasea Island, home to a project that over the past decade has reshaped the Essex coast and enhanced to a remarkable extent the wildlife riches of the county's south-eastern corner. When I worked in the English Nature Colchester office in the early 1990s, on the wall was the whole county at 1:50,000 scale, a painstakingly collaged set of the relevant Ordnance Survey maps. At eye height was a fascinating sight – half a hand-span of empty space surrounded by a sea wall, the only mapped features being a dozen parallel north-south ditches some 300m apart from each other. Nowhere else on the coast was anywhere nearly so empty. That impression was not dispelled when I first visited. However, as conservation thought turned from protection to enhancement, what would now be called rewilding, it started to look more and more like an opportunity, a blank canvas on which to paint the environment of the future.

The first opportunity arose around the turn of the Millennium. The UK Government had just been found guilty under EU law of permitting the destruction of two areas of mud for port expansion (Lappel Bank on the Medway and Fagbury Flats on the Orwell). And quite right – it was legalised vandalism. Compensation was required, we had the experience of developing managed realignment, and so 110ha of new intertidal was created.

But the big vision for the remaining four-fifths came from the RSPB who saw an opportunity to go into beneficial partnerships that would help deliver landscape recreation on a very large scale. The biggest problem with Wallasea was that since the original sea wall was built, the land has continued to sink relative to the sea, leading to a height differential of 2 metres or thereabouts. Break down the walls and let it flood, and the best you are likely to get for many years, even given high siltation rates, is a deep lagoon, of more limited wildlife value than mud and marsh. Then along comes Crossrail, a new east-west rail line under London whose boring activities were producing vast amounts of chalk and clay which needed to be disposed of legally and safely. To raise the land level inside the sea wall to the level at which marsh and mudflat would form quickly, the RSPB was able to take more than 3 million tonnes of this spoil: a 'win-win' for conservation and construction, and so the Wallasea Island Wild Coast Project was born. Another 115ha was opened to tidal inundation, and most of the rest of the island fitted with shallow pools and brackish wetlands. Already the 'regular' estuary birds are using it in force: breeding Avocet and Marsh Harrier *Circus aeruginosus,* wintering Peregrine *Falco perigrinus* hunting the flocks of waders and ducks, migrant Whimbrel *Numenius phaeopus* and Green Sandpiper *Tringa ochropus,* for example, along with Corn Bunting and Yellow Wagtail *Motacilla flava*. Safe to say the island's full potential is only just coming to be realised: recent bird counts have revealed more than 30,000 wildfowl and waders on Wallasea alone, significantly more than the average peak for the whole of the Crouch and Roach Estuaries (within which it sits) combined. And the reserve is about so much more than just birds. The damp grazing marsh is diversifying well, and already includes numerous showy members of the pea family including the coastal specialists Sea Clover *Trifolium squamosum* and Narrow-leaved Bird's-foot-trefoil *Lotus tenuis,* all important forage species for declining bees.

The Inner Blackwater

The largest estuary wholly in Essex is the Blackwater, with Maldon at its head. Or almost so: in fact, the tidal system runs a few kilometres further into the ancient heart of the county. As is so often the case, the very upper reaches of the estuary are complex and changeable, and have been heavily modified over time. None more so than here where the freshwater rivers Blackwater and Chelmer meet the tide, modified by a series of canals and navigations, cuts and mill races. The muddy river channel is frequented by Common Redshank *Tringa totanus* and Eurasian Teal *Anas crecca* in winter, while the scattered fringing reedbeds have breeding Reed Warbler and stands of Giant Hogweed *Heracleum mantegazzianum*, alongside the improbably named Beeleigh Falls, a most surprising water feature in the sluggish waterscapes of Essex. Almost equally improbable just downstream is Heybridge Gravel Pit, a freshwater lake flanked by the Chelmer-Blackwater Navigation on one side, and the open estuary on the other. Between freshwater and salt is only a clay sea wall, a very vulnerable interface at times of climate collapse. But it holds, for now, and on some lengths constitutes the most orchid -

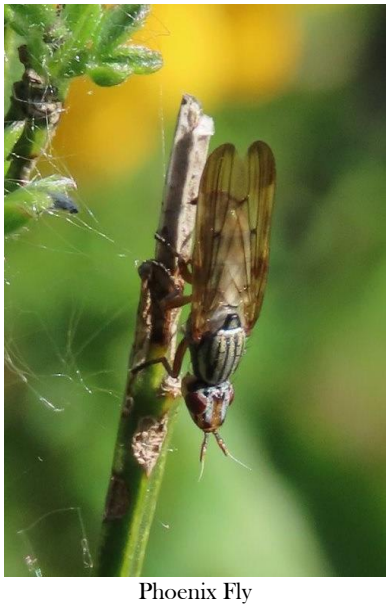
rich grassland (mostly Pyramidal *Anacamptis pyramidalis* and Bee Orchid *Ophrys apifera*) in the county away from the outlier of North Downs chalk in Thurrock.

The Boltholes of Wivenhoe

Sometimes the most surprising things are right under our noses. And for us that was certainly the case: it needed the constrained horizons of lockdown to see them. Within a hundred metres of our flat is a wooden jetty over the tidal River Colne. Oft-walked, but rarely really looked at: the lens of the pandemic introduced us to the boltholes of the timbers, each a 2cm micro-habitat, a faerie garden of delights, with mosses and lichens, everyone a unique masterpiece of microcosmic design.

And so, our mental stroll is complete. The words are written and most photos taken. All we need now is a publisher for the six-volume *Not Just a Field Guide to the Essex Coast* to become a reality. Six volumes, recognising that most people would prefer to carry around a 100-page slim volume on their travels, rather than a 500-page brick. And, not just a field guide, as it is much more than wildlife, from landscape and geology to history and architecture, hopefully everything that anyone with an enquiring mind would be interested to explore. Wildlife guide, travelogue, professional autobiography and call to arms to help protect this woefully underappreciated maritime treasure, it has of course already been invaluable in helping us through dark times, so actual publication would simply be icing on the cake.

Dr Chris Gibson is a passionate advocate for the wildlife and wild spaces of the Essex coast, having spent most of his working career protecting and enhancing it, and putting it on the conservation map. He is a Trustee of BNA, and a former recipient of the David Bellamy Award; his naturalistic exploits since taking early retirement can be found on his website www.chrisgibsonwildlife.co.uk.
All Photos: C. Gibson


Phoenix Fly


Wivenhoe boltholes


Pyramidal Orchid


Grassy plains Thameside Discovery Park

Get Carder!
Fifty Years of Natural Recovery at Blackhall Rocks

Tim and Joseph Gardiner

"An absolute vision of hell"
Get Carter, 1971

On a trip to Scotland in August 2021, we stopped-off at Blackhall Rocks beach to find out how the area had changed since being featured in the final scene of bleak gangster movie "*Get Carter*" in 1971. The beach is situated 30 miles south of Newcastle and five miles north of Hartlepool on the north-east coast. A more desolate location for Jack Carter's (Michael Caine) pursuit of Eric Paice (Ian Hendry) is hard to imagine with the beach black with coal waste from nearby Blackhall Colliery, dumped from the high aerial flight conveyor into the sea in the 1970s. In the 50 years since the iconic film, we found the beach and cliffs rather different to the filmic vision of hell portrayed in 1971 when the Colliery was still operational, finally closing in 1981.


Blackhall Rocks beach

The grassland on the cliffs from which the sniper shoots Jack Carter dead in the film, was wonderfully flower-rich with Knapweed *Centaurea nigra*, Bird's-foot-Trefoil *Lotus corniculatus* and Red Clover *Trifolium pratense* utilised by abundant Common Carder bees *Bombus pascuorum*. The highlight from the pollinators was undoubtedly seeing numerous (10) Wall butterflies *Lasiommata megera*, a scarce species in our native East Anglia largely restricted to seawall flood defences, but fairly well distributed along this rocky stretch of coastline. The Small Heath *Coenonympha pamphilus* was also numerous in the sparse grassland along the cliff top and on the slopes. From tall grass, the Common Green grasshoppers *Omocestus viridulus* was heard stridulating throughout the afternoon. This insect is generally an unimproved grassland species in our native East Anglia so its abundance probably indicates the remnants of ancient meadow along the clifftops.

Towards the northern end of the beach where the conveyor buckets dumped coal waste into the sea, we ascended the cliff path to where Carter killed Eric in the film, finding it so different to the excoriated and largely unvegetated cliff of 1971. Flower-rich grassland with Small Heath and Wall butterflies made the scene largely unrecognisable from the pessimistic panorama of the early 1970s, while Common Green grasshoppers chirped from the longer grass. Fifty years of succession from bare earth to sparse grassland has resulted in a sward of high value for invertebrates.

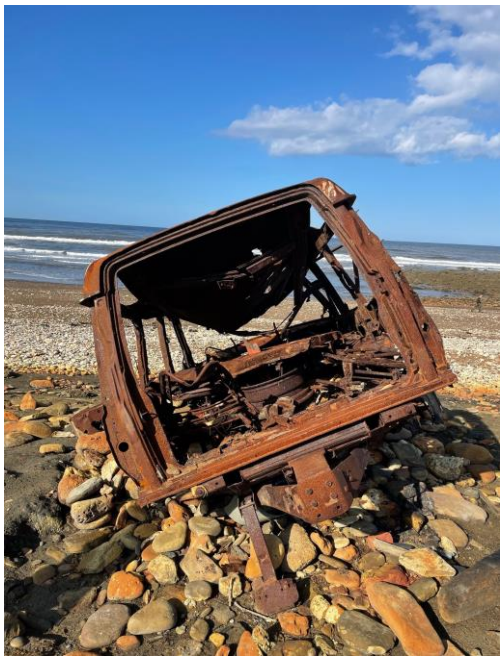
Following the old concrete track of the long-removed conveyor to the beach, we found the base of the tower from which Eric's body was dumped into the sea with the coal waste. My son was fascinated with the rusting ruins of an old jeep sunk into the sand. Dotted along the shore were lumps of sea coal, a reminder of the polluted past. The sand was also still soot black from the Colliery waste deposits. The legacy of environmental degradation will take at least another 50 years to disappear according to ecologists. It's sobering that the most serious long-term damage to this coastline will outlive most of us.

On our way back along the beach, we spotted a black lagoon adjacent to the cliffs which appeared to have little vegetation growing in it. However, on closer inspection we spotted several patches of the branched Widgeon-grass *Ruppia maritima*. Widgeon-grass is closely allied to *Zostera* eelgrasses and while not a strict seagrass it often forms habitat in tidal lagoons which is similar. It is also one of the first species to recolonise polluted and degraded tidal lagoons

so its presence indicates that the beach may be on road to recovery after 50 years. It is thought Widgeon-grass often paves the way for colonisation by *Zostera* eelgrasses. In Essex, *Ruppia* has been found in degraded tidal lagoons at Goldhanger, Mersea, Walton-on-the-Naze, providing habitat for fish and benthic invertebrates where it occurs.

Dr Tim Gardiner PhD FBNA is an ecologist, poet and children's author. His scientific papers, poetry and prose have been published all over the world. He received the David Bellamy Award in 2013. Joseph is Tim's son.

All photos: T. Gardiner



Rusting remains of a beach jeep

Sea Coal

Flower-rich cliff after the long-removed conveyor

Black lagoon

Rare Invertebrates in the Cairngorms: Discovering the Northern Silver Stiletto Fly

Genevieve Tompkins

The Rare Invertebrates in the Cairngorms (RIC) partnership project, which began in 2017, is working to improve the fortunes of several rare insect species found in the Cairngorms National Park. The project's initial drive was to work, with a team of volunteers, to better understand the species' distribution. While continuing to map the species, we have more recently begun to move into a new phase; using this data to work with landowners on habitat management and with students to develop more detailed studies of the species' ecology. The focus species are Kentish Glory moth *Endromis versicolora,* Dark Bordered Beauty moth *Epione vespertaria*, Pine hoverfly *Blera fallax*, Small Scabious Mining bee *Andrena marginata*, Northern Silver Stiletto fly *Spiriverpa lunulata*, Northern Damselfly *Coenagrion hastulatum* (since 2021), Northern February Red Stonefly *Brachytera putata* (since 2021) and Shining Guest Ant *Formicoxenus nitidulus* (2017-2020).

One of the least well known of this list of undervalued species is the Northern Silver Stiletto fly (NSSF). The name 'stiletto' fly refers to the species tapering, dagger-shaped body and is given to a group of fourteen flies found in the UK, Therevidae, who share this feature. As well as this distinctive body shape, the Northern Silver Stiletto fly has shining silvery hairs on the thorax, relatively long legs and, in the females, dark markings along the abdomen.

Northern Silver Stiletto flies have a fascinating life history. The species is associated with river shingle habitat (also known as exposed riverine sediments), a habitat for which Scotland is of international importance. River shingle is a diverse habitat which can range from barren cobbles to well vegetated islands.

Northern Silver Stiletto Fly *Photo: G. Tompkins*

Those sites used by the Northern Silver Stiletto fly tend to feature a mix of sand and shingle, deposited by mobile rivers, and a range of flowering plants. Larvae are ferocious predators of other invertebrates within the sandy sediments before emerging as winged adults in late spring/early summer. Adults feed on the nectar and pollen of flowering plants. Fascinating behaviours are often attributed to larger creatures than insects, such as birds and mammals, but these tiny animals display an equally incredible performance. Males hover and spin in the air, often above particular points on the river shingle, in a silvery, shining dance.

Spiriverpa lunulata larva *Photo: G. Flinn*

It is thought that these groups of male flies are "lekking", in the same way as birds such as Black Grouse *Lyrurus tetrix*; competing for females in a communal breeding display. The theory is that nearby females enter the swarm and select a male, based on his performance, to mate.

Although more recent survey work has increased the species' known distribution, it is still included on the Scottish Biodiversity List and is vulnerable to the same threats which face the many other rare invertebrates which live on river shingle. These are river "improvement" and flood prevention schemes (which alter the course of rivers and sediment deposition), sand and gravel extraction, afforestation (the species is intolerant of shade), excessive trampling by both livestock and people and water pollution.

To date, an incredible 44 surveys for the Northern Silver Stiletto fly have been carried out by project staff and volunteers. In order to train volunteers in how to survey for and identify this lesser-known insect, 5

training days were carried out over the 5-year period, with an initial session in 2017 with national expert, Stephen Hewitt. Stephen also produced an identification guide to the species, including similar confusion species, which can be found on the RIC Hub: https://rare-inverts-rspb.hub.arcgis.com/. Data collected included individual flies and lekking males, plus rarer sightings of a larva, a mating pair and an egg-laying female. This not only develops our knowledge of the species distribution, but also expands our understanding of the ecology and behaviour of this fantastic fly.

A drone survey, carried out as part of an RSPB sabbatical in 2018, and aerial mapping allows us to identify potential shingle sites to survey across the whole of the National Park, with intrepid volunteers sometimes having to cover several miles on foot or by bike to reach the survey sites. This work has significantly increased our knowledge on the current distribution of the species in the Cairngorms, with 19 new 1 km^2 sites discovered by the project team. We have expanded the known distribution of the species further westwards and southwards within the park, discovering the fly on completely new rivers, such as the rivers Garry and Tilt, near Blair Atholl, and Builg Burn, near Glen Avon. The project has also re-surveyed historical sites, to confirm ongoing occupancy, finding the species at four previously known sites across the park.

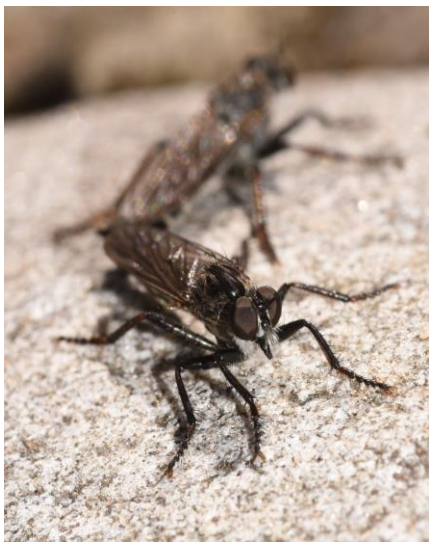
What is needed for this species is a greater understanding of the importance of dynamic river systems and unpolluted freshwaters, as well as a greater appreciation of the significance of river shingle habitats. Surveying for the fly across the National Park allows us to initiate conversations with a wide range of landowners and local communities, highlighting the importance of river shingle, a hugely overlooked habitat type. We outline the threats faced by the habitat, introduce people to the wonderful species that live on it and, where needed, suggest changes or improvements to protect shingle sites. We are also working with other conservation organisations and projects to inform management activities, such as river restoration projects, to ensure existing shingle is treated sensitively and provide a baseline of data for the Northern Silver Stiletto fly.

Male lekking site on the River Garry *Photo: G. Tompkins*

The Northern Silver Stiletto fly shares its river shingle home with a wide range of other rare and specialist invertebrates. Project volunteers and staff often include these hugely under-recorded species in their surveys, while management, advocacy and advice for the stiletto fly often benefits these other insects. Some of the other stunning species we see while surveying includes the Five-Spot Ladybird *Coccinella quinquepunctata,* the Nationally Rare Northern Robberfly *Rhadiurgus variabilis* and Dingy Skipper *Erynnis tages* and Small Blue *Cupido minimus* butterflies, both included on the Scottish Biodiversity List.

While we have an idea of the habitat requirements of the Northern Silver Stiletto fly, this is largely anecdotal and based on observations made by surveyors. In 2021, Morwenna Moore, a Sustainability and Ecology MSc student at the Centre for Alternative Technology, carried out systematic surveys of 19 sites where the Northern Silver Stiletto fly has been recorded through RIC. Morwenna's project aims to measure habitat variables at each site, including composition of shingle types, composition of plant communities and site topography.

We hope that Morwenna's work will allow us to better understand the habitat features required by the fly, leading to a more focused survey approach and better tailored management advice. Her project has now moved into the data analysis phase, with the full report due in 2022, but early results show a preference for a heterogenous habitat featuring a wide range of organic matter, with an average of 19.7 plant species per site.

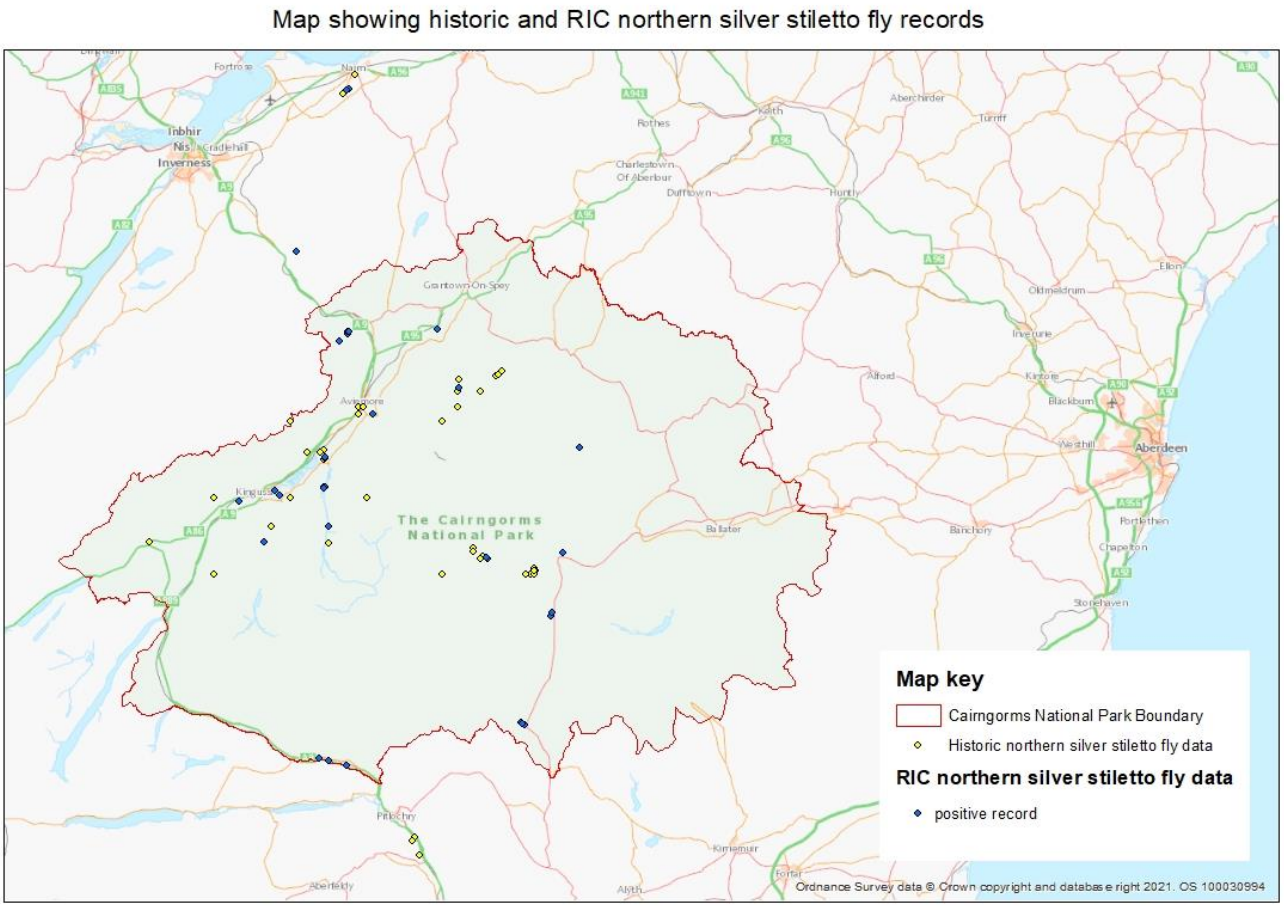


Nationally rare Northern Robberfly
Photo: G. Tompkins

With a growing appreciation for river shingle and its invertebrates amongst communities, landowners and land managers, the future looks bright for the Northern Silver Stiletto Fly. This stunning species, with its fascinating behaviours and complex ecology, is finally enjoying its spot in the limelight, delighting those lucky enough to see it.

Genevieve Tompkins is the Rare Invertebrates in the Cairngorms Project Officer. It was a chance encounter with BNA Trustee Roy Stewart which resulted in this article and her BNA membership.

Lekking male NSSF *Photo: G. Tompkins*



NSSF records map. The species has a scattered distribution throughout the UK with the Cairngorms National Park a stronghold.
Ordnance Survey data Crown copyright and database right 2021 OS 1000030994

River Feshie shingle

Egg laying female Northern Silver Stiletto fly

Five-spot ladybirds – River Nairn 2021

Dingy Skipper

Small Blue Butterfly

All Photos: G Tompkins

References:

The Rare Invertebrates in the Cairngorms project partners are: RSPB, Buglife, Butterfly Conservation, Cairngorms National Park Authority, Nature Scot and British Dragonfly Society. The project was part-financed by the Scottish Government and the European Community LEADER 2014-2020 programme for the period between 2017-2019. During 2020-21, the project has been funded by the Cairngorms National Park Authority, RSPB Scotland, Cairngorms Connect (via the Endangered Landscapes Programme) and the Cairngorms Trust Green Recovery Fund.

A Question of Morels

Roy Stewart MSc FIBMS FLS FRSB MBNA

Morchella esculenta by TOMMES-WIKI - Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=27753655

True Morels (genus *Morchella* Dill. ex Pers.: Fr.) was typified by Christian Hendrik Persoon in 1794 with *Morchella esculenta* designated as the type species. They are fungi that are classified as Ascomycota, Pezizomycetes, Morchellaceae and genus *Morchella*. They produce the largest fruit bodies within the Ascomycota and can reach a height of 20cm. The hymenium has a typical highly folded and exposed honeycomb appearance producing a very large surface area for spore dissemination. They are highly prized for their gastronomic qualities and are highly sought after especially in temperate areas of the world, mainly fruiting in early spring but there are a couple of autumnal species. Morels are some of the most valuable special forest products in Western North America, and the annual commerce related to morels is thought to be between $5 million to $10 million per year in this region. In China, the annual export of dried morels increased five-fold from 181,000 kg to 900,000 kg during the past 5 years, averaging $160 US dollars per kg. Morel festivals are held in several countries but perhaps the most noted occurs in Michigan in Northern America each year and the most famous is in Boyne City. In 1984 it celebrated its 25th anniversary when the champion on that day found over 500 morels in 90 minutes. Apparently, the all-time record was over 900 morels collected by one person in 1970.

The genus is distributed worldwide but recent molecular phylogenetic studies suggest that individual species exhibit high continental endemism in the Northern Hemisphere, and approximately 20 species have been recorded on more than one continent The highest species diversity of true morels is concentrated in Europe and West Asia, East Asia (mainly China), and North America but currently two adjacent regions. More than 20 species have been found in turkey and Cyprus has 11 species. The genus has been the source of considerable taxonomical classification especially with regard to the number of species and traditional classification relies on morphological features and also environmental and ecological associations. These results lead to the classical binominal Latin name as devised by Linnaeus and even using this method it indicated that morels have an intricate genus. Due to insufficient microscopic detail and high levels of variability in form and colour of ascocarps during different developmental stages affected by ecological and climate factors, the species number in *Morchella* by traditional identification varies from 3 to 50 or more, which has also caused confusing use of homonyms and synonyms.

With the advent of molecular biological techniques, the latest study suggests 79 species and this includes several new species that have been described from Australia, Canada, Cyprus, Israel, Spain, and Turkey. This is likely to change over time given the current interest in Morel investigation and classification. However, nucleic acid sequencing (which has become substantially quicker and cheaper) reveals in-depth changes that have revolutionized traditional classification.

Molecular classification has revealed three easily distinguishable evolutionary lineages (clades) and these are currently recognized as:

(i) the basal Rufobrunnea Clade (sect. *Rufobrunnea*, or "White Morels")
(ii) the Elata Clade (sect. *Distantes*, or "Black Morels")
(iii) the Esculenta Clade (sect. *Morchella*, or "Yellow Morels").

These have been classified based on molecular phylogenetic analyses of portions of the genes for RNA polymerase II largest subunit (RPB1) and second largest subunit (RPB2), translation elongation factor-1a (TEF1), the nuc rDNA region encompassing the internal transcribed spacers 1 and 2, along with the 5.8S rDNA (ITS), and partial nuc 28S rDNA D1-D2 domains (28S). This data has also been used with the application and principles of the genealogical concordance

phylogenetic species recognition (GCPSR).

Using these techniques, it has distinguished (as of 2021) 79 phylogenetic species (phylospecies) in three major clades across the globe: 45 in the Elata Clade, 32 in the Esculenta Clade and 2 species in the Rufobrunnea Clade. The big problem is using binominal names and these can be unambiguously assigned to only a part of the phylospecies, and therefore species are usually denoted by a clade abbreviation followed by an Arabic number (Mel-1 to Mel-45 for the Elata Clade and Mes-1 to Mes-32 for the Esculenta Clade). An example of some of these codes with and without traditional names is given in the figure. You can see sometimes multiple names have been used for the same morel. Considering that phenotypic traits are often highly changed by plasticity eg environmental conditions) and/or intraspecific variability the identification of discriminating macro-and microscopic characters that correspond to the phylogenetic species present the most current challenging problem. Currently most of the unassigned codes are found within the morels recently classified from China.

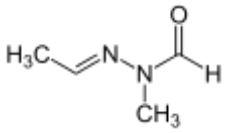
Of the three clades the basal lineage is assumed to be the more primitive (section *Rufobrunnea*) and is estimated to have evolved and diverged in the late Jurassic. This clade is represented by two extant species, *M. rufobrunnea*, which has been grown commercially in America and *M. anatolica* the origin of the later-diverging sister clades, *M. elata* Black Morels (section *Distantes*) and *M. esculenta* Yellow Morels, (section *Morchella*) was dated to the early Cretaceous, approximately 125 Mya. Early ancestral area reconstruction (AAR) tests postulated a western North American origin of morels but had not included in the analyses *M. anatolica*, whose phylogenetic identity remained at the time unresolved. This cast doubts over the accuracy of the original reconstructions, since both species of the ancestral Rufobrunnea clade are present in the Mediterranean, while *M. anatolica* is altogether absent from North America. Following new collections of *M. anatolica* and *M. rufobrunnea* from the Mediterranean islands of Cyprus, Kefalonia, Lesvos, Malta, and Zakynthos, revised AAR tests were performed to update the historical biogeography of the genus. The results, inferred from multilocus analysis, challenge previous reconstructions and now suggest the Mediterranean basin as the most likely place of origin for morels. The question then is, how did *M. rufobrunnea* arrive in the Mediterranean basin and three possible mechanisms have been suggested; 1. The result of recent anthropogenic introductions from North America; which has now been discarded. 2. It may be the result of refugia from the Pleistocene glaciations or 3. Long distance dispersal (LDD) of spores has been suggested as the most likely expansion mechanism. Whether the transcontinental tree-associated species are the result of LDD or refugia, however, remains an unanswered question, and it seems more studies are therefore needed to decipher the complex evolutionary history of these widespread lineages.

The exact ecology of morels is still uncertain but it is clear that not all species have the same requirements. Morels were always thought to be saprotrophic, however there is now a strong link between morels and trees. The formation of mycorrhizae-like structures has been seen in certain species. The Yellow Morel clade generally appear to be more abundant in temperate northern and continental regions, where they are usually associated with broadleaved trees, while the Black Morels clade is more widespread in southern and Mediterranean regions, where they are mostly associated with conifers. Arbruscular associations which are more primitive have been associated with trees such as European Ash *Fraxinus excelsior* or European Olive *Olea europaea.* Endophytic associations are another type of fungal plant relationship and even this has been found in Cheatgrass *Bromus tectorum*, which confirmed the presence of at least two *Morchella* species *M. sextellata*, *M. snyderi* colonising the stems of this grass. Ecological associations can be highly specialized eg recently described *Morchella arbutiphila*, appears to be confined to the Mediterranean basin where it is exclusively associated with *Arbutus*, or extremely cosmopolitan with *M. tridentin* being found on least four continents and linked to no less than 15 tree-hosts. What has become apparent recently is a small number of late-diverging lineages within the Distantes clade (*Morchella eximia*, *M. exuberans*, *M. importuna*, *M. sextelata* and *M. tomentosa*) that are facultative or obligate pyrophiles and can fruit in vast numbers in the first and second springs following a forest fire. The exact mechanism is not known but foragers and growers are taking advantage of this phenomenon and are deliberately burning ground in known morel regions.

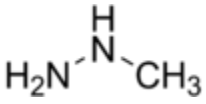
As regards identification of morels the amateur naturalist can now generally speaking only classify them as belonging to a clade complex, e.g. white, yellow or black. Technically *M. esculenta* has been given its own separate position on the clade tree but *M. elata* has not and its place and name still remain hotly contested. With very detailed morphological component identification and a definitive guide then sub identification is possible to a certain level but to truly identify the specimen then nucleic acid sequencing is necessary. Does this matter? If you are just trying to identify the morels at a basal level and /or to eat them, then the answer is no. A simple guide to distinguishing the 2 main morels in the UK follows with a typical representative picture. Esculenta clade (Sect. *Morchella*) There are ridges that are buff or ochraceous, never dark at maturity, usually irregularly arranged, sinus absent or present, ascocarps usually ovoid, sometimes rufescent. Elata clade (Sect. *Distantes*). Ridges at least at maturity dark brown or black, partially longitudinally arranged or ± parallel, sinus always present, ascocarps almost never rufescent, usually conical or cylindrical. The only other distinctive species is *m. vulgaris*. The biggest problem for foragers is the mistaken identity of the False Morel as a true morel. There is

only one False Morel really to consider. Unfortunately, the False Morel *Gyromitra esculenta* carries the epithet esculenta which means tasteful or good to eat. However, *G. esculenta* is potentially deadly. Although it appears at roughly the same time and in similar geographical locations it can be differentiated from true morels because in the *Gyromitra* species, its cap is folded in a brain shape and carries more internal divisions and tend to have a furrowed rather than hollow stem. There used to be a second larger false morel in the UK named *G. gigas* as it was considerably bigger than the usual false morel but in some author's opinions it is now extinct in UK. Worldwide the true number of false morel species has not been ascertained but ranges between 12 and 18. The false morel however carries with it cultural and gastronomic significance and in most cases unfortunately results in illness and certain death. Although potentially fatal if eaten raw, *G. esculenta* is a popular delicacy in Scandinavia, Eastern Europe, and North America. It used to be popular in some districts of the eastern Pyrenees however it is now prohibited from sale. There is some evidence that populations of *G esculenta* appear to vary geographically in their toxicity which could explain why people from certain areas and certain countries are more likely to get ill. A study from France has shown that mushrooms collected at higher altitudes have lower concentrations of toxin than those from lower elevations, and there is some evidence that fungi found in west North America contain fewer toxins than those to the east. However, poisonings in the west have been reported but overall frequency tends to remain high in Europe. Finland seems to still hold a fascination with false morels and they can still be sold fresh, but it must now be accompanied by warnings and instructions on correct preparation. This involves parboiling before preparation but evidence suggests that even this procedure may not make *G. esculenta* entirely safe for consumption. The main active constituent is gyromitrin and is also known as acetaldehyde *N*-methyl-*N*-formyl hydrazone.

The structure is shown below.



Gyromitrin is rapidly broken down upon heating or in acid media such as stomach acid to N, N methyl formyl hydrazine (MFH) with release of acetaldehyde. A slower hydroxylation results in the formation of monomethyl hydrazine (MMH). The structure of MMH is shown below.



The principle toxic agent (MMH) was also used as a rocket propellant. The toxin affects the liver, central nervous system, and sometimes the kidneys. Severe cases may lead to delirium, coma and death after five to seven days. The lethal dose of gyromitrin has been estimated to be 10–50 mg kg1.

So, has the question of morels been answered? Not exactly, but hopefully it has shown how the natural world is still fascinating and wonderful and how recent technological advances and molecular biology is not only enlightening the subject but also making it even more curious.

Morchella elata By Holger Krisp - Own work, CC BY 3.0 https://commons.wikimedia.org/w/index.php?curid=19083626

False Morel *Gyromitra esculenta*
Photo: Roy Stewart

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Roy Stewart is a BNA Trustee and the Chairman and Science Officer with South Yorkshire branch.

Eurasian Curlew Recovery

Chrissie Kelley

Seemingly a common sight on the mudflats and estuaries of the UK in winter, the Eurasian Curlew (*Numenius arquata*) is Europe's largest wading bird. A bird immortalised by writers and artists throughout history, inspired by its distinctive mournful cry that evokes emotion in all that hear it.

The genus name *Numenius* comes from two Greek words, '*neos*' meaning new and '*mene*' for moon and refers to the crescent shape of the curlew's bill. The species name also refers to the shape of its bill, as *arquata* is the Latin word for the archery bow.

Globally there are eight species of curlew, two of which are thought to be extinct, the Eskimo Curlew (*N. borealis*) and Slender-billed Curlew (*N. tenuirostris*). The Eurasian Curlew (*N. arquata*) and Whimbrel (*N. phaeopus*) are the two species found in the UK. Although occasionally Hudsonian Whimbrel (*N. phaeopus hudsonicus*), a subspecies of the Whimbrel, have also been recorded.

Many of our wintering birds are a result of the seasonal influx of Scandinavian-breeding curlews taking advantage of our warmer climate. In early spring, as numbers of the wintering population returns to their northern breeding grounds, around 58,000 pairs stay in the UK, representing roughly a quarter of the world breeding population of Eurasian Curlew. Numbers are falling faster in the UK than anywhere else in the world. Around 65% of the breeding population has been lost since the 1970's, with lowland England experiencing some of the severest declines. Our breeding population is of global importance and the curlew was added to the UK Red List in 2015. It is currently the highest conservation priority species For Natural England and now vital that action is taken to reverse this decline.

Male curlew incubating eggs on a nest *Photo: Martin Hayward Smith (MSW)*

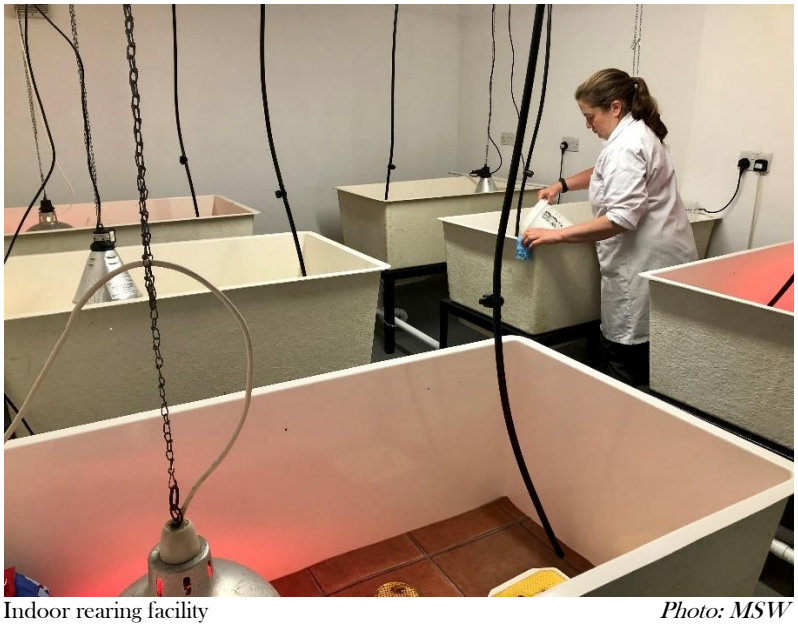
Breeding curlews favour open, often damp grassland and heaths, which have provided safe nesting sites and places for both adults and chicks to feed. They are vulnerable to changes in land use, such as implementation of monoculture, mechanised mowing and the early cutting for silage. National scale analysis has shown predation of nests and chicks also has significant impact. In the East of England, airfields, often surrounded by perimeter fences, offering some protection from Red Fox *Vulpes vulpes* and European Badger *Meles meles*, have proven to provide the kind of open grassland habitat preferred by ground-nesting curlew. A small but significant number of pairs are found nesting on Ministry of Defence (MOD) airfields, however, due to dangers to air safety, eggs have been destroyed by licence to prevent the risk of collision between birds and aircraft. In 2020 Pensthorpe Conservation Trust (PCT) joined a new East of England Project Partnership with Natural England (NE), British Trust for Ornithology (BTO), Wildfowl and Wetlands Trust (WWT), the Defence Infrastructure Organisation and the Royal Air Force.

Two curlew nests on MOD land
Photos: G. Irvine

The project focus was to collect eggs from nests found on airfields, that would have otherwise been destroyed under licence, incubate them, and then rear chicks through to fledging in captivity. 'Headstarting', which protects chicks during this critical period, pioneered by the WWT for other species such as the Spoon-billed Sandpiper (*Calidris pygmaea*) and Black-tailed Godwit (*Limosa limosa*), is considered a potential conservation tool to bolster small populations of breeding lowland Eurasian curlew. In 2021 the project collected 147 eggs from eight military and civilian airfields across Eastern England, where nesting curlew presented a serious risk to air safety. 106 of these eggs were transported to the new purpose-built rearing facility at PCT in Norfolk, and 41 were taken by the WWT for a project in Dartmoor. Most eggs from the airfields were delivered before incubation had started, and with an incubation period of thirty days, careful management of the eggs was crucial. Each egg was weighed and measured on arrival, the weight loss during incubation was recorded and conditions in the incubators adapted to ensure close to the ideal egg weight loss of 15% per day. The first eggs arrived on the 20th April, with the first chick hatching on the 12th May. Chicks spent five days inside, to grow and gain strength before being transferred to the outdoor facility, with heated houses and grass runs. The polytunnel built for this purpose is netted and has buried steel sheets around the base, giving total safety from both aerial and ground predators. Inside, the runs could be expanded as the chicks grew.

1st chick to hatch *Photo: PCT*

Weighing the eggs and placing them in the incubator *Photos: MSW*



Indoor rearing facility *Photo: MSW*

Outdoor facility *Photo: MSW*

When the chicks hatch, they are given an identity ring, so we follow individuals all the way through their growing stage. At around four or five weeks old the chicks have grown enough to replace this ring with uniquely coded coloured leg flags and a BTO metal ring. This will enable them to be identified as part of this project, if they are seen later in the wild. At this stage they are transferred from the polytunnel to the nursery flight pen. The flight pen houses curlews of similar size and age, where they continue to grow after receiving their leg flags, until they fledge, with minimal human disturbance. The ringing scheme for this project has the birds marked as below:

(i) Left above = Yellow flag engraved (00), Orange
(ii) Left below = Nothing
(iii) Right above = Yellow
Right below = Metal

Chick with 1st colour ID ring

30-day old chick with BTO ring and leg flag
Photos: MSW

At 45 to 55 days old the birds are boxed individually and transported to one of the project release sites at Sandringham and Ken Hill Estates in West Norfolk. The release sites were chosen for their proximity to the intertidal mudflats and saltmarshes of the Wash, one of Britain's most important feeding areas for waders. The birds spend a short period in the release pen in order to acclimatise. On release day the end panel would be removed, and the birds were free to explore their environment. Over 80 curlews were reared to fledging age this year. With the last of the birds released on the 14th August, the next stage, to see how they fare in the wild is exciting and interesting.

Curlew Monitoring:
Monitoring after release is important, to observe how the birds behave, and where they go. So, a proportion of birds from each release were fitted with radio and GPS tags enabling the project to follow them post release, monitoring their movements and behaviour.

Three curlews were fitted with GPS tags this year and the results are proving to be very interesting. These tags allow project scientists to monitor the birds' activities in 'real time' when the tags download daily locations over the mobile phone network.

The data already received from the GPS tags has shown the birds venturing further afield, with the female flagged '0E', the very first to hatch on the 12th May and released at Sandringham on 6th July, exploring her surroundings. Initially '0E' visited fields adjacent to the release site before moving a little further afield and onto the Wash, for short periods.

Fitting radio tag

Fitting GPS tag *Photos: Sam Franks (BTO)*

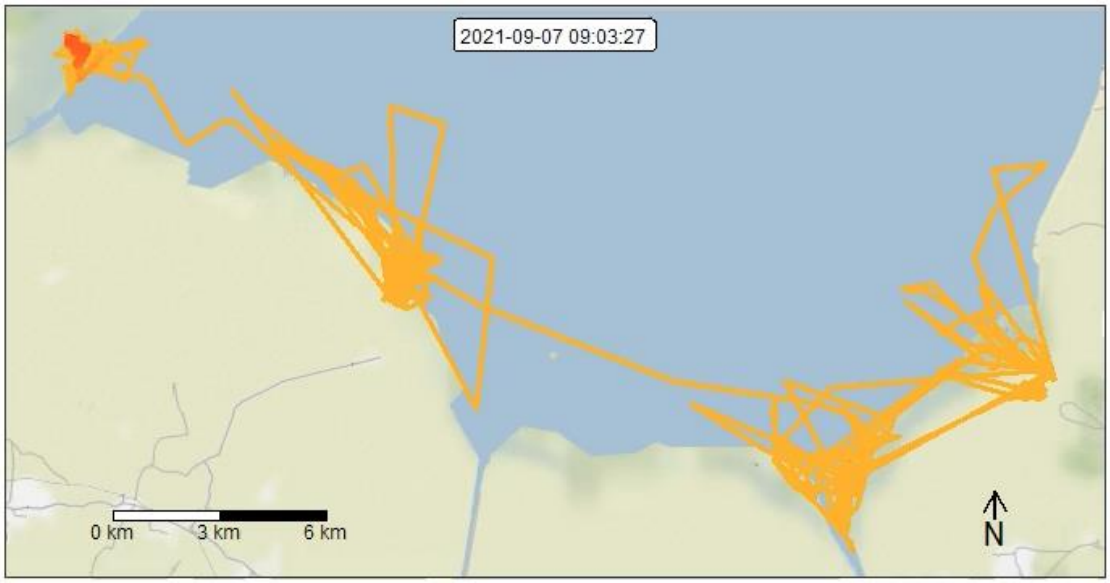
This is a hopeful project, with the low breeding success and lack of fledging of chicks in the wild becoming ever more apparent, the aim of this project is to increase the number of breeding adults and assist in the long-term recovery of the species. It is important however not to see it as an answer to the crisis the curlew is under. Such projects can produce a good short-term boost to populations but are expensive and challenging. It is a crucial tool that can only work as part of a wider programme that ensures suitable habitat and protection from predators. It is vital that long term solutions are found that help curlew chicks survive when hatched in the wild.

Chrissie Kelley is Head of Species Management at Pensthorpe Conservation Trust.

Release pen at Ken Hill

Curlews waiting to be released at Sandringham *Photo: MSW*

Nursery flight pen at Pensthorpe
Photos: MSW



Snapshot of the movements of '0E' moving from the Wash to Frampton foreshore *Photo: PCT*

The Wasps Less Noticed

Dr. Gavin Broad

Rarely do people bemoan the inconspicuousness of wasps. The thing about social wasps is that they are so in your face. Most people would say they are far too conspicuous, inviting themselves along to picnics, your kitchen, your drink (not me; I never tire of watching wasps). It could seem perverse to say that most wasps are unobtrusive and the main difficulties are finding and identifying them, but that is the case for many of our wasps, which comprise a far more diverse group of insects than they are generally given credit for.

Over the summer I spent a lot of time hunting for wasps in various parts of England and Scotland. The motivation was a genome sequencing project called Darwin Tree of Life (about which, more later), and this was a really illuminating experience in reminding myself about the sheer diversity of wasps, along with the obscurity of so many of them, and just how difficult they can be to identify in the field. But first, what do I mean by 'wasp'? Britain and Ireland are home to a little over 7,700 species of Hymenoptera, the insect order which includes bees, wasps, ants and sawflies. At least 6,000 of these species are parasitoid wasps, essentially very specialised predators of other insects (and spiders). The life history of a parasitoid wasp involves finding a host, laying an egg in or on this host, and the wasp larva then eating the doomed insect or spider alive, either paralysed or active. A few species are fairly well known, such as *Cotesia glomerata*, a gregarious parasitoid of caterpillars of the Large White butterfly *Pieris brassicae* on cabbages; or *Rhyssa persuasoria,* the Sabre Wasp, a spectacular parasitoid of wood-wasp larvae, to be found drilling through pine logs. However, most of the parasitoid wasps fail to attract much attention, quietly seeking out hosts in the undergrowth.

Larvae of the wasp *Cotesia glomerata* emerging from a Large White *Pieris brassicae* larva.
Photo: Natural History Museum (NHM)

Larva of the Bright-line Brown-eye *Lacanobia oleracea* with two small larvae of the ichneumonid wasp *Netelia cristata* feeding on it.
Photo: Gavin Broad

The UK's parasitoid wasps could be thought of as the Hymenoptera which lack common names, but really all of the Hymenoptera other than sawflies are wasps in origin. Bees are derived from a group of digger wasps (think of them as furry, vegetarian wasps), ants are wasps which went underground and became eusocial. The black and yellow wasps which make paper nests are a small group of eusocial wasps (10 species in Britain) which usually form large societies and get away with being conspicuous because they have very effective stings. Incidentally, that venom evolved from the complex venoms which parasitoid wasps use to subdue hosts, often including permanent paralysis, antibiotics to keep the immobilised hosts clean, substances to subdue the immune system; a veritable cocktail of compounds. These wasps' range, just in Britain, from 0.2 mm in length to c. 10 cm (including the long ovipositor). There are tiny, bejewelled chalcid wasps, which Alexandre Arsène Girault termed the *'gem-like or marvellous inhabitants of the woodlands heretofore unknown and by most never seen nor dreamt of'*. There are myriads of tiny platygastrids, attacking the myriads of gall midges. Weird and wonderful families such as Trigonalyidae (specialised hyperparasitoids, with one British species) and Evaniidae (which develop in cockroach oothecae). My speciality is the Ichneumonoidea, two families (Braconidae and Ichneumonidae) comprising at least 5,000 species in this country. Other languages have imbued the ichneumonoids with common names such as the German schlupfwespen (devious wasps) or the Japanese himebati (princess wasps), but in English we make do with ichneumon.

To give an idea of how parasitoid wasps go about their lives we can look at two ichneumon species with contrasting approaches to how they use their hosts. *Pimpla rufipes* is a conspicuous black species with contrasting red legs and a protruding ovipositor (the egg-laying part of the body, which also delivers venom). This is a particularly common species in the autumn when they are often seen seeking out moth and butterfly pupae. *Pimpla rufipes* has, on one level, a fairly unsophisticated relationship with its host: the pupa is permanently paralysed and the *Pimpla* larva develops within, essentially, a bag of fresh meat. However, the means with which *Pimpla rufipes* locates hosts, recognises them as hosts and then renders the hosts suitable for its offspring are all very specialised. Females locate hosts via a form of echo-location, tapping on solid substrates and 'listening' for the returning vibrations which give away a pupa in a stem, for example (or, as observed once, trying to oviposit in a pea in a pod!). When they lay the egg, they inject complex venoms which arrest the development of the pupa and sterilise the tissues so minimise infections. The host can be any of a

very wide range of species, but the niche of *Pimpla rufipes*, how it goes about its life, is very specialised.

Contrast *Pimpla rufipes* with *Stilbops vetulus*. In spring, *Stilbops vetulus* can be very common in deciduous woodland where you can often see them searching emerging leaves of trees for the eggs of a longhorn moth, Adela reaumurella. This is the only species which *Stilbops vetulus* is able to use as a host. Other species of *Stilbops* seem to be equally restricted to particular longhorn moth species. *Stilbops vetulus* has a fine, needle-like ovipositor, needed because it is laying its egg very precisely within the egg of the host moth. The caterpillar hatches from the egg and begins feeding, later dropping to the ground to continue feeding on dead leaves. For a long time, the *Stilbops* larva sits tight, feeding little and not growing much, within the body of the host caterpillar. Then, when the host Adela reaumurella pupates within a tough little cocoon, the *Stilbops vetulus* larva feeds rapidly, consuming the body of the host and pupating, hopefully safely, within the cocoon kindly provided by its host. In this way, *Stilbops vetulus* has access to hosts when they are exposed and easy to find (tracing minute chemical signatures with their antennae) but can complete its development in more concealment and have a guaranteed large meal. Pimpla rufipes vary a lot in size as the larva is stuck with whatever size host it is laid into. The disadvantage for *Stilbops* is that the larva has to contend with the host's immune system. Various wasps have developed very sophisticated means of overcoming or avoiding the immune system, including co-opting viruses and hiding in brain tissue. Being very tied to the physiology and life-cycle of a host has resulted in *Stilbops vetulus* being a host-specialist to a degree which is actually quite unusual in ichneumons.

At Beinn Eighe National Nature Reserve in North-West Scotland (Britain's first NNR) I found a small ichneumon wasp while sweeping my net through low vegetation under birches. Fungi were abundant at the time. To identify it and separate it from the hundreds of other ichneumons which are basically black and about 5mm long, I anaesthetised it and looking down the microscope I was surprised to see it was *Bioblapsis cultiformis.* This has been reared from hoverfly larvae feeding in fungi but was only known in Britain from a few specimens reared by Graham Rotheray back in 1988 and 1989 in Perthshire and Speyside. So that was nice. It might be common out there in rich woodland in our temperate west coast rainforest.

Finding out what these wasps are doing is a painstaking process, typically involving a lot of natural history, in having the knowhow to rear potential hosts for their parasitoids, and a fair bit of serendipity. Years ago, I was really keen to know the host of *Ophion slaviceki*, a common and widespread nocturnal ichneumon which is a very frequent invader of light traps but strangely lacking host records. Mark Shaw (parasitoid wasp guru of National Museums Scotland) and I had worked out that caterpillars of the Heart and Dart *Agrotis exclamationis* were likely hosts so when several Heart and Dart larvae blundered into my light trap, I put this to the test. Sure enough, an *Ophion luteus* emerged from one the following year. Knowing what these wasps are doing out there helps us to understand how populations of different species are linked, knowledge we increasingly need as wholesale environmental change impacts on ecosystems.

Pimpla rufipes emerged from its host, the pupa of a Swallowtail Butterfly *Papilio machaon. Photo: NHM*

Stilbops vetulus. Photo: Olga Retka

An awful lot of what we know about parasitoid wasps boils down to the data labels on specimens in collections. It is my pleasure to introduce you to *Stethoncus monopicida*, (see picture index p. 1) a wonderfully obscure little wasp which first came to my attention as a series of specimens in the Natural History Museum labelled as having been reared from a tineoid moth, *Monopis laevigella*, feeding in Barn Owl *Tyto alba* pellets at the base of a chimney. I described this as a new species and for a while it seemed to follow me around, popping up in samples wherever I worked, and even walking around a window in my house. Describing this species, detailing the known specimens and describing what little we know of its biology, adds a little piece to a very large and difficult ecological jigsaw. Another way in which we are increasingly learning more about the evolution and maintenance of the staggering diversity of life is through the DNA which we can sequence from even old, dry specimens in collections. Darwin Tree of Life is a project headed by the Wellcome Sanger Institute, involving the Natural History Museum, national herbaria, some universities and others, with the ambition of sequencing and stitching together the entire genomes of all UK eukaryotic organisms (species other than bacteria). This is why I've been trying to identify little wasps alive, so that they can be flash frozen to -170 C so as to preserve the DNA as completely as possible. These genomes can reveal a huge amount about the evolutionary history of a species and its adaptations to the world, but a genome also opens up the old, pinned specimens in museums to many more uses. Those fragments of degraded DNA can be mapped to the genome scaffold provided by the fresh specimen, so potentially many genes can be studied.

There is a rate-limiting step in this process from organism to assembled genome, and that is the ability to find and identify species. For some groups of insects, it is relatively straightforward: run light traps in different parts of the country and you will, over the course of a season, catch a relatively high proportion of British moths. Add some rearing from leaf mines, seed heads and the like, and you are on track to sample most of the fauna. But for parasitoid wasps there are several problems, such as the small size of many species, the lack of specialists to identify them, and the lack of knowledge of their life histories. *Coleocentrus excitatory*, for example, is a large (3 cm long), conspicuous ichneumon wasp which has nevertheless only been found on a few occasions in Scottish pine woods. We don't know what its host is so where do we look to find another one? On the other hand, I can find some wonderful species without having to go much further than my garden. The many aphids feeding on my roses are eaten by hoverfly larvae. In turn, diplazontine wasps lay their eggs in the hoverfly larvae. I can find several species of diplazontines buzzing around the aphid colonies. If you know where to look, there are wasps all around.

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The Natural History Museum

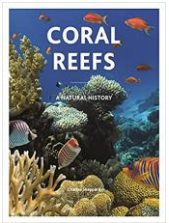
Bioblapsis cultiformis

Ophion slaviceki

Photos: NHM

Book Reviews

Editor: Roy Stewart MSc, FIBMS, FLS, FRSB, MBNA



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This is another book in the increasingly popular info graphics type format. It's a hardback coffee table type format book written by two accomplished authors; Charles Shepperd, professor emeritus life sciences Warwick University and Russell Kelley program director of Coral Identification Capacity Building Program. The book comprises six main chapters. The chapters are 1. The coral animal, 2. Different kinds of reefs, 3. How a coral reef works, 4. Local and regional disturbances to reefs, 5. Climate change and reefs and finally 5. People and reefs. Within these six chapters though are numerous mini chapters each two pages long with minimal text and glorious full colour high resolution photographs. There are approximately 200 photographs and many include rare and unusual species. Although the text is minimal there is more than enough scientific information in the 230 pages to convey the wonderful aspects of coral reef natural history and it's written in a very eloquent manner. Although this is not an identification guide, representative examples of corals have been selected to illustrate the broad range of species. The beauty of this type of book is it can be dipped into at any stage because of the nature of the mini chapters. This book will obviously appeal to marine biologists and divers but as a general guide to coral reefs biology, flora and fauna and how the crucial impact of climate change will impact on them, then it will also appeal to all readers with an interest in general natural history. Highly recommended.
Reviewed by Roy Stewart

Treepedia: A Brief Compendium of Arboreal Lore.

Joan Maloof. 2021. Princeton University Press.
ISBN-10: 069120875.
Hardcover. 152 pages. £ 9.99
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Treepedia is a pocket-sized book packed with tree facts and figures. Joan Maloof is the founder and director of the Old-Growth Forest Network, USA - an organisation for the preservation and protection of threatened forests. She is also professor emeritus of biological sciences at Salisbury University. The entries are arranged alphabetically from Adirondacks, the mountainous region in New York State, to conservationist Ken Wu, and covers topics such as ecology and conservation, and trees in relation to art, religion, film and literature. Illustrator Maren Westfall has added black and white line drawings which are well suited to trees, leaves and fruit. There are musings on many trees, the familiar and not so familiar: ash, aspen, baobab, ginkgo, Guanacaste, maple and palm and tulip poplar, to name a few. There are potted biographies of those who have contributed to our knowledge of trees. Scottish born John Muir (1838 - 1914) recognised humans were destroying wildlife, his efforts being instrumental in Yosemite becoming a national park, protecting it from loggers, grazers and hordes of tourists. President Roosevelt is said to have escaped a dinner party in Yosemite, to spend the night under the sequoia trees, discussing why these giant trees should survive. (They are still there.) Margaret Lowman (1953 -) recognised that tree canopies were not being studied due to the difficulty of accessing them. She started her career by using climbing ropes. In some of her later projects, she used a hot air balloon with sled instead of a basket, crane access, or ropes with motorised ascent. She was responsible for the first public canopy walkway in USA, a 25ft high and 100-foot-long suspension bridge in a forest in Florida. If you want to learn the definitions of : burl, catface, epicormic branching, leaf scar, meristem, sinuosity - you will find them all explained in simple terms here. Various countries and religions observe celebrations for the tree e.g., Arbor Day and Tu BiShvat. In USA Arbor Day is celebrated usually in April, or when regional weather conditions are optimal. Its origins were said to derive from a Spanish priest in 1805 who celebrated his tree planting with a "fiesta del arbol" This was then adopted by J. Sterling Morton when he moved from a wooded Michigan to unwooded Nebraska, and as a newspaper editor, he was able to spread the idea so that the first Arbor Day came to be in April 1872. It is claimed that Nebraskans planted over a million trees on that day. The idea of Arbor Day spread quickly round the world, and now it is celebrated by 43 countries. Tu BishVat is a Jewish holiday celebrating a day of tree planting and ecological awareness. Tu BishVat has a close connection with fruit trees. After a young tree has lived through four Tu BishVats its fruits can be harvested, part of which must be put towards tithes. A feast of the tree fruits has become a traditional part of the festival. In literature, trees often put in an appearance in fairy tales and myths. Tolkien's Ents are part tree, part human, that become more treelike if they do not move enough. 'The Tale of the Talking Tree' comes from Italy in the Middle Ages. Groot is a character who first appeared in Marvel Comics in 1960, and in 2008 he became part of the Guardians of the Galaxy team. From another planet, his stiff larynx make speech difficult so as a result all his communications sound like he is saying "I am Groot". In the film 'Avatar' The Tree of Souls is central to its plot, being a sacred connection to Ewya, their Supreme Being. If the tree is destroyed, then the cultural and spiritual void would lead to the demise of the race of the Na'vi people. As the author says in her preface Treepedia is " a mini encyclopaedia for our times, short and precious titbits, not to be read in one sitting, but to pick up and put down at a moment's notice." This sums up this book nicely.
Reviewed by Patricia MacDuff

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