Country-*Side*

The Magazine of the British Naturalist's' Association
Volume 36 Number 8 Summer 2022

Habitat Appraisal – Rewilding Studland Bay –
Phytophthora – The Sawfly *Pareophora pruni* –
Pembrokeshire Hedgebanks – Wildlife Recording from Home

Country-*Side*

Founded by E. K. Robinson 1905
Summer 2022
Vol. 36 No 8
ISSN No. 0011-023X

Founded by E. K. Robinson in 1905
Editor: Pauline Rutherford
Artwork: P. Rutherford
Printing: Hot Metal Press, Barnsley

Country-Side is published by:
British Naturalists' Association ©2021
Registered Charity No. 296551
A Company Limited by Guarantee.
Registered No: (02119195) in England & Wales
Registered Office: 27 Old Gloucester Street, London WC1N 3AX

British Naturalists' Association
Contact Details:
Email: info@bna-naturalists.org
Website: www.bna-naturalists.org

Editors Contact:
Email: country-side@bna-naturalists.org

Front cover: Spiny Seahorse
Photo: N. Garrick-Maidment
Back cover: Marsh Frog
Photo: J. McCrindle

Picture Index

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;
(4) BNA reserve the right to edit and lay out an article in the style adopted in Country-Side.

Please note that Copy for future issues of Country-Side should be sent to the Editor. Each contribution is accepted on the understanding that it is original and unpublished and will be in no way whatsoever a violation or infringement of any existing copyright or licence, that it contains nothing libellous and that all statements contained therein purporting to be fact are true and that any recipes or formulae or instructions contained therein are not injurious to the user. While every care is taken with submitted material, neither the publisher, nor the printer, nor BNA can be responsible for loss or damage, however caused. The opinions expressed in editorial material do not necessarily represent the views of the BNA and the opinions expressed by the contributors are not necessarily those of either the publisher, the Editor, the sub-Editor, the Book Reviews Editor or the BNA.

Copy may be emailed to country-side@bna-naturalists.org
Deadline for next issue: 15th September 2022

Editorial

Pauline Rutherford

We have all experienced tough times over the last two years, caused by the Covid virus, unable to meet, work or "play" as normal, with restrictions meaning our regular recording took a hit; there will be big gaps in the national records for these years. The winners of course have been the wildlife as many species seemed to flourish with less disturbance. John McCrindle should be congratulated for taking advantage of the restrictions imposed on everyone and encouraging recording at home – in our own gardens. Within a short time, he was receiving records from BNA members across the length and breadth of the UK, thus resulting in the article submitted for this issue. Recording species is an important part of being a naturalist, and I would hope that people continue with their own records sending them to the national recording bodies, some of which are listed below in Steven Rutherford's observation. An example of discovering and recording a rare species is in David Wareham's article. Other articles submitted include one about Phytophthora a subject not many will have heard of but a disease which is having drastic effects on the tree populations and needs controlling and careful monitoring.
Thanks go to all the contributors for submitting articles.

Natural History Observation

The Expansion of Mobile Species

Steven Rutherford FBNA

In 2001 the Tree Bee *Bombus hypnorum* was discovered breeding successfully in the village of Landford in Wiltshire, and this was the first record of this smart little bee in Britain. In 2010 I found, and recorded the Tree Bee for the first time in my own village of Thorpe Hesley in South Yorkshire, at the time this was a new county record and proof of the northerly expansion of its range. In 2018 I again was able to record this progress in the town of Wigton in Galloway, Scotland and the Tree Bee is now found throughout mainland Britain.

Another mobile species of interest that has been extending its range north is the gall wasp *Andricus aries* that produces the distinctive ram's-horn gall that is found on the buds of the English oaks, the Pedunculate Oak *Quercus robur* and the Sessile Oak *Q. petraea*. This wasp is, again, a newish species to the British fauna as it was first recorded in Maidenhead Thicket, Berkshire in 1997, but was soon found throughout the southern counties of England and parts of Wales. The gall was seen by members at the Attenborough Nature Reserve in Leicestershire at the BNA AGM in 2017 and is now in and around the borders of Scotland.

The third insect that is showing an ability to adapt to a northern expansion is the Swollen-thighed Beetle, *Oedemera nobilis*. This is a very distinct insect with a bright glossy green sheen and the males have the enlarged thighs that gives this insect its common name. They used to be occasional sightings by the members of the South Yorkshire branch of the BNA but are now seen each summer in most rough grass habitats. There are only four records further north than South Yorkshire on the NBN Atlas site so it will be interesting to follow its progress over the next few years.


Tree Bee


Ramshorn Gall


Swollen-thighed Beetle

This ability by the more mobile species to respond to the changes in climate and land use make for interesting studies but can only be of use when regular and accurate recordings are made and submitted. Submitting records can be very simple on most mobile devices and are best accompanied with a photograph. Here is a list of useful addresses to send your records to –

IRecord – www.brc.ac.uk/irecord
NBN Atlas – www.nbnatlas.org
Ants, Bees and Wasps – www.bwars.com
Plant Gall Society – www.british-galls.org.uk

Steven Rutherford is the BNA Honorary Chairman, having taken on the role when Roger Tabor stepped back in 2018. He was awarded the Richard Fitter Memorial Medal in 2015 and became FBNA in 2017. He is the author of *"How to Begin the Study of Plant Galls"* published by the BNA in 2021 which is available to buy from the Website Online Shop. *Photos: S. Rutherford*

Habitat Appraisal, Wentworth Woodhouse

David Swales MBNA

Wentworth Woodhouse *Photo: P. Rutherford*

For anyone who doesn't know, Wentworth Woodhouse is a Grade I listed stately home situated in the South Yorkshire village of Wentworth. The house sits in 87 acres of gardens and grounds and is famous for having the longest façade of any country house in England.

It was the 1st Marquess of Rockingham who started building the first house around 1735, though it continued to change and evolve over the next 40 years before the whole estate passed to the Fitzwilliam family.

Since these glory days the house has had many ups and downs. During World War II, the mansion was commandeered by Military Intelligence and after 1945 the coal board commenced open cast coalmining in the gardens and park. This wanton act of vandalism made it impossible for the family to ever return.

In 1947 the West Riding County Council used the house as a college for teacher training, then in 1974, Rotherham Metropolitan Borough Council used the property as a student campus, for Sheffield Polytechnic College (now Sheffield Hallam University). As the maintenance costs started to mount up, Rotherham Council gave up the lease in 1988.

In 1989 the estate became the private home of W.G. Haydon-Baillie, then in 1999 it was bought by the Newbold family, who continued in residence until 2017 when the property was purchased by Wentworth Woodhouse Preservation Trust on behalf of the nation. The number one priority for the trust was to preserve the house and grounds on a long-term sustainable basis for the general public to enjoy, and this is where members from the South Yorkshire branch of the BNA enter the story.

Steve and Pauline Rutherford have a good relationship with the owner of Wentworth Garden Centre (Tony Airey) and the group has been collecting biological records at the site since 2014. The Wentworth Woodhouse grounds are literally over the fence from the garden centre, so Tony mentioned the work the BNA group had been doing for him to the newly formed Woodhouse Preservation Trust, thinking these services would be useful to them too.

The trust liked the idea as they really needed some baseline biological data for the site to help with the development of future management plans and grant funding for the grounds and gardens. So, in 2018 Steve met with Scott Jamieson, the Woodhouse head gardener, and it was agreed that a small group from the BNA would be allowed regular access to the gardens to start collecting biological records. Initially these visits would be monthly during 2019 to get a broad view of the species diversity on the site throughout the changing seasons. This would then be followed in 2020 with regular moth and mammal trapping on the site, adding that extra depth of knowledge to the records. Unfortunately, the pandemic intervened and rather scuppered everything, the upshot being that less visits happened than was hoped for, but the group battled on as best we could when the changes in Covid guidance allowed.

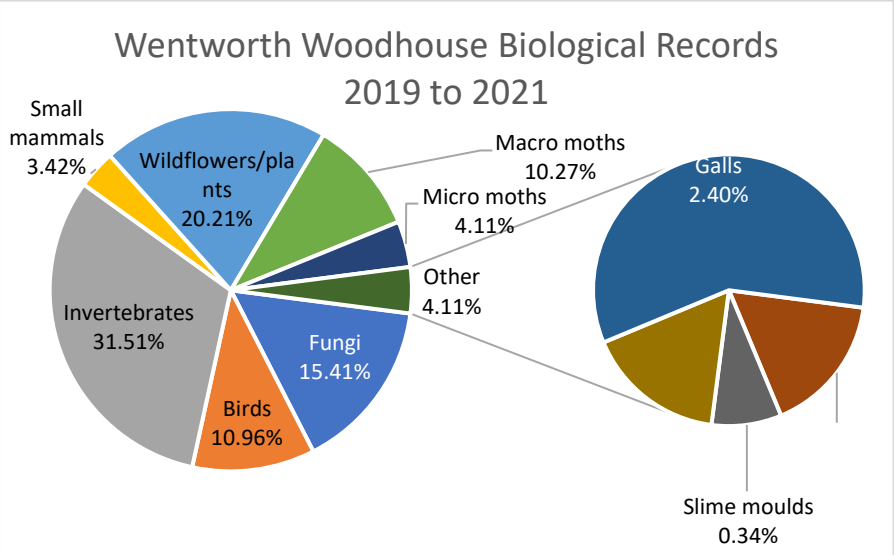
2021 brought greater BNA involvement with the Woodhouse

project when Steve was asked to take part in the Habitat Appraisal Plan. This led to an intensification in data collection, with weekly visits being the norm for a large portion of the year. The purpose of the data had also shifted slightly as the Trust now wanted us to help in the identification and locating of any important species to help minimalize any disturbance during planned works. We also started to identify any species with a specific conservation status as this would add weight to the final report being prepared for further grant funding.

The grounds to Wentworth Woodhouse are extensive but our work focused on the 40-acre gardens which, until recently, had been private and not open to the public. The gardens consist of several different habitats, such as formal lawns, woodland, grassland, formal flower beds, orchards and hedgerows. The totals table (Fig 1) is a condensed version of all the recording on the site between 2019 and 2021, with the fully detailed list being submitted to the trust to help in the preparation of the final report for the site. The pie chart (Fig 2) has been included to help visualise the proportions of species groups found across the site.

	Total	Conservation status
Fungi	45	4
Birds	32	8
Invertebrates	92	1
Small Mammals	10	5
Wildflowers / Plants	59	14
Macro Moths	30	4
Micro Moths	12	0
Amphibians	2	1
Slime Moulds	1	0
Leaf Miners	2	0
Galls	7	0
Totals	292	37

(Fig 1) Totals of species found at Wentworth Woodhouse gardens 2019 to 2021



(Fig 2) Pie chart showing species proportions at Wentworth Woodhouse gardens 2019 – 2021
Chart: D. Swales

Alongside the total number of species in each group, the table (Fig 1) also shows the number of species within that group that has any sort of conservation status. We found a total of twelve UK biodiversity action plan (BAP) priority species, including the Brown Long-eared Bat *Plecotus auritus*, Noctule Bat *Nyctalus noctula* and Common Toad *Bufo bufo*. We also found several Ancient Woodland Indicator species (AWI) along with plant communities which indicated MG5 unimproved neutral grassland under the National Vegetation Classification (NVC) system. We also recorded several red and amber list Birds of Conservation Concern (UK), such as the Skylark *Alauda arvensis* and Song Thrush *Turdus philomelos*, along with a few notable invertebrates and fungi species that were either occasional, infrequent or rare such as the False Blister Beetle *Oedemera femoralis* and Snowy Waxcap *Cuphophyllus virgineus*.

All this information is of great importance to the Woodhouse Trust; not only does it help in the planning of works, reducing wildlife disruption, but it also provides that baseline knowledge of the site and shows the grounds are richer and more diverse than perhaps first thought.

The gardens were extensively damaged during the controversial open cast coal mining operations, so some areas of the garden landscape are not as old as they

may appear. However, the main woodland area not only contains some substantial mature trees, but it also contains some ancient woodland indicator species such as Yellow Pimpernel *Lysimachia nemorum* and Enchanters Nightshade *Circaea lutetiana*, giving us a strong indication that this is an undisturbed and original garden area. The woodland also provided some good fungi finds such as Stinkhorn *Phallus impudicus*, Dryad's Saddle *Polyporus squamosus* and Silky Rosegill *Volvariella bombycina* which is quite rare this far north and requires the deadwood habitat that is often "tidied" away in gardens. The other main area we can be confident is undisturbed is a long, broad strip of grassland on the gardens southern edge (known as the South Terrace). This area contains plant communities you would associate with MG5 unimproved neutral grassland such as Birds-foot Trefoil *Lotus corniculatus*, Lady's Bedstraw *Galium verum* and Common Knapweed *Centaurea nigra*. The western end of this strip is slightly mounded leading to the ground being much drier and less dominated by grasses than its surroundings. This isolated island habitat has produced an interesting and very attractive mix of plant species which was dominated by Harebell *Campanula rotundifolia*, Yarrow *Achillea millefolium* and Mouse-ear-hawkweed *Pilosella officinarum*. There are a few photographs from the time of the open cast mining, and they do appear to tally with what the plant communities were telling us in the field, with regards to which areas of the gardens were destroyed and which survived intact, giving us confidence in our findings.

Silky Rosegill *Photo: R. Stewart*

Stinkhorn fungi on deadwood *Photo: P Rutherford*

The head gardener Scott has played a major role in the current state of garden biodiversity due to his interest in wildlife and his wish to see the gardens develop further into a place which is good for both nature and people. As our data shows, the largest single group for species diversity is the invertebrates which is mainly down to current garden management. Scott is happy for areas of the garden to be quite wild with both standing and laying deadwood, sitting happily alongside the more formal garden elements. He also maintains a large meadow area of long grass, which is cut only once at the end of the year. It was this area that produced most of the invertebrate finds using a combination of sweep netting and inspection of the various thistle and umbellifer plant species that had grown up through the grasses. It is interesting to note that this meadow area and the adjacent formal lawns were both totally removed and replaced by the open cast operation but yielded very different results. The lawns had very few records and the long grass the most, demonstrating how site management, rather than just age, can have a great effect on biodiversity. All these habitats are great for invertebrates and fungi,

forming a strong base to the food chain in the gardens and supporting all those species further up the chain who feed on them, as well as the vital recycling services these organisms provide.

This has been a substantial but very enjoyable project to work on, but it really is only the beginning. Armed with our data the Trust can plan for the future of Wentworth Woodhouse gardens and as we continue to collect records in the coming years, we will be able to help monitor the effects of any changes in management on the site. Ultimately the goal is to improve the grounds, making it enjoyable for visitors and wildlife alike while safeguarding important habitat areas, increasing biodiversity and educating people as they walk through these beautiful gardens.

David Swales is a committee member for South Yorkshire branch, he writes a nature column for a Barnsley local magazine. He became MBNA in March 2022.

Harebells (top) Yellow Pimpernel and Lady's Bedstraw *Photos: P. Rutherford*

Above - South Terrace, Right - Wild Flower Meadow and Woodland, Wentworth Woodhouse *Photos: P. Rutherford*

Rewilding Studland Bay, Ecomoorings and Spiny Seahorses

Neil Garrick-Maidment FBNA

The Seahorse Trust has been studying Studland Bay in Dorset and its unique population of Spiny Seahorses *Hippocampus guttulatus* since 2008 and proposed it became a Marine Conservation Zone (MCZ) in 2010.

Even though working with Southampton University we proved the site was degrading and the seahorses and crucially the seagrass (both protected species and habitat) were disappearing and degrading, it took until 2019 and three attempts to finally get the site designated as a Marine Conservation Zone.

It has been a controversial project with amazing support from the general public to have it designated as a MCZ, however a few vocal members of the boating fraternity have not been so keen because it is a popular anchoring site along the south coast and is indeed very popular with visiting day boats from nearby marinas. Until recently they have been able to anchor into the protected seagrass, which has caused severe damage to this protected but highly important habitat. This in turn has seen a massive reduction in seahorse numbers and a loss of other species as the seagrass fragmented and the ecosystem has broken down.

Damage caused by traditional anchoring

Pair of Spiny Seahorses

In 2019 with the designation of the bay to become a Marine Conservation Zone, this has given the opportunity to form a partnership to oversee and protect this site from future destruction. Indeed, the MCZ status means that the seagrass which is a Habitat of Conservation Interest (HOCI) and the seahorses which are a Feature of Conservation Interest (FOCI), must now as a condition of the MCZ status be returned to favourable conditions but how to do it?

Sadly, the authorities have not had the resources or the inclination to do anything about the site and so it has taken 18 months to get going on with restoring (rewilding) and protecting the site, which left us the question of what and how to do it?

Late in 2020, I met with the CEO and Founder, Michael Prideaux of Boatfolk https://www.boatfolk.co.uk/our-sustainable-future, the largest marina and boating services company in the UK to discuss how they could get involved and try to solve the issue of boats visiting this sensitive site and to stop the destruction of the seagrass. We have never wanted to stop boats visiting Studland Bay but they are destroying the seagrass and so measures and ways had to be found to make sure they could visit and not cause harm, but how could we do this and the answer was ecomoorings. Within 12 months with Boatfolk's amazing team we had devised a system of Ecomoorings, applied for a license from the government body Marine Management Organisation (MMO) to install them and in august of 2021 we installed the first 10 ecomoorings into the seagrass as a pilot project.

We had actively started to restore the site to increase seagrass and restore the ecosystem, we were rewilding Studland Bay for the future, after years of destruction. Crucially important is that the public and most of the boating community are in full support of what we are doing.

We now have funding in place for more ecomoorings and in 2022 we hope to install 10 more ecomoorings which is a brilliant step two. Crucially this project has started a conversation, inspired others to get involved and critically to its success, encouraged the authorities to put into place measures to protect the site. It was always meant to be an inspiration to others and thankfully this is happening and it is bringing people together to ensure the seahorses and seagrass is there for the future.

We have formed an alliance of interested groups, led by the National Trust, ourselves and Boatfolk and crucially it includes representatives of the boating community, to work together and put into place measures of protection.

This has persuaded the authorities to jumpstart their conservation work on the site and in 2021 they announced that all the seagrass areas of Studland Bay will become a Voluntary No Anchor Zone (VNAZ) to encourage the boats to anchor out of the seagrass. Only time and cooperation by the boating community will tell if this is successful but it is a major positive step forward in rewilding the bay. If they find this does not work then they have said they will bring in a bylaw to stop boats anchoring in the seagrass but they want to give the VNAZ a chance first to see if this improves the situation.

Boats anchored in Studland Bay close to the shore

The new Voluntary No Anchor Zone (VNAZ) Studland Bay

Ecomoorings and how they work – why they're needed

- Sensitive Habitats. Seagrass meadows are highly sensitive habitats that are home to so many species, including seahorses. Although it is mainly the Spiny Seahorse here in the UK that live in seagrass, just occasionally the Short Snouted Seahorse are also found in them.
- Nurseries. So many species come into seagrass to breed and so ecomoorings help to protect and restore vital breeding areas from destruction. Species like Bass, Cuttlefish, Undulate Rays and Spiny Seahorses use seagrass areas as nurseries. Not only is this brilliant for all these species, it is also good for the commercial

fishing industry and to ensure we have a fully working ecosystem.

- Rewild ecosystems. Ecomoorings allow sensitive habitats like seagrass to restore, to rewild. Installing Ecomoorings into the seagrass means that boats can moor up to them and not use their anchors, which dig up and destroy large areas of seagrass.
- Allow access for boats. By installing Ecomoorings into sensitive areas it allows boats to be able to still visit the area but stops them from wrecking the seabed with their anchors. It is a win-win situation.
- Carbon Sequestration. Seagrass is an amazing plant that sequesters carbon. It is highly efficient and sequents more carbon than trees in the Amazon, it allows us to fight global warming.
- Wave Diffusion. Seagrass grows in shallow waters and as the waves come in from the sea, they lose their energy as the seagrass softens the effect of the wave, so by the time it reaches the shore it has very little energy left. This is great news as it stops the beach and cliffs from being eroded away and avoids having to install expensive, ugly sea defences, basically nature does it better.
- Global Warming. Global warming is killing our planet. That much is not in doubt and so we need every tool in our toolbox to fight it. As a perfect seagrass meadow can sequent so much carbon it fights global warming. Ecomoorings allow the seagrass to restore back to favourable conditions and so putting in Ecomoorings not only protects seahorses and so many other species it also protects the planet and all the species that live on it.
- Seahorses. Seahorses thrive in a healthy habitat like seagrass (it is mainly the Spiny that live in seagrass here in the UK) because the full ecosystem supports many species for the seahorse to feed on. It allows the seahorses to set up territories to breed in and it also provides shelter for them from predators and storms.
- The Future. The ecomoorings are the way forward, they allow access for boats and they enable the seagrass to thrive and recover, helping address global warming by carbon sequestration, it diffuses wave action and protects the beach and crucially is a nursery for commercial and non-commercial species and is home to seahorses. If we want a positive green future, then ecomoorings protecting sensitive habitats are the only way forward, especially as they allow us to rewild our seas.

Ecomoorings and how they work

Ecomoorings provide a small footprint on the seabed that allows sensitive habitat to survive without the pressure that traditional swing moorings cause. The use of the helical screw (anchor) into the seabed means that all the weight is taken on this anchor and nothing is above or on the seabed. The anchor is then attached to the mooring buoy by an elasticated, rubber riser (rode), which stretches and contracts as the tide rises and drops which stops the rode from dragging on the seabed. If for some reason it ever laid on the seagrass below, it would not harm it as it will just slide over the seabed and not dig into the roots of the seagrass or the seabed, like a swing mooring would do. Ecomoorings allow sensitive habitats like seagrass to expand and thrive because nothing is chopping it down and crucially it means that the ecosystem of the seabed can be left undisturbed. Being undisturbed, seagrass flourishes and is our equivalent of an underwater rain forest, with all the complexities that rainforests have.

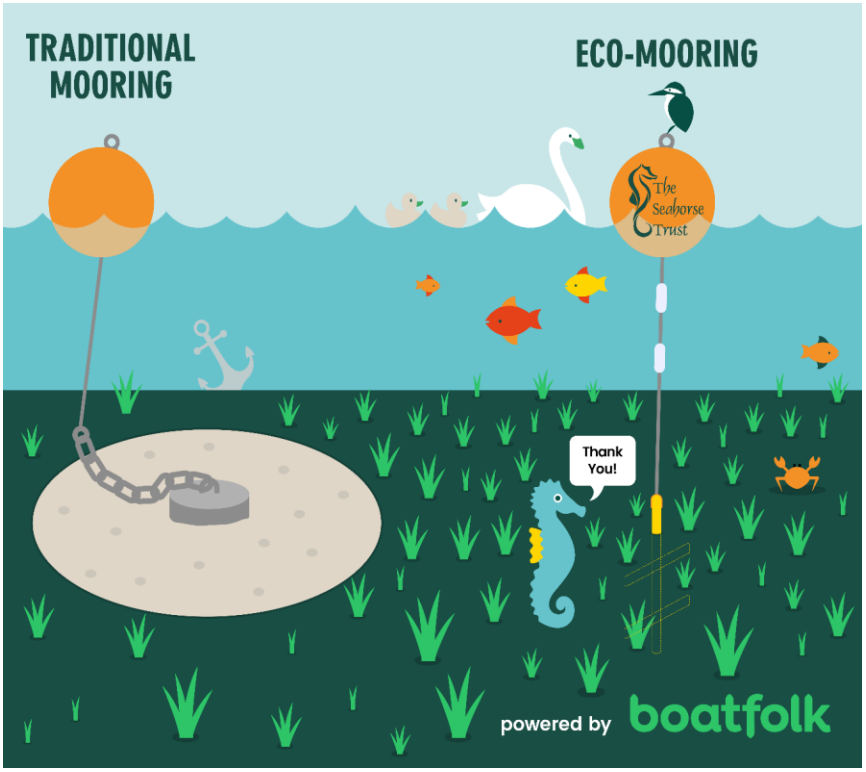
Installing the ecomoorings

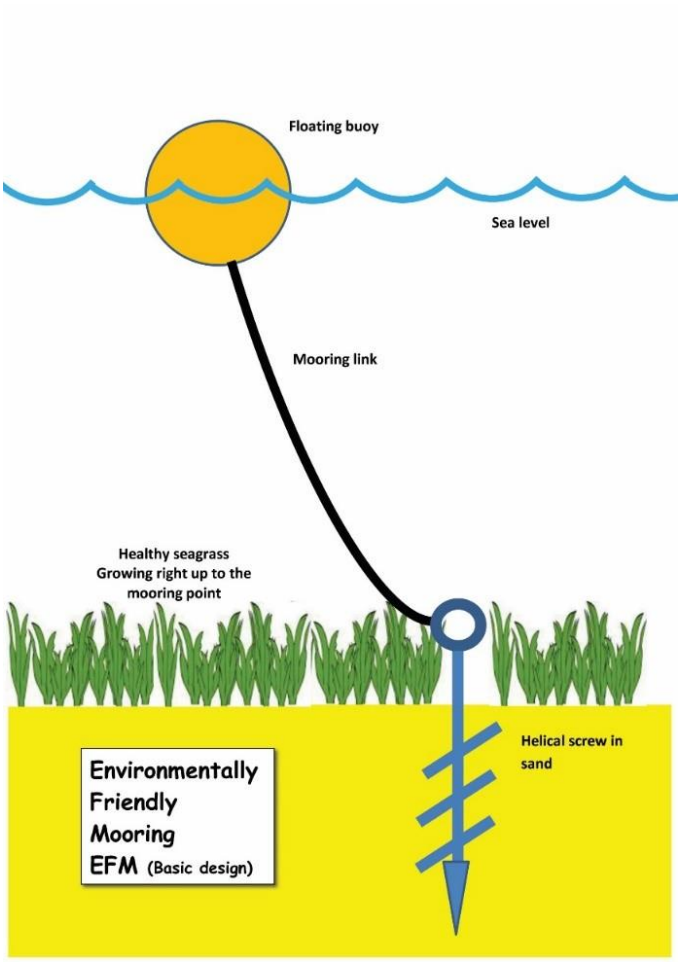
Swing moorings (traditional)

Traditional swing moorings rely on a large concrete block or lump of metal to hold them to the seabed. The riser (Rode) is a chain and when the tide drops this chain lays on the seabed. As the mooring moves around it drags the chain with it. As the chain is dragged by the tide it cuts up or scours everything in its path and stops any regrowth, especially of seagrass which is easily cut down by these chains. These traditional swing moorings are so damaging to the natural world and really should be banned for the environmental damage that they do.

The future and the way forward

By taking this initiative in partnership with Boatfolk, the National Trust and so many others and crucially with organisations like the Royal Yachting Association (RYA), we are rewilding our seas, we are creating pristine habitats for so many species like seahorses and we are helping to fight global warming. This partnership approach to conservation, bringing together all sides is the only way forward to save our planet and the species that live on it, including us. The work undertaken at Studland Bay is setting an example to others and gives great hope for the future.





Neil is the Founder and Executive Director, of the Seahorse Trust, and a Visiting Fellow to the faculty of science and technology, Bournemouth University. He became BNA Fellow in 2009.
More information on the Seahorse Trust and how to get involved can be found on the website – www.theseahorsetrust.org
Photos & graphics: Neil Garrick-Maidment

Phytophthora; What's the Problem(s)

Roy Stewart MSc, FIBMS, FLS, FRSB, MBNA

There are two main problems that will be highlighted by this article. The first is still the misconception that *Phytophthora* is a fungus and the second will be the current devastation caused by *Phytophthora* and possible future consequences.

Up till the late 1980s *Phytophthora* was still considered a fungus but since then the evidence has been accumulating to the point that *Phytophthora* has now clearly been reclassified. Unfortunately, it is still often referred to as a fungus and as recent as last year two new popular albeit non-technical/academic books still called it a fungus and even a forestry report referred to it as a fungal pathogen. It's unfortunate that part of its new classification includes the word mycota and it is because of this that they are often described as fungal like.

Feature	Oomycete	True Fungi
Neighbouring taxonomic groups	diatoms and golden-brown algae	animals
Hyphal architecture	aseptate and coenocytic hyphae	either single cell or septate with one or more nuclei per compartment
Ploidy of vegetative hyphae	diploid except for transient haploid state in gametogenia	Typically, haploid or dikaryotic often with stable diploid state following mating
Typical size of genome	50 - 250mb	10-40mb
Major glucans in cell walls	cellulose and Beta linked glucose polymers	usually chitin and/or chitosan and Beta linked glucans
Pigmentation	usually, unpigmented	very common in hyphae and spores
Toxic secondary metabolites	none described	common; typically, aromatic heterocyclic hydrocarbons
Mating hormones	non peptide and probably lipid like	usually, small peptides and lipopeptides
Predominant asexual spore	undessicated unicellular sporangia	desiccated single or multicellular conidia
Motile asexual spores	nearly universal biflagellate zoospore	uncommon and only found in chytrids which are monoflagellated
Sexual spores	oospores on terminal of specialized hyphae	various types often in large numbers in specialized complex enclosures e.g., fungal cap
Major energy reserves used by spores	mycolaminarin and lipid and possibly polyphosphate	glycogen and trehalose with sugar alcohols and lipids
Mitochondria	internal cristae tubular	internal cristae lamellar
Sterols	phytosterols e.g., fucosterol or cholesterol derivatives	ergosterol
Polarized growth of hyphae	Spitzenkörper (SPK) not present	Spitzenkörper (SPK)present and constitutes a collection of secretory vesicles and polarity-related proteins
Lysine biosynthesis	DAP pathway; also found in algae, plants and bacteria	AAA pathway also found in euglenoids

The table shows features that are used to distinguish fungi from oomycota.

Phytophthora belong to oomycota. Oomycota comes from the Greek ωόν (oon, 'egg') and μύκητας (mykitas, 'fungus'). This name is derived from the large round oogonia which are the large structures containing female gametes. The other name that is often used is "water mold" and this refers to their preference for conditions of high humidity and running surface water, which is again a characteristic of the oomycetes. A definition that is often used is 'They from a distinct phylogenetic lineage of fungus like eukaryotic microorganisms and characterized by hyphal growth. Again, the problem with this naming is that it implies that the oomycota are fungi. They are not fungi. Looking at the tree of life it is clear they now sit within the stramenopiles group along with brown algae, diatoms, dinoflagellates and ciliates and it is obvious they sit a long way from fungi which sit alongside animals to which they are more closely related.

The group used to be known as the kingdom Chromista but because flagella are present during various stages of the life cycle and always includes one straminipilous flagellum and this was considered to be the one feature of such importance that led the author Dick to the naming of the Kingdom Straminipila instead of Chromista. The latin derivative of Straminipilous is *stramen* = straw and *pilus* = hair. Classic flagellum has a 9+2 arrangement of microtubules and when it projects beyond the cell surface it tends to be 'naked' and has been coined Whiplash flagella. In contrast, the straminipilous flagellum is coated in 1-2µm hair like structures and these are called Tripartite Tubular Hairs (TTHs) and has led to the name Tinsel Flagellum. These are crucial in the motility of the zoospores once in the watery environment. The actual number of species of oomycota is unknown but a figure of approximately 1000 has been suggested and although mainly saprotrophic many are economically important aggressive algae, plant and animal pathogens.

Examples include the following:

1) *Plasmopara obducens* is an obligate biotrophic pathogen of horticultural plants from the *Impatiens* genus. It causes the *Impatiens* downy mildew foliar disease, which results in wilted and defoliated plants that die within weeks of disease onset (note powdery mildews as opposed to downy mildews are fungal in origin).

2) *Aphanomyces invadans* causes an ulcerative syndrome; It is pathogenic on several economically important fish, including carp, perch and salmonids. It has been responsible for large-scale mortalities of farmed and wild fish in more than 20 countries across four continents.

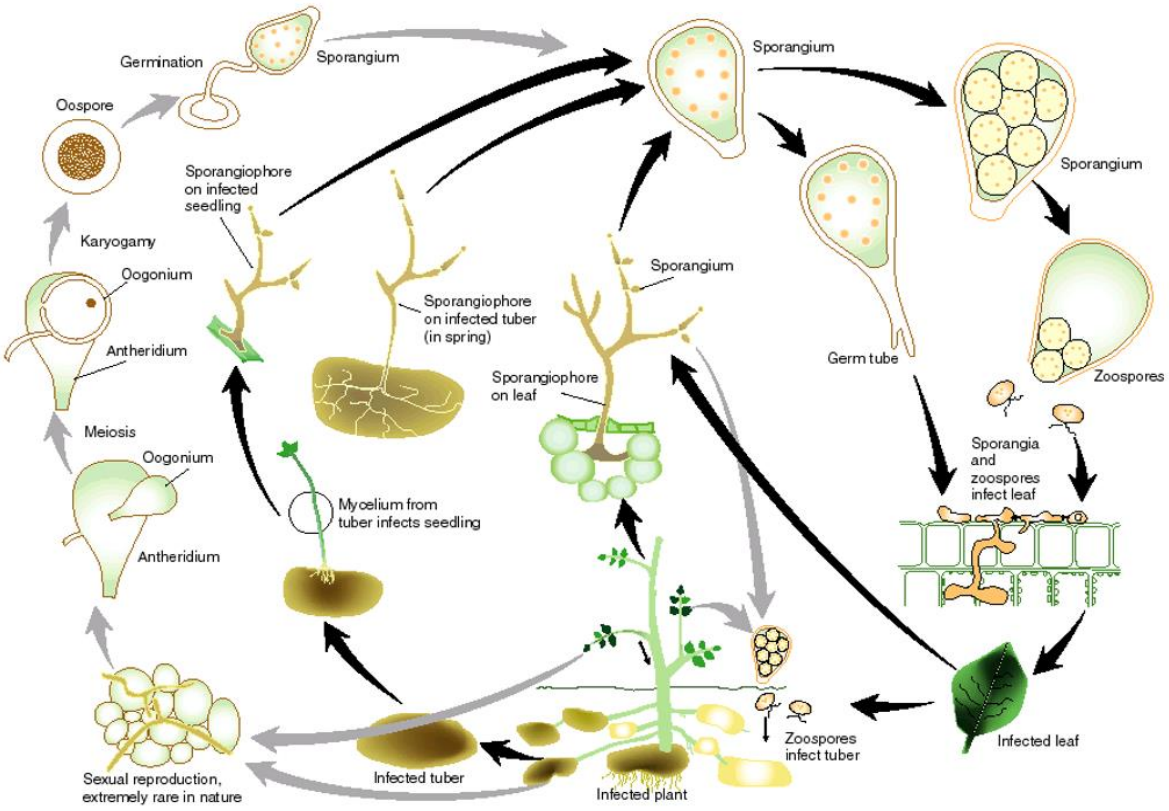
3) *Saprolegnia parasitica* causes saprolegniosis on various fish species; at least 10% of all hatched salmon succumb. In addition to fish, species of amphibians (could be a global problem) Crustaceans and aquatic insects are also highly susceptible.

4) *Pythium insidiosum* was considered to be the only oomycete pathogenic for mammals. In 1999 it was reported that several dogs were diagnosed with an unusual oomycete in the genus *Lagenidium* and this was causing extensive cutaneous and subcutaneous infections. The infection has been also reported in humans and cats, and it could possibly affect other mammalian species as well.

Probably the most well-known group of Oomycetes are the genus *Phytophthora*. The name is derived from the Greek and literally means plant destroyer. Currently there are approximately 180 species of *Phytophthora* that have been provisionally named worldwide, with new species being described at an increasing rate as a result of global surveys for *Phytophthora* in an increasing number of environments and it is predicted the number could rise to 500 plus species. There is also the problem of increasing hybridization between species (highlighted later). In Britain, new species of pathogenic *Phytophthora* (eg *P. ramorum, P. kernoviae, P. lateralis, P. austrocedri, P. alni, P. pseudosyringae and P. cinnamomi*) have been reported since 2003, all causing serious damage to trees and plants across a range of different environments and resulting in significant economic and ecological losses. Three of these pathogens (*P. lateralis, P. pseudosyringae and P. austrocedri*) were actually discovered as a result of disease outbreaks on trees at public parks and gardens and all being highly disturbed sites with extensive planting histories. Future invasions of *Phytophthora* from other global sources are likely because of their ability to survive in soil. This raises serious biosecurity issues especially due to the massive importation of plants into this country with very little or only basic monitoring. *Phytophthora* cause numerous problems to plants and often the infection and resulting necrosis may be found in leaves, stems, or roots. If the infection is foliar then it's called BLIGHT. Infection on stems or twigs creates a CANKER which may be localized or expand around the stem. This can lead to a gradual decline or sudden death of the canopy. *Phytophthora* may

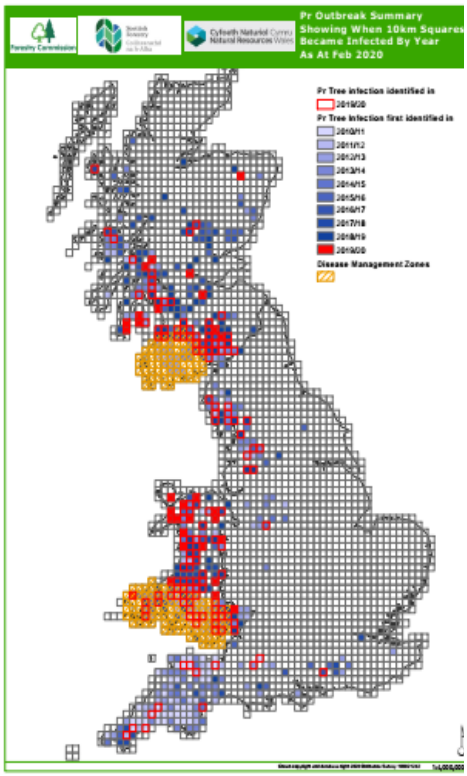
also invade the water conducting wood (xylem) beneath the inner bark, and cause symptoms in all or correct detection and part of the canopy associated with water stress, e.g., WILT. It may also invade the phloem causing disruption in the movement of nutrients e.g., sugars. Many *Phytophthoras* infect the roots, causing ROOT ROT; some kill fine roots only, and in others necrosis may progress up the root and into the root crown. Some species can cause multiple symptoms on a single host, or cause different symptoms on different hosts. The problem is many other pathogens, pests, injuries, and abiotic factors may cause similar symptoms therefore identification is essential. A quick test in the field can be done with a lateral flow test exactly using the same principles and technique and equipment as used in Covid testing. Again, like huge economic losses Covid to identify a specific species or strain then PCR has to be used. Potato blight is currently the most well-known disease caused by *Phytophthora* and It was a period of mass starvation and disease between 1845 to 1852 and it's estimated about 1 million people died and perhaps up to two million fled the country. The cause of the famine was P. *infestans* and this is fortunately confined only to solanaceous hosts. It also infected potato crops throughout Europe in the 1840s, causing an additional 100,000 deaths. *P. infestans* still worldwide and Potato late blight remains a major threat to food security and carries a global cost conservatively estimated at more than $6 billion per year and its estimated the losses would be sufficient to feed anywhere from 80 to many hundreds of millions of people. The genome was found to be considerably larger (240 Mbp) than that of most other *Phytophthora* species whose genomes have been sequenced; eg *P. ramorum* which has a 65 Mbp genome and this may be due to more genes coding for proteins to overcome plant immune defences and proteins involved in plant tissue invasion especially via haustoria.

The species of phytophthora that is causing the most concern at the moment is *P. ramorum* which was first found in the UK in 2002, initially in the horticultural trade. *P. ramorum* infects the leaves and shoots of ornamental shrubs such as rhododendron, pieris and camellia. *Rhododendron ponticum* is an invasive, non-native species found in many British woods and forests and unfortunately the infected leaves from *R. ponticum* produces large quantities of spores, putting



P. infestans life cycle.
https://www.asiablight.org/what-is-late-blight/

nearby susceptible trees at particular risk and Since 2009 *P. ramorum* has also been found sporulating on bilberry (*Vaccinium myrtilus*) in heathland. Typical symptoms on rhododendron include leaf blackening, wilted shoots and dieback. Since the mid-1990s, *P. ramorum* has killed millions of tanoak trees and several oak tree species (coast live oak, California black oak, Shreve oak, and canyon live oak), and caused twig and foliar diseases in numerous other plant species, including California bay laurel, Douglas-fir, and coast redwood mainly along the coastal areas of California and Oregon. This has led to the term Sudden Oak Death (SOD). This term (at the moment) does not apply to the UK. The pathogen has been detected on oaks but fortunately does not seem to induce disease but it does however affect Larch trees and causes what has been termed Sudden Larch Death (SLD) in this country. Already 3,000 hectares of larch in Wales, Devon, Cornwall, Somerset and Northern Ireland are known to be infected and thousands of trees have been felled in Scotland especially in Dumfries and Galloway district in an industry worth one billion pounds. The problem is so chronic in Scotland that the area has effectively been sealed off with very strict biosecurity arrangement for felling transport and disposal. The area has also been declared untreatable and the best option is containment as much as possible. There are isolated infections in other parts of Scotland but these are now treated on an emergency cull basis. The big potential problem is *P. ramorum* has a host range of more than 150 plant species. European sweet chestnut (*Castanea sativa*) is also a host, and increasing numbers have been found affected in southern England since 2015. Other conifer species such as Douglas fir (*Pseudotsuga menziesii*), grand fir (*Abies grandis),* noble fir (*A. procera)*, and western hemlock (*Tsuga heterophylla*) can be infected when growing near infected larch. It has also been confirmed on a small number of Sitka spruce (*Picea sitchensis*), another commercially important conifer species widely grown in the UK.



The UK outbreak map shows where *ramorum* disease has been confirmed or presumed in larch trees.

https://www.forestresearch.gov.uk/tools-and-resources/fthr/pest-and-disease-resources/ramorum-disease-phytophthora-ramorum/Crown Copyright Courtesy Forestry Commission licensed under the Open Government Licence

Recent tree infections first identified:
- 2019-20
- Disease management zones


Overall devastation in Bagger Woods, Barnsley


Effect on pine needles


Peeling effect on bark


Black bleeding lesions

Photos: R. Stewart

P. kernoviae was first found in the UK in October 2003 in a large bleeding canker on a mature beech tree in Cornwall. About the same time scientists from the Central Science Laboratory isolated an identical new organism from established rhododendrons, also from South-West England. It was confirmed as being the same organism. The scientist who discovered it was Professor Clive Brasier; he named it *Phytophthora kernovii* after Kernow, the Cornish name for Cornwall, where it was first identified. The spelling was later changed to *kernoviae*. Since then, it has also been found elsewhere in Great Britain, mainly in South-West England, but occasionally at other locations in England as well as Scotland and Wales. The symptoms are very similar to *P. ramorum* so very specific identification is needed. *Phytophthora* alni was first discovered in Great Britain in 1993 and is now considered widespread and the estimated number of alder trees affected is now at least 20% with the highest incidence of the disease incidence is in South-East England. Heavy tree losses are also occurring in alder populations in the borders region of Wales and alders on Scottish river systems are suffering damage. Alder dieback is now in 11 European countries including Austria, Belgium, France, Germany, Hungary, Ireland, Italy, Lithuania, Netherlands and Sweden.

A sub-species of the organism, called P. *alni* subsp. *uniformis*, has been found in Alaska, and another new *Phytophthora* has been reported affecting alder trees in Australia. *P. alni* can infect all species of alder, including the UK's native common or black alder (*Alnus glutinosa*) and the other two species widely planted here, which are Italian alder (*A. cordata*) and grey alder (*A. incana*). Green alder (*A. viridis*), another species native to continental Europe, but less often used here, is also susceptible. It appears to be highly specific to alder species, and is not known to affect plants in any other genus. Common alder in particular has considerable landscape value along waterways; it plays a vital role in riparian ecosystems and the root system helps to stabilise riverbanks. Molecular analysis has shown that *the P. alni* is a hybrid between *P. cambivora* and *P. fragariae* like species – a pathogen of strawberry and It is now spreading across Europe as a hybrid swarm. Some of the hybrid types are locally very damaging, and pose a serious threat to alder. The standard type of the pathogen has recently been named as *Phytophthora alni subspecies alni*, and is the most aggressive variant. The different hybrid types or variants are collectively known *as P. alni subspecies uniformis* and *P. alni subspecies multiformis.* The species consists of a range of heteroploid organisms and includes *P. alni* subsp. *alni* which is a tetraploid, while P. *alni* subsp. *uniformis* and *P. alni* subsp. *multiformis* have chromosome numbers between a diploid and a tetraploid.

P. lateralis is thought to originate in Asia. It is now the main cause of death of Lawson cypress trees in their native range in the West Coast region of North America but the pathogen was also first discovered in the UK in 2010, at Balloch Castle Country Park in West Dunbartonshire, Scotland. Since then numerous Infection sites have been identified and now include forest stands, windbreaks, parks and private gardens. The most likely source of the outbreaks in the UK has been the importation of infected plants from neighbouring European countries – four confirmed outbreaks on mature trees in the UK have been on nursery sites or next to garden centres or plant sales areas. Outbreaks of infection have been confirmed in Lawson cypress trees in South-West England, Yorkshire, Scotland and Northern Ireland. The disease is most prevalent on the western side of Central Scotland. Although *P. lateralis* mostly affects Lawson cypress trees its host range also extends to: Sawara cypress (*Chamaecyparis pisifera*);western red cedar (*Thuja plicata*);Pacific yew (*Taxus brevifolia*), a close relative of Britain's native common yew (*T. baccata*);northern white cedar (*Thuja occidentalis*);other cypress species (members of the Cupressaceae family)juniper (species in the Juniperus genus), periwinkle (Vinca spp.) and petunia (Petunia spp.).Alaskan cedar (*Cupressus nootkatensis*) and Douglas fir (*Pseudotsuga menziesii*) have been found to be susceptible in experimental conditions. It has also been found in soil in nurseries associated with cyclamen, marigold and pomegranate.

P. austrocedri was first isolated in 2000 in a nursery in Germany on creeping Juniper and in 2007 it was discovered to be the cause of dieback and deaths of Chilean cedar (*Austrocedrus chilensis*) in Argentina and the species was fully characterized from this infection. In Scotland it has infected amenity specimens of Lawson cypress (*Chamaecyparis lawsoniana*) and Nootka Cypress (*C. nootkatensis)* and a Mediterranean cypress in Iran. Although Juniper is protected it was already recognised as vulnerable in Great Britain before *P. austrocedri* was confirmed here. Figures from Natural

England report that of 35 SSSIs in England where Juniper is a main feature, 66% are in unfavourable condition and since 1990 onwards the extent of Juniper and its condition has declined considerably, especially on upland sites, where its importance is tied in with nature conservation and game management. Overgrazing, burning, deforestation, lack of regeneration and other land-use changes are factors mainly causing its decline but *P. austrocedri* infection could accelerate this decline.

P. pluvialis is known to affect a variety of trees including western hemlock, tanoak, pines and Douglas-fir. It was originally reported in Oregon, USA in 2013 on tanoak and Douglas fir and was subsequently identified as the pathogen responsible for 'red needle cast' of radiata pine in New Zealand. Of great concern is *P pluvialis* was discovered in a woodland in Cornwall in September 2021, where it was found to be affecting mature western hemlock and Douglas-fir trees. As of writing **This is the first report of this pathogen in Europe**. It's currently under investigation to see if it's actually the cause of the disease or a 'passenger' but it's thought to have been in Britain for more than 100 years. Although it is often found on ornamentals including shrubs, increasingly it has been found to affect trees such as sweet chestnut and oak, attacking the roots and root collar. The disease it causes on sweet chestnut is known as ink disease because of the blackish colour of infected roots and associated soil.

P. cinnamomi is distributed world-wide and causes disease on hundreds of hosts, including azalea, rhododendron, camellia, boxwood, eucalyptus, avocado, pine, juniper, hemlock, spruce, fir, cedar, and cypress. The disease is very promiscuous and infects economic groups as well, including food crops such as avocado and pineapple. Research has shown that *P. cinnamomi* can infect club mosses, ferns, cycads, conifers, rushes, grasses and lilies and a large number of species from many dicotyledonous families. In the South-West Botanical Province of Western Australia (WA), an estimated 40% of the 5710 plant species, are susceptible to *P. cinnamomi,* including 14% considered highly susceptible. This could be the most dangerous species of all *Phytophthora*.

What does the future hold? A couple of recent studies could highlight future problems we could face. Metabarcoding is a powerful technique that enables the identification of multiple species present in a single environmental sample based on a DNA 'barcode' unique to each species. A study in Scotland (Green et al 2020) using this technique found 23 *Phytophthora* species, the majority of which are known to be pathogens of woody hosts and were detected across all sites sampled. These included nineteen of the forty-two species recently listed as present in the UK and four species not previously recorded in Britain. Also detected were three as-yet undescribed *Phytophthora* species and nine oomycete sequences with no clear match to any known genus. Another study (Riddell et al 2019) used the same technique to analyse *Phytophthora* species diversity in soil samples collected from fourteen public garden/amenity woodland sites in Scotland. A high diversity of *Phytophthora* s was detected at all sites, corresponding overall to 23 *Phytophthora* species as well as twelve as-yet undescribed oomycete sequences. The question is: will these new species become pathogenic. Nobody knows but very careful surveillance and rapid action could possibly restrict their effect on what's becoming a global problem. The future is not looking very bright at the moment.

References

1) Everett M. Hansen. *Phytophthora* Species Emerging as Pathogens of Forest Trees. Curr Forestry Rep (2015) 1:16–24

2) Gordon W. Beakes & Sally L. Glockling & Satoshi Sekimoto. The evolutionary phylogeny of the oomycete "fungi". Protoplasma (2012) 249:3–19

3) Burki et al., The New Tree of Eukaryotes, Trends in Ecology & Evolution 2020 Jan;35(1):43-55.

4) McGowan J, Fitzpatrick DA. Recent Advances in oomycete genetics. Adv Genet. 2020;105:175-228

5) William Fry. *Phytophthora* infestans: New Tools (and Old Ones) Lead to New Understanding and Precision Management. Annu Rev Phytopathol 2016 Aug 4;54:529-47.

6) Chepsergon et al. Organize, Don't Agonize: Strategic Success of *Phytophthora* Species. Microorganisms. 2020 Jun 17;8(6):917.

7) Suomeng Dong and Wenbo Ma. How to win a tug-of-war: the adaptive evolution of *Phytophthora* effectors. Curr Opin Plant Biol. 2021 Aug;62:102027.

This article is based on a PowerPoint Presentation given by Roy through an online Zoom portal for the BNA National AGM on 6th October 2021.

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

The sawfly *Pareophora pruni*: A new population discovered on the south coast

David C. Wareham FLS FRGS FBNA

On a warm, sunny afternoon in late June of 2021, my wife and I were walking along the East Overcliff Drive overlooking the beach between the piers of Bournemouth and Boscombe. The tracts between the Drive and the cliff top are a combination of grassland and gorse scrub and are home to a surprisingly large variety of plants and animals, including several rare species such as the Sand Lizard *Lacerta agilis*, and Dartford Warbler *Sylvia undata*.

I had been photographing some of the many interesting invertebrate species that inhabit the maritime cliff there. Although the area is encompassed with waist-high chain-link fencing, to prevent people from gaining access to the cliff, it is possible to view the shrubs and wild flowers quite easily from the pavement. During the summer the area is alive with the sound of crickets and grasshoppers. Shield bugs occur on the Bramble *Rubus fruticosus*, and Thick-legged Flower Beetles *Oedemera nobilis* can be seen feeding in the flowers of daisies. Butterflies and day-flying moths too are a feature with species such as Cinnabar *Tyria jacobaeae*, Cream Spot Tiger *Arctia villica*, Marbled White *Melanargia galathea*, Gatekeeper *Pyronia tithonus* and Common Blue *Polyommatus icarus* frequently being joined by continental relatives such as Painted Lady *Vanessa cardui* and Clouded Yellow *Colias croceus*.

As we walked, my attention was drawn to something on the leaf of a small Blackthorn *Prunus spinosa* half a metre away on the other side of the fence. At first, I thought it was just a bird-dropping but on closer inspection I recognised it as the larva of a Vapourer Moth *Orgyia antiqua.* It was only about 15mm in length so, knowing the larva can look quite spectacular when fully grown, I decided to take it home where I could photograph it as it grew. I picked a small branch with half a dozen or so leaves and placed it and the larva in a plastic box. On reaching home, I transferred the branch and larva into a transparent ventilated container.

Larva of Vapourer Moth *Orgyia antiqua*

I checked on the larva every few hours and was happy to see it eating well. I cleaned the container daily and replaced the leaves with fresh ones every few days. The larva had several moults and grew quickly.

As it did so, so did the size of its frass (droppings). One day I noticed that there was a scattering of smaller frass on the bottom of the larva's container. Something else was feeding on the Blackthorn.

Carefully, I examined each leaf in turn and, to my surprise, found two other different larvae, each one lying along the central vein of a leaf. They were both identical, about one centimetre in length, and green with numerous strange white, Y-shaped spines along their bodies. I placed these larvae in a separate container with some leaves so I could watch them develop. At that stage I had no idea what species they were or how big they would grow.

Over the course of the next two weeks, I made frequent visits

Sawfly larva *Pareophora pruni*

to the site where I had found the larvae in order to get fresh food for them. During that time, I came across a further eleven of the mystery white-spined green larvae amongst the leaves. Identifying them took a while as I could not find anything in my reference books. I knew they were not the larvae of butterflies or moths as lepidopteran larvae have four to six eyes on each side of the head whereas these larvae only had a single pair of diminutive eyes.

Finally, more by accident than anything else, I found a photograph of a larva that matched mine whilst scouring the internet. It was of a Sawfly currently known only by its scientific name of *Pareophora pruni*. When I searched for more information about it, I couldn't find very much at all other than it was rare, with only eleven previous British records. I was somewhat taken aback by this so sought confirmation. It came from Professor Jim Hardie, Director of Science, at the Royal Entomological Society. I subsequently sent details of my discovery to CEDaR Online Recording, iRecord, and the website of The Sawflies (Symphyta) of Britain and Ireland.

Sawfly larvae pupate in different ways depending on the species. Some do so in bark or in chambers in the soil, whilst others make cocoons in the leaves. Because I was uncertain as to how the larvae of *P. pruni* pupate, I took them all back to the site where they were found, together with the now fully-grown Vapourer Moth larva and carefully transferred each one onto a leaf so they could pupate in the way they should.

In 2022 it is my intention to return to the site and take samples of foliage from the Blackthorn bushes that grow in profusion elsewhere on the Bournemouth cliff top in the hope of finding how extensive the population of this species is there.

David C. Wareham lives in Bournemouth and specialises in Amphibians and Reptiles but has an avid interest in all living things. He was awarded FBNA in March 2022.
Photos: David Wareham

Blackthorn on Bournemouth Overcliff

Site of *P. pruni* population on Bournemouth Overcliff

An Introduction to Pembrokeshire Hedgebanks

Michael Higgins BSc(Hons)CEnv CHort MRTPI FArborA MBNA

Figure 1 – Hedgebank in an exposed location – scattered gorse and blackthorn are most prevalent

Introduction

I have worked in my current role as a tree and landscape officer for nearly 14 years with the Pembrokeshire Coast National Park Authority. I am consulted on approximately 200 planning applications a year, of which Pembrokeshire hedgebanks are regularly a material consideration.

Hedgebanks are key to Pembrokeshire's landscape character, they have historical significance and are an essential element in the biodiversity and connectivity of the immediate and greater landscape.

The following is an introduction to the Pembrokeshire hedgebank with an insight into the overall benefits they provide. I have only briefly discussed Pembrokeshire hedgebanks and planning as I am currently in the process of producing a more detailed article on this interaction, which I hope to include in a future publication with BNA.

The Pembrokeshire hedgebank

The Pembrokeshire hedgebank (locally referred to as Cloddiau) varies visually throughout the county; from their construction type, size, condition and associated species.

The most common construction method is to produce a 'battered' (tapered) structure comprised of stone separated by turf bedding. Figure 2 shows a new hedgebank, with Figure 3 showing an artistic representation for a new Pembrokeshire hedgebank, based upon traditional specifications.

It is not entirely clear how the Pembrokeshire hedgebank boundary structure came about; however, my personal theory is based on historical land management, subsequently followed by the introduction of the Inclosure acts where defined boundaries became more necessary. This possibly resulted in the hedgebanks originally forming incidentally to land management, but later becoming a preferred method of defining boundaries due to their intrinsic value, and a means of stock control in the absence of fencing.

My thoughts, looking at the hedgebank structure is that as land was initially cleared and prepared for farming, the larger stones would have been the first to be exposed during land preparation/ploughing. These would have been put aside – most likely along the edge of the worked area.

Much of Pembrokeshire soil is loamy[1] and may have resulted in a texture that is more prone to remaining attached to the stones when removed from the soil during management. The dormant seed stock within this soil may have begun to establish in this time resulting in a single layered, low stone bund, with the native flora establishing on and between the stones.

Figure 2 – New hedgebank feature at a field opening

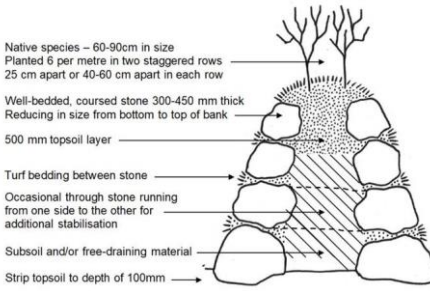


Figure 3 – A typical construction specification for a new Pembrokeshire hedgebank

As the land management continued through the years, stones would have continued to have been exposed and again stacked on the side of the field, but on top of the previous row/bed. The stones removed may also have been irregularly shaped, or of a poor quality that made using them to build walls impractical, and this process may have continued until a hedgebank naturally developed.

There is no definitive evidence for this, but from site assessments and personal experience it seems a reasonable hypothesis, and I have not yet heard another reason for their implementation rather than more typical historic boundaries such walls or standard hedgerows. If there are other explanations, I am keen to hear and please contact me.

When constructed from new, the hedgebank typically has an internal construction incorporating free draining material at the base up to about halfway, with the remaining space filled with topsoil to enable planting of native species along the apex of the bank (*Figure 3*). Pembrokeshire hedgebanks are structurally strong enough to support mature trees, with the hedgebank structure in turn supported by the roots of the trees and hedges within the hedgebank (*Figure 4*).

Figure 4 – Hedgebank denuded by grazing showing the interlinked root structure of the existing mature tree

Figure 5 – Tithe Map[1] - Saundersfoot, Pembrokeshire (National Library of Wales) The original historic field boundaries as recorded on the Tithe Maps for the area.

Historical Significance

The vast majority of Pembrokeshire hedgebanks in situ today are historical boundary features that can also be identified on Tithe maps[2] of the area with the features predating the Inclosure Act 1845[3].

Pembrokeshire hedgebanks are locally important landscape features and are one of the most prevalent boundary features in the county, and will even be found as garden boundaries. Through reference to historical records, it is possible that the majority of the hedgebanks existing today have been present in excess of 170 years and are also likely to have historic hedgerows, trees and flora present.

By referring to the Tithe maps (*figure 5*), post war aerial images[4] (*Figure 6*) and present-day aerial images (*Figure* 7), it is possible to compare the history of hedgebanks and confirm that the majority of the historic field boundaries within Pembrokeshire remain in situ. Where smaller fields have been previously combined, the interior boundaries of these parcels will have been removed, however, the exterior hedgebanks will have been retained.

Figure 6 - 1947 Aerial plan – Saundersfoot, Pembrokeshire (Welsh Government) Where smaller fields have been combined, the new parcels have still retained the external historic boundaries.

Figure 7 - 2017 Aerial plan – Saundersfoot, Pembrokeshire (Google)

Dating hedgebanks and hedges

Where hedgerows on Pembrokeshire hedgebanks have been surveyed in relation to Hedgerow Removal Notices, the typical Pembrokeshire hedgerow tends to show mixed hedge species with an average of 3 woody species present, although it should also be noted that less species will be found at exposed, coastal locations.

Through the dating of hedgebanks using a recognised methodology[5] the age of the

hedgerow can be approximately dated:
Age = (no of species in a 30yd stretch) x 110 +30 years.

Taking the average estimate of three woody species within the typical Pembrokeshire hedgebank, this will result in a calculated age of 360 years ((3 x 110) + 30) for these established structures.

This calculation is often simplified as the average number of species equates to the age in centuries, resulting in an average age of 300. With this calculation and supporting documentation from historical records; it is considered that the hedgebanks would be historic landscape features, worthy of consideration in the same way as ancient and veteran trees and woodlands.

There are also risks of 'over-aging' when assessing newer hedgebanks as there will invariably be a more diverse mix of species often due to conditions applied during planning, suggesting a greater age. As such care should always be taken when assessing hedgebanks and their associated hedges in this way.

The Pembrokeshire Hedgebank and associated hedgerow species dependant on location

Due to the range of landscape in Pembrokeshire, the Hedgebanks have varied visual qualities, as well as associated hedge species dependant on location. The following are examples of site types of woody species likely to be present.

Very exposed sites

Hedgebanks in very exposed areas such as the St David's Peninsula will sometimes only be topped with turf and wild flowers, with small woody specimens scattered along the hedgebank in clusters (*Figure 1*). These will predominantly include the more coastal tolerant native hedge species such as:

- Gorse (*Ilex europaeus*)
- Blackthorn (*Prunus spinosa*)
- Hawthorn (*Crataegus monogyna*)

Less exposed areas

In areas where there is still some exposure that will restrict larger trees from establishing, the hedgebanks will support structurally contiguous hedgerows with increased species diversity such as:

Smaller trees
- Crab Apple (*Malus Sylvestris*)
- Wayfaring tree (*Viburnum lantana*)
- Holly (*Ilex aquifolium*)
- Hazel (*Corylus avellana)*

Hedge species
- Elder (*Sambucus nigra*)
- Hawthorn (*C. monogyna*)
- Blackthorn (*P. spinosa*)
- Wild privet (*Ligustrum vulgare*)

Sheltered Areas

Hedgebanks located in areas with the least exposure to the elements will normally support a variety of woody specimens of various sizes from large trees to established hedgerows and even climbing species may also be present:

Larger established species
- Ash (*Fraxineus excelsior*)
- Wych Elm (*Ulmus glabra*)
- Oak (*Quercus petraea & Q. robur*)
- Sycamore (*Acer pseudoplatanus*) – Non-native but beneficial for lichens

Smaller species
- Elder (*S. nigra*)
- Hawthorn (*C. monogyna*)
- Blackthorn (*P. spinosa*)
- Wild privet (*L. vulgare*)
- Hazel (*C. avellana*)
- Spindle (*Euonymus europaeus*)
- Dogwood *(Cornus sanguinea)*

Climber species
- Honeysuckle (*Lonicera periclymenum*)
- Dog rose (*Rosa canina*)

Comparisons with other historical landscape features

Through their establishment and age Pembrokeshire hedgebanks have associated irreplaceable relationships including:

- Floral associations – Woody and non-woody species present along the hedge, bank and margin
- Faunal relationships – Habitat corridors, nesting and shelter potential
- Fungal relationships – Within the typically undisturbed structure of the hedgebank and within the soil of the immediate area, as well as growing on mature hedge and tree species.
- Contiguous links within the immediate and greater landscape to other features such as hedges, woodlands, ponds and other hedgebanks.
- Historical and archaeological features – The hedgebank itself as well as associated components.
- Local landscape – Visual qualities, screening and local character.

Pembrokeshire hedgebanks are historical features; and it is reasonable to consider them in the same context as other invaluable natural resources such

as ancient woodland, ancient trees and veteran trees.

Benefits of a Pembrokeshire Hedgebank

The structural resilience of Pembrokeshire hedgebanks has resulted in their long-term retention to produce a valuable, interconnected ecological habitat. This longevity has also had an additional benefit of minimal intervention in most situations.

Hedgebanks also provide an immediate screen; which is further supplemented by the associated hedge species along the apex, adding more visual interest and providing a 'softer' boundary feature compared to fences or walls.

This resilience has also resulted in a vast, interconnected habitat throughout the landscape of Pembrokeshire that has survived for hundreds of years to result in features of incredible ecological value.

Potential of a Pembrokeshire hedgebank to support growth.

Another benefit of a Pembrokeshire Hedgebank is the potential to provide a larger growing area. Each hedgebank has a footprint of approximately 2 m. For every metre of standard hedge with the same footprint there will be 2 m^2 of growing area on the ground for the hedge and associated flora growing along the hedgerow.

Although a Pembrokeshire hedgebank also has a 2m footprint, it also has an increased surface area due to the sides and top of the bank, which results in a larger potential area for flora to establish. For example, the top of the average hedgebank is 900mm (0.9m) wide; along with two sides each measuring approximately 1.6m, results in an area of 4.1 m^2 for every metre length of hedgebank (Figure 8). This can be taken further in terms of the potential growing volume a Pembrokeshire hedgebank provides (*Figure 9*).

A Pembrokeshire hedgebank therefore has the potential to provide over twice as much soil volume for growing as a typical hedge; and the surface area has the potential to support twice as much flora as a typical hedge (*Figure 9*).

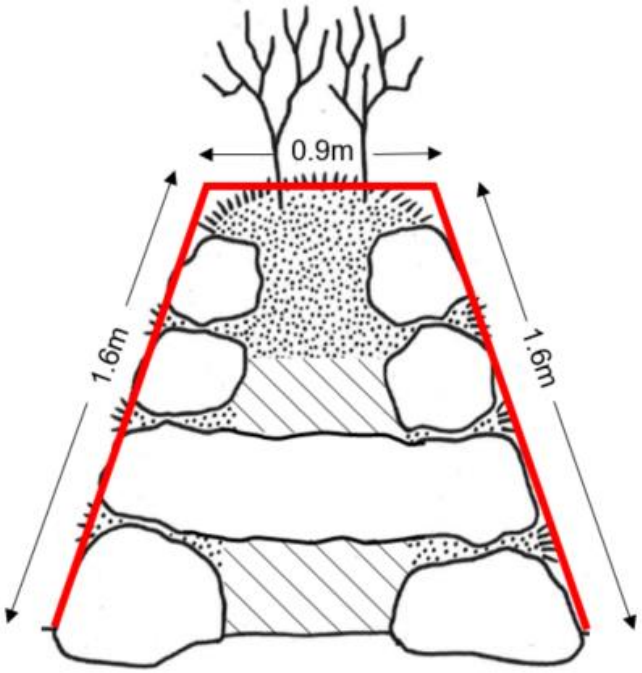


Figure 8 – Potential growing area of a Pembrokeshire hedgebank per linear metre
The red line is the equivalent of 4.1 m long resulting in an area of 4.1 m^2 per linear metre

Assuming an approximate rooting depth of 800 mm for a standard hedgerow on 'flat ground'; the hedgebank structure also provides additional rooting volume above ground within the structure of the hedgebank.

This results in an approximate potential growing area of 3.77 m^3 which more than doubles the potential soil volume of a standard hedge to support flora in this context. This provides a significant potential soil volume for root development of trees and other woody species growing on the hedgebank, and one of the reasons large trees are found to establish on Pembrokeshire hedgebanks.

This results in a significant increase in carbon and water storage potential along with the other benefits associated with a Pembrokeshire hedgebank; such as the establishment of native flora, fauna and fungi, along with the hedgebank also acting as an ecological corridor.

Conclusion

Pembrokeshire hedgebanks are a unique landscape feature that have been predominantly retained within the Pembrokeshire landscape; they provide huge habitat potential as well as helping to shape the landscape of Pembrokeshire and

have distinct character depending on location.

The retention and protection of the Pembrokeshire hedgebank is paramount, with the need to continue to incorporate these features in our changing, modern landscape. With legislation such as the *Environment (Wales) Act 2016*, biodiversity has never been more important, and Pembrokeshire hedgebanks are one of our iconic natural resources that can be sustainably managed in the future for this purpose.

Pembrokeshire hedgebanks are historic features, limited predominantly to the southwest of the UK; with unquestionably high ecological values, that also contribute to a unique and iconic landscape. (*Figure 10*).

With the application of current and pending legislation relating to environmental and biodiversity issues, these ancient hedgebanks must be considered in the same vein as ancient trees and woodland and protected accordingly.

My thanks go to Paul Cleaver, an arboricultural consultant with an equally keen interest in Pembrokeshire hedgebanks.

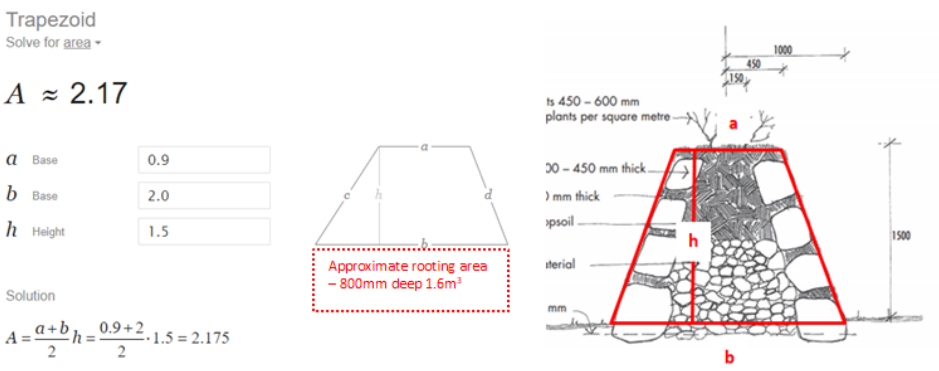


Figure 9 - Calculating the area of a Pembrokeshire hedgebank (trapezoid): Area times length of hedgebank (1m) = 2.17m³

Figure 10 – Iconic Pembrokeshire hedgebanks either side of the coast road near Nolton

Foot Notes

[1]https://www.landis.org.uk/soilscapes/index.cfm

[2]*Tithe Maps of Wales – https://places.library.wales/*

[3]*https://www.legislation.gov.uk/ukpga/Vict/8-9/118/section/94*

[4] *Welsh Government Historic Aerial Photography WMTS* http://lle.gov.wales/services/tiles/apu/#1947/leaflet

[5] *Pollard, E; Hooper, M D and Moore, N W (1974) Hedges Collins New Naturalist*

[6]National Library of Wales - https://places.library.wales/

[7] Welsh Government Historic Aerial Photography WMTS http://lle.gov.wales/services/tiles/apu/#1947/leaflet

Bibliography

1) Crow, P. (2005) *The influence of soils and species on tree root depth* - Forestry Commission Information Note

2) Website: Devon Hedge Group *Devon Hedges* https://devonhedges.org/

3) Mynors, C. (2011) *Law of Trees, Forests and Hedges*. Sweet & Maxwell, London.

4) Website: National Library of Wales

6) Planning Guidance (Wales) (1997). *Technical Advice Note (Wales) 10 - Tree Preservation Orders*

7) Pollard, E; Hooper, M D and Moore, N W (1974) *Hedges* Collins New Naturalist

8) Sterry, P (2007) *Collins Complete British Trees* London; Collins

9) The Conservation Volunteers *Hedging Conservation Handbook*

10) Website: Tithe Maps of Wales

11) Website: Welsh Government Historic Aerial Photography WMTS

12) Welsh Government (2018) *Planning Policy Wales: Edition 11*

Michael Higgins works for the Pembrokeshire Coast National Park. He was awarded MBNA in August 2021.

Photos: M. Higgins
Maps & graphics see footnotes

Wildlife Recording from Home during the 2020 Worldwide Coronavirus Pandemic

John McCrindle BSc MBNA

Introduction

In 2019 a new virus began to infect mankind. It first appeared in China and became known as Coronavirus or in short Covid. Within months it had spread to other countries and it was not long before the world was in the grip of a pandemic. With deaths due to the virus spiralling the UK government, in March 2020, announced a national lockdown in an attempt to curb the spread of the virus.

People were asked to stay in their homes and gardens and only venture out for medical help, food and exercise close to their homes. For someone who would normally be out during the summer searching for and photographing British wildlife whether it be rare orchids, butterflies, wildflowers, birds or dragonflies, lockdown was a severe blow. However, this also presented an opportunity. Gardens are often an overlooked area when looking for wildlife and yet there are over 20 million back gardens in Britain and they cover an area as large as the Norfolk Broads, Dartmoor and the Lake District combined. It turns out that gardens are in fact more of a haven for wildlife than one might first expect. Dr Jennifer Owen as detailed in her "Ecology of a Garden" (Ref:1), recorded more than 2,000 species of plants and animal in her normal suburban Leicester garden, persuading her to conclude that it (along with, she supposed, other gardens in general) included "an astonishing large portion of the species recorded in the British Isles."

After a successful reintroduction programme Red Kites *Milvus milvus* were seen in the skies above a number of gardens. *Photo: J. McCrindle*

One might question how it was possible for her to record so many different species knowing that the number of birds, reptiles, mammals, wildflowers etc. one could ever possibly hope to see in a garden would probably number no more than two or three hundred at best. However, that list does not include insects and that is where the numbers all change. In Britain there are a staggering 27,000 types of insects, so by careful observation and the necessary knowledge to identify some of those many small insects, it is entirely feasible to record wildlife species in a garden amounting to a few thousand.

Encouraged by this information, I decided to start recording the wildlife I saw in my garden and to invite other people within the village where I live to do the same. Apart from providing useful data, I also saw it as an activity that people might enjoy doing during the time they were confined at home, whilst finding out what wildlife they had on their doorsteps and learning to identify different species. Within a short time nine people within the village had joined the 'club', the rules of which were simply to record any wildlife that they saw in and from their home and garden without leaving either. After the initial success, I invited a few other family members and friends to do the same where they lived, and following that, invited the BNA to follow suit and invite its members to join in the survey. It was not long before there were people recording their garden wildlife from Aberdeen in the north to the New Forest, near Lymington, in the south, Little

Baddow in Essex in the east and South Brent in Devon in the west.

The gardens where the recordings were being carried out varied greatly, as did the areas bordering them. There were small gardens in urban areas, large gardens in villages and in the countryside and even a farmhouse garden. Some gardens contained borders with cultivated flowers and well-manicured lawns, others had large areas that were left uncultivated and wild, and some had ponds both small and large. The outlook of the houses varied greatly as well. Some small gardens just looked out onto their neighbours' gardens and others had vistas over the surrounding countryside. In the New Forest, one of the gardens there looked straight out onto heathland.

In Methven Scotland the recorder's house was situated in an area of farmland, woodland, moorland and the highland line. In Little Baddow, the views from the farmhouse were of grazing pasture running down the side of a hill to a small brook at the bottom.

It was decided to run the survey, from its commencement in mid-March at the start of lockdown, to the end of October 2020.

Birds

Initial sightings consisted mainly of birds. The most common birds recorded were much as one would expect to see in gardens, namely Blackbird, Robin, Blue Tit, Great Tit, House Sparrow, Dunnock, Wood Pigeon, and Magpie. The arrival of spring saw House Martins, Swallows and Swifts being seen in the skies above although in Methven, the recorders there reported a lack of House Martins and Swallows, both of which had nested on their house in previous years, as well as Swifts. The sound that truly heralded the arrival of spring was the Cuckoo and although I am sure many people heard it there were very few sightings of this bird. The most common finches seen were Chaffinch, Greenfinch, Goldfinch and Bullfinch. A single record of a Siskin, seen in Aberdeen was possibly the pick of the bunch of smaller birds. Both Green Woodpeckers and Great-spotted Woodpeckers were visitors to a number of gardens and some of those people living close to woodland were treated to sights of Nuthatch, Treecreeper and Blackcap in their gardens. Of the farmland birds Pheasants were well recorded but the most intriguing sighting of a farmland species was of two Red-legged Partridges that took to walking up the middle of a road in the cul-de-sac where one of the recorders houses was situated, clearly making the most of the lack of traffic on the road due to the lockdown.

Throughout the survey period, birds of prey were well represented in the recorded sightings, the Buzzard being at the top of the list. Sparrowhawks were seen in a number of gardens often just flying through looking for an unsuspecting smaller bird to catch. One of the recorders, whilst sitting on her patio, saw a Sparrowhawk cruise down to the bird feeder and take a Blue Tit right in front of her eyes. Another person said that a Sparrowhawk had learnt to fly around the corner of their house before the smaller birds had a chance to scatter. From the farmhouse in Little Baddow Kestrels were seen hovering over the pastures. They had nested in a Kestrel box mounted on the nearby church tower and were using the pastures to hunt for small mammals. In Harpenden, on the edge of the Chilterns, there were many sightings of Red Kites. These magnificent birds of prey with their distinctive reddish-brown body and forked tail suffered years of persecution and became extinct in the UK by 1879, other than in remote parts of central Wales where a very small population of breeding pairs remained. A reintroduction programme was started in 1990 when 13 birds were brought in from Spain and released in the Chilterns. This has been a wildlife introduction success story and their numbers have increased in the Chilterns and other release sites to such an extent that they were recorded during the survey on a number of occasions as far apart as Essex and Perthshire. Hobbies were seen but were far and few between.

Owls were also well represented. Tawny Owls being the most common. From the farmhouse garden in Little Baddow, Barn Owls that were making use of an owl box nearby to raise their young were seen quartering the fields. A Little Owl was also seen at the same site.

Ring-necked Parakeets seen from a Harpenden Garden were one of the more unusual species to be recorded and a Kingfisher on a branch overlooking a large garden pond in Little Baddow was a surprise. In Scotland and the New Forest, with heathland nearby, Curlew was added to the overall list.

In Boreham, Essex, Graham Ekins, with whom we were in contact throughout the survey period, and who independently had started his own lockdown garden survey recorded an astonishing 67 different species of birds in the short period from 17th March to 11th May. His list included a Peregrine and a number of birds normally associated with the coast namely Golden Plover, Whimbrel, Oystercatcher and Great Black-

backed Gull, being on a flight route between the coast and some flooded gravel pits nearby clearly helped. By the end of October, the total number of species he had recorded was 78.

Three species of birds warranting special mention were a Crane seen flying overhead by Cliff Jones in Aberdeen, a Goshawk similarly seen flying overhead by Pauline Rutherford in Rotherham, and a Hen Harrier, seen by Jan and Colin Taylor, sitting on the hedge and a strainer post in their garden. The latter two species, both considered to be relatively rare birds of prey have suffered from habitat loss and persecution by gamekeepers.

The total number of different bird species recorded was 69. This did not include those recorded by Graham Ekins which would have added an extra 10 species to the total.

Mammals

Mammals are one group which seemed to benefit from the lack of road traffic and human movement during the Covid lockdown.

Badgers and Foxes appeared to be seen much more frequently than during normal times. Field observations in the past have long supported that Badgers were the dominant of the two species but certainly the observations during lockdown in Little Baddow showed that Badgers are quite happy to feed with Foxes on food put out for them in gardens. In more than one garden they were seen to be feeding together and in one particular garden in Little Baddow it was not unusual to see up to two or three badgers and two foxes eating food together paying no attention to each other. The area surrounding this village has a high density of Badgers, the main predator of Hedgehogs, so it was not surprising to find that there were no recordings of Hedgehogs in the gardens in this area.

Badgers *Meles meles* feeding with foxes *Vulpes vulpes* in one of the recording areas was a common occurrence.
Photo: G. Houghton

In Harpenden there didn't seem to be a problem. In two of the recorders' gardens camera traps recorded hedgehogs nightly foraging around for food.

One of the most common mammals seen in the gardens were Grey Squirrels, but in Methven in Scotland the recorder was surprised to see a Red Squirrel. This was only the third time they had been seen in this garden. At the same household they were also fortunate enough to see three Stoats which stayed around for eight days. Elsewhere there was one sighting of a Weasel.

There was no shortage of Rabbits to be seen from the houses that backed onto open spaces but only one sighting of a Hare. One sighting that was not welcomed was that of a Mink, in the river at the Mill House in Little Baddow. Essex Wildlife Trust have been trying to eradicate them with generally good success.

Once summer got underway bats began to appear. Common Pipistrelle and Soprano Pipistrelle with the addition of one record of a Noctule Bat were the three species recorded. It was only those with bat detectors who could distinguish in flight the Common Pipistrelle, the smallest of our bats, from the Soprano Pipistrelle.

Wood Mouse, and House Mouse were recorded as well as Bank Voles and Rats. One record of a Pygmy Shrew was an interesting addition to the overall list. There was also one record of a Mole.

Moving to the other end of the size spectrum, Muntjac Deer were recorded in a number of the larger gardens, much to the dismay of the garden owners, because of the damage they did. One Roe Deer was also seen.

Reptiles and Amphibians

With only six native species of reptiles in the UK and seven amphibian species these two groups turned out to be the smallest of the list of species recorded. Common Frog and Toad were seen as one would expect but the Marsh Frog was an unexpected record. The Marsh Frog is slightly bigger than the Common Frog and is green all over. It is an alien species and found in small patches in South-east England. This was recorded in one of the Essex garden ponds, possibly brought in as frog spawn from Rainham Marshes where they are present.

Smooth Newts were also recorded in garden ponds. The two most common species of lizard i.e., the Common Lizard and Slow Worm were found as was a Grass Snake, the commonest of the three snakes present in the wild in the UK.

Insects

In her book "Extraordinary Insects" Anne Sverdrup wrote "There are more than 200 million *insects for every human being living on Planet Earth today. As you sit reading this sentence, between one and 10 quintillion insects are shuffling and crawling and flapping around the planet, outnumbering the grains of sand on all the world's beaches. Like it or not they have you surrounded, because Earth is the planet of insects.*"

As stated previously there are over 27,000 types of insects present in the UK so this represented a real opportunity for people to add significantly to their record lists. The most commonly encountered groups of insects were Lepidoptera – butterflies and moths, Odonata – dragonflies and damselflies, Hymenoptera - bees, wasps and ants, Diptera - flies Coleoptera - beetles, Orthoptera - grasshoppers and crickets.

Butterflies (Lepidoptera)

The first butterflies were recorded soon after the start of the survey. Comma, Brimstone, Peacock and Orange Tip butterflies were the first to be seen in late March and early April, followed by Small Tortoiseshell and Holly Blue, both being seen in a number of gardens. There was only one sighting of a Common Blue during the survey and because this was recorded unusually early for this species it may just have been a mis-identified Holly Blue. Mid-April and May saw Small White, Green-veined White and Large White butterflies on the wing and in June a Marbled White was recorded by the New Forest Group. Following early sightings of Speckled Wood butterflies' other "browns" namely Meadow Brown, Ringlet and Gatekeeper began to appear in mid-summer. Both Large and Small Skippers were recorded as was a Dingy Skipper, a butterfly not normally associated with gardens which was seen by a recorder in Pontefract. A Small Copper recorded in Little Baddow and the New Forest was another species one would not normally associate with gardens. Painted Lady butterflies can in some years arrive in this country in millions having migrated over successive generations from the Atlas Mountains in North Africa. This was not to be one of those years with only one recording of this species in Harpenden. The "star" butterfly sightings during the survey have to be the Dark Green Fritillary seen by a New Forest recorder and in Little Baddow, Essex the sightings by Marie Molyneaux of a Silver-washed Fritillary and White Admiral both of which had probably ventured into her garden from the woodland nearby that they have colonised over the last few years. The addition of the very common Red Admiral brought the total number of butterflies species recorded to 23. With only 57 species present in Britain, including 3 migrants, this represented 45% of the British population of butterflies.

A White Admiral *Limenitis Camilla* was an unexpected visitor to a garden.

Mint Moth *Pyrausta aurata.*
Photos: J. McCrindle

Moths (Lepidoptera)

Although Britain has only 57 species of butterfly there are over 2,500 species of moths. This was the most recorded group in terms of numbers during the survey. Of the day flying moths the Cinnabar Moth, Six-spot Burnet Moth and Mint Moth, *Pyrausta aurata*, were arguably the most common ones seen but the most spectacular of the day-flying moths that were recorded surely must be the Jersey Tiger Moth and Hummingbird Hawkmoth both recorded by the New Forest Group, the latter species being a regular immigrant, which in mild winters is known to hibernate in southern Britain. The other hawkmoths recorded during the survey were the Lime Hawkmoth, Poplar Hawkmoth, Privet Hawkmoth, Pine Hawkmoth and Elephant Hawkmoth. Most of these were recorded as a result of moth traps being set up in gardens. At the other end of the scale there were micro-moths such as the Small Magpie, Bee Moth, Straw Dot and Light Brown Apple. Macro moths included Marbled Minor, Middle bar Minor, Peppered, White Ermine and Barred Yellow. As mentioned previously a number of recorders set up moth traps overnight and this massively increased the numbers of moths found and identified. The most spectacular night's recording goes to the Little Baddow Group. Moth traps were set up in the garden of the Little Baddow fruit farm and in one night alone 932 moths were trapped and 196 different species identified and recorded before being released. A number that are scarce in the County were recorded including Obscure

Wainscot, Kent Black Arches, Marbled Pug, The Drinker and Rosey Footman.

In Boreham, Essex, Graham Ekins was recording an incredible number of moth species in his garden. He used several moth traps, in both his front and back gardens, and experimented with different lure types and trapping techniques. Throughout 2020 he trapped for 140 nights in his garden, mainly between lockdown and the end of October and logged 18,875 moths comprising 625 species. The most surprising moth that he trapped was a Fisher's Estuarine Moth on 16th September. This was the first inland record in Essex of this rare species that is restricted to Essex and Kent. Another interesting find was the micro moth *Panmene suspectana,* a new species for Essex.

Dragonflies and Damselflies (Odanata)

Dragonflies are divided into two distinct sub-orders, *Zygoptera* or Damselflies and *Anisoptera* or Dragonflies. Surely the dragonfly must be considered as one of the world's most amazing flying creatures. Present since prehistoric times, it is deemed to be among the world's most efficient predators succeeding in more than 95 percent of its attempts. With a head consisting almost entirely of eyes, which allow it to see on all sides of its body, and its ability to fly both upside down and backwards and having the ability to switch from hovering motionless to speeds close to 50 kilometres an hour, makes it a truly amazing insect.

During the survey six species of damselflies and seven species of dragonfly were seen. These were seen primarily, but not exclusively, in the gardens which had ponds. Those gardens which backed onto areas such as heathland had the additional advantage that damselflies and dragonflies would also find their way into recorders' gardens. Prior to the emergence of these species some of those with garden ponds were seeing damselfly and dragonfly larvae and nymphs. Six species of damselflies were recorded in total including the Large Red, Azure, Blue Tailed and Banded Demoiselle. A more unusual species was Willow Emerald. Seven species of dragonflies were seen. These were represented by three chasers: Four-spotted, Scarce, and Broad-bodied, together with a Southern Hawker and Common Darter. More than one person also recorded an Emperor Dragonfly. A Gold-ringed Dragonfly was a species that arrived in a garden backing onto the New Forest heathland as was the damselfly Beautiful Demoiselle.

Gold-ringed Dragonfly *Cordulegaster boltonii.* *Photo: J. McCrindle*

Bees, Wasps and Ants (Hymenoptera)

Albert Einstein was once said to have stated that "if the bee disappeared off the face of the Earth, man would only have four years left to live." He was of course referring to how critically important the role bees play in the production of our food. Whilst it could be argued that this is an overstatement it is undeniable that the loss of bees would have a major impact on mankind. In her book "The Little Book of Bees" (Ref.3) Vike Vint states "70 out of 90 main crops grown for human consumption are dependent upon bee pollination and an astonishing third of the food we eat has been pollinated by bees."

The farmers, gardeners and naturalists amongst us will of course already know this. It was therefore very encouraging that 22 different species of bees were recorded during the survey. In one garden alone Mike Squires in Barnsley recorded 13 different species. Amongst his sightings was a male Red Mason Bee which he first saw flying around his bee box, sometimes landing on the tree stump supporting the box and sometimes on the box itself. It was not until late April that the first female was sighted. Male Tawny Mining Bees were first seen by Mike on Apple blossom but the females were not spotted until later when he discovered eight nest entrance holes in a rough grassed area near to the door of his potting shed. Similarly, it was the male of the tiny green-eyed male Blue Mason Bee that he saw first. It was sunbathing on some large logs arranged between bushes. Females were seen later on Lavender as well as on the logs and on several occasions a female was seen entering the crevices on the logs. A Dogwood leaf, where a male Ashy Mining Bee was resting provided his first view of this species. Also found on the Dogwood leaves were Gooden's Nomad Bees which were also seen flying close to the ground around low growing shrubs. Another species of Nomad Bee Mike spotted in his garden was a Marsham's Nomad Bee. However, there was one particular species he found that caused him a problem in identifying. However, from a poor-quality photograph that he took he ascertained that it was probably a Nomad bee (*Nomada sp*), most likely one of three species, *N.*

panzeri, N. flava, or *N. ruficornis* being the other two. Of these three, *N. panzeri* is the only one known to prey on the Tawny Mining Bee (*Andrena fulva),* one of the other bees found in his garden.

Of all of the bees recorded in the different areas the most common were the Honeybee, Red-tailed Bumblebee and White-tailed Bumblebee. Other species seen by a number of people included Buff-tailed Bumblebee, Common Carder Bee, Hairy-footed Flower Bee and Tree Bumblebee.

Wasps are second only to beetles in terms of species numbers with approximately 9,000 species being found in the UK. The vast majority of these are parasitic wasps, some of which are so small you need a microscope to see them. Despite these numbers they were under recorded in the survey in comparison with bees. Those that were recorded included the Common Wasp, Pimpline Ichneumon Wasp, Solitary Wasp, Ruby-tailed Wasp and Black Slip Wasp. Also, the parasitic wasp *Sapyga quinquepunctata* was noted. A number of people did however see the largest of our social wasps - the Hornet.

It may come as no surprise that ants are the most numerous insects in the world. It is estimated that they may number between 10-100,000 trillion individuals globally. Most of us easily recognise Red Ants and Black Ants as they are abundant in many gardens and these two species along with Wood Ants were the only three species recorded during the survey despite there being around 50 species of ants known to commonly be found throughout the UK. Wood Ants, are the largest of our ants and are generally found in woodland as the name implies and it is usually their large nests built out of twigs, soil, leaves and pine needles which draws one's attention to them. It was therefore surprising to see this species recorded in a garden.

Beetles (Coleoptera)

Over thirty species of beetles were recorded. Ladybirds were the most frequent to appear on the record sheets. Two-spot, Six-spot, Seven-spot, Ten-spot, Fourteen-spot, Eighteen-spot, and twenty-four spot had all been seen, the most common being the seven-spot. In addition, Harlequin, Pine and Orange Ladybirds were also noted.

Beetles that people recorded which are associated with different plants included Green Dock, Alder Leaf, Scarlet Lily and Lavender Beetles. The green iridescent Thick-legged Flower Beetle could arguably be said to be the one that looked most spectacular on flower heads. Cockchafer and Rose Chafer were also two species that were present. It was pleasing to see that a Stag Beetle, Britain's largest land beetle, was seen in two different gardens. It is a species that is in danger of disappearing as old dead wood trees, its natural habitat, are cleared away by people intent on making a place look "tidy."

Grasshoppers and Crickets Orthopetra)

It was slightly surprising that there were only two grasshopper species recorded i.e., the Field Grasshopper and Mottled Grasshopper, and three species of crickets namely, the Speckled Bush Cricket, Dark Bush Cricket and Oak Bush Cricket.

Thick-legged Flower Beetle *Oedemera nobilis.*

Wasp Spider *Argiope bruennichi.*
Photos: J. McCrindle

Flies (Diptera)

There was no shortage of the common flies, i.e., House Fly, Bluebottle and Cranefly. Other species of fly included Horsefly, St Mark's Fly, Caddis Fly and Scorpion Fly. Early in the spring Bee Flies were common. By far the largest group that were found were hoverflies with over 20 different species being recorded. There are over 250 species in the British Isles although more are being discovered each year. They live for a very short time surviving for a few days up to a few weeks. Most do not have common names although there are a few such as the Marmalade Hoverfly, which was one most commonly found and identified during the survey. The problem with hoverflies is that it is not that easy for most people to identify them and many require detailed microscopic examination to determine the species. If that was not enough to contend with some mimic bees and wasps. The Hornet Mimic Hoverfly *Volucella zonaria*, the largest of our hoverflies was found

and identified in one of the gardens. As its name suggests it looks remarkably similar to the Hornet Wasp. Other hoverflies found during the survey which could be identified without microscopic examination included the Grey Spotted Hoverfly *Platycherius albimanus*, Common Banded Hoverfly *Syrphus ribesii, Eupeodes luniger* and *Eristalis pertinax.*

True Bugs (Hemiptera)

Bugs are often used loosely by many people to describe all insects. However, one of the primary features that distinguishes them from other insects is that they have piercing mouthparts which can suck the juices from plants. This order of insects includes aphids, pond-skaters and shieldbugs. The gardeners amongst us were quick to spot both Blackfly and Greenfly on our plants and some of those with garden ponds were able to add Pond-skater to their list. Three species of shieldbugs were recorded during survey namely Green Shieldbug (the one most commonly seen), Hairy Shieldbug and Red-legged Shieldbug.

Spiders (Arachnid - Araneae)

Spiders are not classified as insects. They belong to the order Araneae which comes under the higher classification Arachnid. Spiders as we all know can be found in our houses, garages, sheds and gardens and this was the case during the survey, the Giant House Spider being one that many people found had made their way into their house towards the end of the recording period. Another common spider to be found indoors was the Money Spider and outside the Garden Spider and Orb Web Spider. Other spiders that were recorded included the Jumping Spider, so called because of their method of catching prey by leaping onto it, often from some distance away. The Spitting Spider which catches its prey by squirting venomous fluid over its prey and uses this spitting technique to protect itself from predators. The Crab Spider, so called because of its crab like appearance. One of the most distinctive spiders that was recorded in one garden was the Wasp Spider. Its horizontal yellow and black bands giving it a wasp like appearance which made it easy to identify.

Wild Flowers

Other than moths the largest number of recordings in any one category went to wildflowers. The New Forest Group in Hampshire logged an amazing 147 different species of wildflowers, by far the most of any of the recording groups. In one garden alone they recorded over 81 different species.

In Spring Common Dog Violet, Lesser Celandine, Primrose, Lady's Smock, Greater Stitchwort all appeared on lists. As the year progressed common species that were found included Speedwells, Plantains, Clovers, Trefoils, Vetches, Cranesbills, Bindweed, Sow Thistles, Spurges and Hawkweeds. There was also one locally common species in profusion in one garden in Devon, Pink Purslane. In gardens where there were damp areas plants such as Brooklime, Marsh Marigold and Ragged Robin were added to a few lists. More unusually in a New Forest Garden they found Viper's Bugloss and one unexpected entry from them was Green-winged Orchids. The New Forest Group were however not the only group to record wild orchids in one of their gardens. In Little Baddow Common Spotted Orchids were found to be growing.

The most exciting find was another orchid found in one recorders garden in Little Baddow. The orchid in question was Irish Lady's-tresses *Spiranthes romanzoffiana*. This species of orchid was discovered as new in England in 1957 when a single flowering spike was found. It appears that it was last recorded in England in 1994 and it is understood that since

Green-winged Orchid *Orchis morio*.
Photo: J. McCrindle

then, despite numerous searches, it has not been found again and is now considered extinct in England. It can however be found in parts of Ireland and north-west Scotland particularly on some of the islands in this region. This year it has also been discovered on a peat bog in Wales. Realising the potential significance of this find the recorder sought confirmation of its identification by sending photographs to the RHS. Their response was as follows: "Your photographs appear to show *Spiranthes,* also known as lady's tresses, tuberous-rooted orchids producing white flowers in spiral racemes. Of the two species found in the wild in the British Isles it resembles *S. romanzoffiana,* Irish Lady's-tresses. Since it had not been planted by the recorder in the garden which she and her husband had created and since the garden was fairly basic and set to lawn when they arrived the question arose as to how it appeared in the garden. One theory is that it came into the garden in a bag of peat which was the basic growing medium on top of

a fibre glass pond edge in which it is now currently thriving as a spreading clump. Being self-seeded this was therefore a significant find.

Other Wildlife: Fungi, Slugs, Snails, Fish

Towards the end of the survey fungi were being seen and added to the recorder's lists. These included Stinkhorn Fungus, Field Mushroom, Sulphur Tuft, Fly Agaric, Parasol Mushroom, Shaggy Inkcap, Birch Polypore, Turkeytail and both Upright and Crested Coral.

On wetter days in early autumn slugs were more readily noted as people looked for new species to add to their lists. Very few people know the first thing about slugs and just see them as tubes of slime but surprisingly they have similarities to us in that they have a heart, lung and kidneys. The species noted were Yellow Slug, Dusky Slug, Large Black Slug and Large Red Slug.

Throughout the year the gardeners in particular were combatting the usual problem of snails eating their crops. The Garden Snail was most commonly seen, although others like the Rounded Snail were present. Finally, some of those people with ponds added Roach, Rudd and Common Carp to their lists.

Summary

In total nearly 1,500 wildlife species were recorded by those participating in the survey and of that number 779 were different species. The number of species individuals and groups recorded varied considerably from a few tens to over 300 different species recorded by the Little Baddow Group and the New Forest Group. No attempt has been made in this article to mention all of the wildlife that was recorded during this survey, it would have run into many pages of text but hopefully this article gives a snapshot of the number and variety of wildlife species that were seen by the participants without leaving their homes. The table summarises the total number of different species recorded in each category of wildlife. During the survey period we were fortunate to have a year of very good weather with it being particularly

Species Name	Different Species Recorded
Birds	69
Mammals	22
Reptiles	3
Amphibians	4
Butterflies	23
Moths	254
Dragonflies & Damselflies	13
Bees	22
Wasps	7
Ants	3
Beetles	33
Grasshoppers & Crickets	5
Flies	43
Bugs	6
Spiders	18
Wild Flowers	208
Other Wildlife	46
Total	**779**

unseasonably good at the beginning of the recording period which got everyone off to a good start. The people who took part ranged from young children to people who had retired. Some had a lot of expertise at identifying species and others little knowledge of recognising wildlife species but a keenness to learn. Those with knowledge were able to help the novices from photographs that were taken. It was particularly pleasing to see two young children in Harpenden (the next generation of naturalists?) with the encouragement and some help from their parents taking part. The children came up with a commendable list although the entry on their list of the horses racing wildly around a field at the end of their garden was a little bit questionable but entirely understandable from their point of view!! Even family pets helped in the survey. The farm cat brought in a weasel to the farm garden and Albert the dog contributed a flea and tick, to their owner's list. The single most satisfying part of the survey was the comments that were received from a number of people stating how much they enjoyed doing the survey and how it helped them to get through the very difficult period of Covid lockdown when they were confined to their homes and gardens. The health benefits of nature should never be underestimated.

To conclude. You don't need to go far to see wildlife, it is on your doorstep. You only need to keep your eyes open and you can see a wealth of wildlife both large and small, in and from your garden.

References

Ref 1. Owen, J. (1991) The Ecology of a Garden: The first fifteen years. Published by Cambridge University Press.

Ref 2. Sverdrup-Thygeson, A. (2019) Extraordinary Insects. Published by Mudlark an imprint of HarperCollins Publishers.

Ref 3. Vint. V. (2021) The Little Book of Bees. Published by Summersdale.

Acknowledgements

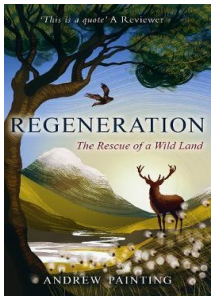
First and foremost, I would like to thank all of those people who took part in recording the wildlife seen in and from their gardens. Also, thanks must also go to Professor Ted Benton and Steve Rutherford for their help in identifying from photographs a few of the more difficult species to identify that some recorders found in their gardens. I would also like to thank Marie Molyneaux for her help in assisting me to combine some of the records to help me summarise the findings in this article. Finally, thanks go to Graham Ekins, who independently was recording all of the species he could find in his garden and with whom I was in contact throughout the survey, for providing me with some information on what he recorded. He also provided and set up his moth traps in the Little Baddow farm garden which resulted in 932 species being trapped on a single night each of which he identified.

Please Note: only common names have been used when naming species in the text above so that the article is more readable. An addendum of species with taxonomic names is available on request from the Editor.

John McCrindle was the founder of Central & N. Essex Branch (now Essex Branch) and its Chairman for 10 years. He became MBNA in 2007 and was awarded the Richard Fitter Memorial medal in 2011.

Book Reviews

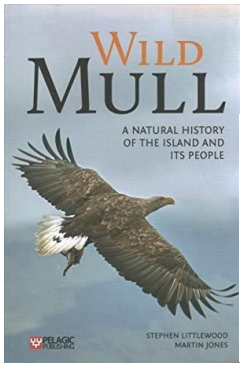
Editor: Roy Stewart MSc, FIBMS, FLS, FRSB, MBNA



Regeneration: The Rescue of the Wild

Andrew Painting. ISBN: 9781780277141. Published 2021 by Summerfield Books.
304 pages. £16.99.
www.summerfieldbooks.com

The trick of getting a message across in a book is to tell a story that carries the reader along in a way that will inspire them to wish to see and experience that story for themselves. Andrew Painting has captured the ideas, reasons and successes in the Marr Lodge Estates first twenty-five years of regeneration in this beautifully scripted book. Each chapter is headed by a single species, place or journey that is unique or special to the Estate and introduces the people who work on bringing this story to reality with the diversity of a healthy environment. It is also a working Estate, that is a sporting estate, with hunting and fishing as its main income, however, Marr Lodge is managing the land in a way that is allowing and encouraging the natural regeneration. This management will not sit easily with everyone as the need to control deer and lower the numbers to a level where the natural surrounding nature can thrive has been condemned by some on the sporting side, while culling to this degree may seem drastic to a few naturalists. But without an apex predator the deer will carry on slowly destroying the ecosystems that supports this wild landscape with all of its biodiversity. Painting, in this book, has inspired me to want to go see the flowers and trees coming to maturity, to look for the insects and birds found only in a few areas of this landscape, and to experience walking along the river and then up to the snow line to take in the spectacle of the view in a land that, even in the words written in this book, feels wilder, and, better for it.
Reviewed by Steven Rutherford

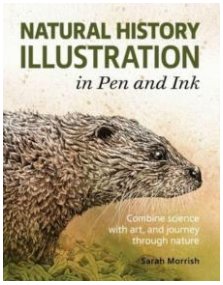


Wild Mull a Natural History of the Island and its People

Stephen Littlewood and Martin Jones.
Published by Pelagic, 25th October 2021. 312 pages. ISBN: 9781784272760
30% BNA Members Discount visit www.pelagicpublishing.com use code: **BNA123**

As this is a beautiful book and with the sumptuous photos of all the species throughout, it would have made it a "good book to own". Wild Mull, however, has been written by two exceptional field naturalists which adds to the enjoyment of the reading experience. The book is opened with a look at the Island and the history of its people before going into how the Island has shaped the subject with extinction and introductions throughout its history. Within this, the authors, quite rightly, begin by explaining and describing the geology of the island to the story; I am not a geologist, but the quality of the writing, and the simple but effective painting of this discipline in words had me looking to see when I could go and experience the formation of the land below my feet for myself, and this was a first for me! Each species, and there are some very special species, found on the island, are dealt with by, not only looking at the identification, but assessing their impact on the people and the ecology that they are part of. Mosses, fungi and lichens are given as much detail and care as eagles, otters and orchids, along with Japanese knotweed, Scottish crossbills and adders. Naturalists will love this book.

Reviewed by Steven Rutherford



Natural History Illustrations in Pen and Ink.

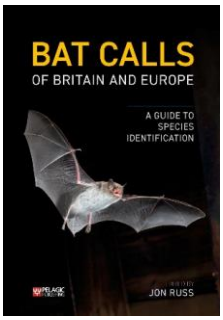
By Sarah Morrish.
ISBN: 9781785009228
Published 10/8/2021 by Crowood, www.crowood.com
208 pages, £18.99.

Natural History Illustration in Pen and Ink – combine science with art, and journey through nature by Sarah Morrish. Thumbing through the 208 pages of this paperback copy, it is immediately evident that the author was born to teach. Along with her working background in ecology and conservation, Sarah Morrish, has produced an amazing book full of scientifically detailed illustrations, celebrating nature and raising awareness of the fragility of nature. She looks at various natural history topics, opening our eyes to what it is that makes them interesting to study and to draw, the importance of reference material and where to find natural history specimens. She looks at techniques, materials – even making your own ink!

The author is a fine artist in her own right, yet as with any good teacher she talks about mark making techniques and the importance of sketchbooks, study pages and recording valuable information, along with all the relevant techniques. There are sections on botanical drawing, strandline and marine discoveries, fossils, insects and other invertebrates, birds, feathers and nests, mammals and much more. Throughout the book there are interesting case studies which continue to teach the reader more about the subject matter and art. It is a beautiful book, thoroughly researched and exquisitely illustrated. It is an ideal book for students or for anyone thinking of embarking on a new hobby in art, as well as for nature lovers and lovers of art generally. A pleasure to read - deeply enjoy.

Sarah Morrish is a member of the American Society of Botanical Artists, the Guild of Natural Science Illustrators, the Chelsea Physic Garden Florilegium Society and a Fellow of the Linnean Society.

Reviewed by Endymion Beer



Bat Calls of Britain and Europe

Edited by Jon Russ
ISBN: 9781784272258
Published 23/8/2021 by Pelagic
472 pages. £49.99
30% BNA Members Discount visit www.pelagicpublishing.com use code: BNA123

When John Russ released *British Bat Calls: A Guide to Species Identification* in 2012 it quickly became the 'go-to' book for everyone working on bat surveys, both professional and amateur alike with clear descriptions of the acoustic range of bat echolocation calls for identification purposes. This new book, *Bat Calls of Britain and Europe,* edited by John Russ with contributions by a host of specialists in the field of bat acoustics and identification, has however surpassed this book both for quality and quantity of information. For those of us who do not have a background in physics or acoustics, the introductory chapters are a phenomenally well-explained, in-depth delve into the sounds produced by bats, clearly explaining what indicators can be considered for identification using bat detectors, the terminology used, and the present state of the technology for listening to, recording, and analysing calls, as well as a discussion on the development of echolocation by bats. That in itself is a fantastic piece; extremely useful in simply getting your mind around bat calls, how they are used by bats and how we can use bat detectors and sound analysis to identify bats. However, what makes this book an incredibly practical book are the extensive species descriptions. Covering this time not just the bats of Britain, but bats found across Europe, each species section is an in-depth description of the species echolocation calls. The species sections also include descriptions of the species habitat, distribution, and behaviour, all delivered practically and clearly. The sonograms show the range of calls which can be made by bats, covering social calls, distress calls and feeding calls as well as echolocation calls so you can quickly understand how the calls of one species might look different in different environments, or in different circumstances. The book is a real identification tool and undoubtedly an invaluable resource for anyone serious about bat identification and survey. It's certainly a book I will be returning to time and time again. It's also highlighted for me just how many bats across Europe I have yet to see, and hopefully with the aid of the information here I can track down some of the more elusive species on my travels.

Reviewed by Stephanie Holt

Volume 35 Number 8 Summer 2022

British Naturalists' Association the National Body for Naturalists ISSN No. 0011-023X