Nature in Avon
Volume 81

Bristol Naturalists' Society

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The Bristol Naturalists' Society aims to stimulate a greater awareness of natural history and geology in the Bristol area. It is a thriving and friendly Society with something of interest for everybody, young or old, professional or amateur. It is actively involved in a long term programme of education, research and conservation. Each year its talks, trips and publications are enjoyed by hundreds of people wanting to find out more about our natural world.

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Nature in Avon

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Nature in Avon, Volume 81

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Editorial

This issue comes at a particularly sad time for all of us, with the loss of Clive Lovatt in March. The botanists will miss him greatly as a gentle mentor and companion but he was also a valued member of the editorial board of this journal, as well as being a Council member. He always had time to review papers, help with proofreading and give advice. His last paper is included here, recounting the first botanical expedition of the year.

The last year has seen the gradual return of field meetings and recording and this is reflected in the articles in this issue. Simon Carpenter and his colleagues have done some good work on providing a new geological trail and Bob Fleetwood managed to undertake an extensive survey for the National Trust. Jean Oliver has been out on fungus forays and illustrates some finds that will surely be new to many of us. She also discovered a new fungus growing on the cord grass that dominates our saltmarshes which is likely to be under-recorded. Viper's Bugloss is a plant that is a particular favourite of mine and I recount a few encounters with the native plant and some of its relatives.

Maico Weites has been out and about recording and taking photographs of entomological gems. Here he introduces us to the Ant Woodlouse and his images illustrate Ray Barnett's latest Invertebrate Report.

Richard Arthur continues his series of papers with 'Earth Movements in East Mendip' and celebrates 50 years since he studied at Bristol University. Barry Horton has provided his usual fascinating summary of the year's weather, including some thought provoking graphs that clearly show the rise in average temperatures over the last 130 years.

We hope that this, our 160th year, will prove to be a much better one for meetings and recording efforts as Covid-19 hopefully recedes. My thanks to the editorial committee for their help and advice with this issue.

Dee Holladay

Saltford: Walking through the geological past

Simon Carpenter
additional contributions by
Richard Ashley, David Moore, Richard Arthur and Dick Stabbins

This guide is dedicated to Professor Desmond Donovan who has contributed so much to our understanding of the local geology.

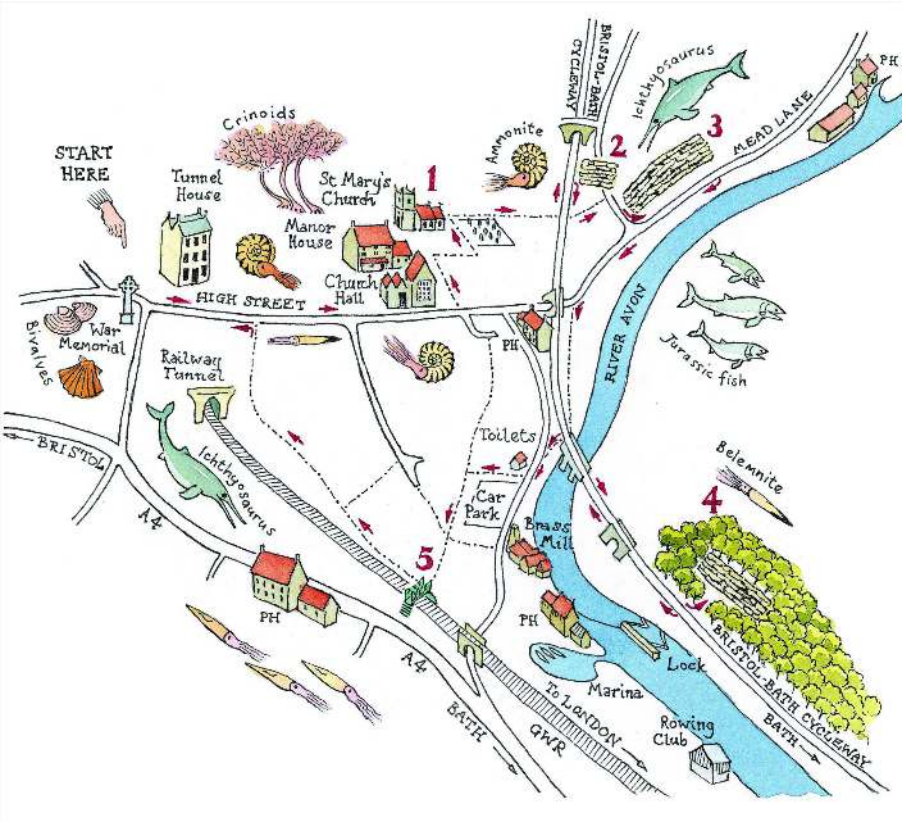
If like me you find rocks and fossils fascinating – why not join me, metaphorically, on a circular walk around Saltford to find out more. I grew up in Saltford, and finding fossils in the garden of the family home started a life-long interest in geology and natural history. Saltford has a number of accessible rock exposures linked by footpaths, or alternatively the rock exposures can be visited separately. However you tackle it, I hope you have a great walk and come away understanding a bit more about Saltford's ancient past.

A Geological introduction

Saltford sits on Lower Jurassic rocks that formed about 200 million years ago when a large part of southern England was covered by a warm shallow sea, perhaps similar to the Bahamas today. When they were laid down, these rocks were soft muds and limy oozes that settled on the sea floor. They contained numerous shells and a few teeth and bones of some of the animals that lived there, including marine reptiles, fish, ammonites and belemnites.

These sediments have since become hard limestones and softer mudrocks, mainly composed of calcium carbonate ($CaCO_3$). Houses in the village are largely built from it and it is often referred to as the 'lias', probably an old quarryman's term for 'layers'.

A small limestone slab with ammonites and brachiopods. ©Steve Smith



Illustrated map of the walk (by Jane Brayne)

Starting your walk

The walk has been designed as a circular route; however, if you prefer to visit the sites individually use the grid references to find the stop locations.

Start and Finish: ST 6831 6733 *War Memorial at the junction of Norman Road and Beech Road.*

Stop 1: ST 6856 6746 *St Mary's Church Cemetery: Local and exotic rock types.*

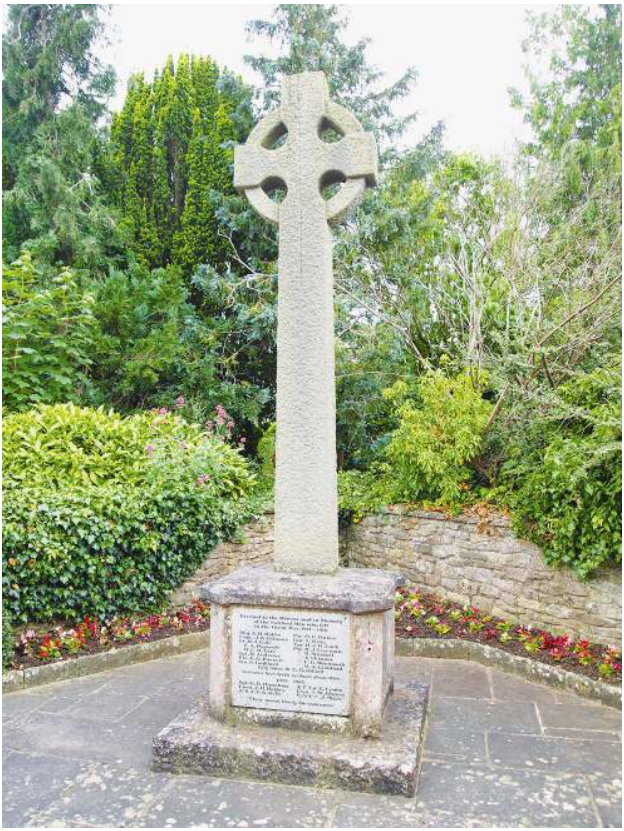
Stop 2: ST 6866 6777 *Bristol & Bath Railway Path: Lower Jurassic rocks.*

Stop 3: ST 6890 6767 *Mead Lane: Lower Jurassic rocks.*

Stop 4: ST 6890 6713 *Bristol & Bath Railway Path: Late Triassic rocks.*

Stop 5: ST 6862 6698 *Footbridge over Great Western Railway: Lower Jurassic rocks.*

The trail starts (and finishes) at the War Memorial at the junction of Norman Road and Beech Road. The memorial is constructed of three different rock types, all older than Saltford's Jurassic rocks.



The memorial cross at the start of the walk is made of dolomitic conglomerate, Pennant sandstone and granite. ©David Moore

The base is of dolomitic conglomerate, a coarse mixture of limestone fragments of assorted sizes, held together in a red-brown rock. This type of stone is a fossil 'scree' created when piles of rock fragments accumulated at the foot of steep valleys and mountains. It formed before our Jurassic rocks, at the end of the Triassic Period *c*.220 million years ago. It is very durable and was used in the construction of Bristol Temple Meads Railway Station.

The cross is cut from a coarse grey-green stone called Pennant sandstone, also found in Saltford cemetery – I will explain more about it there.

The memorial plaque uses granite. This is an igneous rock formed when molten rock cooled slowly, deep underground, instead of being erupted from a volcano. This allowed large crystals of the minerals quartz, alkali feldspar and mica to form. The stone's origin and age is uncertain but it may well have come from Devon or Cornwall.

Before we leave the memorial, look across the road at the Georgian building, 'Tunnel House'. The GWR line passes under it and it was the temporary home of Isambard Kingdom Brunel (1806–1859) when surveying and constructing the railway.

Stop 1

ST 6856 6746 *St Mary's Church and the Cemetery*

From the War Memorial, head down the hill along Saltford High Street. You may notice that most of the older buildings and garden walls use the local lower Jurassic limestone in their construction. Continue walking for about 100 metres until you reach the church hall (formerly the village school) on your left. Walk through the church hall car park and take the tarmac path towards St Mary's church (but not the driveway to Saltford Manor on the left).

Left: Pennant sandstone showing signs of weathering. *Centre:* A cross carved from granite. *Right:* An example of a memorial in marble. ©David Moore

The local Lower Jurassic limestone can be seen in the walls around the cemetery and in the fabric of St Mary's Church. The church has elements in its architecture ranging from Saxon to Victorian times. In the older part of the cemetery the favoured stone for gravestones is the Pennant sandstone already seen in the war memorial. Not all the graves have stood the test of time however. You will see

where freezing and thawing in the winter months has flaked away the surface, in many cases damaging the inscriptions.

The Pennant sandstone was formed about 300 million years ago during the Late Carboniferous Period, probably deposited by large, meandering rivers. But rapid deposition and the coarse structure of the rock mean that few fossils survive, other than poorly preserved plant remains. Pennant does not outcrop in Saltford so may have been quarried in places close to Bristol, including along the river cliffs of the Avon at Hanham and the Frome at Frenchay.

As Saltford became more affluent and water, road and rail links improved, more exotic stones began to be used in the cemetery, such as granites and marbles. Marble is a limestone that has been altered by heat and pressure.

Next to the church, Saltford Manor House dates from around 1160 and may be the oldest continuously inhabited domestic house in the country.

When you are ready to move on, go through the stile in the back wall of the churchyard that looks out over the large field and follow the footpath signs opposite. Walk along the hedge line on the right with the field on your left. At the field corner follow the footpath signs that direct you down a set of steep wooden steps (these can be slippery in wet weather). At the bottom of the steps, pass through the metal gate and immediately take a right turn through the gap in the stone wall. You are on the Bristol and Bath Railway Path. Turn left towards Bitton and Bristol but do be aware of cyclists. Walk for about 200 metres passing the Avon Lane gated access on your right. A short distance beyond this is a large rock exposure. This is Stop 2.

Stop 2

ST 6866 6777 *Bristol & Bath Railway Path*

Here, for the first time on the trail, we are looking at the Lower Jurassic rocks as they occur naturally, as thin beds of limestone alternating with mudrock or shale. The cutting, the former route of the London Midland Railway, now forms the popular Bristol & Bath Railway path and is part of the National Cycle Network.

Many of the spectacular ammonites we see in Saltford were found in rocks like these. The bones of marine reptiles also occur in places.

Retrace your steps back to the gated access on Avon Lane. Leave the railway path here and turn right down Avon Lane towards Mead Lane. Keep your eyes peeled for fossils (mainly ammonites) preserved in the walls. At the junction with Mead Lane, turn left and follow the road to a point just beyond the entrance to ‘Spion Kop’. This is Stop 3.

The rock exposure you will find at Stop 2. ©Lyn Davies

Left: Ammonites in limestone from the Lower Jurassic period found in Saltford. ©Phil Harding. *Right:* The large ammonite in the stone pavement. ©Lyn Davies

Stop 3

ST 6890 6767 *Mead Lane*

The most impressive part of the Mead Lane section occurs at the south-western end of the lane (the end nearer the village) where you are now. The rock exposures are all on private land, *so please do not trespass but observe what you can from Mead Lane*. The section continues in a north-easterly direction as a cliff behind private houses and Bristol Avon Sailing Club and eventually peters out in the vicinity of Saltford Boat Yard. The exposure clearly demonstrates the alternating limestone/mudrock and mudrock/shale sequence already seen on the Railway Path.

Many hypotheses have been advanced to explain this phenomenon, but the method of rock deposition remains unresolved and beyond the remit of this guide. It is thought that the water depth and sea floor environment changed dramatically over time, ranging from lagoonal (very shallow water separated from a larger body of water, such as the open sea, by a natural barrier), through intertidal (the area that is

above water at low tide and under water at high tide), to shallow marine (open sea) conditions.

Now look towards the rock exposure, particularly the upper part. Here the cliff is composed of distinctive limestone and mudrock layers. These are simply a continuation of the rock layers exposed on the railway path. The remaining and lower part of the rock face is composed of thin layers of uneven, rubbly limestone. These are some of the oldest Lower Jurassic rocks to be seen at Saltford.

The next rock exposure on the railway path is on the eastern side of Saltford, in Tennants Wood. Walk back along Mead Lane, passing the junction with Avon Lane, and take the footpath on the left, immediately before the old railway bridge. When you join the Railway Path, turn left and continue walking south-westwards towards Bath for about 400 metres until you see a small stone cairn. This marks the position of the rock exposures to your left, located along the brow of the cutting, high in the wood. Enter the wood, taking care climbing the steep slope here, especially if it is wet. You are now at Stop 4.

The rock exposure you will find at Mead Lane. ©Lyn Davies

An ammonite from Mead Lane missing its inner whorls. ©Lyn Davies

Stop 4

ST 6890 6713 *LMSR Exposure 2 on the Bristol & Bath Railway*

This rock exposure was cleared by volunteers in 2015-16 and shows layers of pale limestone and mudrock, known as the White Lias. This is the only place where we will see rocks of this age on our trail, although it is used in some of the houses in 'The Batch'. These rocks formed at the end of the Triassic Period approximately 210 million years ago, so are slightly older than our Lower Jurassic rocks. Ammonites are absent here, possibly because of adverse sea conditions or the occurrence of barriers that prevented them from migrating from the open sea into shallower bodies of water.

Current bedding in a block of White Lias. ©Lyn Davies

Near the very top of the rock exposure there is a thick limestone bed with a flat upper surface. This is called the 'Sun Bed' and on closer inspection you may be able to see the U-shaped burrows of tube worms exposed in the top portion of the limestone. These organisms lived by burrowing through the soft sediments on the sea floor before they became hardened into rock. The pale limestone is fine-grained and some layers display desiccation cracks suggesting that the water level was shallow enough to occasionally expose the sea floor to the atmosphere.

U-shaped animal burrows like these are common trace fossils. ©Lyn Davies

Now make your way back down to the railway path, turn right and start walking back towards Saltford. Please look out for cyclists. After approximately 400 metres, you will see a red Sustrans milestone on the left hand side. Leave the railway path on the left and take the steep steps down to the field below and then follow the footpath to 'The Shallows'. The public toilets here are built from the same pale Triassic limestone we have just seen. The fine lines that run through some of the blocks are 'current bedding', the natural layers created by currents as the sediments accumulated on the sea floor.

Take the tarmac path that runs diagonally up the grassy slope to the more level footpath above you. Turn left where the paths meet and carry on past the steep gardens on your left before joining the footpath that runs parallel with the Great Western Railway. Take the descending path for a very short distance and stop at the metal footbridge over the railway. This is Stop 5.

Volunteers cleaning the rock face at Stop 4. ©David Moore

Stop 5

ST 6862 6698 *Footbridge over the railway line*

Before the footbridge was strengthened, it was possible to view the entire railway cutting, with Saltford Tunnel and Tunnel House in the distance.

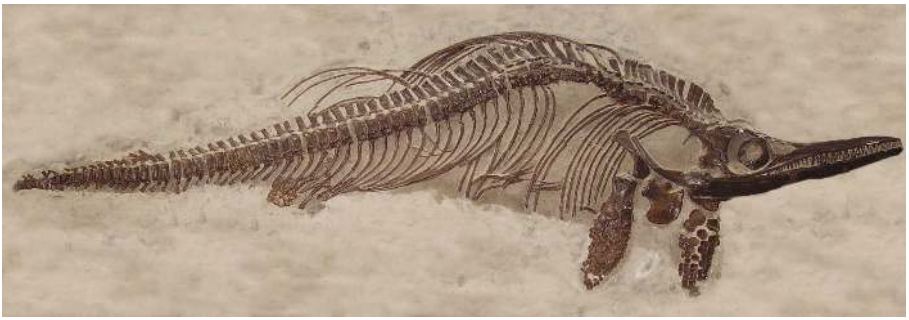
The cutting was made during the construction of the Great Western Railway in the late 1830s. The rock layers encountered were recorded at the time by William Sanders (1799–1875), a founding president of the Bristol Naturalists' Society, who also helped in the early development of Bristol Museum.

Records show that a skeleton of a dolphin-shaped marine reptile called an Ichthyosaur (pronounced ik-theo-saw) was excavated from the cutting and given to the Bristol Institution by Isambard Kingdom Brunel.

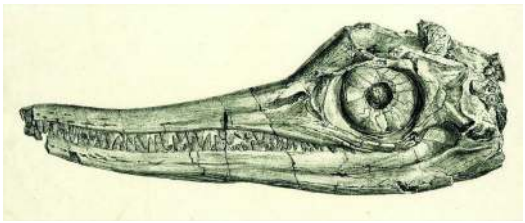
Several years ago, Network Rail stabilised the cutting because of the risk of landslides. The sides of the cutting were covered in netting fastened down with rock bolts which has, unfortunately, made the geology much more difficult to view.

Return to the end of the footbridge and take the ascending path keeping the railway line on your left. Stay on this footpath to Saltford High Street. Turn left at the High Street and proceed to the War Memorial where the walk finishes.

I hope you enjoyed this tour of Saltford geology.



Ichthyosaur skeleton (Wikipedia)



Left: Ichthyosaur skull (Wikipedia). *Right:* The lower jaw of an ichthyosaur found in the Jurassic limestone at Saltford. ©Phil Harding

Further Information

D.T Donovan & G.A. Kellaway (1984) *Geology of the Bristol district: the Lower Jurassic rocks*. Memoir for 1:63 360 Bristol geological special sheet. British Geological Survey, HMSO, London.

Internet Resources

Saltford Environment Group: www.saltfordenvironmentgroup.org.uk
Includes pages describing the geology of Saltford

Geological societies and clubs

Bristol Naturalists Society, Geology Section: www.bristolnats.org.uk/geology

Bath Geological Society: www.bathgeolsoc.org.uk

West of England Geologists Association: www.wega.org.uk

The Geologist Association: www.geologistsassociation.org.uk

Local museums with geology displays

Bristol City Museum, Queens Road, Bristol: www.bristolmuseums.org.uk

Bath Royal Literary and Scientific Institution (BRLSI), Queens Square, Bath

Before setting off

Code of conduct

There are no longer any working quarries in the Saltford area, so the few remaining exposures are precious. Our aim is to preserve them for the future. So, please don't climb on, hammer or remove fossils from them.

For people interested in fossil collecting try visiting the Dorset Coast. The modern way to collect fossils is to take photographs and leave the originals for others to see. For more information about fossil localities on the Dorset Coast, visit: jurassiccoast.org

Be prepared

- Wear stout footwear as some of the trail locations may be wet, muddy or uneven.
- Take a magnifying glass to see the detail of the rocks and fossils.
- Take a camera and notepad to record anything of interest.
- Take some money as you are never far from a pub or cafe in Saltford!

Please report any damage to the rock exposures (or any difficulties you have navigating the trail) to me at *simonccarpenter@gmail.com*

Thanks and acknowledgements

Friends have supported this project in lots of different ways – some have made improvements to the guide, while others have helped clear and maintain the geological sites. They include: Richard Arthur, Richard Ashley, Dick Bateman, Alan Bentley, John Garrett, Phil Harding, Richard Keyford, David Moore, Bob Mustow, Joyce Pickard, Dick Stabbins, Richard Stevens and Rob Knap. Thanks to you all.

Gibberella gordonii, a possibly under-recorded fungus in the Avon Area

Jean Oliver

While on a botany trip to look at plants on the saltmarsh at Aust on 26th October 2020[1] my eye was drawn to some pink/orange growths on the old inflorescences of Common Cord-grass *Spartina anglica*. I also noticed that the heads had been parasitised by an ergot. I decided to take a piece home for further investigation.

Fig. 1: Photograph showing the pinky/orange mass of *Gibberella gordonii* at the base of an ergot of *Claviceps purpurea v. spartinae* on an old inflorescence *of Spartina anglica.* ©Jean Oliver

It transpired that the *Spartina anglica* inflorescences had been infected with the mycelium of *Claviceps purpurea v. spartinae*, an Ascomycete that invades the ovaries of the plant and produces the first stage of its life cycle, the *Sphacelia* state, where the plant is induced to produce honeydew in which *C. purpurea v. spartinae* conidia become immersed. These can drop onto other florets or be dispersed by visiting insects. Next the black banana-shaped sclerotia or ergot (Fig. 1) is produced. These sclerotia fall to the ground and in this case can be dispersed by the water currents. In the spring the second stage of the life cycle commences and ascospores are produced.

While on the inflorescence the ergot can sometimes become infected with *Gibberella gordonii*, another species of Ascomycete, which produces the colourful masses that had attracted my attention (Fig. 2).

[1] Bristol Naturalist News December 2020 – January 2021 (596: 8-9)

Fig. 2: *Gibberella gordonii*. ©Jean Oliver

Having seen these pink blobs, I started to keep an eye out for them when visiting other local areas of saltmarsh and so far I have recorded them at the following sites.

Aust (my first sighting)	ST559882	26/10/2020
Portbury	ST484774	06/11/2020
Sea Mills	ST545764	12/01/2021
Avon Gorge (Leigh Woods side)	ST562738	26/01/2021
Clevedon	ST387699	17/11/2021
Sea Mills	ST545764	01/01/2022

The National Biodiversity Network atlas seems to have few records of *Gibberella gordonii*, however it would appear that it may be more widespread but just overlooked.

Ergot infection causes a reduction in the yield and quality of grain, and if infected grain is eaten by humans or livestock it may cause a disease called ergotism. It is also often found on wild grass species. Both *G. gordonii* and *C. purpurea v. spartinae* are highly toxic and should be handled with care.

Close encounters with Viper's-bugloss

Dee Holladay

I first encountered Viper's-bugloss *Echium vulgare* in a sandy car park in West Wittering, Hampshire over 60 years ago. This was the nearest area of coast to my family home and a favourite beach to visit at weekends in the summer. My mother had never seen the plant before and stopped to look at it carefully. Although she was not a trained botanist she knew the names of all the common plants and often stopped to examine anything she didn't recognize. A single plant was carefully taken home to be identified using the Collins Guide[1]. We were both delighted to find its name was such a memorable one!

Viper's-bugloss *Echium vulgare.* ©Dee Holladay

Viper's-bugloss is a native plant mostly found in dry sunny, well-drained areas such as sand dunes, dry calcareous grassland, cliffs, banks and in disturbed ground. It is an extraordinarily attractive plant, the flowers start out pink and then become bright blue, with red stamen filaments protruding from the flower. The plant has a spotted

[1] D McClintock & R S R Fitter (1956) The Pocket Guide to Wildflowers published by Collins

stem which is how it got the name 'Viper' though some say the name comes from the shape of the seeds (nutlets) and their resemblance to the head of a viper. The New Herbal of 1551 by William Turner refers to a plant that appears to be Viper's-bugloss as being *'good against the bitings of all serpents, and especially against the bitings of the viper'*. The stem and leaves are very hairy, indeed 'bugloss' comes from the Greek meaning 'ox tongue' and is thought to refer to the rough nature of the leaves.

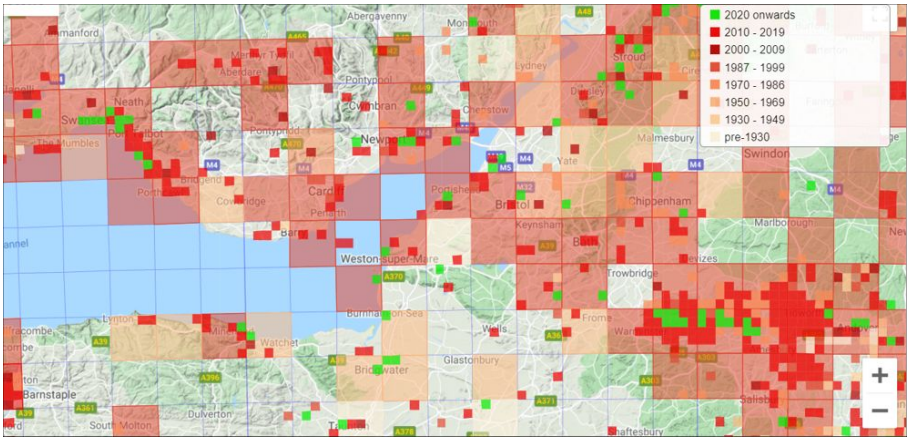
I had never seen Viper's-bugloss in my home town of Clevedon, despite having botanised there for some years - until the seawall of the marine lake was refurbished in 2016. A ramp was constructed to allow heavy machinery to be driven into the drained marine lake, and this involved importing considerable amounts of sand and gravel.

The year after the heavy machinery departed on the completion of the project, the Somerset Rare Plants Group met on 1 January 2018 to carry out a New Year's Plant Hunt. Mark Kitchen noticed a few leaves on a patch of grass where the ramp had been dismantled (ST39867116) and identified it as *Echium vulgare*.

The following summer the Viper's-bugloss bloomed continuously for many months across this area. It became prolific in just that one spot, including a nearby abandoned flowerbed beside the Pitch and Putt course. I checked where the machinery might have come from and discovered that the contractor had a depot in Swansea.

Viper's-bugloss *Echium vulgare* close to the Marine Lake, Clevedon in 2019.
©Dee Holladay

Looking at the BSBI distribution map for *Echium vulgare*, although records are relatively few locally, there are a swathe of records all along the Welsh coast, including Swansea and Port Talbot so maybe this was the source of the seeds, perhaps brought in with the sand.



Distribution map of *Echium vulgare* (January 2022) showing a cluster of records around the southwest coast of Wales. ©BSBI

The plants were there for those two years but then disappeared altogether. Viper's-bugloss is a biennial so maybe the seeds did not find the right conditions for germination in the following year.

Shortly after the renewal of my acquaintance with Viper's-bugloss in Clevedon I was in Glenridding in Cumbria. I had often botanised around the Sailing Centre where I stored my traditional pilot boat and the riverside alongside the boat park was rich in species. In December 2015 storm Dennis brought havoc to the village and the Sailing Centre, with extensive flooding when Glenridding Beck overtopped its banks. The following year the Environment Agency dug mountains of gravel out of the riverbed (it had been washed down from Helvellyn) and then set about shoring up its banks.

This work took almost three years and in 2019, walking down towards the Ullswater Ferry jetty, I glanced up at the bank and saw a vast forest of *Echium vulgare* – a wonderful sight with its vivid pink and blue flowers. They were growing all over the gravel bank of the river, again this was disturbed ground. Although Viper's-bugloss is relatively uncommon in Cumbria, interestingly there is one record of it in this same location made in 2010, a year after the previous extensive flooding in 2009.

Viper's-bugloss alongside Glenridding Beck, Cumbria NY3816. ©Dee Holladay

My fourth encounter with an *Echium* was a few minutes from my home. Seeing several plants with a cluster of large pointed, hairy leaves along a scrappy bit of roadside in 2020 I consulted one of our Vice-County Recorders, as I was stumped. Giant Viper's-bugloss, she pronounced! *Echium pininana.*

Rosettes of Giant Viper's-bugloss *Echium pininana,* Clevedon ST409715.
©Dee Holladay

These plants definitely don't need much encouragement. There are now at least a dozen plants in the same place a year later and two of them are still flowering as I write in January! The inflorescence is truly gigantic – well over 2 metres high! This time no problem with the origin – checking the garden above the path I could see several plants, so that is where they originated. I wonder how quickly these plants could become a menace as I recently spotted six more along a roadside in another part of the town.

Giant Viper's-bugloss showing the inflorescence, Clevedon. ©Dee Holladay

Consulting the BSBI database I found two records of *E. pininana* spotted on the M5 close to Clevedon in 2014 and 2015. A single plant was seen on the central reservation, which died after flowering and has not been seen since.

My final Viper's-bugloss is Purple Viper's-bugloss, *Echium plantagineum*. Consulting Captain Roe's *The Flora of Somerset* (published in 1981) I came upon a note about this other species. *'A casual or garden escape which appeared in several places by a short stretch of the new M5 motorway near Clevedon in 1973 and 1974'*. I have not encountered this species myself, but it has recently been reported in Portishead (2020) and Weston-super-Mare (2021) - so I shall have to keep a look out for it!

Two New Year Plant Hunts from Observatory Hill, Clifton, VC34, 3 January 2022

Clive Lovatt

The New Year Plant Hunts (NYPH) championed by the Botanical Society of Britain and Ireland (BSBI) have now been running for over a decade. Over four days around the New Year members and their associates are invited to submit lists of plants they have found in flower in the wild during a three-hour excursion. BNS is an institutional member of BSBI, but this was the first open meeting for our own members. Our results have been posted at https://nyph.bsbi.org/results.php and using the interactive 'Daisy Map' of Great Britain and Ireland, you can see the overall coverage and view the list of plants found at or near each geographical point.

One of the advantages of pre-booking on BNS meetings is that the organiser becomes aware how many people will be coming and gets a general impression of their interests and level of expertise. By Christmas there were about a dozen signed up, and with the subsequent BNS email alert numbers more or less doubled within 10 days. Of course we all know about exponential growth nowadays. Without David Hawkins signing up to lead one subgroup (or 'bubble') and Will Eden volunteering to co-lead my larger bubble it would have been impossible to accommodate everyone who wanted to come (Plate 1). We were fortunate that it remained a dry and far from cold day throughout.

We split into two groups. David Hawkins took the smaller group northwards along the Promenade, along the edge of the Downs, down the Gully, back along the Portway for a while, back up to the Downs and returning to Observatory Hill. On this route, they found 17 plants flowering in ST5673, and 20 in ST5674. Five were in both squares, making a total count of 32. Many were common weeds which might have been found anywhere, but the following are of greater interest and were mostly not found by the larger group: Stone Basil *Clinopodium acinos* which is regularly seen in unseasonal flower on the rocks at the top of the Gully; Small Scabious *Scabiosa columbaria*, that favourite of limestone rocks and grassland; Mexican Fleabane *Erigeron karvinskianus*, which has become plentiful on the riverside walls below the Portway; Winter Heliotrope *Petasites fragrans*, originally introduced with the railway that used to run through the Gorge; Spurge-laurel *Daphne laureola*, wild in the woods along the way; and Laurustinus *Viburnum tinus* from Victorian shrubbery, noted in White's *Flora of Bristol* (1912) near Bridge Valley Road but not commented upon by local botanists as thoroughly naturalised thereabouts until 1951.

Plate 1: 23 of the 26 New Year Plant Hunt participants outside the Observatory, Clifton Down, 3 January 2022. © CM Lovatt

Plate 2: Silk-tassel Bush *Garrya elliptica* flowering on St Vincent's Rocks close to the Observatory, Clifton Down, 3 January 2022. © CM Lovatt

Clive first took his group to see the Silk-tassel Bush *Garrya elliptica* behind the safety fence above the cliffs near the Observatory. It has been known to botanists there since 1955. It was cut down a few years ago but has recovered (Plate 2) and a close look at a zoomed-in image showed anthers visible in one of the male catkins. I expect that we were the only group to have it on our list. St Vincent's Rocks is one of two places mentioned for it in the 1995 catalogue of *The Alien Plants of the British Isles*. Libby Houston (not in the group photo) in the meantime popped off to see if the rare native Rock Hutchinsia *Hornungia petraea* was flowering on the cliffs yet. It was not.

We then moved down from Observatory Hill past where the 'Clifton Poet' Peter Gabbitass used to sell his printed poems in late Victorian days. We expected to find some plants in flower on the south facing rocks and walls beside the approach road to the bridge, and beside the pier of the bridge, opposite Sion Hill, and so we did, including Navelwort *Umbilicus rupestris*, which seems to have become more plentiful in the last few decades, and what close examination later proved not to be Chicory but a mown Greater Lettuce *Lactuca virosa*, with anthers just exposed. Little more turned up in flower until we reached the Portway, and Libby reported Greater Periwinkle *Vinca major* and Butcher's Broom *Ruscus aculeatus* from beside the Gallery below the Suspension Bridge, where they had been planted in the early 1980s. The inevitable Water Bent *Polypogon viridis*, reckoned in the first decade of this century to be the fastest spreading non-native plant in the British Flora, was under the riverside wall opposite the terraced houses.

In the harbourside area at the entrance to the Cumberland Basin Buck's-horn Plantain *Plantago coronopus* and the Flattened Meadow-grass *Poa compressa* were in flower, but Musk Stork's-bill *Erodium moschatum* was only found in fruit, or in leaf, and persistent as the Perennial Amaranth *Amaranthus deflexu* might be by the spiral staircase descending from the flyover, it wasn't flowering either. It has been there since at least 1995.

To get a lot of plants in flower in winter, you really need waste ground, untidied urban pavements and verges, or houses with small front gardens and low walls, so we picked up quite a few around the harbour, and then at the little roundabout on the A4. By the harbour there was a lot of Trailing Bellflower *Campanula poscharskyana* (scarcely seen wild 40 years ago) and some 'Spurred Cape-Jewels' *Nemesia denticulata*, found new to Gloucestershire in January 2019. On the Hotwells roundabout we surprised ourselves with two flowers on Hedge Woundwort *Stachys sylvatica*.

We then made a diversion into Ambra Vale in case the Sea Stork's-bill found there last year at its only country site was in flower, but it wasn't. As I had hoped, the residents are protecting it from digging out and spraying. We added Sweet Alison *Lobularia maritima*, incongruously growing in the stone wall. With time running out, we ascended Clifton Vale, pausing outside no. 12, not because of the potential

trip hazard, as the cable from the house to an electric car was well covered, but to pay homage to Miss Martha Maria Atwood, the discoverer of the Bristol Whitebeam *Sorbus bristoliensis* who lived there in the 1840s and 1850s, and where her parents and a sister all died in 1856.

Time was running out as we identified flowering Mediterranean Spurge *Euphorbia characias* in some quantity at the base of a supporting wall in Goldney Avenue and from there, shedding numbers as we went, the last of us returned, observing. and chatting, to Observatory Hill via Birdcage Walk, Victoria Square, and the Green opposite Christ Church. 'We should find over 50 plants in flower' I had written in the *Bulletin*. We did (55). 'We should be back by 1.00pm' I added. We weren't.

The minimum count for a place in the 'BSBI top 20' is 63 and our Somerset friends made five counts higher than that, the best being 92 (third place). We may have been well outdone by them, but it isn't a competition, is it?

Who else, I wonder, started off with 25 participants and came back enriched with three plants new to the county, as described below?

Additional discoveries

Plate 3: The fruiting body of the fungus Dog Stinkhorn *Mutinus caninus*, in the Orchid Meadow, Clifton Down, ST566744 3 January 2022.

Jean Oliver sent me this photo (Plate 3) of the Dog Stinkhorn *Mutinus caninus,* which she found and identified whilst on David Hawkins' plant hunt, growing in the Orchid meadow on Clifton Down, near the Circular Road. It is said to normally inhabit woodland, and the NBN Atlas has several records for Leigh Woods, but none for the Downs.

Plate 4: Giant Honey-flower *Melianthus major*, from near the top of the Zigzag, Sion Hill, Clifton, ST56617306, 3 January 2022. It is new to Gloucestershire and the West of England as a plant in the wild. Dylan Peters, who spotted it first, is admiring it.

Walking down the cliffside path between the Clifton Suspension Bridge and the top of the Zigzag, Dylan Peters and moments later, Mark Kitchen, spotted a dramatic and unusual looking plant several feet high with large toothy pinnate leaves in the vegetation below the path (Plate 4, ST56617306). Clare and Mark Kitchen investigated and found a clump of peaty soil around its base but there was a creeping rhizome, and it was rooted, making it an obvious established throw-out. One of the party recognised it from her garden and another obtained a name from an image recognition app. I confirmed the name from a leaflet sample and various books including the *European Garden Flora*. It is Giant Honey-flower *Melianthus major*. All 55 records currently on the BSBI database were made in the 2010s in the London area by Mick Crawley, co-author of the recent (2015) New Naturalist book, *Alien Plants*. It is an evergreen herbaceous perennial from South Africa which doesn't like winter dampness or a drying wind but may survive in the mild climate.

Plate 5: A seedling of Silverbush Everlastingflower *Helichrysum petiolare*, near to the parent plant on the harbourside by The Pump House, ST571723, 3 January 2022. It is new to Gloucestershire as a plant in the wild. © CM Lovatt

A seedling of Silverbush Everlastingflower *Helichrysum petiolare* was spotted below a brick wall outside the Pump House on the Bristol Harbour close to Merchants Road by Dylan Peters (Plate 5). The source was a large plant in a pot nearby. Attempts to identify it using an online app were inconclusive, suggesting an

aromatic Mediterranean shrub related to Mints, but it was obviously one of the composite (Daisy) family and I was quickly able to identify it from books at home. It comes from South Africa and is new as an escape to Gloucestershire. Most records on the BSBI database are from the Scilly Isles and the London area. It was recorded once at Taunton in Somerset in 1998.

The Periwinkles (*Vinca* species) are well-known perennial evergreen and slightly woody ground cover plants, often seen in woods, shady hedgebanks and abandoned shrubberies. They rarely set seed in Britain. The Greater and Lesser Periwinkles (*V. major*, with hairy leaf-margins and *V. minor*, with smooth leaf-margins) are the commonest and their flowers may be seen in different shades of blue, and some cultivars of *V. major* have variegated leaves. *V. major* var. *oxyloba* with attractive narrow purple petals has been naturalised around the boundary fence of Leigh Woods on North Road for well over 40 years. There is a third species, *V. difformis* Intermediate Periwinkle, like *V. minor* but with larger flowers. After a long walk, beside Birdcage Walk in the cemetery of St Andrews churchyard in Clifton, ST573730, the rest of us passed it by without comment but Dylan Peters recognised a periwinkle with pale blue flowers as different and later identified it as *V. difformis*, a regular winter-flowerer, which is apparently new to Gloucestershire. His photos can be seen on his excellent website at https://wildbristol.uk/groups/trees-shrubs/shrubs-non-native/intermediate-periwinkle. It was obviously originally planted but can be regarded as naturalised in the wild in this lightly-managed graveyard.

An Invertebrate Survey of Summer House Wood, Failand

Bob Fleetwood

In 2019 I was given the opportunity by the National Trust to undertake an informal invertebrate survey of Summer House Wood in Failand. It is a small wood, approximately one mile east of Prior's Wood, two miles west of Leigh Woods, two miles north of Tyntesfield and overlooking the Bristol Channel two miles to the north.

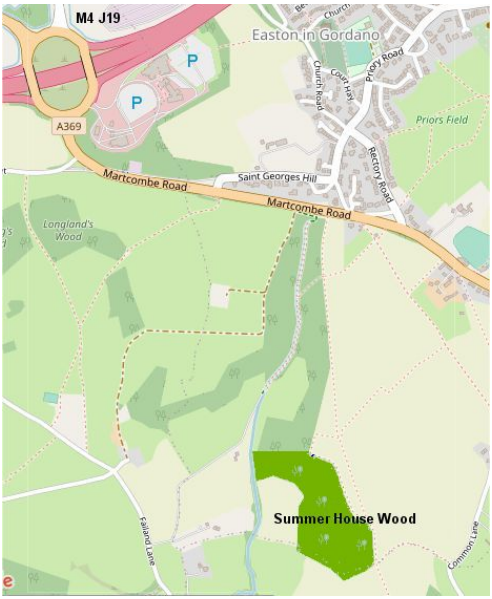


Plate 1: Location of Summer House Wood ©Google Maps

An extract from *National Trust Nature Conservation Evaluation 2013: Failand, Somerset* reads:

> "This wood is included on the Ancient Woodland lnventory (AWl). lt supports ancient semi-natural woodland with frequent oak and ash, and occasional field maple - there are several impressive old specimens of each and wood-decay habitat is plentiful, including some complete fallen trees left *in situ*. Some areas of the wood are dominated by birch. The understorey includes frequent hazel, including some very old coppice stools adding to the wood-decay habitat, and occasional holly and field maple. Climbing species include locally frequent honeysuckle and old man's beard, the latter

> especially around the edges of the wood. The ground flora includes patches of dog's mercury, locally frequent bluebell and yellow archangel, and occasional enchanter's nightshade, red campion, primrose and wood avens. Some areas are dominated by a dense ground cover of ivy. This woodland would qualify under the Lowland Deciduous Woodlands Priority Habitat and appears to be in Favourable condition.
>
> Brief examination of the wood-decay invertebrate fauna during the 2013 survey revealed the Nationally Scarce false darkling beetle *Orchesia minor*, which is associated with fungoid growth on bark, and locally distributed species such as the weevil *Acalles misellus* and the hoverfly *Xylota sylvarum*. Other more common wood-decay associated included the bark bug *Aneuris laevis* and the tumbling flower beetle *Anaspis fasciatus*. The door snail *Cochlicopa laminata* was also present - this is a locally distributed species of long-established shaded woodland. Wasp beetle *Clytus arietis*, a wood-boring species, was noted on the southern edge of the wood. And there was also a sighting of silver-washed fritillary *Arygnnis paphia* on the southern edge of the wood during the current survey."

Other than maintaining the usual safeguards, the wood had not been actively managed for some years and the intention was to undertake some small scale opening-up to allow light to penetrate certain darker areas and so encourage growth of understorey flora. It was hoped that this, in turn, would increase associated biodiversity. An initial invertebrate survey could prove valuable in future years in monitoring how successful this objective proves to be.

Drawing on experience gained from surveys at Leigh Woods and Tyntesfield, I selected an area at the southern end of the wood and installed five flight interception traps on mature trees displaying significant decay: three on oak and two on ash. I also set eleven pitfall traps: five about 2 metres apart in a hedge bordering the wood and the adjacent organic farm field, two in a logpile recently made from the opening-up works, and four adjacent to a small spring inside the wood. Fortunately, these were all in place (just) before the Covid lockdown started at the end of March 2020.

Because the wood is visited by only very few people, I was able to get my exercise safely and monitor the traps throughout the lockdown periods of 2020. In general, the traps were monitored every month until the end of 2021. Some individual traps were removed during 2021, usually because of damage, but all had been removed by the end of 2021. When conditions were suitable, I also surveyed using a sweep net and beating tray. Practical difficulties limited the amount of night-time moth trapping that was possible, but daytime visits yielded a number of day-flying Lepidoptera, including the very attractive *Alabonia geoffrella* (Plate 2). Most trap specimens were taken home, sorted and identified. Records have been kept only of species that could be identified with confidence. Beetles, such as many

Aleocharines, most *Cryptophagus*, many Ptilinidae, etc., were beyond my competence, optical capability, or manual dexterity and so were not recorded.

Plate 2: *Alabonia geoffrella* ©Bob Fleetwood

This article is to document the preliminary findings of the first two years; the identifications of a few specimens are still to be resolved. Looking ahead, I intend visiting the wood specifically to investigate the invertebrates that would not normally be found in the types of passive traps used to date. The main tools will be sweep-netting and using a beating tray to tap invertebrates from low-hanging tree branches.

The full list of species found is too long to be included within this article. However, complete records are lodged with the National Trust and the Bristol Regional Environmental Records Centre (BRERC), should they be useful to future investigations. The number of species identified in each of the Orders examined is as follows:

Coleoptera	(Beetles)	315
Diptera	(flies)	232
Heteroptera	(True Bugs)	37
Auchenorrhyncha	(Hoppers)	9
Lepidoptera	(Moths & Butterflies)	51
Other Insects		8
Araneae	(Spiders)	16

The following records are considered to be of particular interest:

Coleoptera	**GB Rarity Status**[†]	**BRERC Records**	
Acalles ptinoides (Marsham)*	NS	4	
Acidota cruentata (Fabricius)	NS	0	
Agathidium laevigata Erichson		0	
Agathidium nigrinum Sturm*		0	
Agrilinus ater De Geer		0	
Anaspis fasciata (Forster)*		0	
Anotylus nitidulus (Gravenhorst)		0	
Choleva agilis (Illiger)		0	
Cis fagi Waltl*		1	
Cis festivus (Panzer)*	NS	2	
Enicmus rugosus (Herbst)*	NS	1	
Epuraea fuscicollis (Stephens)*	NS	0	
Esymus pusillus (Herbst)		0	
Euglenes oculatus (Paykull)*	NS	4	
Eurodalus coenosus (Panzer)	NS	0	
Hallomenus binotatus (Quensel)*	NS	0	
Kissophagus vicinus (Comolli)*		0	
Kykliocalles roboris (Curtis)*	NS	0	
Leiodes rugosa Stephens		0	
Lycoperdina bovistae (Fabricius)*	NS	2	
Margarinotus marginatus (Erichson)	NS	0	First Somerset record
Mycetoporus Lepidus (Gravenhorst)		0	
Mycetoporus longulus Mannerheim		0	
Mycetoporus rufescens (Stephens)		0	
Nicrophorus interruptus Stephens	NS	0	
Nimbus obliteratus (Panzer)		0	
Ocalea picata (Stephens)		0	
Oedemera femoralis Olivier	NS	34	Locally frequent, esp. at light.
Omalium italicum Bernhauer		0	
Onthophilus striatus (Forster)		0	
Orchesia minor Walker*	NS	0	
Othius laeviusculus Stephens		0	

Coleoptera	**GB Rarity Status**[†]	**BRERC Records**	
Oxypoda spectabilis Markel		0	
Parabolitobius inclinans (Gravenhorst)		0	
Philonthus concinnus (Gravenhorst)		0	
Phloiotrya vaudoueri Mulsant*	NS	0	
Polydrusus tereticollis (De Geer)		0	
Pselaphus heisei Herbst		0	
Quedius nemoralis Baudi di Selve		0	
Quedius truncicola Fairmaire & Laboulbene*		0	
Rhizophagus cribratus Gyllenhal*	NS	0	
Rhizophagus nitidulus (Fabricius)*		0	
Sericoderus brevicornis Matthews		0	
Stephostethus alternans (Mannerheim)	RDB?	0	Only 15 records on NBN Atlas. Recent immigrant?
Strigocis bicornis (Mellie)*	NS	0	
Strophosoma nebulosum (Stephens)		0	
Symbiotes latus Redtenbacher*	NS	1	
Tachinus subterraneus (Linnaeus)		0	
Tetratoma ancora Fabricius*	NR	0	
Tillus elongatus (Linnaeus)*	NS	10	Locally frequent.
Trechus obtusus Erichson		0	
Trixagus carinifrons (de Bonvouloir)		0	

[†]NS: Nationally Scarce, NR: Nationally Rare, RDB: Red Data Book

The GB Rarity Status has been extracted from the latest available English Nature Species Status reports. The BRERC database was accessed on 29 January 2022. (The absence of the *Orchesia minor* and *Anaspis fasciata* records mentioned in the 2013 survey from the BRERC database suggest that the latter may be incomplete when it comes to historic records and this should be borne in mind).

Some specimens, most notably *Ptinus* and some *Dorcatoma*, could not be satisfactorily identified to species, largely due to Covid restrictions limiting access to museum collections and consultation with experienced colleagues. This will be pursued as and when conditions permit.

All species marked * are considered to be saproxylic; *i.e.* dependent for some, or all, of their life cycle on fungoid or decaying wood. Of the species with a GB Rarity

Status listed above, 76% are saproxylic; this seemingly high proportion is probably mainly due to two factors: the quality of the woodland and the chosen methods of capture. The wood is a known ancient wood with some very old trees, some with evident long-term decay, suitable for the development of saproxylic fauna. Flight interception traps, placed strategically close to visible decay in trees, enable sampling to be undertaken continuously throughout an extended period. This is a method that may not be appropriate for surveys undertaken on only a few isolated days during a year, leading to a likely under-recording of saproxylic species.

Although the primary aim of this survey was to record a list of species present in the wood, it is worth noting that seven of the eight records for *Cis fagi* came from June/July, most of the *Dorcatoma* records came from July and most of the *Ptinus* records came from April/May.

Plate 3: Traps T3 and T4 on a hillside oak in the wood. ©Bob Fleetwood

The most productive trap for *Cis fagi* in 2020 was T3 and so I erected a second trap, T4, on the same oak (Plate 3) to try and replicate the results and, hopefully, deduce meaningful conclusions concerning emergence times. As it transpired, the results for 2021 were not sufficiently numerous and were complicated by a number of previously unnoticed variables. Thus, any conclusions about emergence times could not be justified. A longer term programme of targeted trapping would be needed in order to gather sufficient data to give statistically valid conclusions.

Diptera	**Rarity Status**[†]	
Tipula selene Meigen	RDB3	Develops in rotten wood
Dilophus bispinosus Lundstrom	Rare	A species of which only females had been recorded in Britain until males were found in Wye Valley in 2018; Crickley Hill, Gloucs & Cothill, Berks in 2019
Mycetobia obscura Mamaev	DD	Develops in rot holes and sap runs
Eupachygaster tarsalis (Zetterstedt)	NS	Develops in rot holes in various trees, widespread but very local
Scenopinus niger (De Geer)	NS	Develops in rotten wood
Anthalia beatricella Chandler	NT	Most records from tree blossom in woodland
Hercostomus nigrilamellatus (Macquart)	NS	Local in damp woodland and by streams; biology unknown
Clusia tigrina (Fallen)	pNS	Develops in rotten wood, usually of standing trees with exposed heartwood
Lasiambia brevibucca (Duda)	pNS	Develops in rotten wood, rot holes and sap runs
Phaonia laeta (Fallen)	pNS	Adults are most often found at sap runs in which the predaceous larvae develop
Chrysopilus laetus Fallen		New to Britain in 1936 and restricted to Windsor until 1980s, now spreading

[†]NS: Nationally Scarce, RDB: Red Data Book, NT: Near Threatened, pNS: provisionally Nationally Scarce, DD: Data Deficient.

This project has generated a lot of records – those from 2020 were from the same traps throughout the year and at approximately monthly intervals; those from 2021 were also monthly, but from a gradually reducing number of traps. Further analysis might yield additional information, for instance on phenology, but that is outside the immediate aim of this survey. However, the most important result is that the data

unequivocally confirm that Summer House Wood is a very precious asset that must be protected and valued.

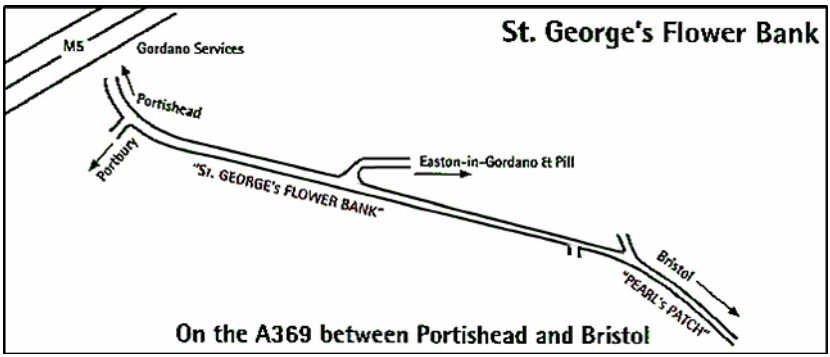
Acknowledgements

I would like to thank Carole Burnett, Lead Ranger for National Trust, for permission to survey the wood. I am indebted to Peter Chandler, who identified most of the flies, Glenda Orledge who identified all the Ciid beetles, and to James McGill, who identified all the spiders.

An Update on the Fungi growing on St. George's Flower Bank 2016-2021

Jean Oliver

St. George's Flower Bank Nature Reserve is situated along the verges and cycle path of the A369 at Easton-in-Gordano. It is mainly noted for its display of primroses in the spring and orchids in the summer.



I reported on my fungal findings from 2011-2015 in *Nature in Avon* Volume 75. This was the result of monthly walks along St. George's Flower Bank. A total of 128 species were recorded. I have continued with these monthly visits and have been pleased to add a further 38 species (see attached list) making a total of 166.

Over the past two years the usual management has been affected due to the Covid 19 pandemic. North Somerset Council decided to instigate new health and safety regulations for working on the Flower Bank, so the usual mowing, raking and coppicing regime has not taken place. However, despite these constraints I only missed one monthly visit in this period. In spite of the overgrowth of some of the herbage the fungi still put in an appearance.

It's pleasing to continue to find new species, perhaps indicating that the plant community of the Flower Bank is still evolving with the changes in the dominance of different plant species and in the quantity and variety of dead wood.

Fungi, being rather ephemeral in their nature, may appear and disappear between each monthly visit so may have escaped being recorded. This may also explain why some species have only been recorded once between 2011-2021.

Some of the interesting new finds include *Cordyceps militaris* a fungus that parasitizes moth pupae, the tiny *Mycena acicula* growing on a mossy stump, *Leotia lubrica* on mossy soil, the oddly shaped *Lycoperdon excipuliforme* and two species of fungi that are found in association with wood, *Coprinopsis atramentaria* and

Pholiota gummosa, both of these growing on old stumps. Occasionally new rust fungi appear which tend to be plant-host specific, as in *Phragmidium mucronatum* on Rose species and *Pucciniastrum agrimoniae* on *Agrimonia eupatoria*.

Scarlet Caterpillarclub *Cordyceps militaris*

Jellybaby *Leotia lubrica*

Orange Bonnet *Mycena acicula*

Pestle Puffball *Lycoperdon excipuliforme*

Photos ©Jean Oliver

New Species 2016-2021

Agaricus campestris (Field Mushroom)
Agrocybe rivulosa (Wrinkled Fieldcap)
Clitocybe geotropa (Trooping Funnel)
Clitopilus prunulus (The Miller)
Coprinellus micaceus (Glistening Inkcap)
Coprinopsis atramentaria (Common Inkcap)
Cordyceps militaris (Scarlet Caterpillarclub)
Ganoderma australe (Southern Bracket Fungus)
Gymnopus erythropus (Russet Toughshank)
Inocybe geophylla (White Fibrecap)
Lenzites betulinus (Birch Mazegill)
Leotia lubrica (Jellybaby)
Lepista saeva (Field Blewit)
Lepista sordida (Sordid Blewit)
Lycoperdon excipuliforme (Pestle Puffball)
Melampsora epitae
Melampsora hypericorum (Tutsan Rust)
Miyagia pseudosphaeria
Mycena acicula (Orange Bonnet)
Mycena galericulata (Common Bonnet)
Mycena pseudocorticola
Mycena pura (Lilac Bonnet)
Mycena stylobates (Bulbous Bonnet)
Parasola plicatilis (Pleated Inkcap)
Phlebia radiata (Wrinkled Crust)
Pholiota gummosa (Sticky Scalycap)
Phragmidium mucronatum (Rose Rust)
Pluteus ephebeus (Sooty Shield)
Psathyrella spadiceogrisea (Spring Brittlestem)
Puccinia allii
Pucciniastrum agrimoniae
Ramularia ari
Ramularia filaris
Scleroderma verrucosum (Scaly Earthball)
Thelephora penicillata (Urchin Earthfan)
Trametes hirsuta (Hairy Bracket Fungus)
Tricholoma stiparophyllum (Chemical Knight)
Xylaria polymorpha (Dead Man's Fingers)

Common Inkcap *Coprinopsis atramentaria*

Sticky Scalycap *Pholiota gummosa*

Rose Rust *Phragmidium mucronatum*

Pucciniastrum agrimoniae

Photos ©Jean Oliver

Ant Woodlouse *Platyarthrus hoffmannseggii* in Bristol

Maico Weites

Most readers will be familiar with isopods, the many-legged crustaceans in the order Isopoda. The British isopod fauna in Britain contains about 141 species (including some non-native species). Of these 77 are marine, 4 are freshwater, and the remaining 60 are terrestrial species (Maguire 2019, Gregory 2013). These terrestrial species are often referred to as woodlice but many other common names are in circulation such as chunky pigs, sow pigs, and slaters.

One of the more unusual woodlouse species in the UK is the Ant Woodlouse *Platyarthrus hoffmannseggii* Brandt, 1833. Its vernacular name is derived from the fact that it is usually found in ant nests. This largely subterranean ecology has led to physical adaptations that make the species stand out from the other isopods that we find here. They for instance lack eyes and also lack pigment, giving them a ghostly white appearance. Similar adaptations can be observed in other animals that live in dark subterranean habitats such as caves and one could argue that an ant nest is a bit like a cave.

Plate 1: (*left*) Ant Woodlouse *Platyarthrus hoffmannseggii*, 30.05.2021, The Gulley, Avon Gorge, Bristol. The dark line at its rear is the gut content.
(*right*) Ant Woodlouse *Platyarthrus hoffmannseggii*, 16.05.2020, Saltford, Somerset.

Ants don't tolerate just any intruder in their nest and with sharp mandibles and chemical warfare they can ward off uninvited guests. Many species however, from the caterpillars of the Large Blue *Phengaris arion* to the Rove Beetle *Claviger testaceus* have found a way to infiltrate these nests with a variety of instruments.

Some myrmecophilous (ant-loving) species produce a chemical camouflage that fools the ants while others, such as the caterpillars and Large Blue pupae also produce stridulations similar to those of the ant queen. The ants act as a barrier for potential predators and food is available in abundance so it is worth evolving an ant-fooling mechanism.

Woodlice are often not regarded as a threat and other species of non-myrmecophilous woodlice may on occasion also be present in an ant nest. No special adaptations to trick the ants (such as chemical camouflage) have been recorded but this does not mean that the Ant Woodlouse definitely does not have any.

Whereas many myrmecophiles have a narrow host range, Ant Woodlice can be found in the nests of many different ant species and genetic analysis has not shown any genetic differentiation between woodlice with different hosts (Parmentier *et al.* 2017). They seem be able to disperse to new nests when they have to without having to pay too much attention to which ant species is occupying the nest. At least 15 ant host species have been identified in the UK (Robinson 2001, Hames 1987).

Plate 2: Ant Woodlice *Platyarthrus hoffmannseggii* together with the host ant *Lasius niger*, 09.01.2022, Brandon Hill, Bristol. ©Maico Weites

Ant Woodlice feed on a wide variety of organic matter in the nest, from decaying plant matter to their own faeces and so-called infrabuccal pellets (Robinson 2001, Hames 1987). These pellets comprise regurgitated sugar-rich waste produced by the ants. The Ant Woodlouse's presence does not seem to affect the ants in an either negative of positive way and thus they are regarded as commensals.

Over the last two years I have recorded the species ten times in the Bristol area, detailed in the table below. As observed in previous studies the species seems to have a rather catholic taste for host species and I found it in the nests of four different ant species in two different subfamilies.

Date	**Number**	**Host species**	**Location**	**Grid Reference**
19.04.2020	5	*Myrmica sabuleti*	The Gulley, Avon Gorge, Bristol	ST5623074495
01.05.2020	3	*Formica fusca*	Avon Gorge, Somerset	ST5621173672
01.05.2020	5	*Lasius niger*	Avon Gorge, Somerset	ST5622273679
11.05.2020	4	*Formica fusca*	Avon Gorge, Somerset	ST5621173671
11.05.2020	1	*Lasius flavus*	Avon Gorge, Somerset	ST5621373662
16.05.2020	2	*Lasius niger*	Saltford, Sometset	ST6865767816
30.05.2021	5	Not recorded	The Gulley, Avon Gorge, Bristol	ST5624974553
30.05.2021	2	Not Recorded	The Gulley, Avon Gorge, Bristol	ST5629274584
04.07.2021	4	Not recorded	Royal Fort Gardens, Bristol	ST5833173331
09.01.2022	100	*Lasius niger*	Brandon Hill, Bristol	ST5782773013

Table 1: Records of Ant Woodlouse *Platyarthus hoffmannseggi* in the Bristol Region

The best way to find the Ant Woodlouse is to expose an ant nest by turning over rocks. Do take care to place the rocks back in the same position. The highest number was a record of over 100 individuals in a *Lasius niger* nest on Brandon Hill on 9 January 2022. Once exposed the woodlice tend to crawl away into the tunnels. When I returned on 30 January 2022 to take some better pictures I had no joy. I found exactly the same rock and the same ant nest, but no Ant Woodlice. Potentially some changes in the microclimate had forced them deeper into the nest, either due to my previous disturbance or by the weather. This indicates that these woodlice are probably very common but are usually only observed when they are near the surface.

The species is relatively easy to identify and under-recorded, so keep an eye out for them! Please send records to iRecord or the Bristol Regional Environmental Records Centre (BRERC).

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Earth Movements in East Mendip

Richard Arthur

A displaced post-erosion surface suggests an extended time frame for earth movements in East Mendip caused by ancient plate-tectonic collision.

The year 2022 marks 50 years since I began my degree at Bristol. Mendip was designated an area of outstanding Natural Beauty in 1972, and the Open University and the clothing company Rohan began, all things I have a long-standing local connection with; so I share a half century with some auspicious company. Also in that year the 'blue marble' photo was taken and a geologist set foot on the Moon.

In 1953, the year of my birth, scientists discovered the median rift which runs all along the centre line of the chain of mountains forming the Mid Oceanic Ridge (MoR), that I always thought had also just been discovered, but I now realise just how well this hugely important hidden topographic feature (which represents the largest mountain chain on the planet earth) was known about many decades earlier (Judd 1881). The realisation that the ocean floors were far from absolutely flat together with the discovery of reversals of the earth's magnetic field record in the rocks, sparked the beginnings of the theory of Plate Tectonics.

In 1962, 60 years ago, Harry Hess proposed his groundbreaking hypothesis of sea-floor spreading on this plate margin, and this proved key in understanding how Plate Tectonics moves continents by creating new oceanic lithosphere. To round off this chain of coincidences, 110 years ago in 1912 German meteorologist Alfred Wegener published a treatise on Continental Drift, but rather than drifting we now know the continents are driven. Importantly the new material created by sea-floor spreading does not make the globe expand because in other plate margins oceanic lithosphere is subducted back into the mantle, and in the process many volcanoes and earthquakes are initiated.

Plate Tectonics is a geological phenomenon which now explains most of Earth's geological history - particularly how it drives the workings of the whole sphere of planet Earth, so it is puzzling that most diagrams which explain it are shown on a flat surface. For Bristol perhaps the most important thing about Plate Tectonics is how ancient continent-continent collisions produced the forces that folded some of the local rocks.

We are indeed fortunate that such collisions are now a long way off both geographically and geologically. We are also fortunate that the other major features associated with Plate Tectonics, major earthquakes and volcanoes, are also a long way away – that is, until a new subduction zone develops just off Ireland and Portugal etc., when the eastern Atlantic Oceanic Plate will surely one day dive beneath the Continental Plate that Bristol is on. This will rather liven up the local geology somewhat as magma rises up to the surface to erupt as a line of Andesite volcanoes fairly close to Bristol and the UK starts to experience major earthquakes.

Perhaps best not to worry overly much about this or the tsunamis which will be generated as the oceanic plate splits. Having suitably terrified you all, I would like to offer a degree of solace in that I do not think this is likely before, in a few hundred million years, the Pacific and or Indian Oceans close completely. However, like all good geologists I may be wrong, and other factors such as the opening of a new ocean as the East African rift splits apart just may initiate subduction.

There is the ubiquitous misunderstanding that Earth's Mantle is liquid (an unfounded idea presumably arising because many believe a liquid mantle is the source of magma which feeds volcanoes). Earth's Mantle is solid and we know this because earthquake shear waves pass right through it, however it is capable of flow and convection. These currents were originally thought to be the driving force for moving plates, but we now know that gravity is much more important. As gravity can only act downwards, the plates move because they effectively slide down a ramp at the Mid Ocean Ridge (MoR). This ramp works because the MoRs are truly spectacular mountains lifted by thermal expansion and convection, so the ramp is high and the forces large. Gravity also acts in subducting an oceanic plate.

Plate 1: Demonstrating the fit between the continents of Africa and South America

I am sure everyone has been shown how the continents of Africa and South America seem to fit like jigsaw puzzle pieces. Employing a photocopied map and a pair of scissors is a good way to demonstrate this; although the fit is good, it is far from perfect. Some overlap can be explained by post split-up sedimentation, while most of the gaps are explained away if the true edges of the continents are used - so it's back to a new photocopy, but this time cutting out along the continental shelf edge

which lies below the sea at a depth of about 200m. This time the reconstruction is far better, but there are still big gaps particularly further from the equator. The reason for this is that most maps are projections of a globe onto a flat surface, and in order to demonstrate this I like to stick the cut-out continent of Africa onto the back of one hand and the continent of South America on the other. In this way I can put my index fingers on an imaginary south pole and my thumbs on an imaginary north pole of an orange, aka Earth's sphere.

Starting with my hands together I can simulate the opening of the Atlantic Ocean over 150 million years as it split open in the Jurassic and began spreading at some 2cm per year, the rate my finger nails grow. Obviously, I have to move my hand a little more rapidly or we'd be here a long time. What this shows is that not only are the gaps reduced and the continent fit is far better but that the spreading rate is much faster at the equator than near the poles. As I move my hands and open the Atlantic my hands also come together on the far side of the globe simulating the closure of the Pacific Ocean, as South America is driven over the subducting Pacific oceanic plate. A video of this is on YouTube. R.F.J. Arthur https://youtu.be/rl1naDPyp0Q

So, what has all this got to do with Bristol? Well suffice it to say that continent-continent plate tectonic collisions created the geological structures in the local rocks we are familiar with.

Timing of the Variscan Structures in Bristol

Previous descriptions of the main folding and faulting of the Bristol region (Arthur 2017, 2018) gave only a blanket age of Variscan for this event but what does this mean in practice? The Variscan fold belt is given different names such as Hercynian or Armorican across Europe but we now know these are all part of the same orogeny which broadly speaking runs east-west from central Europe across southern Britain and on through Ireland to also form the mountains of eastern North America (which at that time was attached before the Atlantic Ocean opened up). We know that any deformation must occur after any rocks involved in the folding (e.g. Carboniferous Coal Measures) were laid down but before any strata were laid down on-top of the uplifted tilted and eroded deformed rocks. In Bristol these unconformable rocks are Triassic and conventional wisdom gives a bracketed age of very end Carboniferous and pre Triassic for the Variscan.

In several locations these Triassic rocks; usually Dolomitic Conglomerate (now given the unhelpful mouthful of a name Mercia Mudstone Marginal Facies) can be seen resting on tilted Carboniferous Rocks. Perhaps the best location and my favorite is near Cheddar (Plate 2).

Unfortunately, this small quarry is on private land but is well seen from the road. Please note there is no footpath and no parking, and drivers should keep their eyes on the road at all times. Perhaps time to promote cyclo-geology as an idea.

Plate 2: Small quarry looking west from the Yoxter to Cheddar Road in a dry exhumed wadi valley at ST 50075 53507. ©Richard Arthur.

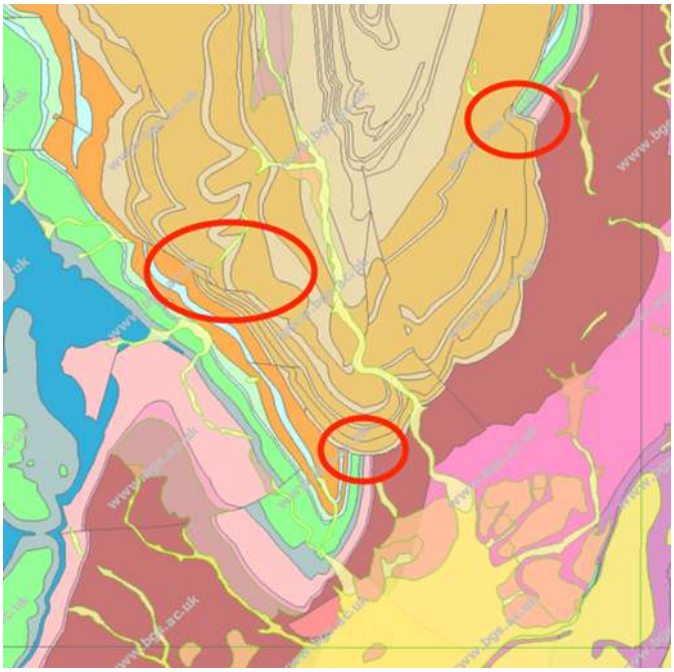

Plate 3: Extract geology map of the Forest of Dean from the BGS igeology app, with the permission of the British Geological Survey. (*n.b.* This uses strange colours).

Permian rocks are absent in the Bristol Region, but not far away in Devon these are unfolded and derived from uplifted Variscan rocks and so we can narrow the date further to End Carb / Permian, and by the early Permian the two great continents of the Paleozoic, Gondwana and Laurasia (Euramerica), had collided to form the supercontinent Pangea. This gives a date of around 300 Million years. However, it is not quite that simple; in the Forest of Dean area in particular, there is strong evidence that deformation began much earlier and was already well underway before deposition of Coal Measure rocks.

We know this because there is a huge angular unconformity between Carboniferous Limestone and Coal Measures (see Plate 3). Narrow winding blue and orange and green Carboniferous Limestone outcrops on the map (step dips) (+ Devonian pink and mauve) disappear below the wide outcrops (shallow dips) Coal Measures, depicted in the centre of the map as light brown and buff. This geology map shows these rocks disappearing and reappearing at three places near Yorkley, Lydney and Bream, and in the east between Yorkley and Lydney, Coal Measure rocks overstep Carboniferous Limestone to rest directly on the Old Red Sandstone. All the rock units are folded but the Carboniferous Limestone is more intensely folded than the Coal Measures. The "U" shaped outcrops in the middle of the map are plunging synclines, and the inverted "U" shape in the south west is a plunging anticline.

This proves conclusively that the Carboniferous Limestone was folded before the deposition of the Coal Measures which were themselves folded at the end of this time. So, the orogeny was not a single event but was due to a prolonged plate tectonic collision; a complex sequence of events too involved to go into any detail here.

Another spectacular unconformity is seen at the very famous Vallis Vale site and also at the quarry at nearby Tedbury Camp. Both locations in the far East of Mendip never fail to impress; these are very much the UK's premier geological sites and as such have been written up often.

Plate 4: Vallis Vale ST 75566 49175. Here near-horizontal Jurassic Oolite Limestone rests with angular unconformity on tilted and eroded Carboniferous Limestone. ©Richard Arthur.

At Vallis the angular unconformity is seen in stark cross section, and while a small amount of the unconformity surface is exposed, it is at Tedbury Camp (ST 74673 48974) that a vast expanse of this sensational wave cut unconformity surface has been uncovered by quarrying.

Probably because most visitors are so distracted by the sheer awe of the amazingly flat wave-cut platform, the contrasting rocks and structure, a very important bit of geology seems to have been overlooked.

Most will look closely at the animal borings into the grey Carboniferous with yellow infilled burrows while some who visit will see the patches of Jurassic sediments attached directly onto the unconformity surface.

Plate 5: Bored Carboniferous Limestone, collected at Tedbury more than 50 years ago. ©Richard Arthur.

Plate 6: Damaged patches at Tedbury. ©Richard Arthur.

Unfortunately, despite this being a SSSI, some seem intent on hammering these absolutely priceless gems of irreplaceable geological information. Over the years these patches are ever decreasing and it will not be long before they are completely destroyed. It is high time an information plaque was erected, because at this rate it will not be long before nothing is left of these patches to study (Plate 6).

The spectacular erosion which created this angular unconformity even slices through hard chert bands, wearing them to the same level as the limestone.

However, although some may see the colonies of Lithostrotion corals, I wonder how many notice that the erosion surface is in fact far from absolutely flat. Good observation (a geologist's most precious tool) reveals that the platform is dropped down in a series of discrete steps, each by some 10cm to the north. The edges of these steps are rounded but it is difficult to imagine how erosion could achieve this effect if the fault steps were always present, especially as the hard chert bands are planed off at the same level as the limestone.

Plate 7: Looking east over the peneplain, along one of the faults (bedding plane slides) which step the unconformity surface at Tedbury Camp. Note the smoothed, bored and rounded stepped edge. ©Richard Arthur.

What seems likely is that the platform was eroded completely flat, then subsequently what appear to be minor normal faults offset this surface. These 'faults' are in fact small displacements bedding plane slides on the dipping bedding planes, which took place in a way similar to the way beds ride up during folding, but here the movement was the other way. Employing the faithful Arthurian paperback-book model, when folded the leaves of the book (the beds) have to ride up as the pages are bent, whereas at Tedbury the bedding plane slip is downthrow not upthrow. It seems that after the main compressional forces subsided, tension took over and this gives us an extended date for the earth movements. The original displaced surface would have produced sharp edged contacts. Because these stepped surfaces are bored and rounded off, we know that aggressive and long-lived erosion continued to operate coeval with the late earth movements to leave these 'footwalls' rounded. This puts a whole new slant on the full timing history for Variscan movement and extends the time over which the orogeny operated considerably, and is consistent with accepted tectonic models.

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Tedbury Camp Quarry: a geological gem in the Mendip Hills https://geohubliverpool.org.uk/tedbury/index.htm

Bristol & District Invertebrate Report, 2021

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Introduction

As was adopted for 2020, this report takes a narrative approach rather than just listing records. I hope this is a more engaging style for readers interested in the local invertebrate fauna.

2021 was of course a second year lived under the constraints created by the Covid19 pandemic. However, unlike 2020, the vaccination programme and subsequent relaxations of the more severe limitations on social mixing allowed limited reopening of field meetings for naturalists including those studying invertebrates. One feature of the first year of the pandemic had been the number of individuals who seemed to take up a new interest in looking at the wildlife found in their gardens, unfortunately this does not seem to have translated into a new generation of invertebrate recorders in 2021, or at least not ones submitting their records and sightings to established recording schemes.

In the spring of 2021, Butterfly Conservation published its regular assessment of the *State of Britain's Larger Moths,* a report which demonstrated again how our once common species of insect are declining in abundance and to an alarming extent. It is an important fact to focus on and not to be distracted by the colonisation of the country by new species from the continent or elsewhere. The new arrivals are largely thought to be the result of a warming climate or accidental introduction of plant nursery pests. The reduction in abundance of our existing species is much more likely to be due to habitat degradation although combined with some impacts of climate change. In the summer of 2021, the results of the annual, national *Big Butterfly Count* again raised concerns about the state of our insect populations. Despite the largest ever number of records submitted, the numbers of butterflies were the lowest in the 12-year run of the survey. These sorts of concerns do not only apply nationally but also locally here in the West of England.

The importance of addressing the dual concerns of climate change and biodiversity loss has never been clearer nor as universally acknowledged. Initiatives led by the local authorities in our region are hoping to negate the impact of climate change and reverse biodiversity loss, and we can only hope they succeed. One thing is clear though, the provision of good data on how populations of key components of the local biota (such as invertebrates) are faring is imperative if action that is taken is to be shown to be effective. Reporting your sightings through the Bristol Naturalists' Society is part of that.

Although loss and degradation of habitats is thought to be the biggest cause of invertebrate loss, the weather conditions prevailing can impact on populations

which are already struggling. In 2021 poor weather in the spring and summer is thought to have had a negative effect on insect populations locally. In particular a dry and cold April followed by a dry May was then compounded by July and August seeing a random mix of torrential rain and mini-heatwaves.

I am grateful to all those who make their records of invertebrates available (whether members of the BNS or not) for public use such as this. Without the efforts of dedicated but often very professional enthusiasts our knowledge of what is happening with invertebrate populations locally would be very difficult to judge. Special thanks as always are due to those with specialist expertise in one or more orders and all who submit records to the Bristol Regional Environmental Records Centre (BRERC), other local or national recording schemes and social media outlets. The names of those will be obvious by the frequency of the appearance of their contributions in the sections below.

(Scientific names are those used on the National Biodiversity Network (NBN) Atlas site https://nbnatlas.org)

Springtails (Collembola)

The springtails were considered to be insects until relatively recently but, along with the Protura and Diplura, are now regarded as not that closely related (although still within the subphylum Hexapoda). Their identification is perhaps not for the beginner so I am grateful to Maico Weites who has recorded *Dicyrtomina minuta D. saundersi*, *Dicyrtoma fusca*, *Kalaphorura burmeisteri*, and *Orchesella villosa* all on 16 January at Troopers Hill. He then added *Cyphoderus albinus* from the same site on 22 August and *Monobella grassei* (and previously *Neanura muscorum* from Ashton Court on 20 December 2020). Rupert Higgins has also submitted sightings, *Lepidocyrtus cyaneus* and *Orchesella cincta* from Royal Fort Gardens, Bristol on 17 January. Although perhaps not rare species they are poorly represented in the databases of our local invertebrates.

A further record from Maico is of *Kalaphorura burmeisteri* which he has found to be quite common in the Bristol area *e.g.* Oldbury Court Estate, Brandon Hill, Troopers Hill, and Westonbirt Arboretum amongst others. On the National Biodiversity Network Atlas (NBN) there are only 48 scattered records throughout the British Isles but this reflects how few people record them. In this case Maico describes the species as looking like tiny white eyeless ‘Michelin men’.

Bristletails (Archaeognatha)

Once considered Thysanura along with silverfish, bristletails are now separated out as a separate order of insects. *Dilta hibernica* has been previously reported from the Avon Gorge and Troopers Hill in Bristol. However, Maico Weites established in 2021 that the population in the Gorge is actually *Dilta chateri.* This species was first described as new to science in 1995 where it was found in several sites in Wales.

This identification is the first confirmed colony in England. The population at Troopers Hill though, is still thought to be of *D. hibernica* and was seen again there on 22 August for example.

Plate 1: *Dilta* sp. ©Maico Weites

Dragonflies & Damselflies (Odonata)

As with other orders of insect, this was not a vintage year for migrants but we had a small scattering of interesting sightings. A Red-veined Darter *Sympetrum fonscolombii* at Portbury Wharf on 5 June reported by Giles Morris was a positive start to the season. This species is thought to be attempting to breed in the UK so may become established eventually in the region. Similarly, the Lesser Emperor Dragonfly *Anax parthenope* has been shown to be breeding occasionally in southern England and likely to become a resident rather than migrant. We have occasional sightings most years and one was seen at Oldbury Power Station on 29 July by Heather England as reported on Twitter.

Duchess Pond in Stoke Park, Bristol keeps coming up with surprises and in 2021 it was the confirmed occurrence of the Scarce Blue-tailed Damselfly *Ischnura pumilio*. This is a rare species, although likely to be overlooked, associated with small seepages of water and disturbed habitat. It would seem to be a species which colonises newly created habitat and prefers a site to have open areas with only small amounts of emergent vegetation, *i.e.* at an early stage of succession.

A second surprise was Golden-ringed Dragonfly *Cordulegaster boltonii* at Lords Wood, on 26 July seen by Rich Andrews. This species is usually associated with more acidic habitats like heathland streams but it is known to wander away from such locations which may explain it appearing near Pensford.

Grasshoppers and Crickets (Orthoptera)

Roesel's Bush-cricket *Metrioptera roeselii* continues to expand its distribution locally making it now a regular member of the local fauna. Southern Oak Bush-cricket *Meconema meridionale* is probably similarly distributed but is not as obvious and more easily overlooked.

True bugs (Hemiptera)

There are only two species of treehopper in the UK, the common *Centrotus cornutus* can be found on a variety of plants whereas the Broom Treehopper *Gargara genistae* (Plate 2) is only on Broom and was thought to be associated with sites in East Anglia and the south east. Its discovery in Bristol on Troopers Hill as reconfirmed on 22 August by Maico Weites, Bob Fleetwood and Ray Barnett raises the question how it found this rather isolated site.

Plate 2: *Gargara genistae* ©Maico Weites

The Lygaeidae are a family sometimes known as ground bugs which does reflect where many of them can be found. They make a discreet family which would repay local study. *Peritrechus lundi* is one such species which was seen by David Hawkins at Cadbury Camp on 19 April, associated with Stork's-bill. *Macroplax preyssleri* is another in the family and only known from a few sites to the south of Bristol, a few in Gloucestershire and also on Gower in South Wales. Ray Barnett confirmed this species was still present on Walton Common on 14 August.

Sthenarus rotermundi is a specialist of grey and white poplar and was found by Rupert Higgins at Long Cross Tip on 9 July, not a species we have many records for. *Closterotomus trivialis* is another Mirid bug and one which arrived in the UK in 2009 from its native range in the Mediterranean. It seems to have found the UK to its liking and is rapidly expanding, Bob Fleetwood recorded one in the churchyard

at St. Mary's Church, near Ladye Bay in Clevedon on 7 June. *Buchananiella continua* is a small, easily overlooked bug first recorded in the UK in 1995 and to be looked for on Sycamore and Ivy. Bob Fleetwood's record from his Clevedon garden on 29 March in a flight interception trap would appear to be the first for the region. Similarly with *Nysius senecionis* taken at light on 18 July at a light trap in Bob's garden. This species first appeared in 1992 in the UK. An even more recent arrival is *Nysius huttoni* arriving in the UK from Europe around 2007 but actually native to New Zealand. Bob identified one from Walton St Mary on 18 August.

Butterflies (Lepidoptera)

The year 2021 was not especially noteworthy for butterflies in our region. It was not a great year for migrants, no swarms of Painted Ladies *Vanessa cardui* or Clouded Yellows *Colias croceus* unfortunately. As regards our resident species, there were some early records to start with, for example, a Holly Blue *Celastrina argiolus* on the wing on 27 February. Then at the start of April the appearance of more Holly Blues accompanied numbers of the three common white species *Pieris brassicae, P. rapae, P. napi*, along with Orange-tip *Anthocharis cardamines* and Speckled Wood *Pararge aegeria*. However, after that there were few notable sightings.

A Small Blue *Cupido minimus* at Winford on 29 July at Melanie Patch's farm was a surprise and new for the site but it is a species which is so easily overlooked. The same could be said for White-letter Hairstreak *Satyrium w-album* which is why sightings in Bristol associated with the River Frome valley attracted so much attention on social media. A single Grayling *Hipparchia semele* in Kurt Vickery's Sandford garden in early September is encouraging and one can only hope we might see some recolonization of old sites of this lovely species in and around Bristol. Similarly a Chalkhill Blue *Polyommatus coridon* on Purdown, Bristol on 22 July holds out hope for this species to be increasing. The status of the Marsh Fritillary *Euphydryas aurinia* locally remains precarious. The small population reported as present in 2020 in the B&NES area failed to be seen in 2021, however the butterfly was seen at a different nature reserve not too far away. It is possible that these outliers are being established from more stable populations in the Mendips.

The greatest surprise was perhaps a second brood Small Pearl-bordered Fritillary *Boloria selene* at Charterhouse 6 September photographed by Colin Higgins. There was little indication that the weather was favourable for such an event which is unusual even in 'good' years. Finally, the realisation that the Purple Emperor *Apatura iris* is much more widely distributed in southern England than was previously thought and that it can colonise sites other than old woodland gives hope that new sites will be found locally in coming years.

Moths (Lepidoptera)

Sightings of moths out of the normal season continue to be both a symbol of how our climate is changing but perhaps also as to how species can adapt to change.

A Scorched Carpet *Ligdia adustata* seen by Andrew Jones in Portishead on 2 April is an example of a species normally not seen before May, through June and then again in August. At the other end of the year, Neil Mellersh had second generation Eyed Hawk *Smerinthus ocellata* at light in Radstock on 5 September. The remarkably mild conditions in the first half of the winter of 2021 into 2022 saw species which would normally be on the wing in the following spring being reported - Bob Fleetwood's light trap in Clevedon demonstrated this with the exceptional records of Mottled Grey *Colostygia multistrigaria* on 20 November (usually March/April) and Pale Brindled Beauty *Phigalia pilosaria* on 16 December (usually January-March).

Artificial pheromones have been used for many years to attract the clearwing, day-flying moths, and has shown them to be commoner than we thought. A pheromone developed as a control for the micro-moth *Grapholita funebrana* which in some countries is a pest as a larva on plum trees has now been shown to attract other micros too. Roger Edmondson used this lure at Lower Woods, Wetmoor, S Gloucestershire on the afternoon of 19 April and then again in Leigh Woods on 22 April and on each occasion successfully recorded *Pammene giganteana*, a species for which we had very few previous records and one which may not be attracted to light at night. Similarly, *Pammene suspectana* has been recorded increasingly around the country at pheromone lures, one was taken at light on Walton Moor (Gordano NNR) by Paul Chapman on 14 June, a species new to our region.

Other species recorded in 2021 as new to the Bristol Region were: the Hoary Plume *Platyptilia isodactylus* found by Colin and Dave Hawkins on the Gordano NNR, N. Somerset in early June; *Anarsia innoxiella* was photographed by Wayne Tucker in Bath on 30 June 2021 (this species was recognised as new to science in 2017 but with specimens previously identified as *A. lineatella* thought now to have been this species); *Epinotia demarniana* was confirmed by dissection at Gordano NNR, N Somerset by Paul Bowyer and then others seen at the same site on 9 July, a specialist of this sort of habitat; *Parectopa ononidis* is a strikingly marked gracillariid moth thinly distributed across southern England and usually associated with chalk grassland or coastal sites. The first records for our region were of one at light in Whitchurch by Rich Andrews, and another at light by John Aldridge *et al* at Burnett, near Bath, both instances being on 25 July.

Two species not noted from our region since the 19th century until now are *Endothenia nigrocostana* found at Yanley near Long Ashton on 7 June 2021 by Dave Hawkins and *Eudonia delunella* seen at Ray Cotterill's light trap at Severn Beach on 19 July.

Other unusual records of species not regularly reported included the following: Pine Hawk *Sphinx pinastri* reported from Bristol on Twitter by Lee Gardiner, 1 July; larvae of Golden Plusia *Polychrysia moneta* on delphiniums in a Weston-super-

Mare garden, end of May, Dave Gibbs; Small Purple-barred *Phytometra viridaria,* Dolebury Warren, end May, Rupert Higgins; *Eana incanana,* Bishopston, Bristol garden, 21 July, Jean Oliver; *Oncocera semirubella, Celypha cespitana, Nemophora metallica* and *Acrobasis suavella,* all from Yanley, Long Ashton, mid-July, Dave Hawkins; *Blastobasis rebeli,* Easton, Bristol, 17 July, Michael Davis; a melanic Peppered Moth *Biston betularia* – rarely seen these days, Filton, 13 June, Andy Pym; *Phyllocnistis saligna/ramulicola,* Whitchurch, 15 July, Rich Andrews; and *Grapholita lobarzewskii* reported by Matt Hobbs 11 June, Jean Oliver 2 July and Rich Andrews 10 July (latter to the SKI pheromone lure).

Several records of Plain Pug *Eupithecia simpliciata* which is rarely seen locally, around 23 July suggested an influx of this moth from elsewhere. Otherwise migration presumably resulted in one record of a Death's-head Hawk *Acherontia atropos* larva found on an allotment in Westbury-on-Trym, Bristol at the end of July (Mark Rose, per BRERC) and David Agassiz had a Striped Hawk *Hyles livornica* in his Weston-super-Mare light trap on 10 June. Other migrants included a good sprinkling of White-point *Mythimna albipuncta* but the year was perhaps most notable for the numbers of Radford's Flame Shoulder *Ochropleura leucogaster*, a very unusual migrant to our region in previous years but perhaps one to become a new colonist.

New colonists that had a good year included the magnificent Clifden Nonpareil *Catocala fraxini* where moth recorders started to categorise themselves by those who had ***not*** seen one yet, rather than those having seen one. Apparently concentrated (but by no means solely found) in urban areas, Box Tree Moth *Cydalima perspectalis* occurred in amazing numbers, *e.g.* Rupert Higgins reporting 98 from one night's trapping in Bishopston, Bristol on 25 September. Jersey Tiger *Euplagia quadripunctaria,* L-album Wainscot *Mythimna l-album* and Toadflax Brocade *Calophasia lunula* continued to be present in numbers and the Gypsy Moth *Lymantria dispar* is likely to be the latest colonist established with one reported by Alan Chard on 10 August and one from Jean Oliver (Bishopston) on 17 August. This follows a single record from Bradley Stoke, S. Glos in 2019 (Ali Bourne). (The extinct English race of the Gypsy Moth fed on Bog-myrtle and Creeping Willow but was lost in the early 20th century, following the clearance and draining of the sites where it was found. The European race feeds on a variety of trees and bushes and has now become established in southern England and so is likely to become resident in our region. Introduced into the USA in the 19th century it is major pest of trees there and when it first became established as a breeding species in the SE of England, from 1995, DEFRA attempted to destroy the population but without success.)

The popularity of moth recording is reflected in the number of sightings listed here, this popularity and historic information enables us to see that dramatic changes continue to be taking place. If they are happening for moths they are also probably happening for less well recorded insect groups.

Beetles (Coleoptera)

Xylocleptes bispinus and *Leptophloeus clematidis* have both been recorded by Maico Weites from the stems of Old Man's Beard in the Avon Gorge. The former species is a bark beetle specialising in living within *Clematis vitalba* and the larvae of that beetle are thought to be preyed upon by the larvae of those of *L. clematidis.* The latter has been largely confined to south east England until recently so whether it has been overlooked or is genuinely expanding its range is not clear.

The fungus known as King Alfred's Cakes *Daldinia concentrica* is very common in the Bristol region looking like lumps of coal sticking to ash branches and twigs. The striking weevil *Platyrhinus resinosus* is a species which feeds on it but less well known is *Biphyllus lunatus* whose larvae also feed on this fungus. Under recorded but probably widespread, Maico Weites has located this beetle at many sites locally. With the impact of Ash Dieback resulting in the felling and removal or very many ash trees in local woodlands, it is unclear what the consequences are likely to be for such species.

Plate 3: *Platyrhinus resinosus* ©Maico Weites

A number of records of the Welsh Chafer *Hoplia philanthus* have been received in 2021 which suggests it is continuing to become commoner locally. There have also been a good number of oil beetle sightings but it is difficult to judge whether they are genuinely getting commoner or whether more people are looking out for them.

Bob Fleetwood has continued to assemble excellent records of beetles especially saproxylic species from local woodlands. Rupert Higgins reported a nice assemblage of woodland and grassland species from Stoke Gifford on 1 June including *Ischnomera sanguinicollis, Cryptocephalus aureolus* and *C. hypochaeridis.* Another good record from Bob Fleetwood in the churchyard at

St. Mary's Church, near Ladye Bay in Clevedon on 7 June was of *Magdalis cerasi*, a local weevil which may be expanding its range and abundance.

The ladybirds are a well-known group, and the accidentally introduced and now very well established Harlequin Ladybird *Harmonia axyridis* does seem to have impacted on the populations of the Two-spot Ladybird *Adalia bipunctata* which appears to be in decline. Less well known to many are the smaller but closely related *Rhyzobius* species. These too include species which have arrived from abroad and *R. forestieri* is an Australian species first found in the UK in 2014 and steadily increasing. Maico Weites found one on the door of his garden shed in December which looks to be the first for Bristol and the region.

Bees, wasps and ants (Hymenoptera)

Some of the largest and most impressive species of sawfly are found in the Cimbicidae but as with so many groups of insects we have seen winners and losers in recent decades. Two species which seemed to have a good year in 2021 were Giant Birch Sawfly *Cimbex femoratus* with one in Shirehampton on 5 May seen by Stephen Judd plus several other reports such as a larva in Keynsham on 23 June by John Aldridge and also Willow Sawfly *Cimbex luteus.* The latter was spotted by Stefan Csaki on 30 May at Wick in South Gloucestershire.

The Long-horned Bee *Eucera longicornis* is a solitary species in which the male has very obviously extra-long antennae. It has been thought to be in decline across southern England and so a sighting at Oldbury Power Station on 23 July by Matt Plenty is significant (the last record locally that I am aware of was at Nailsea in 2011).

The parasitoid wasps have long been a group of insects which present many difficulties in identification for the non-specialist. The rise in interest in all our insect fauna includes this group, helped by access to expertise via online resources such as Facebook Groups, hence changes in the fauna which would have never been spotted are coming to light. Rich Andrews sought help in this way to identify a parasitoid noted at his light trap in Whitchurch, Bristol on 17 July. This proved to be *Stauropoctonus bombycivorus,* a parasitoid of the Lobster Moth *Stauropus fagi,* and which appears to be increasing across the country.

True flies (Diptera)

The Thick-headed Flies (Conopidae) are a discrete family superficially resembling hoverflies perhaps but with a strikingly different lifestyle as they are internal parasitoids of hymenoptera. *Leopoldius signatus* is thought to specialise in parasitizing the Common Wasp *Vespula vulgaris* and is scattered in distribution across southern England. A sighting at St Werburgh's City Farm, Bristol on 20 October by Jon Mortin ties in with its autumnal appearance when it frequents ivy blossom in order to locate its prey.

The spring is perhaps characterised by the appearance of bee-flies not just in nature reserves but also in our gardens. 2021 saw the continued surge of sightings of the Dotted Bee-fly *Bombylius discolor* along with the very common *B. major*.

Plate 4: *Bombylius discolor* ©Maico Weites

Found in an interception trap at Failand at the end of July by Bob Fleetwood was the Tree Snipefly *Chrysopilus laetus*. The online national map of this species on the NBN Atlas shows a heavy concentration of records in south east England, with a single spot in Cornwall. Its discovery locally therefore is very significant in extending its known range.

Rachel Pennington photographed the galls of the Yellow Flat-footed Fly *Agathomyia wankowiczii* on Artist's Bracket Fungus *Ganoderma applanatum* on 7 March in Lower Woods, Wetmoor, S Gloucestershire. This is the only insect-caused gall on a fungus known in the UK. It infects this particular bracket fungus which grows slowly enough to allow the development of the gall. The gall was first noted in the south east of England in 1990 and has been expanding its range.

Like the Conopidae, the Soldier-flies (Stratiomyidae) are a family of flies which are distinctive and a good group to study. *Stratiomys singularior* is one of the larger species and often associated with coastal grazing marshes. However, it can also tolerate completely fresh water locations and Rupert Higgins reported it from Chew Valley Lake (Herons Green) on 25 July.

As with other insect orders, some species/families are faring better than others. Nationally, information from the Hoverfly Recording Scheme suggests 55% of the

UK's hoverfly species are in decline, paralleling the data from moth recording. One of the fly species which has benefited though is the Bee-fly *Villa cingulata.* Once thought to be likely to be extinct over the last few decades it has expanded across southern England including our region and was seen again in 2021, *e.g.* at Ashton Court by Rupert Higgins on 6 July.

Spiders (Arachnida)

Michael Davis, based in Easton, Bristol, has become the vice-county recorder for Gloucestershire for spiders. He continues to make very interesting findings in his own 'back yard' as follows: *Macaroeris nidicolens* Easton, Bristol 21 April – a Mediterranean species first recorded in the UK in 2002 in London where it has become established; it has now made it to Bristol. *Uloborus plumipes* is sometimes known as the garden centre spider as it is commonly found in such locations and is another accidentally introduced species thought to have arrived in 1992 in the UK from plants imported from the Netherlands. Michael reported examples at the Riverside Garden Centre, Southville, Bristol on 10 May although it has been in the city for many years now. *Theridion pinastri* found by Michael at Royate Hill Reserve in Bristol on 25 August, and again at Greenback Cemetery by Michael and Andy Pym in September, has been in the UK since 1977 and so was perhaps a species awaiting discovery locally. *Cryptachaea blattea* was also found in Greenback Cemetery by Michael on 24 October – a species native to Africa which has now been found in several locations in the UK.

Aside from Michael's many important findings, the Wasp Spider *Argiope bruennichi* continues to slowly expand its distribution locally, *e.g.* found at Roundhill, Bath by Wayne Tucker on 26 August.

Harvestmen (Opiliones)

The rare harvestmen *Sabacon viscayanum* was recorded near Snuff Mills, Bristol on 22 May 2021 by Maico Weites. In the UK the species is known from a few locations in Wales and adjacent English counties. Previously Peter Smithers had discovered the species in the woods in the Avon Valley near Hanham, where we found it again on a BNS field trip on 12 June 2021.

Pseudoscorpions (Pseudoscorpiones)

Pseudoscorpions are not rare but not often recorded due to their small size. *Chthonius ischnocheles* was recorded on several locations including Leigh Woods, Bickley Wood, The Gulley, on driftwood in the Avon near the Cumberland Basin in 2021 by Maico Weites. Two further species were *Neobisium carcinoides* in the Gulley on 30 May and *Pselaphochernes scorpioides* in a dead tree in Bickley Wood on 17 April by Maico.

Centipedes (Myriapoda)

Plate 5: *Stosatea italica* ©Maico Weites

Stosatea italica was found by Maico Weites in Ashton Court on 9 May and again in Nightingale Valley, Leigh Woods on 26 May. There are records from Leigh Woods and the Avon Gorge from the 1980s and 1990s but it is 'Nationally Scarce' in the UK and likely originally non-native.

Flatworms (Tricladida)

Dave and Anne Jewell reported striking black and yellow flatworms from their daughter's garden in Thornbury in 2021. This was identified by Maico Weites as the so called 'Southampton flatworm' *Caenoplana variegata* an Australian species thought to have been first accidentally imported into the UK around 2008 with an established population now in Southampton.

Molluscs (Mollusca)

The taxonomy of the golden-shelled slugs *Testacella scutulum* agg is still to be resolved, examples found by Maico Weites on 24 and 26 May 2021 in Nightingale Valley, Leigh Woods have been confirmed by Ben Rowson as *Testacella 'tenuipenis'* sensu Rowson 2014.

Weather Report for 2021

Barry Horton

Introduction

Perhaps 2021 was not a remarkable year weather-wise, but as usual there is plenty to look at and note. It seems that never a year goes by without something at least a little out of the ordinary popping up and grabbing our attention. Even in an unspectacular weather year our climate is of vital importance to us and to other living organisms that are less well protected than ourselves. Whether it is the changing distribution of plants or altered bird migration patterns, the climate significantly impacts everything.

We had the UN climate conference, COP26, in November 2021 and very briefly the world's media focused its attention on what we are doing to our environment. Politicians and institutional leaders stepped up to say the right things and make us feel that we were going in the right direction to tackle these largely man-made climate issues. Sadly other world events have subsequently put climate issues into the background as other matters are deemed more prescient.

There has been an amateur weather station in Totterdown, Bristol since 1993 and it is from here the weather data has been collated and analysed. You can look at the data for yourselves, as it is updated via the internet at http://www.bristolweather.org. The weather station is in Bristol's urban area and with that in mind, there are influences placed upon the data that would not be the case in a rural setting. Since 2005 the weather station data has largely been collected digitally, but the author manually checks on the rainfall data and sometimes other local sites for comparison.

The weather data used in this article comes from a variety of locally published historical sources. Some of the data is from as early as 1853 but there are time gaps and site differences which are too numerous to detail here. Broadly speaking the author has collated the continuous records of rainfall and temperature that are available for the Bristol area since 1882 and 1891; a period of 140 and 131 years, respectively. To see further information on the different date periods and the sources used see http://www.bristolweather.org/Historical.htm. There are several other good web sources of weather data in Bristol and the surrounding region which can be found easily when using an internet search engine.

When analysing and discussing the data you will see that there are different time periods used, and this relates to what has been said above about the dates of the different data sources. The 30-year averages used are a standard Meteorological Office device to easily denote the 'longer term' weather 'normal'. This may not be a perfect method but it is well understood and widely used. The current 30-year period being used as the countrywide standard is 1991-2020.

Being an urban site near the heart of Bristol, there will be elevated temperatures especially at night when compared with a rural setting. Even if the site is not ideally situated, and is 'amateur', it is still probably correct to say that neither were many of the historical weather sites. Even data from decent modern equipment that is not the Met Office standard equipment have their value over a long time period and help build up the historical picture and highlight the current trends.

Annual data

Temperatures in Bristol continue largely to reflect the UK and wider situation. In 131 complete years of Bristol's average temperatures 2021 was the joint 10th warmest with 1999 and 2015, having an average temperature of 11.9°C. The second warmest month, after July, was more unusually September. The annual 2021 rainfall of 891.1 mm was 97.5% of the 30-year average (1991-2020). The average for Bristol is 913.8 mm. The wettest month was October with 145.6 mm (145.6%) of rainfall whilst the driest was November with only 14.1 mm (14.0%) of the 30-year average. In 2021 the predominate wind direction was from the SW or WSW, accounting for 42.7% of all the wind directions. It was the least windy year since data began in 2005 with regard to the average wind speed. There were no wind gusts over 50 mph for the first time in 4 years. The annual average pressure of 1017 mb was the equal third highest in 27 years of data at this site. Thunder was only heard on 2 occasions.

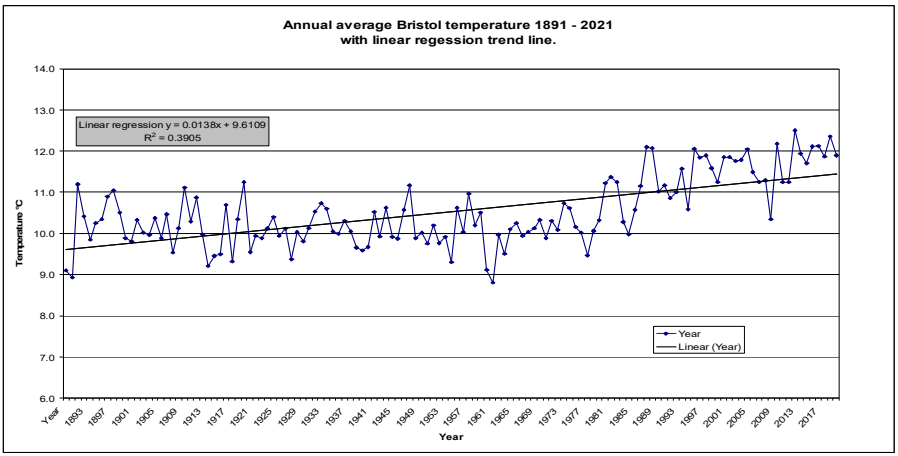

Fig. 1: Annual average Bristol temperature 1891 - 2021.

The graph above (Fig. 1) shows the continuous annual temperature record for Bristol from various sites since 1891 including the current one. Looking at annual data points it can be seen there is a fairly static picture, with annual variability in the

period up until the 1960s, but since the early 1970s there appears to be a pretty consistent rise. Overlying the data on the graph is a linear regression plot which is the continuous straight line. The change in temperature in the last 131 years on the regression line from 1891 Bristol shows an average annual increase of temperature from 9.6°C in 1891 to 11.4°C in 2021, which is a rise of 1.8°C over the whole period. This represents a rise of 0.14°C every 10 years or 1.4°C every 100 years if the trend of the past is extrapolated into the future. However such a rising linear trend should not be assumed as many factors, human and natural, may exert an influence on an artificial linear trend. Nevertheless it is fairly certain that a real upward temperature is taking place and action to mitigate this is urgent in the author's view.

In 131 complete years of Bristol's average temperatures 2021 was the joint 10th warmest with an average temperature of 11.9°C. The 15 annual average temperatures in the table below have all occurred in the last 33 years and this data set actually goes back 146 years with some years missing before 1891.

Year	Annual mean temperature °C	Rank
2014	12.5	1
2020	12.4	2
2011	12.2	3
2018	12.1	4
2017	12.1	4
1989	12.1	4
1990	12.1	4
1997	12.1	4
2006	12.0	9
2021	**11.9**	**10**
2019	11.9	10
2015	11.9	10
2006	11.9	10
2005	11.9	10
2002	11.9	10

Table 1: Highest annual mean temperatures.

The graph below of the last 30 years of mean temperatures in Bristol (Fig. 2) shows via the linear regression line that Bristol average temperatures have risen by 0.7°C in the last 30 years. The anomaly in 2010 when the annual temperature was only 10.3°C was down to the exceptionally cold winter of that year. For historical

reference the annual average temperatures for Bristol in 1853 and 1860 were 8.1°C. Even allowing for some instrument inaccuracies in the past they are a long way short of the 12.5°C recorded in 2014.

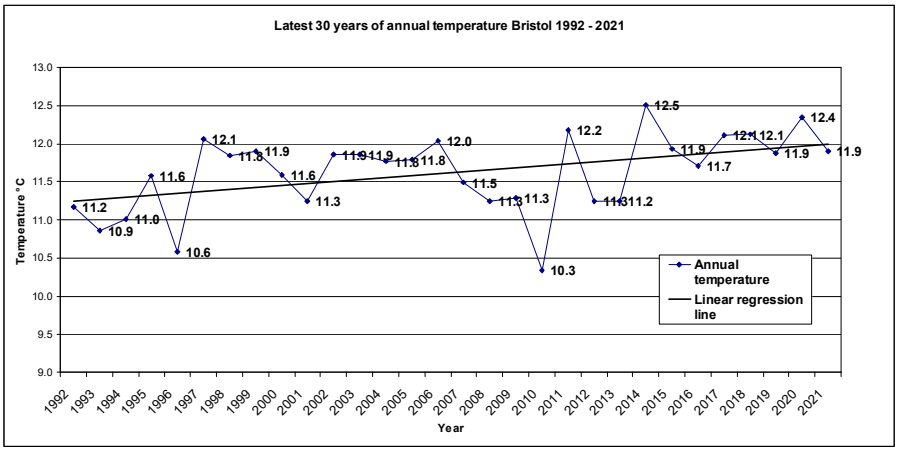

Fig. 2: Annual Bristol temperatures 1992 - 2021.

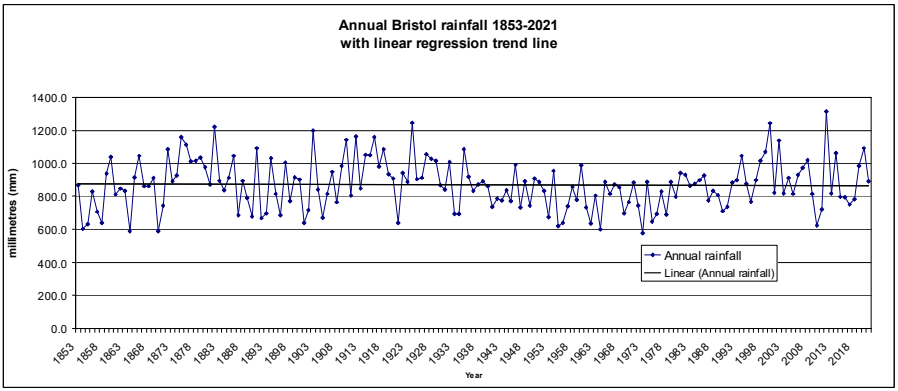

Fig. 3: Annual Bristol rainfall 1853 - 2021.

Regarding the annual rainfall the graph above (Fig. 3) shows that there is in fact continuous data for the city of Bristol going back to 1853. This is a good long period with which to be able to look back and analyse trends. However it should be noted that some UK sites go back into the 18th century and the Bristol record is from several sites around the city, so some care should be taken when drawing very specific conclusions about the rainfall and possible patterns. It is very striking in the graph above that despite the obvious inter-annual variability of the annual rainfall

there is an almost horizontal linear regression trend line. This demonstrates that overall there is little movement (upward or downward) in the total annual rainfall record for Bristol. We can see that the annual rainfall this past year was well within the normal range at 97.5% of the 30-year average with an annual rainfall of 891.1 mm for 2021. The 30-year average (1991-2020) for the city is 913.8 mm.

Whilst looking at the longer term is valid, it can mask any shorter term trends. The table below looks at the shorter time period of 30 years. When looking at the 4 overlapping-period 30-year averages from 1960 of the same data as above, but only in 30-year periods, it can be clearly seen that a pattern of increasing rainfall emerges.

30-year average period	30-year average rainfall (mm)
1961-1990	794.8
1971-2000	848.6
1981-2010	889.9
1991-2020	913.8

Table 2: Average rainfall for four 30-year periods between 1961 and 2020.

Table 2 above clearly shows a pattern of increasing rainfall that is hidden when looking at the whole data period. The graph below (Fig. 4) is from Table 2 above.

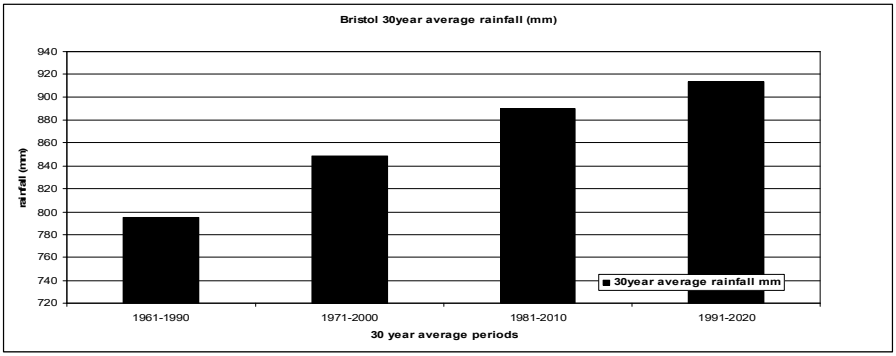

Fig. 4: Bristol average rainfall for four 30-year periods between 1961 and 2020.

A closer look at the 30-year averages of rainfall shows there has been an increase in the annual variability (change from the previous year) of rainfall amounts. The average standard deviation for each of the 30-year averages are shown in the table below (Table 3) and clearly show (at least in Bristol) rainfall is annually becoming more variable.

30-year average annual rainfall period	Average 30-year interannual variability (mm)
1961-1991	81.2
1971-2000	84.8
1981-2010	90.5
1991-2020	121.6

Table 3: Annual variability of Bristol rainfall over four 30-year periods 1961 - 2020.

The graph below (Fig. 5) depicting the monthly rainfall for 2021 shows the stand out months of January, May and October producing high rainfall amounts and the months of April and November being particularly dry. The 30-year averages (1991-2020) for Bristol are shown for comparison and depict a drying trend in the early part of the year and then increasingly wetter months, with an interruption for September, until the end of the year. As seen in 2021 this is not always followed by any means.

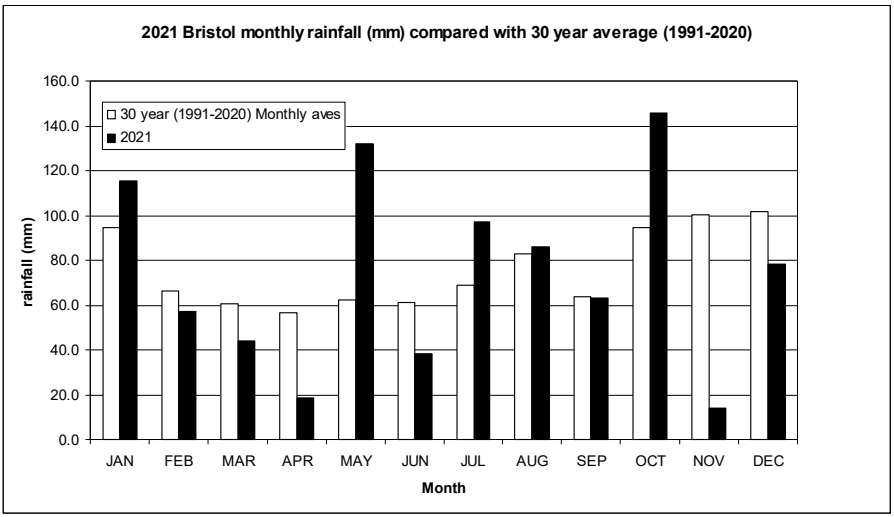

Fig. 5: 2021 Bristol monthly rainfall compared with 30-year average for 1991 - 2020.

With regards to monthly temperature one can see from the graph below (Fig. 6) that it tended to be the latter part of 2021 that saw the largest positive anomalies. These were December (+2.2°C), September (+2.0°C) and October (+1.6°C) all being above the 30-year average 1991-2020. In contrast to the very warm spring of 2020, 2021 saw a much cooler season with an April temperature of -1.9°C and a May temperature -1.8°C below the 1991-2020 Bristol average temperature.

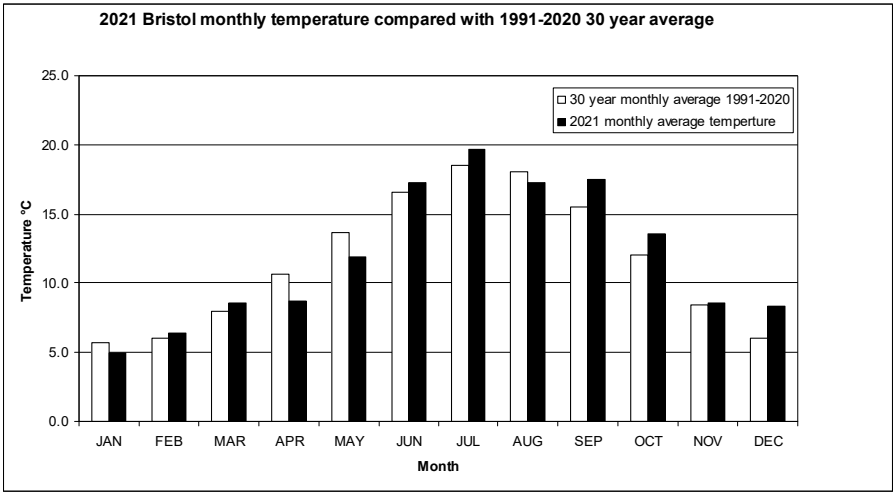

Fig. 6: 2021 Bristol monthly temperature compared with 30-year average for 1991 - 2020.

2021	N	NE	E	SE	S	SW	W	NW	Calm	Total
January	10	3	0	0	3	13	1	0	1	31
February	2	8	1	1	11	5	0	0	0	28
March	6	5	0	0	5	14	1	0	0	31
April	6	15	1	0	1	5	2	0	0	30
May	3	5	0	0	7	16	0	0	0	31
June	3	8	2	0	1	16	0	0	0	30
July	3	6	1	0	3	14	3	1	0	31
August	0	10	0	1	1	15	4	0	0	31
September	1	5	2	0	0	15	3	0	4	30
October	1	1	0	0	3	18	5	0	3	31
November	7	0	0	0	0	13	6	0	4	30
December	2	6	0	2	1	12	6	0	2	31
Totals	44	72	7	4	36	156	31	1	14	365
Percentage for year	12.1	19.7	1.9	1.1	9.9	42.7	8.5	0.3	3.8	100.0

Table 4: Daily wind direction by month.

The daily wind direction in Table 4 above is broken down into 8 main compass points by month. One fairly consistent weather statistic is the annual wind directions for Bristol. In 2021 this follows the typical pattern of the South Westerlies being the

dominant wind direction in our region. In the table South Westerlies accounted for 42.7% of the total days with North Easterlies accounting for nearly 20% of the total. This data is calculated automatically by the weather station's software which accumulates the data every 10 minutes and writes out the 'predominate' wind direction in that period. It then takes the highest number of the 10 minute direction values and records that as the daily predominant direction. There are often other 10 minute directions recorded during a 24 hour period, but only one predominant direction for the whole day.

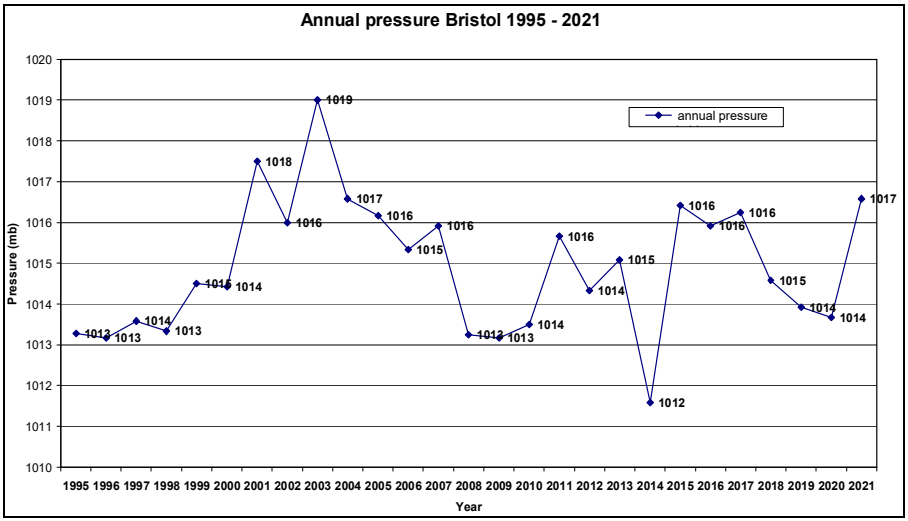

Fig. 7: Annual pressure Bristol 1995 - 2021.

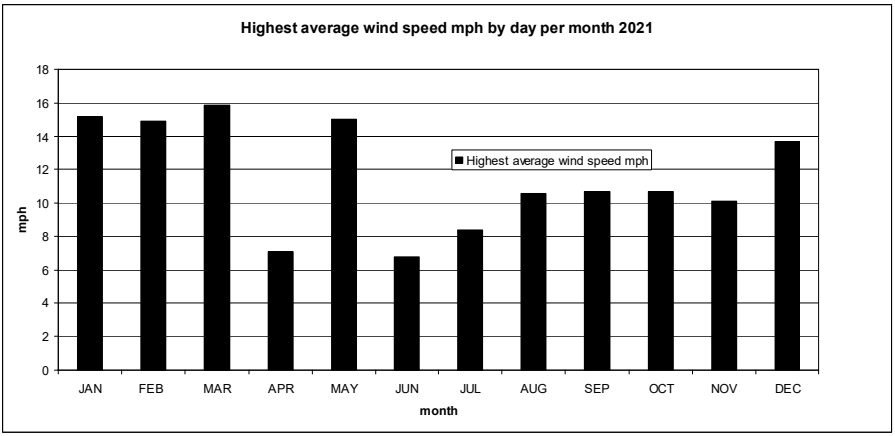

Fig. 8: Highest average wind speed by day per month 2021

The annual average air pressure for the year 2021, as depicted in the graph above (Fig. 7), was 1017 mb (millibars) which was the third equal highest, with 2004, since this data started at the current site in 1995. The highest annual pressure at the current site was in 2003 at 1019 mb. The global average pressure is a little over 1013 mb.

The bar chart above (Fig. 8) shows the highest average daily wind speed during each month. In 2021 it is seen that the highest daily wind speed occurred in the winter months with the exception of May. June 2021 was the least windy of the year. It was also the second calmest month of all months from data starting in 2005. The calmest month on record was September 2014.

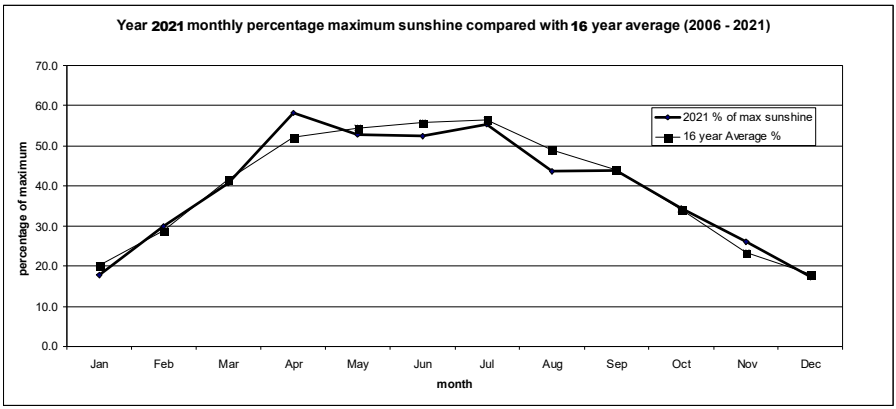

Fig. 9: 2021 monthly percentage maximum sunshine compared with 16-year average 2006 – 2021

In contrast to 2020, 2021 was a duller year with respect to the percentage of the maximum sunshine possible at 39.4%. As seen in the graph above (Fig. 9) the percentage of sunshine in 2021 was largely in line with the 16-year average for the site, with April perhaps being the most notably above the average with a monthly figure of 58.3%. The sunniest month with regard to the total sunshine was July and the month standing out as below the average of maximum percentage sunshine was August which was the dullest for that particular month since 2015.

Seasonal data

Winter 2020/21

The average winter temperature (December 2020 - February 2021) of 6.0°C was close to the 30-year average (1991-2020) of 5.9°C. Despite some cold spells it was the 33rd warmest winter in 131 years of data starting in 1890/1. The total rainfall for the three winter months was 318.7 mm. This represents 122% of the 30-year average (1991-2020). It was the 23rd wettest winter since records began 140 years ago in 1881/2. Comparing the two recent 30-year averages (1981-2010 and 1991-2020) it can be seen that the average winter rainfall has increased by approximately 10 mm.

Spring 2021

The spring of 2021 (March - May 2021) was cooler than the recent 30-year average. With a mean temperature 9.7°C for the three months it was -1.0°C cooler. It was the below-average minimum temperatures that accounted for most of the cooling being -1.3°C below the 30-year average. Even with May's high rainfall the total spring rainfall placed the season only at 47th wettest out of 140 years of data for Bristol.

Summer 2021

Without feeling particularly spectacular the summer of 2021 was the 17th warmest in 131 years of complete data for the city of Bristol. With an average temperature of 18.1°C it was 0.4°C above the 30-year average (1991-2020). The warmest summer was 1995 with an average temperature of 19.4°C. The coolest was the summer of 1954 when the average temperature only reached 14.4°C. It was the 26th warmest summer with respect to maximum temperatures at 22.0°C out of 116 complete years of data. With respect to average minimum temperatures the summer of 2021 was the equal 4th warmest (with 1983) at 14.4°. The summer rainfall total for the three months was 222.1 mm which is 10 mm above the 30-year average, so nothing too remarkable there.

Autumn 2021

With respect to the autumn season (September - November) the mean temperature was 13.2°C. This makes 2021 the 4th warmest autumn in 131 years of data for Bristol. The 30-year average for the season in Bristol is 12.0°C. The warmest was in 2011 with an average temperature of 13.7°C. With rainfall high in October and very low in November the autumn rainfall of 223.2 mm was 35 mm below the 30-year average; a typical case of averages masking some of the smaller time scale noteworthy events.

Monthly data

January

January 2021 was a colder and wetter than average month. The average temperature of 4.9°C was -0.8°C below the 30-year average (1991-2020) and was the coldest since 4.8°C was recorded in 2011. With an average minimum temperature of 2.3°C it was the coldest since 0.0°C was recorded in January 2010. With regard to the average maximum temperature of 7.4°C it was the lowest since 7.2°C in January 2013. The total rainfall for the month was 115.2 mm which was 121.6% above the 30-year average (1991-2020). It was the wettest January since 2014 when 183.8 mm was recorded. The 2014 rainfall figure was the wettest on record for the month from continuous data starting in 1883.

February

The month was divided up into a cold spell toward the middle of the month with warmer spells either side with the later one having some high temperature for the time of the year. Rainfall was below the 30-year average (1991-2020) at 86.0% of the average at 57.1 mm. The average temperature for the month at 6.4°C was 0.4°C above the 30-year average.

March

March 2021 was a drier and slightly warmer than average month, but amounts of sunshine were slightly down on the average. The total rainfall of 44.0 mm was 72.6% of the 30-year average 1991-2020. The average temperature of 8.6°C was 0.6°C above the same 30-year average. The average monthly pressure at 09:00 hours at 1022 mb was the highest for the month since 1026 mb was recorded in March 2012.

April

April 2021 was a cool and dry month with above average sunshine and high pressure. The rainfall of 18.8 mm in 2021 was only 33.3% of the 30-year average for the month. For 15 consecutive days from the 12th there was no measurable rainfall and is defined as an 'absolute drought' and was the longest dry spell in 2021. It was the coldest April with an average temperature of 8.7°C since 7.9°C was recorded in April 1989. 2021 was 4.0°C cooler than April's 2020 average temperature which of course was exceptionally warm. The average temperature in 2021 was only 0.1°C warmer than March 2021. The average minimum temperature in 2021 was 2.9°C below the 30-year average (1991-2020), whilst the average maximum temperature was only 1.0°C below the average. The average minimum temperature of 3.6°C was the lowest since 3.3°C was recorded in April 1978. April 2021 was the fourth joint sunniest since this data started in 2006. At 58.3% of the maximum sunshine it was equal with 2011. Unusually 50% of the wind

direction was from the North East which largely accounted for the cooler temperatures. It was the calmest month of any with an average wind speed of 3.4 mph since April last year but this was superseded by June which recorded very light winds. The average pressure of 1023 mb at 09:00 hours GMT was the joint highest, with April 2007, since data began in 1994.

May

May 2021 was a cooler and much wetter than average month. Only in the last few days of the month did the temperatures rise and the rain ease off. The total rainfall for the month was 132.2 mm which is 212% of the 30-year average for the month. By way of contrast May 2020's rainfall was less than 10% of the average. May 2021 was the 6th wettest May since continuous records began in 1881. The wettest was May 1932 with 164.3 mm. Temperatures were below the 30-year average in 2021. With an average temperature of 11.9°C it was -1.8°C lower than the 1991-2020 average of 13.7°C. Minimum temperatures were as cool as 2013 at 7.9°C, and maximum temperatures, at 15.8°C in 2021, were lower than any May since 1994. In contrast to May 2020 which had a very high percentage of maximum sunshine, May 2021 was slightly below the average for the month and approximately 20% less than last year. The average air pressure of 1020 mb was the equal third highest for the month since this data started in 1994. It was in fact the windiest May since 2015.

June

June 2021 was a quiet month with temperatures slightly above the 30-year average and rainfall below the 30-year average. Perhaps most notable was the lack of high winds throughout the month. June's average wind speed of 3.5 mph was the lowest since April 2020. The maximum wind gust of 23 mph was the joint lowest of any month, with August 2002, since this data started in 1995. The monthly mean temperature of 17.3°C was 0.7°C above the 30-year average of 16.6°C (1991-2020). Minimum temperatures were 0.8°C above the same long term average and maximum temperatures were 0.6°C above. The monthly rainfall of 38.7 mm was only 63.3% of the 30-year average (1991-2020).

July

It was a mixed month with hot and cool spells, dry periods and then downpours. This can of course all be masked by averages so one has to look more closely at the individual data. There was a 10 consecutive day dry spell from the 13th to the 22nd inclusively with a wet spell at the beginning and the end of the month. The lowest pressure of the month at 09:00 was 994 mb and was the lowest for a July since 17th July 2011, when 992 mb was recorded at 09:00. The July average wind speed of 3.3 mph was the lowest for the month since this data started in 1995. The average is 5.2 mph. The highest average daily wind speed of 8.4 mph on the 6th was the second lowest since this data began in 1995. The lowest daily average of 7.9 mph was recorded on 28th July 2013. The monthly average temperature of 19.7°C was

1.2°C above the 30-year average for Bristol. The rainfall of 97.1 mm was 141.1% of the 30-year average for the month. It was the wettest July since 100.7 mm was recorded in 2012.

August

The August average temperature was 17.3°C which was -0.8°C of the 30-year average for Bristol. It was equal coolest, with 2017, since 2015 at 17.2°C. The average maximum temperatures were 1.2°C below the 30-year average (1991-2020) but average minimum temperatures were only 0.2°C below. It was the dullest August since 2015. The maximum percentage of sunshine in 2021 was 43.7%, 5% below the average 2005-21. There was a large range of pressure during the month as the maximum pressure at 09:00 GMT of 1030 mb on the 31st was the highest in August since 2012, and the lowest pressure for the month of 994 mb was the lowest since 992 mb in August 2014. There were an unusually high number of North Easterly winds for the month. The total monthly rainfall for August was 86.3 mm which is 104% of the average for the month.

September

With an average temperature of 17.5°C it was the equal warmest, with 2014, and the joint second warmest September in Bristol since continuous data started in 1891 (See the graph Fig. 10 below). The 30-year average temperature is 15.5°C. The warmest September was 2006 with an average temperature of 17.7°C. The average minimum temperature of 13.6°C for the month was the second highest for the month since this data started in 1893 (6 years of data missing). The highest was in 2016 when 14.0°C was recorded. The total rainfall of 63.5 mm was practically the same as the 30-year average for the month. The month's low average wind speed of 3.3 mph was the lowest for September since 2014 when only 2.5 mph was recorded.

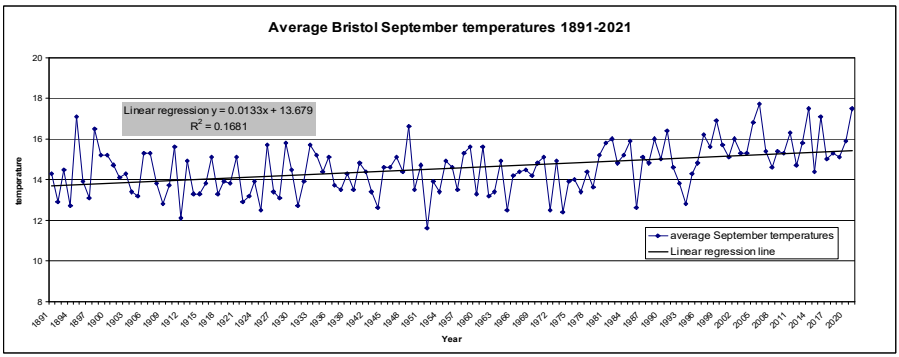

Fig. 10: Average Bristol September temperatures 1891 - 2021.

October

Rainfall for the month of October (145.6 mm) was over 150% of the monthly 30-year average. The total rainfall for the month fell in only 50 hours at an average rate of 3 mm per hour. This intensity of rainfall looks as if it is unusual when comparing it with other 'heavy' rainfall months. It was the second wettest month of the year after May 2021. When comparing with other recent 'wet' months (>2.0 mm per day) October 2021 had an average rainfall of 12.0 mm on each 'wet' day. This is the highest 'wet' day recorded in recent years. Despite the rainfall amounts there was also a consecutive 12 day dry period from the 6th to the 17th inclusive.

The October average temperature of 13.6°C was 1.6°C above the 30-year average for Bristol. It was the warmest October since 2017 when the average temperature was 13.7°C. The average minimum temperatures for the month were 2.0°C above the 30-year average.

November

The total rainfall for November was 14.1 mm which represents only 14% of the 30-year November average. This is the third driest November since continuous records began in 1880. The driest November was in 1901 when only 11.9 mm was recorded. In fact it was the driest of all months since May 2020 which in itself was exceptional. With an average temperature of 8.6°C for 2021 it was only 0.2°C above the 30-year average. In 17 years of detailed wind data at this site November 2021 saw the lowest average wind speed at 3.2 mph and the lowest average wind gust of 18 mph of any November month.

December

The average temperature of 8.3°C was 2.2°C warmer than the 30-year average for the month and was the largest positive monthly temperature anomaly of 2021. The average minimum temperature for December was, at 6.2°C, higher than the November minimum temperature of 5.7°C. Rainfall at 78.4 mm was 77% of the 30-year average for the month. It was the driest December since 2016 when only 30.3 mm was recorded.

Some notable events in 2021

Wind

The 10 minute average wind speed of 27 mph recorded on 23rd February was the highest of any month since 29 mph was recorded in February 2020.

The maximum daily wind speed of 6.8 mph on the 27th June was the second lowest of any month since this data started in 2005.

Pressure

The high pressure reading of 1042 mb on the 27th of February was equal second highest for the month since 1043 mb was recorded in 2012.

The lowest air pressure of June 2021 was 1007.0 mb, on the 20th. This is the second highest since the data started in 2005. The highest was 1007.6 mb on June 14th 2018.

The high pressure of 1029 mb recorded on the 17th of July was the highest for the month since 1034 mb was recorded on July 8th in 2013.

Temperature

The highest daily maximum temperature of 14.3°C on 14th of January was the third highest since records began in 1938. The -0.2°C lowest daily average temperature on the 7th of January was the lowest for the month since -0.4°C was recorded on the 20th in 2013 and the lowest of any day since 1st March 2018 which is remembered as the 'beast from the east'.

The maximum temperature of 23.4°C recorded on the 30th of March was the highest recorded for March in the city since the data started in 1938. The previous highest was 23.2°C recorded on 28th March 2012.

The lowest daily minimum temperature of 2.2°C on the 2nd of May was the lowest for the month since 2003 when only 1.9°C was recorded.

The maximum daily temperature of 28.8°C on the 13th of June was the lowest since 2016 when only 26.9°C was recorded.

In July, for the first time in 28 years at this weather site, there were five consecutive days with a maximum temperature of over 30.0°C. These were between 18th and 22nd. The highest daily mean temperature of 25.8°C recorded on the 22nd was the 5th highest for a July day since this data started in 1993.

The highest daily maximum temperature of 24.1°C on the 14th of August was the lowest maximum (but equal with 2010) for an August day since 21.4°C in 1993.

The maximum daily temperature of 30.8°C on the 7th of September was the second highest for the month since records began in 1937.

The highest daily minimum temperature of 13.1°C on the 31st of December was the highest since this data started for Bristol in 1960. The highest daily mean temperature of 13.9°C also on the 31st was the joint highest, with 2015, since this data started in 1993. The lowest minimum temperature of -0.7°C for the month on the 27th was the highest since 4.9°C was recorded on 25th December 2015.

Solar radiation

The maximum hourly solar radiation (Wm^{-2} – Watts per square metre) of 9.92 recorded at 12:00 on 26th of February was the highest for the month since this data started in 2006.

On the 6th of June the hourly Watts per square metre (Wm^{-2}) of solar radiation from 12:00 was 1013.5. This is the 4th highest since this data started in 2005.

The lowest daily minimum sunshine of 1.32 MJ m^{-2} day^{-1} (megajoule per square metre) on the 20th November was the highest for the month since this data started in 2005.

Rainfall

The maximum 24 hour rainfall of 27.4 mm on the 27th of July was the highest for the month since 29.1 mm was recorded on 24th in 2015.

During the first week in August 2021 there were 4 spells of rain, totalling 7 hours, that delivered 44.8 mm of out of a total of 64.6 mm of rain for the week. This is very unusual for this site in urban Bristol at any time of the year. The first spell was 14.6 mm between 15:20 and 17:20 on the 2nd of August. The second spell was 12.4 mm between 18:50 and 20:50 on the 5th. The third spell was 7.4 mm between 13:40 and 14:40 and finally the fourth spell was 10.4 mm between 03:20 and 04:20 all falling on the 7th. The 28.9 mm of rain recorded in the 24 hour period on the 7th August was the highest of 24 hour rainfall of any month since December 2020 when 29.5 mm was recorded.

Over half the September rainfall was from one 24 hour event of 33.4 mm on the 28th of the month. It was the highest of any month since 37.1 mm in October 2020.

On the 9 days from 26th September until 4th October 78.8 mm of rain fell. One of the two heavy rainfall days was on the 4th October with 21.4 mm falling of which 19 mm fell in just 3 hours.

The maximum 24 hour rainfall of 3.5 mm on 5th of November was the lowest of any for the month since data started in 1893.

Snow and Frost

In 2021 there were only four occasions when snowfall was observed to fall and only one had any snow lying at 09:00 hours. There were 21 days of air frost. This is when the air temperature falls below 0.0°C. This is not to be confused with a ground frost which can occur when, the atmospheric conditions are right, and the temperature can be still a couple of degrees above 0.0°C. The graph below (Fig. 11) shows the decline in air frosts over recent years even though in 2021 there was a slight rise in occurrences of temperatures at or below zero degrees.

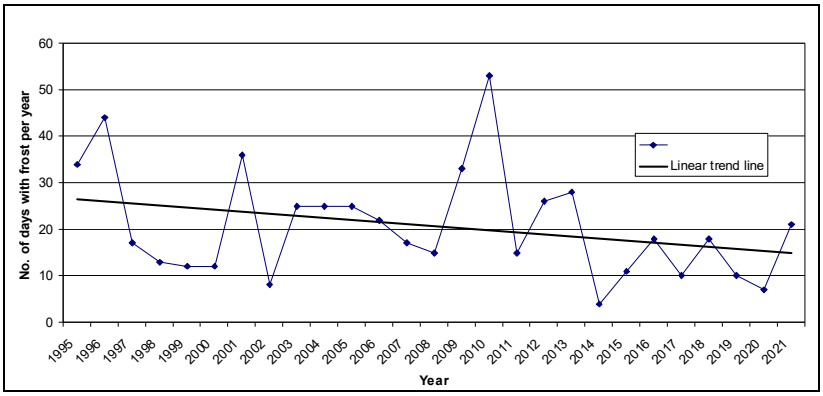

Fig. 11: Number of days of air temperature below 0°C in Bristol, years 1995 - 2021

Conclusion

Trends in weather do exist, single events do catch us out, and they are fascinating and of some interest to us all, but what are we to make of it all? How should we act collectively if individually our actions do not add up to the change required? Clearly we cannot act collectively if we all have different agendas and opinions about what to do.

In the meantime local and macro weather events are happening and stressing our shared environment. I don't know when the breaking point will be but some life forms are already dying, like for example the coral reefs. Biodiversity is suffering through our desire for more and more production of commodities to consume as the population grows. These, and many more 'drivers', are affecting our climate even if we don't fully understand all the mechanisms. In the light of this may I suggest the precautionary principal?

I am interested in the changes to our climate; others can see the changes to life forms and our environment. As we fight pandemics and wars perhaps we should proceed very carefully with the limited abundance of the planet.

Obituary: Clive Lovatt

With the sudden and unexpected death of Clive Lovatt, long-time Hon. President of the BNS Botanical Section, on 1st March 2022 at the age of 67 we have lost an irreplaceable and unique friend, guide and mentor. For many of us, the gap he leaves behind is extremely large and already palpable. It is impossible in a few short paragraphs to do any sort of justice to his character and work, and we are all still in shock; but here are some initial reflections and a few details of his life.

Clive at Tyntesfield ©Steve Parker

A great enthusiast and enthuser, Clive was always ready to share his immense knowledge about plants. He combined the methodical, scientific approach of the

professional with the eager excitement of the amateur. This is exemplified by how he would stick with a difficult specimen (a saltmarsh orache *Atriplex*, say, or a stubborn willowherb *Epilobium*), carefully examining all the characters and keying it out; and also in the way he might physically act out a particular feature of species, gesturing and smiling with his charming, boyish sense of humour and a twinkle in his eye.

Clive didn't just offer encouragement, useful tips and determinations of difficult plants; he showed us how to look, how to look again, how to look closer, better. These are things to carry with you as a naturalist.

As well as advice, he also gave good presents, especially in the form of books – keen to help others become more rigorous botanists and to enjoy the process. He could be relied upon to celebrate the finds reported to him (as the Botanical Society of Britain and Ireland's county recorder for vice-county 34, West Gloucestershire), underscoring the importance of observing and recording wild plants.

As well as President of the Botanical Section, Clive was also Honorary Archivist for the Society, Chair of the Library Committee and a valued member of Council. His reputation as an eminent botanist and especially his early research with Dr Lewis Frost on the plants of the Avon Gorge is well known. He later spent some time working in Africa but took on the job of compiling the annual Bristol Botany report in around 2004, while still living abroad. After he came back to Bristol in 2010 he played a key role in the BNS and several other organisations such as the Botanical Society of Britain and Ireland, Somerset Rare Plants Group and Gloucestershire Naturalists' Society.

Clive always held a particular fondness for 'aliens' – non-natives and weeds and things that are out of place. One autumn he found a staggering array of curious species on a new road embankment. He was recently delighted by the appearance of Sea Stork's-bill *Erodium maritimum* on a street in Clifton Wood. At the same time, he wouldn't shy away from the unglamorous species, such as the tricky fleabanes *Conyza*, that tell us so much about how our flora is eternally dynamic and surprising.

He was kind and generous beyond the realms of botany and natural history. We discovered a shared love of English folk music, and he gave me some rare records by one of our mutual heroes, Peter Bellamy, recounting that he had once compered a night headlined by the legendary singer at a folk club in Cambridge in the 1970s. I am sorry never to have heard Clive play one of his several vintage squeeze-boxes, which sat on top of the towering bookshelves that were home to his botanical library.

Among the many ongoing projects in which Clive was engaged was investigating and writing up the history of the botanists of the Bristol region – all the greats, from George Thwaites, to J.H. White, to Ida Roper. Many fascinating extracts from that

work have appeared in the pages of *Bristol Naturalist News* in recent years. He now takes his rightful place among those luminaries, albeit much too soon.

I still have hundreds of questions to ask him, and a long list of places I was hoping to visit in his company. But to quote one of his favourite remarks from the aforementioned J.H. White, author of the seminal *The Flora of Bristol*, 'finality in field botany is fortunately unattainable'. So, we keep going and try to remember what Clive showed and taught, in his ever-gentle way.

David Hawkins and the BNS Botany Section

Society Annual Report 2021

1. Society Organisation

With the Covid pandemic in its second year, the Society had adjusted to the restrictions that had become an accepted part of our lives and most of our activities were able to continue, if not as normal, then at least in a functional semblance of normality. A full programme of indoor meetings took place on Zoom and field meetings were able to take place from April onwards. The AGM took place on Zoom on Wed 17th March. The following were elected to serve the Society.

President:	Ray Barnett	Members:	Tim Corner
Hon. Secretary:	Lesley Cox		Robert Muston
Hon.Treasurer:	Mary-Jane Steer		Steve Nicholls
Hon. Membership Sec:	Margaret Fay		
Hon. Librarian:	Jim Webster	Section Reps:	
Hon. Bulletin Editor:	David Davies		Geology: Richard Ashley
Hon. Archivist:	Clive Lovatt		Invertebrates: Maico Weites
Hon. Publicity Sec:	Alex Morss		Ornithology: Giles Morris
Hon. Proceedings Editor:	Dee Holladay		Botany: David Hawkins

2. Grants and Legacies

There were no applications to the Society for major grants this year. Council will be looking at ways by which we can make this aspect of the Society's charitable work more widely known to local natural scientists and naturalists. The Society was also honoured and grateful to be remembered in legacies left by two sadly departed members.

Grants

£62 for a sign on Gordano Ringing Group's hut to acknowledge the BNS contribution to its rebuilding.

Legacies

£5000 received from estate of Paul Chadwick (March)

£10,000 received from estate of Mr Niblett (September)

3. The Library

The Society's Library, situated within the Bristol Museum and Art Gallery, was closed for the first half of the year due to strict Covid regulations. With the gradual reopening of the Museum, which required prebooking of time slots, a few members of the committee were able to visit the basement library to check on the post and the dehumidifier. It also enabled us to bring in all the newly purchased books that were then accessioned onto the computer.

We ended the year with a booking system for members wishing to visit the library and this has enabled all overdue books to be returned safely. Whilst a quiet year for the library, BNS members have been kept fully informed and entertained by the "Library News" in the BNS Bulletin written by Clive Lovatt, our Library Chair.

Jim Webster
Hon. Librarian

4. Annual Section Reports for 2021

Botany Section

The committee remained the same as it was in 2020: Clive Lovatt as President; David Hawkins as Secretary; and Helena Crouch, Jenny Greenwood, and David Hill, as ordinary members.

Indoor meetings were impracticable during the Covid-19 lockdown in the early part of the year. We did not run any online 'Zoom' lecture-format meetings but instead held two 'out of season' field meetings in late October and November (see below). Four of the nine (2020: 3) field meetings were on the Gloucestershire side of the BNS area and five on the Somerset side; there were six leaders. It is clear that meetings closer to Bristol are better attended and we are pleased to be attracting younger botanists as well as the long-standing members.

All of the meetings are announced and then written up in the monthly BNS bulletin, known as *Bristol Naturalist News*, together with botanical notes and in recent times a running commentary on the effects of the Covid-19 pandemic on us all. An average of about 4½ pages appeared in each of the bulletins published in 2021. These can be accessed on the BNS website, currently with an archive of about five years.

For the meeting in the northern part of Leigh Woods on 25 April we were confined by the 'rule of six': five plus Clive Lovatt leading. We were interested to see Broom *Cytisus scoparius* flowering on the sides of the cutting immediately north of 'Sandstone Tunnel'. At Uley Bury on 26 May we were at last unrestricted, and seven friends were able to catch up and tell tales while admiring the extent of the

local speciality Wall Whitlow-grass *Drabella muralis*, albeit mostly in seed, among many other items of interest.

On 13 June Helena Crouch and three others met at the Avon Wildlife Trust reserve Bathampton Meadows, the party including someone involved in the conception and design of the site (then agricultural land) when a bypass was built in the 1990s. It was good for orchids, sedges and aquatics, and the 'splendid but terrible' leaves of *Heracleum mantegazzianum* Giant Hogweed were admired but not touched.

On 25 July David Hawkins led a group of six to Nailsea Moor, part of the 'wild west of North Somerset – bleak, desolate and remote'. Luckily, 'the ditch gods were kind' and there was much in flower. Two umbellifers, similar in leaf, were carefully distinguished and 'the collective knowledge of the group made for a most enjoyable and informative jaunt'. Then on 1 August we returned to dry ground as Neill Talbot made his debut as a meeting leader for the Botany Section at that always interesting spot for anyone tiring of limestone habitats, Trooper's Hill. We were seven this time and aside from the suite of calcifuges, we were close enough to habitation to find garden escapes as well.

On 22 August David Hawkins and Jenny Greenwood led six others to the Yatton and Congresbury Wildlife Action Group's (YACWAG's) Stowey Reserve at Yatton, finding five sorts of duckweeds and Yellow Loosestrife *Lysimachia vulgaris* and its eponymous bee, which were on the cover of the latest edition (80) of our *Nature in Avon*. Indeed, the authors of the paper referenced inside, Faith and Tony Moulin, representing the landowners, joined the group for a while to talk about the history and management of the site, and their ongoing plans for it.

On 22 September David Hawkins and Clive Lovatt took 11 members and guests onto the saltmarsh at Pill. The rare Long-stalked Orache *Atriplex longipes* was found in small quantity at the back of the marsh, whilst its hybrid with Spear-leaved Orache *Atriplex prostrata* seemed to form a yellow straggling mid-marsh strandline. A heap of disturbed soil just north of the Avonmouth Bridge attracted much attention. We failed to find Slender Hare's-ear *Bupleurum tenuissimum* on the track by the boundary fence where it has been seen in recent years but are reliably informed it turns up on tracks where motorcycles have been ridden across the marsh.

The last two meetings of the year focused on the so-called lower plants. On 24 October, David Hill, a former President of the British Lichen Society, led six of us for a slow walk around part of Lower Woods, Wickwar, to show some of the lichens he had found during recent surveys, one species of which was new to the 'traditional' county of Gloucestershire. We are always pleased to accommodate guests, either because of their special expertise and interests, or as potential new members for the Society – and on this occasion we were joined by the county recorder for lichens in Gloucestershire. On 28 November David Hawkins took more than a dozen of us to see the 'charismatic bryophytes of the Gully' in the Avon

Gorge. We were also shown two of the county rarities there. This was the third winter bryophyte meeting delivered for BNS members and the level of attendance is very pleasing.

Botanical notes were submitted by five members under the editorship of Clive Lovatt. Photographs taken by 12 members and friends were published in the bulletin. Several notes were written about plant finds and observations made by around 20 members and others in the Society's area of interest. The most important of these was the discovery of Sea Stork's-bill *Erodium maritimum* in Clifton Wood, its first known record in botanical Gloucestershire since 1854. After seeing and talking to one of us admiring the extensive population in their pavements and gutters, local residents have become committed to its conservation.

Dee Holladay wrote about her lockdown hobby of learning to identify garden and street conifers and the 'pocketful of needles' that she accumulated. David Hawkins often wrote about his discoveries of Charophytes and other ditch species, and he occasionally mentioned invertebrates as well. Jean Oliver and Lois Pryce submitted images of named fungi and Graham Balfry reported Basil Thyme *Clinopodium acinos* Basil Thyme in flower in the Avon Gorge even after January frosts and light snow. Helena Crouch contributed on two species of Medick *Medicago* on the Somerset coast, one an alien tree and the other a rare native annual herb. Several pieces by Clive Lovatt came from his ongoing work on the Historical Flora of the Avon Gorge and erstwhile Bristol botanists, with occasional delvings into plant names and growth aberrations.

Annual reports of plant discoveries in the traditional Gloucestershire and Somerset halves of the BNS area are published for their members by the Gloucestershire Naturalists' Society and the Somerset Archaeological & Natural History Society respectively. A PDF copy of the Gloucestershire list is usually available from the undersigned mid-year. A pre-print of the Somerset list appears in the Somerset Rare Plants Group's newsletter, which is usually available on their website at the end of March. Three papers with botanical content were published in *Nature in Avon*, one on learning botany during lockdown, and two focused on different Somerset nature reserves, the Sharpham Moor Plot and the land owned by YACWAG.

With grateful thanks to the Section Committee, all of whom led meetings during the year, and to our members and friends for their support and interest.

Clive Lovatt
President, Botany Section

Geology Section

Due to restrictions caused by the Covid-19 pandemic and the consequent inability of the Geology Section to hold indoor meetings, a brief Annual General Meeting was held by Zoom immediately prior the Society AGM on 17th March. In the absence of any other nominations Richard Arthur agreed to continue as Section President and Richard Ashley as Section Secretary and Field Secretary.

A Zoom talk on "Fish, Fossils and Evolution" by Dr Sam Giles of Birmingham University was held on 24th of February and attracted a good number of members. An account of this talk written by Richard Arthur was published in *Nature in Avon*.

For the rest of the year the Section concentrated on holding field meetings that could be attended by members without too much risk of infection. An evening meeting to Ladye Bay, Clevedon on 30th June, led by Richard Ashley, examined lacustrine Triassic Oolites, the Ladye Bay fault, and fluvial cycles in the Old Red Sandstone. On 14th August a meeting, led by Mark Howson, was held at Middle Hope near Weston-super-Mare to examine the Carboniferous Limestone, and associated volcanic rocks. This included a visit to the newly accessible sections at St Thomas's Head that had recently been vacated by the Ministry of Defence.

The final meeting of the year was held on Sunday 12th December at Clifton Downs near the Observatory. This showed how much detailed and varied geology is present within a very small area of the City of Bristol and how this geology lies within arm's reach of anyone unfortunate enough to have to conduct their fieldwork from a wheelchair. One wheelchair user did take part. The meeting concluded with mulled wine and mince pies kindly provided by the leader and Section President Richard Arthur.

These field meetings were well supported by members of the West of England group of the Geologists Association, and Bath Geological Society. In return BNS members were able to attend meetings organised by these Societies that included visits to Thornbury, Clevedon, and the Yorkshire Coast. This is an arrangement that is working well.

Outside the formal meetings of the section members shared other fieldwork. One notable achievement of the year has been the production of a well-illustrated leaflet "Saltford Walking through the geological past" by our member Simon Carpenter with some support from other members of the section. It was pleasing to see an increasing number of geological papers being published in *Nature in Avon* and there is every reason to hope that this will continue in the future.

Richard Ashley
Secretary, Geology Section

Invertebrate Section

The Invertebrate Section saw a very successful 2021 with several field meetings, great invert records, lots of learning, and new connections. After a period of limited participation outdoor meetings, restrictions on social gatherings were eased and in 2021 the Invertebrate Section was able to hold several field meetings again.

We had our first field meeting on 12 June when we were shown around the woodlands in the Avon Valley by Peter Smithers. The focus of this field meeting were the arachnids, and we found many interesting species including the rare harvestmen *Sabacon viscayanus*. In true naturalist fashion we spent several hours beating bushes and looking under rocks and accordingly we ended up barely a five-minute walk away from our starting point! For me this was the first opportunity to see many members, as I had only joined the Society a few months before.

The Gully below the Bristol Downs was visited by two of us on 10 July. The weather forecast wasn't great and understandably kept most people inside. However after a bit of drizzle we experienced a lovely sunny day. Even the Marbled Whites were flying! We were able to find our target species the bristletail *Dilta chateri,* which until 2021 was considered a Welsh endemic. Sorry Wales, Bristol has them too! Furthermore we saw Lesser Stag Beetles (*Dorcus parellelipipedus*) and many of the limestone-loving isopods such as *Armadillidium nasatum* and *Androniscus dentiger.*

On 13 August Mike Hutchinson and Steve Nicholls led a field meeting on dragonflies and damselflies in the University of Bristol Botanic Garden. This was clearly the most popular field meeting of the year and over 16 people attended. Despite the rain we were still able to see Southern Hawker (*Aeshna cyanea),* Emperor Dragonfly (*Anax imperator*) and Common Darter (*Sympetrum striolatum*) amongst others. Luckily Mike and Steve were well-prepared for the intermittent rainy weather and (indoors) Steve showed us informative slides on how to separate the species in our area and Mike had some beautiful footage to share. A meeting well worth repeating!

Our final field meeting of the year was on 22 August at Troopers Hill. This rather unusual heather-clad hill in St George was visited by six of us. The heathland was home to many specialists that are rare in the Bristol region as heathland is not a common habitat here. We found several Broom Treehoppers (*Gargara genistae*) as well as weevils such as *Andrion regensteinense* and *Exapion fuscirostre* that feed on broom. True bugs such as *Kleidocerys ericae* and *Orthotylus ericetorum* are bound to heather and seemed to be abundant on the hill. With 95 species recorded that day, we did very good job!

One of the things I like about our meetings is that there is such a wide spectrum at attendees: from those who have only recently dipped their toes in the world of insects to those who have been obsessively looking through their microscopes

counting hairs on beetle legs for years. The meetings are a great way of connecting people and they have been a great way of for all of us to learn about invertebrates. Several meetings are already planned for 2022 so perhaps see you there!

I would like to thank all the field meeting leaders, the attendees, the Botanic Gardens, the Friends of Troopers Hill, and all those who have otherwise contributed. Here's to another bug-infested field season!

Maico Weites
President, Invertebrate Section

Ornithology Section

This was another year disrupted by Covid restrictions, at least in the early months, but the Ornithology section managed to hold a fairly full programme of events. Our committee remained unchanged following the brief AGM in January with Giles Morris (President) and Lesley Cox (Secretary), plus Mary Hill, Alastair Fraser, Mike Johnson, and Mel Parker as members. My thanks for their help throughout the year.

Once again Zoom enabled our indoor meetings to proceed more or less as normal, with the system having both advantages and disadvantages. On the plus side, we can engage speakers from anywhere in the country (or world?) without the expense or inconvenience of them having to travel; and the Zoom programme has also opened up our meetings to a number of members who are not able or are reluctant to travel to a venue on dark winter evenings. Conversely, I'm sure that many members miss the opportunity for social contact and discussion that is impossible online. Hopefully next autumn will provide an opportunity to restart face-to-face indoor meetings once again.

Our indoor meetings were as follows:

January Orchard Song by Ben Macdonald: a glimpse of the richness of birdlife now lost along with most of our traditional orchards.

February Scottish Birds & Wildlife by Mike Read: a natural tour of the highlands.

March Spot the Difference by Josh Tyler: an introduction to the concept of cryptic species and speciation amongst the Antarctic's penguins.

October New Zealand's Birds by Mike Read: a photo safari to a country with a unique bird population.

November Cancelled at short notice.

December Shropshire Birder's Year by Jim Almond: an exploration of the variety of birds and habitats of one county.

Outdoor meetings were not possible for the first three months of the year due to Covid restrictions, but we managed a full programme from April onwards with trips to: Watercress Farm (Wraxall); the Bristol Downs (Dawn Chorus); RSPB Ham Wall; Snuff Mills; Forest of Dean; Stock Hill; WWT Steart Marshes; Wains Hill; Chew Valley Lake; and Oldbury Power Station.

My thanks to the leaders from the committee who have made these trips possible. We would love to hear from any other members who would be willing to show a group around a birding venue they know well.

Many members continue to increase the value of their bird watching activities by contributing to both local and national surveys and it is to be hoped that more can be encouraged to take part. From the family participation of the Avon Breeding and Winter Bird Surveys to the more focussed BTO Wetland Birds Survey counts, there is something for everyone's level of expertise. Details of how to take part are regularly published in the BNS Bulletin and are listed on our website. The data provided by these surveys and all records and counts submitted via apps such as BTO's Birdtrack are invaluable to those who monitor and research our changing bird populations.

Giles Morris
President, Ornithology Section

5. Society Events

In addition to the activities of the different sections, there is a programme of Winter Lectures which are usually on topics from the natural world that cross specialist boundaries or do not fit within the scope of any of our Sections. In 2021 these were broadcast online via Zoom to members and were well attended and well received. Although the use of Zoom for these talks removes the valuable element of social contact between attending members, it has allowed some members to attend talks who would not normally be able to reach an external venue. Some of the lectures have also been recorded and made available to members unable to attend on the night.

It is our intention to provide a mix of online and venue lectures in future years.

Society Lectures

January: The Management of the Cotswolds AONB presented by Mark Connelly (the Land Management Lead). The Cotswolds covers an area of 787 square miles. Mark explained some of the issues involved in balancing the needs of farming with environmental enhancement, particularly in relation to species-rich limestone grassland.

February: Cornwall Seal Group Research Trust presented by Sue Sayer (Founder of the Research Trust). The talk explained the group's research into the problems and stress caused by human disturbance to Grey Seals and their work to change people's behaviour when near seals.

March: The Society AGM followed by Dragons and Damsels, a film showcasing dragonflies and damselflies presented by BNS Council member Steve Nicholls, the film's maker. Narrated by David Attenborough, this outstanding film managed to be both a visual masterpiece and a mine of factual detail.

October: Urban Butterflies presented by Matt Brierley. A thought provoking look at the right and wrong ways of managing urban grassland areas to increase the abundance and diversity of butterfly species.

November: Spitzbergen, The Realm of the Polar Bear presented by Paul Stanbury. Paul is a regular tour leader with Naturetrek and his presentation took us on a virtual tour of this arctic archipelago with spectacular photographs of its exciting wildlife.

December: To close the year, members were treated to another excellent talk presented by Dr James Taylor, former curator at the National Maritime Museum, Greenwich on Sir Joseph Banks and the Fine Art of Exploration. This talk centred on the use of artists to record the exploratory voyages of James Cook. As in his previous talk to the Society members were impressed by the breadth and depth of the speaker's knowledge.

6. Links with other Organisations

Apart from the links already mentioned elsewhere in this report our links with other respected organisations both national, (for example, BTO, RSPB, BSBI, BENHS) and local (e.g., AWT, BOC, BRERC, WENP and Bristol City Council) are increasingly extensive and too prohibitive to list but our enduring relationship with the Bristol Museum & Art Gallery must be acknowledged. The Society would be very much the poorer in spirit without its support.

7. Membership

Our membership increased during the calendar year 2021 from 351 to 366.

Our Society greatly benefits from the loyal support of many long-serving members. However, many more people share a growing appreciation of our environment and the natural world, and we recognise the importance of developing an increasing

presence on social media in order to inform, and appeal to a broader spectrum of potential new members.

Work is continuing on the development of a new, dynamic website to assist in achieving this aim, with the particular help and hard work of members Dee Holladay and David Hawkins

Our warmest thanks also to Alex Morss, Roger Steer and David Strawford for their work in promoting the Society online.

8. Thanks

As always, the Society is grateful for the help and support it receives from the Earth Sciences Department, University of Bristol and our sincere thanks go to Jon Finch, Head of Culture & Creative Industries, Bristol City Council for the Museum's continued support of our Society Library, located within the Bristol Museum and Art Gallery.

Finally, our thanks go to those members of The Bristol Naturalists' Society who give so willingly of their time and energy in the course of the year to support the aims and aspirations of the Society.

Treasurer's Report
Accounts for the year to 31 December 2021

PROFIT AND LOSS	2021 (FullYear)	2020 (Full Year)	2019 (Full year)
INCOME	**£**	**£**	**£**
Membership Fees	7,503	7,983	8,571
Advance payments made in previous year	965	725	
Advance payments made for coming year	-570	-965	-725
Gift Aid	1,504	1,486	1,564
Donations/Legacies	15,065	194	398
Trading	48	10	52
Interest (COIF Charity Funds)	1,490	1,099	617
Interest (Skipton)	20		
University of Bristol Refund	11,527	0	0
TOTAL	**37,552**	**10,532**	**10,477**
EXPENDITURE			
Administration			
Printing & stationery	0	39	100
Post & telephone	80	65	57
Council meetings	144	210	210
Insurance	96	140	140
Capital Items (Library Computer)	0	682	0
Website	70	1,282	152
TOTAL	**389**	**2,418**	**659**
SURPLUS of Income over Running Costs	**37,163**	**8,114**	**9,818**
Charitable Activities			
Meetings (Speakers' Fees & Room hire)	355	913	1,124
Bulletin Production	3,063	3,092	3,130
Avon Bird Report Printing	2,019	1,466	1,987
Proceedings (Nature in Avon) Printing	1,711	1,529	1,573
Publicity	0	0	0
Library (books & periodicals)	411	894	611
Bristol Tree Forum - RLB memorial tree	0	295	0
TOTAL	**7,558**	**8,190**	**8,426**
SURPLUS of Income over Running Costs and Charitable Activities	**29,605**	**-75**	**1,392**
GRANTS (from Capital)			
Grants Awarded	62	1,500	600
TOTAL	**62**	**1,500**	**600**
CASHFLOW FOR 2021	**29,543**	**-1,575**	**792**

BALANCE SHEET as at 31 December 2021

	2021 (year end) £	2020 (year end) £	2019 (year end) £
ASSETS			
Lloyds Bank	2,520	1.393	2,899
Skipton Building Society	40,632	40,612	80,442
COIF funds sum invested	68,000	40,000	0
Creditors	-570	-965	-725
	110,583	**81,040**	**82,616**
LIABILITIES	**None**	**None**	**None**
NET ASSETS - General fund	**110,583**	**81,040**	**82,616**
inc £60,000 Barry Harper Memorial Fund			
RECONCILIATION			
2020 Final Balance	81,041	82,616	81,824
2021 Cashflow	29,543	-1,575	792
2021 Final Balance	**110,583**	**81.041**	**82,616**

MEMBERSHIP SUBSCRIPTIONS	**2021**	**2020**	**2019**
Received in previous year	965	725	475
Received in current year	7,503	7,983	8,096
Pre-payments for the following year	-570	-965	-725
Total	**7,898**	**7.743**	**7,846**

Instructions for authors

The editor welcomes original papers or short notes on the natural history and geology of the greater Bristol region for consideration for publication in *Nature in Avon*.

Text should be submitted by email in Word. Please send all illustrations as separate files (they may also be embedded in the Word file to indicate placing). These files may be sent separately in emails or by Dropbox (or similar application) links.

The Deadline for submission is March 31 and publication is in June. Recent issues, subject to a 2-year moratorium, are available for download on the BNS website at www.bristolnats.org.uk.

Historical issues of *Nature in Avon* and its predecessor *Proceedings of the Bristol Naturalists' Society* can be found on the Biodiversity Heritage Website at www.biodiversitylibrary.org.

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Rerum cognoscere causas – Virgil

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