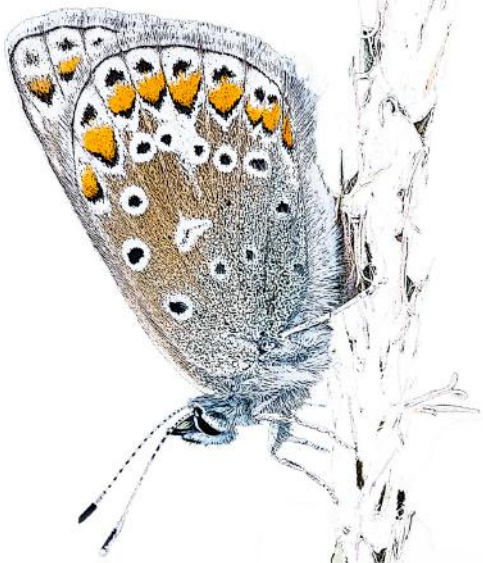
Cheshire and Wirral ARGUS

The Newsletter of the Cheshire and Wirral Branch of Butterfly Conservation

Autumn 2022 Issue 107



https://butterfly-conservation.org/in-your-area/cheshire-and-wirral-branch

Butterfly Conservation
Saving butterflies, moths and our environment

ANNOUNCEMENTS

Welcome to new members!

To those of you who have joined Butterfly Conservation this year, we bid a very warm welcome! We used to print the names of our new members to make the welcome more personal, but Butterfly Conservation received a complaint about that - breach of privacy - so we have been asked to refrain from giving you that personal greeting, but please be assured we welcome you to the branch and encourage you to join in any of our activities. You will get a warm and friendly reception. Provided new Covid variants arrive and the severe restrictions do not return, we should be able to arrange the usual number of field trips next year.

Photographic Competition 2022

Open to all Members of Cheshire & Peak Branch of BC

Entries must be taken in 2022 in the UK; they must be of butterflies or moths in colour or B & W, submitted by e-mail to the newsletter editor as a JPG file at 300 dpi resolution, A5 size. Include your membership number with your entry. Entries are limited to three per member, but only one photo from each entrant may be included in the top 3 places. Entries will be judged anonymously by the Branch Committee, whose members may not enter. The winning entry will appear on the front cover of the Spring 2023 newsletter; second and third entries will be on the back cover and inside back cover. Prizes - book tokens, first prize £25, second £15, third £10.

Deadline extended...

Submissions must be received by 31 December 2022

FRONT COVER IMAGE **Common Blue** *(Polyommatus icarus)* Roosting on a grass stem; image adjusted in *AffinityPhoto*.

BACK COVER **Rosy Rustic** moth *(Hydraecia micacea)* well camouflaged on a pine log. (Both images are © David Tomlinson)

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Copy deadline for the Spring issue - March 31st 2023

BUTTERFLY CONSERVATION

Company limited by guarantee
Registered Office: Manor Yard, East Lulworth, Wareham, Dorset BH20 5QP.
Tel: 01929 400209 Fax: 01929 400210
Registered in England No 2206468 Registered Charity No 254937
E-mail: info@butterfly-conservation.org
Website: www.butterfly-conservation.org

Contact details for Committee Members and Recorders

If you have any questions about their roles, or feel you would like to help the branch, please contact any one of them.

Chairman & Conservation Officer (Stockport) — **Malcolm Plant**
malcplant2009@hotmail.com — 0161 483 3535

Branch Secretary — **Stephanie Leese**
S.Leese@edu.salford.ac.uk

Treasurer & Conservation Officer (Grants) — **Phil Kinder**
p.kinder3@ntlworld.com — 0161 430 5107

Surveys & Transects Co-ordinator — **Tim Ward**
henbury@aol.com — 01625 424797

Newsletter Editor — **David Tomlinson**
david.tomlinson@manchester.ac.uk — 07732785979

WCBS Co-ordinator — **Tim Ward**
henbury@aol.com — 01625 424797

Website and Publicity Officer — **Leanna Dixon**
leannadixon@ymail.com

Membership Secretary and Conservation Officer — **Vacant**

Conservation Officer (Vale Royal) and Education Officer — **Rupert Adams**
rupertadams1@sky.com

Conservation Officer for The Wirral — **David Costello**
mailfordjc@gmail.com

Volunteer Coordinator — **Vacant**

Field Trips Coordinator — **David Tolliday**
davidtolliday1@outlook.com

Recorders (see Page 6)

Cheshire Butterfly Recorder — **Rupert Adams**
rupertadams1@sky.com — 01606 47665

Derbyshire Butterfly Recorder — **Ken Orpe**
ken@malaga.plus.com

Greater Manchester Butterfly Recorder — **Peter Hardy**
pgll@btopenworld.com 28 Hyde Grove, Sale, M33 7TE. 0161 972 0725

Cheshire Micro- and Macro-moth Recorder — **Dave Maddy**
d.j.maddy@btinternet.com

Editorial

This edition is thinner than usual. I am sorry about that, though that is a statement rather than an apology - I can't print what I ain't got. We do have three superb contributions to this edition though and I'm deeply grateful to the three authors who submitted them. Actually the contribution from Peter Hardy was not submitted to us; it was part of the last Lancashire newsletter and Rupert drew my attention to it. I thought it was essential, so we had to have it. Thankfully Peter and the editor of the Lancashire newsletter agreed to let us include it.

There are very few identification problems with UK butterflies: that is a sad fact. In continental Europe some fritillaries, blues and skippers pose real problems. In the UK we have mostly one or two of each genus, so there are occasional problems with *Argynnis* and *Clossiana* fritillaries, but even those difficulties are way too infrequent. It's the whites that frustrate, the three Pierids plus the odd female Orange Tip that won't settle and angles her flight so that you can't see the green. Hence Peter Hardy's article is invaluable, especially for transect walkers, who can't go off piste for five minutes every time a Pierid crosses their path. And, even if you do go after it, you know that it won't settle, but will find a stream to cross or fly up a steep incline. They know what they are doing! It's not random behaviour! So Peter's article offers real help.

Roger Cope's articles are always valuable. His photos are stunning and the knowledge he shares of where to go to see particular species is extremely useful. My most memorable experience watching butterflies in the UK came from Roger's tip-off about Little Scrubbs Meadow in Lincolnshire where I came across around 5000 Marsh Fritillaries, with my first ever Broad-bordered Bee Hawk Moths as a bonus. Anybody who takes a brilliant photo of a High Brown Fritillary at 6 am on Arnside Knott has got to be worth reading.

David Tolliday's visit to the Isle of Wight illustrates the best way to see Glanville Fritillaries. There are, or at least there were introduced colonies near Western Super Mare and at Farnham in Surrey. I visited the Farnham colony a few years ago and you only had to hop over a fence, which was a lot easier that getting a ferry, but my eventual trip to the Isle of Wight was much more rewarding, and I don't know whether the Farnham colony still exists. Anyway, David's article gives you a perfect set of recommendations if you do plan the trip, and it is reliable. It would be awful to go all that way and not see a Glanville Fritillary, but that's not going to happen if you go at the right time and the weather is better than awful.

The rest of the newsletter is mostly bits and pieces that are of specific interest to me. I hope the interest is shared by some of you. Certainly photographing butterflies and moths is a blossoming pastime and the tools of the trade are getting better and more accessible, so I hope there isn't too much overkill in this issue. I also hope that we will have more field trips to report on next Autumn.

Butterfly records

Peter Hardy (see page 4) now takes records for the whole of VC59 (South Lancashire) and VC60 (West Lancashire). This includes the parts of "greater Manchester" north of the Mersey, and also the parts of Warrington and Halton north of that river.

Records for "greater Manchester" south of the Mersey (this includes Sale, Altrincham, Dunham, Wythenshawe and Stockport south of the river) are in VC58 and should be sent to Rupert Adams - who indeed has been dealing with those that come via "iRecord" for some time.

So, in brief, north of the Mersey, records to Peter Hardy; south of the river, records to Rupert Adams.

Moth records for 2022

If you have recorded moth sightings this year, don't forget to submit them to the recorder. Visit https://www.facebook.com/groups/387661328320172/files for instructions and to download the spreadsheet - Records_Input_Template_v2021_2.xlsx

Events Reports

Members' Day and AGM

On 19th June the Lion Salt Works Museum Northwich welcomed back the branch to a members' day meeting in person following two years of Covid enforced isolation.

With 31 members in attendance presentations began with an introduction to Butterfly Conservation's 2026 Strategy followed by a discussion on the current and planned activities of the branch and how these dove-tail with the core strategy. Key projects such as that led by the Cheshire Wildlife Trust around the River Dee and Macclesfield Wild led by Macclesfield Wild Network Trust were explored in more detail.

Dave Maddy, moths officer, gave a presentation on the moths of Cheshire with a focus on recent records and some useful hints on how to separate similar species. He demonstrated just how easy it can be to attribute the wrong name; Brown Line Bright Eye and Bright-line Brown-eye being just one example.

Our presentation on the reintroduction of Chequered Skipper to England took us back to Covid experiences as Susannah O'Riordan, the project lead, was unable to join us in person and instead she'd sent the presentation via a video link. We learnt just how much work and scientific evaluation goes into an authorised release of this nature, and in an update on the initiative we heard that 2022 had seen the first public access to the site, where visitors could witness Chequered Skipper once again flying free in England.

The AGM was conducted swiftly with the presentation and acceptance of the accounts along with the unopposed re-appointment of existing committee members.

Rupert Adams, standing in for the Chair (Malcolm Plant) who was unable to attend, thanked both Alan Chadwick and John Dover for their valuable contributions to work of the Branch Committee and in the case of Alan his tireless work co-ordinating the Wider Countryside Square Surveys that are allocated to the Branch by Butterfly Conservation HQ.

Rupert reminded those present that the Branch Committee is always happy to welcome new members and we can never have too many volunteers helping with survey work.

Closing the formal part of the day, Rupert thanked those attending and led members to nearby Ashton's Flash in search of butterflies and moths on this Site of Special Biological Interest.

Unfortunately, the weather was against us and even though pheromone lures were deployed no Six-belted Clearwing, our prime target, were seen and only a few Meadow Brown and Ringlet were encountered along with a handful of Six-spot Burnet larvae.

Field Trip to Coombs Dale and Longstone Edge

On July 10th twenty Members met at the sports ground car park in Stoney Middleton (Derbyshire) for a walk down Coombs Dale, followed after lunch, by a drive in convoy to Longstone Edge, where we explored the local butterflies.

The weather was almost perfect - sunny and warm, with perhaps a bit too much wind for the photographers, but in light of the conventional gift of Sod's Law to field trip weather, no one complained.

We walked about a mile down Coombs Dale to an area of grass and wildflowers, where most of the butterflies are found. During the walk down there we spotted a few Ringlets and Speckled Woods, but in the more open area (around SK220742)

we soon found the main target species - Brown Argus (left) and Dark Green Fritillary (below). As usual the Dark Green Fritillaries were active, rapid in flight and did not settle for long, so the photographers had to be patient and quick on the job. Brown Argus was more cooperative and we had plenty of opportunities to become familiar with their 'jizz'; in flight they always look greyish, presumably from a combination of the blue-grey hairs on the dorsal wing surfaces and the greyish tint to the underwings.

This area is the best part of Coombs Dale for butterflies. Early in the season (mid-May) it has a good colony of Dingy Skippers plus a few Green Hairstreaks and later on, at the time of our field trip, there are Ringlets, Meadow Browns, Small Heath and, a little later, Gatekeepers, plus the usual whites, Brimstone, occasional Small Coppers and the expected 'Vanessids'. It is also a good area for wildflowers and visitors need to take care not to trample them, especially when concentrating of butterfly photography. There are small numbers of Bee Orchids and other orchid hybrids. One of our members, Terry Instone mailed me to state that he couldn't attend the field trip, but asked us to take care because this area contains one of the few Derbyshire colonies of the Dark-red Helleborine (*Epipactis atrorubens*). One of the members on the trip found this beautiful plant and pointed it out to the rest of us (picture left).

We returned to the car park for lunch and then moved off in convoy to Longstone Edge, a south facing limestone escarpment just north of the village of Great Longstone. We parked at SK199729 and walked west, scanning the grassy areas below the escarpment and its rocky base as far as SK196729. This stretch is home to all the resident

butterfly and moth species. It is an excellent site and merits visits at three different times of the season. Mid to late May has Dingy Skipper, Green Hairstreak and Wall Brown. At the end of May there are also two day-flying moths that are characteristic of the Derbyshire Dales - Wood Tiger and Cistus Forester (above - left and right respectively). Sadly, neither of these was still in flight at the time of our field trip - I had hoped we might find one or two, but we were out of luck. At the time of our visit, Dark Green Fritillary and Brown Argus were present in good numbers and there were more Common Blues than we found in Coombs Dale. Longstone Edge is one of the best spots in west Derbyshire for Wall Brown and their numbers are generally higher in early August, because the second brood tends to amplify the population. Wall Brown can be seen anywhere along the escarpment, but after many visits I reckon that the best strategy is to climb over the gate at SK196729, walk a few yards west to join the track up the hill and climb up to the base of the escarpment, then go further west to a rocky downfall at SK195728. In August this is a favourite spot for Wall Browns; I have never failed to find it there. Though bear in mind - if you think that Dark Green Fritillaries are reluctant photo models, wait 'til you try Wall Browns. They have an unfailing knack of perching beautifully on a rocky spot that is seriously awkward to get to.

So, this was a good field trip. The weather was excellent, we saw most of what we wanted to see and my thanks to the members attending for their enthusiasm and support.

Note - all photographs were taken either in Coombs Dale or at Longstone Edge (though not on this trip, except for the Helleborine) and are copyright of David Tomlinson).

Conservation training in action

Committee members Dave Costello and Rupert Adams raised awareness of butterfly conservation issues at a Biffa training day at their Bromborough Depot and the nearby closed landfill site on the Wirral in late July 2022.

30 plus Biffa employees from across the UK attended the session where they learnt how to identify the species that they would most likely encounter on their sites. In addition Rupert explained how brownfield sites could be managed for the benefit of butterflies and moths and importantly he encouraged attendees to report their sightings through iRecord.

Following lunch at a local cafe run by the Autism Society the group visited the nearby closed landfill site, Port Sunlight River Park which is open to the public as a green corridor alongside the River Mersey. Dominated by expansive areas of grassland Dave soon found both Gatekeeper and Meadow Brown in what were seriously unfavourable weather conditions, much to the admiration of the "students."

Biffa certainly demonstrated their commitment to creating habitats suitable for all wildlife and butterflies and moths in particular with this session just one of a series being delivered nationally.

A very serious request

Please take another look at Page 4. You will see that in the list of duties carried out by the Branch Committee, two important roles are VACANT. This means that necessary (some would say *essential*) tasks must be covered by other committee members. None of these jobs are onerous. In fact most aspects are enjoyable and all are rewarding. We (the Committee) needs help. Please consider approaching one of us to discuss taking on one of these jobs. You don't need to be a butterfly expert. You just need to be interested and enthusiastic and you do need to use email. We can teach you the rest. Please.....

Can you take decent photos of butterflies & moths with your phone?

As a dedicated user of a digital SLR camera I was surprised to discover that the short answer is *Yes*, though the longer answer is *Yes, but....* It requires a bit more care and preparation than selfies, landscapes, etc. So, some details....

First, you do need a decent phone camera. Obvious, but it needs to be stated. The fundamental requirement is a good sensor in the phone cam. If your phone takes good pictures of 'ordinary' scenes and subjects, then you have the basics. Most iPhones are good enough and the higher end Android phones are also fine, indeed the best Androids are as good as it gets. The top phones, such as the iPhone 13, even have a dedicated macro mode, which allows you to get in close without blurring the image. Without a built-in macro mode, the best bet is to buy a clip-on macro lens. Several manufacturers sell these and you can find guidance by spending half an hour via Google. For example, *Apexel* make a 100mm clip-on macro lens under £40 and they claim that their lens fits most phone cams. Just make certain that you choose one that works with yours. Also check that the focal length is long enough for insect photography - some add-on macro lenses require you to hold the phone ridiculously close to the subject, which will inevitably have departed by the time you can take the photo. The short wavelength lenses are OK for flowers and sleeping moths, but useless for butterflies or other active winged insects.

The difficult bit is the behaviour of your subject, just as it is with the best cameras. Butterflies move and, if you get in too close, departure is inevitable, unless the butterfly is roosting, in which case you have plenty of time. Starting a new project demands some encouragement from early successes, so I would begin with moths (if you have access to a moth trap), most of which are quite dopey in the morning. Alternatively, go looking for roosting butterflies; Common Blues are a good target. If you know a site where they are present, you will find them roosting at the top of grass stems in the early evening (see front cover of this newsletter). The other advantage of this is that early evening light can be wonderful for photography. The quality of the light is vital and illumination is frequently at the wrong angle, so a reflector is useful. You can buy a cheap reflector that folds into a pocket-size bag or you can cut a 20cm square of cooking foil, crunch it up, flatten it out and stick it to a piece of card. It works and costs nothing, but is less portable. If you get to the point where you can take decent photos of stationary insects, or practice with flowers, then you can take on the mobile versions.

You need to consider quality control...how easily satisfied are you? If your picture looks good on your phone, then that might be all you need and you can send it to a friend who will also look at it on the phone and be delighted. That's fine - your choice, your judgement. But if you want to upload it, to Instagram, for example, or to make a print, or to enter it into a photo competition, then you need to go a bit further. At least magnify it on your phone to make sure all the areas are sharp. I am

regularly disappointed when I do that on the back-screen of my camera. It looked great until I blew it up and found the blurred bits. Ideally you should upload it to a computer or a tablet and view it enlarged and if you are going to do that, you could consider working on the image. Your computer or tablet will probably have basic software for cropping or resizing images. If you want to go a bit further, then you can download free software, such as GIMP (see the next article), which will enable adjusting brightness, contrast, colour balance and other components. Such adjustments are limited on JPGs from phone cams, but there is some scope. If you load images to Instagram you can make some adjustments on the website.

One final point is to explore what photographers call *burst mode*; this involves setting your camera to take a burst of images like a machine gun as long as you keep your finger on the 'trigger'. I would always do this because when I do, I find some images that are unsatisfactory with much better shots milliseconds later in the same burst. What were the different determining factors? No idea - just happens. So, if your phone has a burst mode, use it. And, lastly, learn to hold it as steady as possible.

So, give it a try and, if at first...well you know the proverb. It's no different to using a dedicated camera...practice, practice, practice. Learn from the rubbish, then delete most of it, but keep some to show yourself how good you have become. Have fun, good luck and enter our Photo Competition.

Image processing

I have been using Photoshop for 27 years. I started using it before digital cameras were readily available because we bought a specialised astronomy camera to take images down our microscope at my university lab. We then bought Photoshop version 1 to process the images and insert them into our papers. Adobe, who produced Photoshop, used to sell it as a one-time purchase; they even gave an educational discount for teachers and students. But all that changed a few years back: you now have to rent it, paying over £10 a month for the privilege. I had bought a version (CS6) for my own use as a one-time purchase and I kept it going for a few years until the next upgrade of my computer operating system made my version unusable. That happened a week ago. I had planned for it, reviewing all the alternative programs. It didn't take long to see that AffinityPhoto by the Serif company was the best option. So, with a nostalgic little tear, I uninstalled Photoshop and installed the one month free trial of AffinityPhoto and - guess what - I wish I'd done it years ago. It has been as straightforward a conversion as possible and I have now paid just under £50 for unfettered use. No regrets. I put this out for any of you in a similar position, but for others, probably the majority, whose needs are more modest there are many other packages, some free of charge, that you can use to manage, manipulate and enhance your pictures.

So, following on from the previous article, it is now pretty straightforward to download your images to a computer - even mobile phone images - and process

them as extensively or as minimally as you like. I have had several queries from members interested in entering our photo competition asking how they can render their images to meet the entry requirements. Here's how....

The essential components of a package, program or app - call it what you will - are to open the image, crop it, resize it, adjust colours, lighten or darken or alter contrast, to just list the basics. The degree of sophistication is your choice, but I think that it is fair to suggest that you will never take a picture that could not be improved by image processing to some degree. The possibilities also depend on the quality of your image. A low-resolution image from a basic phone camera offers little scope. You can crop it and, maybe, lighten it a bit, but it might be best just left on the camera. If you step up lust a little bit, to decent quality phones, or further to a compact camera, any DSLR or the latest mirror-less reflex camera, you will find a much greater range of feasible and worthwhile improvements that can be made with the right package. If you are starting from scratch, the general strategy that I recommend is to learn a bit about digital images (there is a good Wikipedia page), review the options and decide what you want to do, then pick the cheapest or even free option that seems to fit the bill and give it a try. Indeed, if you really are at the beginning, then it makes perfect sense to try one of the free apps.

The only free app that I have used is GIMP and it really is very good indeed. It runs on both Windows PCs and Macs and even Linux, but I don't think there is a version for tablets. It is open source, completely free to use without time limits or adverts. It will allow you to process any image in the JPG format, but if you want to work with RAW images, you need a plug-in. There are two, also free, but they insert an extra step into the process. However if you know enough about RAW files to want to use them, then you are probably far enough down the road to try out GIMP, but rapidly move on to something more sophisticated. If you are working with JPGs, then GIMP will do virtually anything you might need. Take a look at the website (https://www.gimp.org) to find out more and/or to download it and give it a try.

The other free options are said to do a similar job, though some of them incorporate macros to make the various jobs quicker or easier. I have no first-hand experience, but Canva, Fotor, Ashampoo and Photo Pos Pro all have decent reviews on the web.

What is the next stage and why might you need more? If you like - why did I buy AffinityPhoto (AP) rather than using GIMP for free? The major reasons are that AP enables me to construct and save my own macros which do several jobs with 'one click'. This helps with routine processing of large batches of images. AP enables focus-stacking, which is essential for me for moth photos, and it does it more smoothly than Photoshop. All the operations that I regularly used to use in Photoshop are similarly activated in AP, so it was a quick and safe jump from one to the other. It might be of interest to add that you can use AP on an iPad, though I would never want to and I don't know whether the tablet version would fly or limp by comparison with my Mac.

Anyway, I hope this brief background spurs enthusiasm, but like most things (except maybe parachuting) it's best to just give it a go to find out.

A Butterfly Recorder's Greatest Challenge

by Peter B. Hardy

The greatest challenge? It's surely THESE - trying to identify them correctly.

What do we call them? – "Large White, Small White, Green-veined White" or something shorter? To me, they are *brassicae, rapae* and *napi*. Sandars (1939) wrote "It is my belief that even the youngest collector does not shrink from scientific names". I am not a "collector", but I think the same, and let's face it, "*napi*" is rather less of a mouthful than "Green-veined White". These names are abbreviated in my recording notebooks to "B, R and N". Strictly, I am out of order here, as specific names should never be written with a capital initial, but "b, r and n" don't look so clear in the notebook. One very experienced lepidopterist whom I have known for many years uses the abbreviations "Pbra, Prap and Pnap", or simply "Pb, Pr and Pn". I quite like the Bradley & Fletcher numbers, 1549, 1550 and 1551; but when Agassiz, Beavan & Heckford tell us to change these to "58.006", "58.007" and "58.008", then, sorry, I'm not playing. In this article, I think I shall continue with my "B, R and N".

They are the most wonderful of butterflies. After all, Eitschberger (1983) wrote a 1126-page two-volume book (in German) just on N and its allies ... but R is just so amazing – its incredible tolerance of the most man-modified of biotopes – the way it can be seen searching out the tiniest little crucifer plants on which to attempt to

breed (and probably succeed) – plants so apparently insignificant that we simply wouldn't have noticed them if we hadn't had our attention drawn to them by a white butterfly fluttering around them. N can be quite tolerant of parts of cities as well, as long as there is some green – females especially in late summer are often seen searching mown grass in city parks for possible host-plants. Sandars (1939) described N as "a rural species, rarely in gardens and unusually on cultivated ground" but this doesn't always apply.

Once in the 1990s, a new recorder (a bird-watcher starting to take an interest in butterflies as a sideline) wrote to me when submitting his first records that he had not included any "Whites" because he felt sure that they were found everywhere. In reply, I gently impressed upon him the need to record ALL species – it is clearly impossible to state whether a species is or is not "found everywhere" if there are no records for it. Then some years later a former work colleague remarked that she hadn't seen many butterflies of late, and when I suggested that the "Whites" seemed to be doing quite well her reply was "Oh I don't count the Whites!" What a frightfully unfortunate attitude!

The three *Pieris* species were the basis of a paper by R.L.H. Dennis in 2007 ("Support for mending the matrix: resource seeking by butterflies in apparent non- resource zones"), which aimed to show the advantages of "a holistic landscape approach [which] provides the basis for conserving and enhancing the wider countryside, including open spaces in towns such as parks and gardens, for the majority of organisms that have different resource outlets" – I collected the data, by recording what every Pierid butterfly I saw during July, August and September 2005 was doing, and Roger Dennis did the statistical analysis and wrote the paper.

They are the most apparent of butterflies, shining white, like angels of purity, "psyche", the first butterflies I ever knew (and loved) as a child – but WHAT a challenge to the recorder! They are visible from a good way off, but as for IDENTIFYING them...

If they are settled, it's easy – but they are surely the most fidgetingly active of all butterflies. Where butterflies in other families take short flights and settle, these Pierids just fly and fly and fly. As the day becomes hotter, they become more and more restless. Sometimes one will come close and slowly enough so that we can see that it is bright white on the upper side and plain yellow on the underside and we feel certain enough to note down an "R" – but how often does one ever come so close and slow that we can see that it HAS some darker markings on the underside so that we can mark down an "N"? – in my experience, not very often, and sometimes what I thought was a certain R has eventually landed and turned into an N.

Watching one – probably one that we have disturbed – flying and flying: so often it dips towards the vegetation and we think "it's going to settle" – but does it? In most cases, oh dear no – up it goes again. Occasionally, yes, one WILL settle, on a flower,

and we glide in as stealthily as we are able, and are just focusing our eyes on the hindwing underside to clinch the identification, when – after just a momentary sip of the nectar, UP goes the butterfly again and the whole process re-starts ...

Perhaps N is very slightly less furiously active than R but there isn't a lot of difference – and as for the way B, if we ever come across one, hurtles itself about and up high into and over the trees ...

Perhaps there are those who CAN see the markings on the underside of a *napi* in flight; after all, S.G. Castle Russell (1866 – 1955) used to reckon that he could see the black dot on the upperside forewing of a male Orange-tip in flight – but I am not one of them.

What IS the solution?

S. Garland said to me, in 1996: "I never record Whites in flight". J.E. Holmes, doing a survey of butterflies at the Trafford Park "ecology park" in 1994, adopted a policy of recording the "most likely" species if unsure: result: 25 B, 138 R, no N. Some recorders, including B.T. Shaw, have advocated a proportional allocation: thus, if we see, say, fifteen small Pierids at a site and can identify three of them as R and two as N but are uncertain about the remaining ten, then record the fifteen butterflies as nine R and six N; in theory this sounds quite good but how often do we see enough butterflies in any given 100 m grid square to make it feasible to do this? – in my experience, not very.

Another expert once advised me that one should never guess at the species if unsure, but should note it down as "R/N": the snag here is that there is no facility on Mapmate, Levana or any other recording programme of which I am aware, to enter such a record.

A person in Hampshire, whom I used to know and with whom I sometimes travelled abroad, many years ago, made out that he could nearly always identify them in flight because, I think he said, R had a "more direct flight" and looked brighter, but if unsure, he would "either pursue the insect until it settled, which they invariably do in the end" – really? – "or else did not record it at all".

If we are in some dry and not very semi-natural-looking habitat, such as a suburban street, and see a small Pierid flying past, which comes quite close and looks bright white and the underside hind-wings look plain, but we are not 100% sure, do we record it as R? Conversely, if we are in a fairly damp rural location, close to woodland or scrub, and see something which doesn't look quite as bright white and seems a bit slower in flight, but doesn't settle or come all that close, do we record it as N? In each of these cases, there is a slight possibility that we might be wrong, in which case we will have over-recorded one species and under-recorded the other. If however we adopt a policy of never recording them unless they settle and we are 100% sure, then we are definitely under-recording both species.

Perhaps if we see one butterfly and manage to identify it for certain as one species, and then in the same locality see another, which looks the same but doesn't settle and we are not certain, is it reasonable to record it as the same species as the first one? Is it then reasonable to record the next individual seen close by as also the same species, and so on until we come to one which we definitely identify as the other species?

Remember also that in the Spring we have to contend with a FOURTH white Pierid – the female Orange-tip, *Anthocharis cardamines*; my recording abbreviation for it is "Cs" (I use "C" on its own for the Painted Lady). How often do we think, seeing a "White" flying not all that fast or strongly, looking a bit grey perhaps and maybe even with some darker marking visible in flight, oh that's an N, perhaps even write "N" down in our notebook, and then the animal settles and mutates into a female Cs? As we always seem to see at least ten male "Orange-tips" before we find one female "Wood Lady" (far better name for that sex) we then start wondering just how many of the Ns (and perhaps Rs) which we have already written down were misidentifications – and so often N and Cs co-occur in the same biotope to confuse matters further!

I will now come to a matter which seems to me worthy of serious attention. In the data for Greater Manchester from the 2020 "big butterfly count" were the following figures for the three *Pieris* species: B, 2157 (42%); R, 2605 (51%); N, 343 (7%). My own records for 2020 were: B, 71 (6%); R, 823 (64%); N, 388 (30%). Records from all other recorders that year were: B, 321 (12%); R, 1618 (60%); N, 755 (28%).

"N" and "R" taking nectar from Buddleia

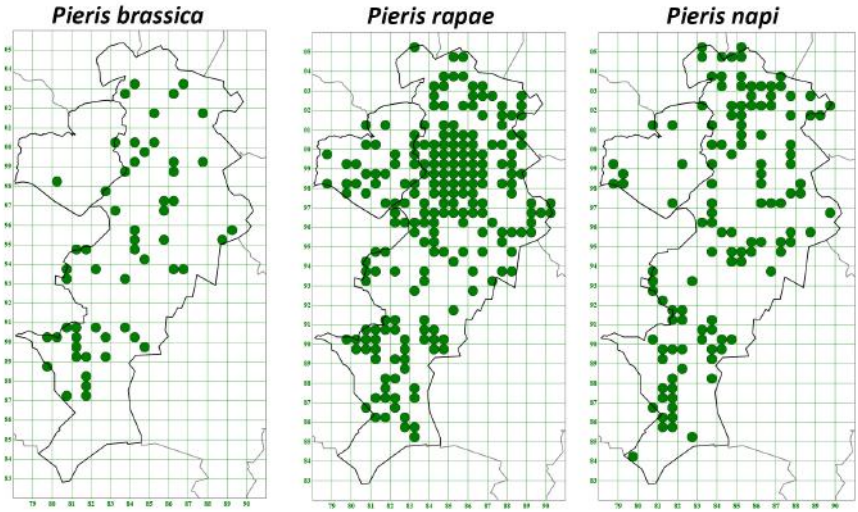
Something is not right here. Some (many?) contributors to the "big butterfly" clearly can't identify Pierids. The "all other recorders" and my own aren't too dissimilar in the percentages, but the "BB" is way out. I had only one answer to this: I scrapped all the "BB" records – of these and all other species as well. B has become almost a rarity, and N should certainly be higher than 7%.

Some reasons for B's scarcity were suggested in a paper dealing primarily with Nymphalid butterflies but also including an analysis of the relative abundance of the three *Pieris* species, which found greater success in those species that laid eggs singly than those which laid in a batch (Dennis & Hardy, 2018).

Clearly, as well as the eternal difficulty over R and N, there is also confusion between B and R. In theory, B should stand out from R and N by its size, but that isn't as simple as it sounds; they vary in size and several times I have wondered whether something was a "small Large White" or a "large Small White". I have long been aware that a B/R problem exists, but from these "big butterfly" records it is clear that the problem is far greater than I had thought. A lot more care needs to be taken especially with records from beginners.

I think the only real advice I can give is: Try your best to get the identification right, and try not to have to say "I saw a hundred butterflies today but can't record any of them because I don't know which of two (or three) species they were".

If this article has earned the wonderful Pierids just a little more respect and share of attention, it will have been worth writing.



MY OWN RECORDS FOR B,R & N IN THE CITIES OF MANCHESTER AND SALFORD IN THE FIVE YEAR PERIOD 2017 TO 2021

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Adventures in 2022

by Roger Cope

These last few years I have taken the odd day off work to embark on day trips to see and photograph butterflies of interest, which is a great distraction from routine and everyday aches and pains. This is an account of adventures in 2022. For information, photographs have been taken in natural light, on a tripod or handheld, or with flash, depending on lighting conditions.

April – Grizzled Skipper

LLanymynnech Rocks is an old quarry on the Welsh border which supports a population of Grizzled Skippers. These butterflies are amongst the earliest to emerge. A wander up from the car park past some climbers into the second large quarry revealed some sizeable clumps of wild Strawberry, and where you find the foodplant … yes indeed, there was a tiny Grizzled Skipper on a nearby stem, still roosting. As the sun came round it opened its wings and revealed that perfect checkerboard pattern, this one more dark brown than black. A great start to the season and very uplifting.

May – Chequered Skipper

Now that the secret location of the re-introduced colony had been revealed, it would have been rude not to have a stab at spotting a Chequered Skipper in Fineshade Wood, Northants. My contact there, Doug Goddard, had warned that it was a mite early and the colony was still pretty small, but I ventured forth anyway. Alas, he was correct and I drew a blank, but as someone said, "if it was an easy challenge we wouldn't be doing it would we?". This is the only UK butterfly I have not seen yet so the final moment will be savoured, maybe next year. I did see a

Lackey Moth caterpillar in its football jersey though, and a magnificent, humungous Hornet which took off like an A380.

Early June – Swallowtail

Swallowtails had so far eluded me, apart from witnessing a few fly-bys at Hickling Broad when I was a kid. On the train during a business trip to Ipswich, since my meeting was not until the next day, it occurred to me I could just carry on the Norwich and take the local train to Brundell, which is a short walk away from Strumpshaw Fen. Pleased with my sneaky plan, at 4pm I found myself walking towards the Doctor's House, a well-known nectaring station for Swallowtails courtesy of the resident upholding a long tradition of planting Sweet Williams and Dame's Violets in the garden, which borders the path around Strumpshaw Fen. There were none to be seen, but a circuit of the fen revealed some lovely

Norfolk Hawker and Scarce Chaser dragonflies, masses of Small Tortoiseshells and some fellow eccentric lepidopterists which I teamed up with. Soon we heard rumours that Swallowtails had graced us with their presence at the Doctor's House, and presently we witnessed a couple of these fine creatures flapping to support their heavy bodies in order to feed on the flowers. Good photos were not possible, but I did manage a snap or two and it was great to re-acquaint myself with them after so many years. The striped caterpillars are evident on Milk Parsley in the fen later in the year.

Mid June – White Admiral

Ever since seeing a White Admiral depicted on some cigarette cards when I was a youngster, I have been fascinated by this member of the Glider family of butterflies, and even more so when I learned of its incredible life-cycle. The eggs are laid on wisps of straggly honeysuckle in the deepest parts of the woods. These develop into caterpillars

that make a sleeping bag out of a curled up leaf to hibernate over the Winter, emerging to feed again in April after weathering the fierce frosts, snow and rain storms of the dark months without eating a morsel.

Ryton Wood in Warwickshire is an excellent place to see all stages. I decided to go in mid-June to perhaps find a pupa and maybe a few early emergers, since the fine weather was advancing the development of many species. After a long and disheartening search getting cut to ribbons by the woodland brambles, the fortunes of the day suddenly turned dramatically, as sometimes happens during butterfly hunting, when I found a pupa and then something equally special. The pupa was dazzlingly beautiful, in silver-gilt, green and brown, evolved to resemble a dried-up honeysuckle leaf bedecked with dew, with the characteristic "Mr Punch" profile. Shortly afterwards, walking back in the evening gloom, wasn't that a newly-hatched roosting White Admiral quietly resting on a honeysuckle twig? Flash photography would do little justice though to the incredible russet tones of the underside, so I raced back to the car to set up the tripod, just in time to take a 3 sec exposure before all light failed.

Late June – Large Blues

The pride and joy of my book collection as a teenager was South's British Butterflies, a definitive work with a massive £10 price tag. In it was a fascinating description of the life-cycle in an ants' nest of the Large Blue, then on the edge of extinction. Sadly, extinction happened, and with it a chance to see one evaporated. Fifty years later, I knew I now had the chance to see the thriving re-introduced colony at Daneway Banks in Gloucestershire. A 4am start and two closed motorways forced a satnav-guided route through Holmes Chapel and Wolverhampton, but eventually I got there around 7am on a lovely sunny day, a bit warm for my liking but I wasn't complaining. Some immaculate male and female Marbled Whites were already evident at this beautiful hillside site, some roosting dew-

laden and others trying to warm up as the first rays hit them. These alone made the trip worthwhile, upper and undersides showing the most incredibly perfect black scrawled lines on a contrasting white background and startling chess-board patterns.

But I was after a bigger prize which I knew would eventually make an appearance. And yes, there was a medium-sized dark

blue butterfly flying around that could only be one thing. Large Blue! As it settled, I was able to study the dash-dot patterns on the underside. Several females were also laying on the wild Thyme, but the day was too hot for insects to bask so upperside views were unlikely. But hold on … as the day clouded over a bit, Craig from Kidderminster was already beckoning me across to highlight a lovely female basking in a lush corner of the field covered in ant hills, maybe newly-emerged? Then his mate Dave spotted a male doing the same 10 yards away! After a few snaps it was generally agreed that today was one of the best days people could recall for seeing Large Blues. A lucky one for me and some very special moments with these two beautiful species, sweetened further by generous, like-minded colleagues, happy to share discoveries.

July – High Brown Fritillary

Just before the very hot spell, I arranged a trip to Arnside Knott to search for High Brown Fritillaries. These endangered butterflies are in serious trouble around the Morecambe Bay area, where they were once so plentiful, especially since rescue conservation work in the area (but not in SW England, thankfully) appears to have failed, possibly offset by climate change leading to loss of synchronisation between larva and foodplant emergence.

I arrived at 6am as usual and had a wander around the foot of the Knott, near Copridding Wood. After a few minutes, I had to rub my eyes in disbelief when I noticed a perfect High Brown sitting on bracken next to the path. Something that will probably never happen again in my lifetime! Later, several were seen flitting around at great speed, so I made a mental note to check this area next year. In mid-August, females can be observed laying

eggs on violets or on bracken nearby, right on the ground.

Early August – Brown Hairstreak

Captive-bred Brown Hairstreak have been released by an individual for several years now around the Gait Barrow area, and these have become established on the Blackthorn next to the limestone pavement. This year was no exception, emergences being especially early due to the hot weather. The female butterflies look like Gatekeepers in flight, though perhaps slightly wobblier. This one was resting on a bramble in the early morning,

thankfully torpid and available for study. In the afternoon, the females will crawl around on Blackthorn to lay eggs only on the suckers, which leaf early and do not flower, thus providing the early nourishment needed for the hatching larvae in Spring.

Mid-August – Wall Brown

Wall Browns (aka Wall butterflies if you are under 35 years old) used to be abundant on our disused railway embankment in Staffordshire, often seen basking on the hot limestone chippings that have since been bulldozed off the make way for a cycle path where the masses can now imagine the wildlife that used to exist there. Sadly, similar losses of habitat have forced this declining species largely onto rocky coastal areas such as the Great Orme at Llandudno. Fortunately, however, Great Longstone Edge in the Peak district offers the warm slopes that the butterfly needs, and it was to here I ventured in search of a second brood.

Wall Browns are a twitchy insect blessed with excellent eyesight, so I switched my camera flash off in readiness as they react instantly to the exposure-scoping pre-flash in my entry-level DSLR. Initial investigations drew a blank, but on the way back to the car park I explored a dangerous rocky area where there was some activity. Of course, this was a meeting point for Wall Browns, marginally accessible without a rope and a good belay. I noticed though a large boulder near the cliff was a favourite perching spot, and the chilly wind enabled some decent photos as the butterflies queued to warm up. It was great to catch up with these sun-loving creatures - old friends that reminded me of happy days

butterfly-hunting on the old railway embankment at Gnosall.

Late August - Bonus Holiday Encounter

Whilst staying at beautiful Cala Blanca near Cuitadella in Minorca, during our evening walk I spotted a perky little Geranium Bronze resting on a Hibiscus leaf. These African migrants are regarded as a potential serious pest to commercial Pelargonium growers in Europe and occasionally make their way to the UK. This provided a fitting end to my butterfly adventures this year!

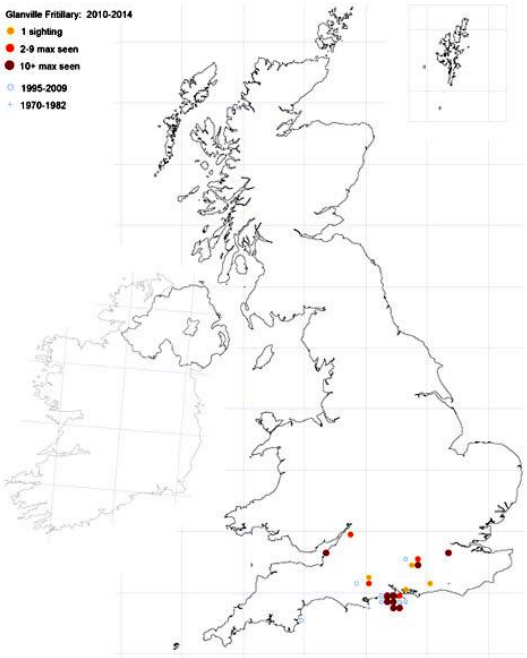
I hope you have enjoyed reading about my travels and please feel free to ask any questions. I source my information about emergence times from searching the species on Twitter, which is now an invaluable aid.

In search of Glanville Fritillaries

by David Tolliday

Back in 2019 I saw a photograph of a British butterfly that I thought was amazing. The butterfly was a Glanville Fritillary. That photograph started a three-year quest to see and photograph one.

First came the research, where do I have to go to see a Glanville Fritillary and what time of year do I have to go? Both of these questions were easily answered by a visit to the Butterfly Conservation website and a search for Glanville Fritillary. This species is virtually restricted to coastal landslips on the southern half of the Isle of Wight and the Channel Islands along with a few coastal locations on the mainland. Although there has been some loss of habitat due to coastal protection measures the status of the butterfly has changed little in recent decades. However, only a few core breeding areas remains in the country, and it remains a vulnerable species. The distribution map shows the limited number of locations where this butterfly has been seen in recent years.



The location was sorted, it had to be the Isle of Wight. So, what about dates? Again, the Butterfly Conservation website gave the answer.

The last week in May or the first week in June. As I wanted to see the butterflies in their best condition shortly after emergence the last week in May was the preferred date.

There are a few options for ferries to the Isle of Wight, but Wightlink Ferries give up to 20% discount to Butterfly Conservation members, so another easy decision.

What about accommodation, where would the best place to stay be? Another visit to the Butterfly Conservation website and the pages of the Hampshire and Isle of Wight branch where there is a page specifically about Glanville Fritillaries. The best locations appeared to be on the west of the island in the Compton Bay area or on the east of the island around Ventnor. We decided to split the accommodation three nights in the west at Freshwater and two nights in the east at Sandown.

Everything was planned ready for a May 2020 trip but then Covid hit, and the trip was cancelled. The next option was May 2021 but again Covid put an end to this plan.

Finally, 2022 arrived and it looked like the trip would be on. The ferries and accommodation were booked, and we finally arrived. Just a word of caution about ferry prices, up to four-night stays on the Isle of Wight are classed as a short break with ferry prices being cheaper than five nights or more which are classed as long breaks.

At the start of the trip the weather was reasonably bright but there was a strong, cold, westerly wind which resulted in all the butterflies hiding at the recommended sites on the west of the island. As an alternative we decided on a trip to Ventnor in the east which has its own microclimate. Recommendations were to park at the far end of the seafront car park and walk along the esplanade where the chalk cliffs are managed for the Glanville Fritillaries.

On warm sunny days with little wind the males are said to be very obvious as they patrol in search of females who spend long periods resting in the grass. Mating usually occurs around midday. The female lays batches of eggs on the underside of

leaves of Ribwort Plantain. She selects small, young plants growing in abundance in open, sunny ground as such conditions provide the warmest microclimate. At the base of the cliffs there is a good supply of the food plant Red Valerian. Despite the fact there was still a fairly strong chilly breeze the first Glanville Fritillaries were seen and photographed within a few minutes of leaving the car.

At the weekend we joined a walk near Compton Bay organised by the local Butterfly Conservation Group; what a friendly and knowledgeable group of people they were. The meeting place was in a small old chalk quarry now used as a car park.

This car park is reputed to be one of the best sites on the Island for butterflies. Within an area of about 10m by 10m, just in front of where I parked the car, I photographed four species that were new to my photographic collection. These were Grizzled Skipper, Adonis Blue, Small Blue and Brown Argus. Other species at this location included more Glanville Fritillaries and Dingy Skippers.


Grizzled Skipper


Adonis Blue


Small Blue


Brown Argus

A very helpful book is '*Hampshire and Isle of Wight Butterfly Walks*' by Kevin Freeborn and Ashley Whitlock, it only costs £6. It includes recommended locations for the 46 species to be found in the area and when to see them. The Isle of Wight Butterflies and Moths Facebook page is another useful resource.

Research

It's in their DNA

I get a bit fed up hearing TV celebs and sports people tell us that a particular attribute is "in their DNA", because it isn't. Their DNA contains no direct coding for loving Shakespeare, making others laugh or dribbling a football. There may be genetically determined attributes way upstream of these skills, but mostly the celebs are referring to learned behaviour. This misuse of language is a bit annoying because of the magnificent feats of bioscientists over the past few years in unravelling exactly what *is* in DNA and how it determines the characteristics of biological organisms.

I spent about 45 years in biological research in universities in Nottingham, then London, then Manchester. I was not involved in any of these magnificent feats, but my research made progressively more and more use of the results of their discoveries and it was a privilege to watch and benefit from these developments as they became available.

You will know that DNA is a long double helix, it forms the components of our genes and contains the coding that governs the proteins that are made in our cells. It replicates itself during cell division and transfers its coding to progeny during reproduction. The structure of DNA was elucidated by Watson & Crick, but it was Frederick Sanger in Cambridge who evolved practical methods for determining the sequential structure of DNA which incorporates the unique characteristics of individual organisms. Sanger was awarded the Nobel Prize twice and his method of Sanger Sequencing of DNA became the 'gold standard' for unravelling DNA coding sequences. Its most recent important application was the determination of the sequence data for the Covid-19 spike protein, which then enabled development of the vaccines against it.

OK, but why am I writing about this in a butterfly newsletter? Because I am trying to lay the foundation for a discussion of phylogenomics. My experience was concerned with determining sequences of DNA and RNA that predispose diabetic patients to develop complications of the disease. Looking for particular bits of DNA coding is now straightforward, if you have the right equipment; the methods evolved from Sanger Sequencing. But other investigators have been interested in the entire genome and not just of single individuals; they wanted to know about relatives and ancestors. To take that approach via Sanger Sequencing is laborious beyond belief and prohibitively expensive. Genomics requires parallel and comparative sequencing of DNA from several to lots of individuals, so we are considering truly massive data sets. The first analysis on six RNA samples that we did in my lab (in 2006) produced an Excel spreadsheet containing about 7600 pages. That was shock to my system. In modern

genomics terms, it is peanuts. The management and analysis of these masses of comparative data is, of course, made feasible by modern computers. The software is elegant and you can do it all on a decent lap-top.

The other problem with 'old style' DNA sequencing is that it produces errors and, in a one-time run you cannot possibly know that an error has occurred. If you are repeat-sequencing a particular DNA locus, the errors will iron out and be detected. If you are comparing genomes (i.e.the entire DNA sequence) from different individuals you can't discriminate between errors and genuine differences. That is a real problem if the objective is to determine whether two different species come from a common ancestor, or indeed whether two groups of individuals represent two sub-species or two different species. The point to underline is that genomic analysis must be either error-proof (probably impossible) or have reliable error detection.

We need to define some terms - I know that scientists seem to hide behind exclusive terminology, but sometimes the proper words help to explain new concepts; you are going to meet these words sometime anyway. The *genotype* is the genetic code of an individual or a species which is 'written' in its DNA - the blueprint diagram, if you like. The *phenotype* is the expression of the genotype - the factory result of manufacture from the blueprint, to follow the analogy. It comprises all anatomical features and the components of functional mechanisms, such as enzymes. Proteins are the basis of the phenotype - they form the basic anatomical structure and mechanisms of function and they are synthesised according to the DNA blueprint, the genotype. So *phylogenomics* is the science of defining the classification of species via the DNA coding of genomes.

So generations of Orange Tips look more or less identical because their genotypes are transferred during reproduction. But wait a minute….only male Orange Tips have orange tips, so how can all Orange Tip genotypes be identical? This is sexual dimorphism and it is common, though far from universal in butterflies and moths. The DNA of the genome is divided into chromosomes: a chromosome is a long strand of DNA which is festooned with protein molecules. These proteins shepherd, protect and repair the DNA if it is damaged. Chromosomes are grouped in pairs and humans have 46 chromosomes (23 pairs). The number in butterflies and moths varies enormously - from 7 to 190, but the chromosomes differ in size, so the size of the overall genome is not so variable. Some of our mammalian chromosomes are labelled X or Y on the basis of their pairing during reproduction and sex-linkage. In butterflies and moths the sex-linked chromosomes are labelled Z and W - I don't know why. Males carry only Z chromosomes (ZZ pairs), whilst females have ZW pairs, hence it is the behaviour of the female chromosomes during reproduction that determines the sex of the offspring and sex-linked female anatomical characteristics are carried by the W chromosomes. This is one reason (there are others) why phylogenomic tracing concentrates on female genomes, especially in insects.

The other point to consider with butterflies is that genotype does not always determine phenotype absolutely. Consider the Map Butterfly *(Araschnia levana)*, which has first and second broods with completely different appearance (phenotype); so different that they look like different species. The larval mutation into the adult form inside the pupa is influenced by different temperatures in spring (first brood) and mid-summer

(second brood). Hence the expression of the genotype can be modified by external factors. It is also subject to internal modification by hormones - remember that the caterpillar and the adult of a given species both come from the same genotype and it is hard to imagine two phenotypes as different as those.

It is fortunate that the development of phylogenomics is proceeding rapidly, because a large percentage of the species inhabiting our world will become extinct before their DNA can be comparatively coded. It is a race against time and this is especially true for butterflies and moths, because they are particularly sensitive to habitat and climate degradation. They are also clear marker species and have been well studied for many years. Many small and elusive insects will disappear without ever being identified - we will never know that they existed - but most of the world's butterflies have already been identified and recorded, so they will be missed, leaving gaps in our understanding of the tree of life.

Phylogenomics is one of the *Cinderellas* of bioscience. Quite rightly medical applications take precedence in the competition for research funds and phylogenomic research isn't cheap. But there have been a couple of advantages for insects in general and Lepidoptera in particular. The Fruit Fly *(Drosophila melanogaster)* has been an extensively studied lab model for many years. It is very easy to breed - remember the great Groucho Marx quotation, '*Time flies like the wind, fruit flies like bananas*'. The generations turn over rapidly, so it doesn't take long to get experimental results. Hence, its genome was one of the earliest to be sequenced and that taught us a lot about insect genomes. It also has some very clear phenotypic characteristics that signal key experimental modifications of the genome. For obvious reasons we have also learned a lot about the genomes of several species of mosquitoes. The good fortune for lepidopterists came from the fact that silkworms are important in China and the Chinese have developed and funded large-scale genomic studies of *Bombyx mori* and its close relatives, the moth whose cocoon produces silk. The result is that Chinese scientists have given phylogenics of moths and butterflies a massive boost, both in knowledge and understanding and in the methods for study.

So the refinement of comparative DNA sequencing has made it possible for modestly established laboratories to make some advances in the phylogenomics of butterflies and moths. This is developing our understanding of species and how sub-species develop as regional adaptations in isolated populations. The Meadow Brown *(Maniola*

jurtina) is a good example. One of our commonest butterflies, it has four named UK sub-species, identified many decades ago by small regional differences in appearance. In continental Europe there are at least 16 sub-species, again classified by phenotypic differences. Some of these have been sequenced and the relation between phenotype and genotype is being established. At a more parochial level, phenotypic and genotypic analysis of the Brown Argus *(Aricia agestis)* has shown that the populations of this species in the Derbyshire Dales are unique. They are certainly Brown Argus by all rational identifiers, but their genome contains some coding characteristic of Northern Brown Argus *(Aricia artaxerxes)*, implying that some time after the last ice-age there was hybridisation between the two species. But we cannot be absolutely certain of that until full genomic analysis of both species has been completed, because it is also possible that all the sub-species developed independently from a common ancestor. Unfortunately it is unlikely that the money, time and expertise will be available to do a full genomic analysis, but we have to accept that society rightly prioritises research projects on a cost/benefit basis.

Linnaeus and the other early classifiers did a fantastic job with honest observation as their only resource. Clearly we have adopted the use of genomics in the classification of species, but I hope that we don't become slaved to it in the ways that some birders have. The obsession with keeping species lists amongst many birders supports the designation of new species by genomic splitting of sub-species to create new species. This enables them to increase their lists without leaving home. In fact one of the 'big listers' is increasing their list year-by-year even though they died some years ago. Let's not get like that, please.

Editor's note: The photographs of Araschnia levana are copyright of Tamás Nestor and are taken from the Butterfly Conservation website at https://butterfly-conservation.org/butterflies/map

Light pollution and the decline of moth populations

This has become a widely studied research question, particularly with groups in the UK, Germany and the Netherlands. There is no overwhelming reason, other than a general need to explain declines in wildlife, but a major stimulus for moths has been the progressive switch of street-lighting to LEDs that are cheaper to run than the older types of lighting. The fact that the replacement LEDs tend to be dimmer does not mitigate their disruptive effects - it's the wavelength that matters. It has long been known that moths are attracted to shorter wavelengths of light and it is the UV emission of mercury-vapour bulbs that made them the favourite light source in moth traps. This has been confirmed by controlled experiments. For example a recent multinational study examined the responses of 95 moth species to lamps with peak emissions from 355 nm (UV) through blue (450 nm), green (520 nm) to red (640 nm). The experiments also looked at mixed radiation lamps of the types used in street-lighting and employed sophisticated statistical analysis of the data. The findings confirmed the bias towards the short wavelengths in attracting moths and supported the notion that mixed radiation commercial lamps giving the longest wavelength emissions should be

preferred for street lighting (Brehm et al., 2021).

Demonstrating that pollution from street lighting actually does harm moth populations is never easy, but many studies point in this direction. Of course, it's not just about street lighting. The striking satellite images that we see of densely populated countries like ours show cities and towns lit like beacons, so it is impossible to perform any meaningful studies in these areas. Without the ability to perform controlled experiments we cannot separate out other factors from light disturbance as contributors to moth decline. The areas where we want our streets and buildings well lit tend also to be areas where natural habitats are under threat or have been banished. We are also trying to address this question at a time when much of the damage has already been done. The alarm caused by the 2017 study by Hallman et al., which reported a 75+% decrease in the biomass of flying insects over the previous 27 years has spurred research on all fronts and in many countries. There are many who believe that it is too late to learn anything properly and certainly too late to do anything about it. Besides, have recent studies been forced to concentrate on species that are actually resilient to damage, because the ones that are susceptible have disappeared or declined to a minority?

What are the essential components of an acceptable study design? The first, most important and most neglected, in the studies reported to date is the duration of the study. Almost all the published papers compare one season with the next and that tells us nothing about real impact on populations. It takes only 5 or 6 years of running a garden moth trap to realise that there are fluctuations in numbers in both directions from year to year, even with Large Yellow Underwings. It follows that studies must extend for longer periods to conclude that real effects on populations have occurred. I have been able to find only one study that has done that by Van Grunsven et al. (2020) and that used experimental light sources, rather than reporting on effects of lighting in the 'human environment'. Although this might be seen as a cop-out, I believe that it is probably the only practical way to reach some genuine conclusions. Experimental illumination which genuinely mimics street lighting can probably tell us what we need to know if its effects are tested in a study of sufficient duration.

Others have suggested the possibility of comparing populations of species that are attracted to light with those that are not - some moth species do not come to light traps. This approach brings in other problems - how are the two types sampled? One assumes that the light-attracted species would be sampled by numbers in light traps, but what about the others? The efficiency of the two methods would need to be compared and discrepancies corrected.

For a scientist like me, raised with the luxury of tight laboratory control, these problems are scary and I would not know how to tackle them. It is like pushing treacle uphill with a pointed stick (a modified proverb from an original that is too vulgar to cite). So let's finish with a bit of optimism. In Switzerland Altermatt and Ebert (2016) have found evidence that at least one species of moth has evolved to ignore street lights. Their evidence is not perfect, but let's hope there's some truth in it and other species evolve similarly.

References (all are available on the internet)

Altermatt, F. & Ebert, D. (2016) Biology Letters doi.org/10.1098/rsbl.2016.0111
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