



WGCG

Conserving Warwickshire's Geological Heritage



**“Don't put your foot in it, this time!”
A Chirotherium footprint on the Isle of Arran**

[Read the article on Page 5](#)

Photo credit: Deborah Parke

Newsletter
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Warwickshire Geological Conservation Group

Hidden wonders in the landscape of Warwickshire

On the web:

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Editor: Brian Ellis Designer: Norman Dutton

Meanwhile....

.... despite all the restrictions on our lives, it is surprising how many ways we have found to keep involved, geologically. The *Zoom* lecture on Arran stimulated Deborah Parke and Paul Abernethy to arrange to join a field trip at the Lochranza Centre on Arran, only to find that Peter Hawksworth had had the same idea and was already there. There is an account of the geology they explored on their visit on page 5.

There was a happy conjunction between a *Zoom* lecture and one of our social media accounts. On his Twitter feed, Jon Radley mentioned the upcoming lecture on Plate Tectonics. This provoked a response from a lady in Kenilworth. You can read about the outcome of that on page 14.

Out of the blue in late October, Natural England sought to include local geological societies in a long-overdue monitoring of geological Sites of Special Scientific Interest (SSSI). We were contracted to survey sites within Warwickshire. Not good timing with changing COVID-19 restrictions and a deadline of the end of January, let alone problems of establishing site ownership from documents that dated back to the early 1990s. There is an interim report on page 18.

In September 2020 WGCG gave a Holloway Bursary award of £2000 to Joe Botting & Lucy Muir, who are independent geology researchers working and living in the Welsh Borders. They rewarded us in part by Zooming a lecture in January 2021 but have also written another piece for this Newsletter on page 11.

Some members managed to find time to fit in some monitoring of our LGS and Phil Henser has updated the information on page 25. He also looks forward to possible activities for 2021.

Following up from his very successful workshop on geological maps, Norman Dutton has a guide to accessing electronic versions of BGS maps: 'Geology of Your Street'. page 22

And lastly looking back, in the Autumn 2020 Newsletter, Larry Wooding told us in the feature 'Geology at Home' about digging a hole for a pond in his garden. He has since sent us some photographs of the wildlife the pond is attracting.

*The local
wagtail soon
found the pool.*



*A young
moorhen
consumed all the
snails and then
moved on.*



Looking forward, the Education Committee has now produced a programme for 2021 which, of course, becomes more provisional from May onward, Page 4. Updates will be posted on the WGCG website and by email as they become available.

Meanwhile comments (likes and dislikes) on the Newsletter and offers of pieces to include in it are welcomed by the Editor and Designer.

News of Future Activities

Mike Allen

The Education Committee continues to put together a programme for members (and visitors), taking account of the uncertain times.

On a positive front we can confirm that **Zoom lectures** will continue until April, with an intention to extend these monthly as necessary or desirable in the absence of anything else.

February 17 th	<i>Prof. Ian Fairchild</i>	<i>The Anthropocene</i>
March 17 th	<i>Stuart Blake</i>	<i>Iceland (photos – right)</i>
April 21 st	<i>Dr. Noel Worley</i>	<i>Henry Clifton Sorby - Sheffield's Greatest Scientist</i>



Possible additional Zooms:

May 19 th	<i>Angus Miller</i>	<i>Closure of the Iapetus Ocean</i>
June 16 th	<i>Tom Sharp</i>	<i>Mary Anning</i>

These talks may be reversed and are subject to confirmations.

Additional talks from the Leicester Lit. and Phil. Society

February 25 th	<i>Nick Shaw</i>	<i>A new opportunity for future geothermal energy in Yorkshire</i>
March 10 th	<i>Stuart Blake</i>	<i>An Introduction to the Geology of Iceland</i>

We would hope that a normal “in-house” lecture programme can be resumed in September.

Field activities will be revived once conditions allow, and basically, we are hoping to resume with the programme we had lined up for 2020. This will include any or all of the following:

- Nottingham Caves
- Wren's Nest (with BCGS)
- Blockley Quarry (if allowed)
- Apedale Heritage Museum / Biddulph Grange

Residential trips currently on hold, but with leaders still available to take them forward:

- North Lincolnshire
- Mendips (?August 20-22)

The **Saturday Workshop** Event is now deferred until February 2022.

Updates will be circulated via emails and on the WGCG website.

Arran Field Trip September 2020

Deborah Parke, Paul Abernethy, Peter Hawksworth

Following the talk given at an online meeting of the WGCG by Stuart Blake of the Lochranza Field Studies Centre on Arran, Paul and I were interested to note that there were opportunities available to visit Arran and see its geology for ourselves. Little did we know that, over in Ettington (the next village along the Fosse Way from ours), Peter was planning the very same trip. On arrival at the Field Centre, we were given a tour of the facilities and shown to our rooms, where there was time to freshen up before meeting the other members of the group for dinner. This is where we three, and the other four members of our group, met. The field activities during the week took us to all parts of the island, with the exception of the central igneous complex. It was a very full week, so only some highlights of the visit are mentioned here. In order to experience the geology of Arran fully, it is really necessary to visit the island - and the Lochranza Field Centre is the ideal base from which to explore.

On day 1 we met outside the classroom for an introductory talk by Stuart on the geological features and rock types we would be seeing during the week. Stuart explained that the Isle of Arran sits astride the Highland Boundary Fault, so it is possible to see both the 'highland' and the 'lowland' geology of Scotland in this one small area. We were also introduced to Hannah, one of the geologists working at the Centre, who assisted during the trip. Ffion, another geologist, joined us later in the week.

The introductory talk was followed by a full day at Fairy Dell, in the north of Arran (only a short walk from the Centre), looking at Carboniferous rocks and Permian sandstones, interspersed with dykes. On the way back to the Field Centre, we stopped at Hutton's unconformity. This caused a certain amount of confusion because, whilst some of us were familiar with Hutton's unconformity at Siccar Point near Edinburgh, most were unaware of Hutton's unconformity on Arran. Whilst there, Stuart demonstrated the use of the compass clinometer to determine directions and angles of dip. The unconformity displays Carboniferous sandstone dipping to the North at 30°, whilst the Dalradian slates and phyllites dip to the South (inland) at 45°.

Hutton's unconformity on Arran

Photo credit: Paul Abernethy



On the walk back, there were opportunities to take photos of the beautiful stags in the surrounding fields. During September, the stags are in the rut and can be heard calling through the night and early morning in the surrounding hills.

After a post-breakfast briefing on day 2, we drove towards the west of the island. Parking in Tor Righ Beag car park, we set out on the forest path towards Kings Cave. The walk is through a wooded area for a couple of miles, opening out into a dramatic view of Drumadoon sill. Before approaching the sill, we visited King's Cave. King's Cave is the largest of a group of sea caves on a raised beach. The caves were hollowed out by wave action when sea level was higher during early Post-Glacial times than it is now (*McDonald, 2015*).

The entrance to King's Cave

Photo credit: Deborah Parke



Careful examination of the outer wall of the cave shows what appear to be sedimentary wave-related structures, demonstrating that sea-level had been very much higher in the past. The authors' field is not sedimentary geology, but a tentative identification would appear to show planar stratification at the base of the sequence, with cross stratification directly above (see below). Unfortunately, the sequence was too high on the wall to place an object 'for scale' but estimate that the entire sequence from top to base was 20-30cm.

Sedimentary bedding outside King's Cave

Photo credit: Deborah Parke



After a short lunch break, we made our way towards Drumadoon sill, a 30-metre-high feature with a sea stack. The base of the sill is composed of a sheet of tholeiite, which thins from around 1.2 metres to approximately 0.8 metres at the south end of the sill (*McDonald, 2015*). The main body of the structure is composed of columnar-jointed quartz-feldspar porphyry (*McKerrow and Atkins, 1989*).

Drumadoon sill

Photo credit: Paul Abernethy



Day 3 saw us travelling to the Corrie foreshore, where there are numerous beautiful examples of finely bedded sandstone structures and, interestingly, a fulgurite. This, we were told, is a fossilised lightning strike formed when lightning strikes sand, melting the silica and fusing it together as it cools.

Fulgurite on Corrie foreshore

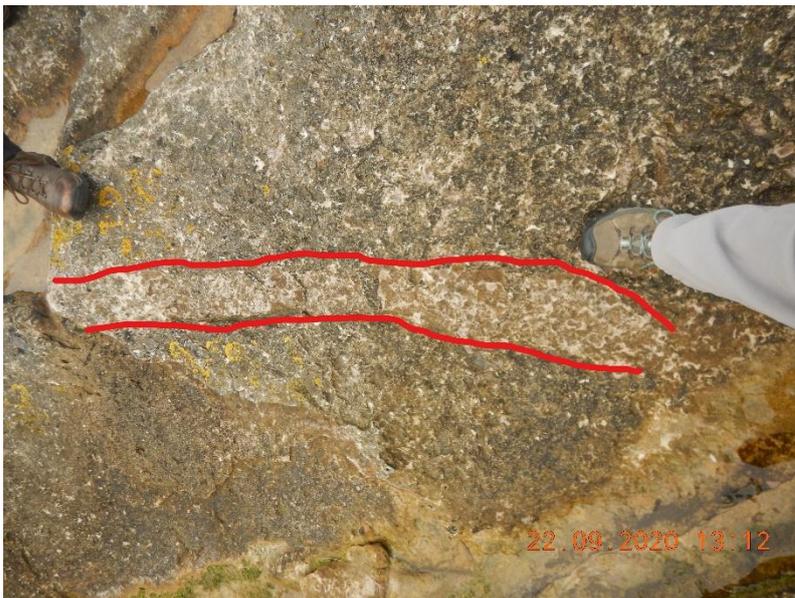
Photo credit: Deborah Parke



This was not all that Corrie had to offer as, later in the day, we were able to see a giant myriapod trail made by *Arthropleura*. This has been filmed by Sir David Attenborough for the 'Life on Earth' series, so may be familiar to some of you.

Arthropleura trail, with trail highlighted

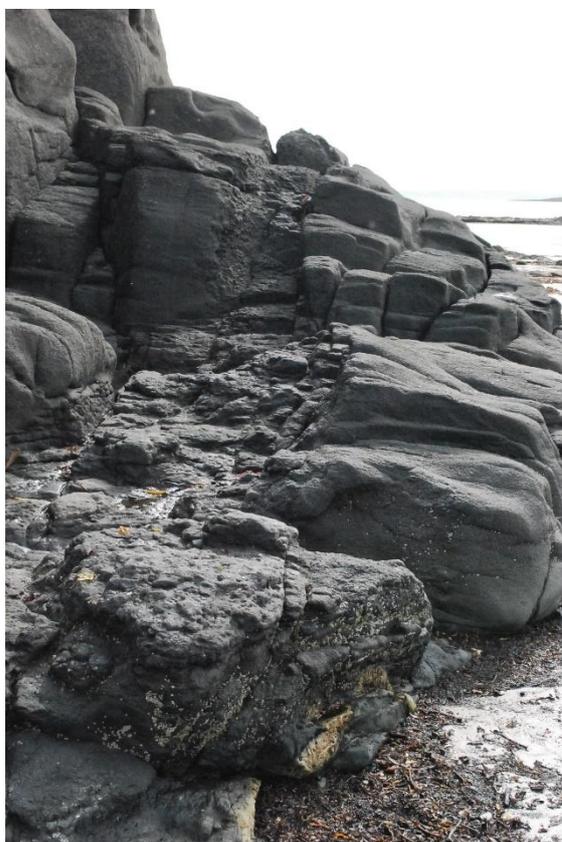
Photo credit: Deborah Parke



On day 4 we visited Kildonan on the southern coast of Arran. Kildonan is the site of one of the best examples of a dyke swarm to be seen. The dykes are composed of black basalt and were formed as the continents of Europe and North America were pulled apart (about 60 Ma ago). Magma, rising to the surface through cracks in the Earth, cooled and solidified in situ. The dykes are intruded into sandstone and there is some thermal metamorphism in the sandstones immediately surrounding the dykes, caused by heat from the rising magma.

Dyke on Kildonan beach

Photo credit: Paul Abernethy



Moving along Kildonan beach to a rocky platform of Triassic sandstone layers, we were joined by an impromptu new member of the group; not necessarily interested in the geology, Sid wanted us to play ball with him.

Sid the Collie on Triassic sandstone

Photo credit: Deborah Parke



Once Sid had left with his owners (who WERE interested in the geology), we discovered the large footprint left by a giant reptile related to early crocodiles, *Chirotherium*. (photo on cover) The name of the reptile translates to 'hand-beast' since the tracks resemble giant human handprints. There was some discussion about whether other similar structures nearby were further footprints - no firm conclusions were reached.

Is this another one?

Photo credit: Deborah Parke



The final full day saw the group heading to a fairly complicated area of cross-cut dykes and conglomerates for an investigation into a small area of local geology. Unfortunately, we were all so focussed on trying to work out what had gone on in the area that none of us took any photos of it. We don't want to reveal the outcome of our investigation, since it seems that, when we can travel again, this might be an ideal field trip for WGCG members and an opportunity to work it out for themselves.

Although the journey to Arran is a long one, it is well worth the trip. We were well looked after at the Lochranza Field Studies Centre, with excellent geology tuition, good food and comfortable accommodation. Not to mention, for those partial to whisky, the Lochranza Distillery a few minutes' walk along the road from the Field Studies Centre. Additionally, I (Deborah) would like to thank Stuart Blake for providing extra information for this article.

References:

McKerrow, W.S., and Atkins, F.B., 2000 (2nd Edition), Isle of Arran, Geologists' Association Guide.

McDonald, J.G., 2015, 'Isle of Arran: Lochranza, North Newton and Cock of Arran', Geological Society of Glasgow Excursion Itinerary.

McDonald, J.G., 2015, 'Isle of Arran: Drumadoon and the Tormore Dykes', Geological Society of Glasgow Excursion Itinerary.

www.Arrangeopark.co.uk

Designer's comments

I was in Lochranza, on an A level geology field trip in April 1964 with 25 others. The poorly written field notebook still survives, including the results of two days of geological mapping, because it had to be handed in to the examinations board - although not marked! I did not need it to remember some of the stunning geology described above and names such as the Drumadoon Sill and have never been forgotten. We stayed at Lochranza Youth Hostel for two days according to the itinerary sheet that has also survived. How things have changed! We had to hand our Y.H.A. cards to the warden which were to be confiscated if 'the member's behaviour is below the standard required'. We were not allowed to bring portable radios on the trip. When the warden at Lochranza told us that our duties included making a bed, we were surprised to be given pliers and spanners for a period of spring-stretching. A life interested in geology is a life of opportunities. Happy days!

The Castle Bank Biota and Microscopes for Amateur Science

Joe Botting & Lucy Muir

Receiving a £2000 Holloway Bursary was a great boon for a major new research project in central Wales. We are extremely grateful for the support, and would like to introduce the project, and the purpose to which the funds have been directed.

The Castle Bank Biota

In marine sedimentary rocks, fossils are nearly ubiquitous. Most of them, however, represent only a tiny fraction of the living community: the hard, resistant components that have a reasonable chance of being fossilised. These can include mineralised shells, bones, and wood, but only a small proportion of those 'fossilizable' components ever make it into the fossil record. We can accumulate and analyse these remains, and have done for centuries, but they're a bit of a blunt instrument: they give us a very murky view of a few of the major patterns in life's history.

Palaeontology depends in many ways on the exceptions: the rare places where conditions were able to turn delicate and even soft-bodied animals into fossils. These sites are called Konservat-Lagerstätten and are rightly celebrated; they include such iconic deposits as the Sölnhofen Plattenkalk (Germany) and the Burgess Shale (Canada). The extraordinary Burgess Shale is one of a suite of similar deposits in Cambrian rocks worldwide (the 'Burgess Shale-type faunas') that preserve exquisite detail of soft-bodied organisms that were buried in marine mudstones and siltstones. Some, like China's Chengjiang Biota, are even richer than the Burgess itself. However, the environmental peculiarities that opened this window were apparently restricted only to the Cambrian and Early Ordovician periods; they have given us an unprecedented understanding of marine communities at this time, but this view does not extend into younger rocks. There are Konservat-Lagerstätten later in the Ordovician, including some in Wales, but they are all relatively limited; they represent odd environments or limited communities, with only some soft tissues.

The discovery of a new Burgess Shale type fauna in Powys promises to be a revelation. Discovered during lockdown, only three miles from our home, it has already yielded truly remarkable preservation of an extremely diverse range of organisms. The preservation is exquisite, showing even microscopic cilia on millimetre-long tentacles of tiny filter-feeders, and the gut of soft-bodied worms. Although still in the very early stages of exploration, it is clear that the Castle Bank assemblage is the closest Ordovician equivalent we have to the best Cambrian faunas, in both diversity and preservation. No papers have yet been published, so there are limits to what we can write here... but there is already a rich fauna, including diverse sponges, several phyla of worms, a wide range of soft-bodied arthropods, and even the minute, fantastically delicate zooids of graptolites. Despite that, we've barely started.

The assemblage includes surviving Cambrian taxa from the Burgess Shale-type faunas, and much more modern, derived organisms that are more familiar from the modern world. It is difficult to predict the

advances that will come from this fauna, but it is the most important discovery in Ordovician palaeontology since the Fezouata Biota was revealed in 2010 (we were lucky enough to be involved in that one as well).

A selection of some of the unusual fossils from Castle Bank. Scale bars 1 mm.



the sponge *Teganiella* sp. nov.



a priapulid worm with central gut preserved



a new species of early starfish



a minute crustacean



a problematic, soft-bodied filter-feeding organism

The photomicroscopy suite

One of the most remarkable features of the Castle Bank Biota is the small size of many of the creatures it contains, and their exquisitely fine detail. To illustrate material like this at the level required for publication requires advanced photomicroscopy equipment, as is found in university palaeontology departments. However, we work largely as amateurs (being professional palaeontologists only when in China, usually for three months per year), with very ordinary levels of income. In short, we just can't afford what we need.

This year, therefore, together with the Castle Bank site's owner, we launched a crowdfunding campaign to purchase a research-grade photomicroscope system. <https://gofund.me/1a9df7a7>. The response has been truly extraordinary, and we've been overwhelmed by the generosity of around 200 donors, reaching a total of around £15000—including the Holloway Bursary. The campaign hasn't reached the initial target (a top-of-the-range Leica M205 with all the trimmings), but in some ways this has forced us into a better solution: an S8APO with a superb camera, combined with an M125 C with *camera lucida* (drawing tube). These microscopes (and especially the M125) need multiple components to optimise their functionality, such as objectives, light sources (including a cross-polarising ring light), and eyepieces to increase magnification.

In contrast to hobby microscopes, these instruments eliminate chromatic aberration and spherical aberration in order to generate sharp, undistorted images. The polarising ring light allows us to cancel reflections and highlight areas that reflect light in the same polarisation—an extremely powerful tool. The *camera lucida* allows us to draw accurate representations of fossils using all the lighting combinations available, condensing and simplifying all the available information into one image. The equipment is probably the best that we've ever had everyday access to.

It's not just for us, though. Part of the rationale of the campaign was to make these tools available to anyone who needs them, but particularly for amateur scientists across Wales and the Midlands. We have an electronic engineer next door, for example, and a mineralogist in the next town, neither of whom can afford this type of equipment. This opens a new world of possibility for many amateur scientists—ourselves included. We hope it will help in the renaissance of amateur science in the region and look forward to helping others to make the most of their discoveries!

Elements of the photomicroscopy suite.

Joe attaching the HiChrome camera and computer system to the Leica S8APO



the fully operational Leica M125 C with *camera lucida*.

Alfred Wegener and the Kenilworth Connection

Ian Fenwick

Some surprising coincidences have emerged from the valiant efforts of our publicity team to raise interest in the Group, its initiatives and activities, and the Earth Sciences in general. One avenue we use is the Twitter feed (@WGCG_UK) presided over by Jon Radley. Way back before the Covid-19 crisis, in September 2019, Jon was tweeting about plate tectonics which generated a response from a lady in Kenilworth quite unknown to our local members. The gist of the reply was

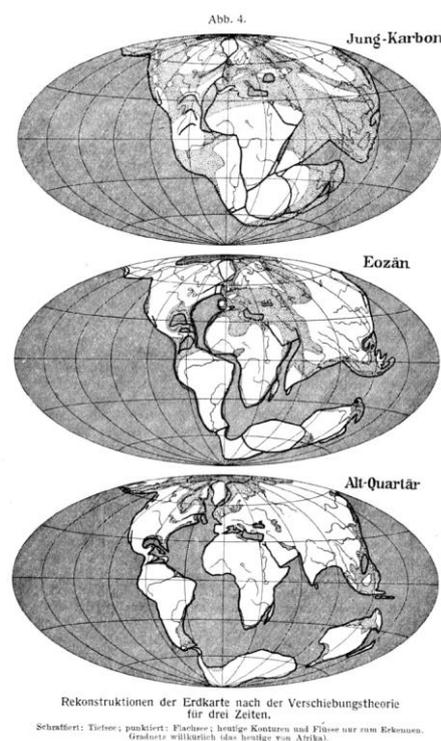
Interesting that you are having a meeting on plate tectonics I believe that one of my relations was involved with plate tectonics in the 1920s, but I can't remember his surname! Jon thought 'Hmm, plate tectonics, 1920s – not very likely'. Then she said *He was German*. German, 1920s – so Jon had a guess and said, 'His name wasn't Wegener [he of Continental Drift fame], was it?' *That's right*, she said, *Alfred Wegener*.

Jon just happens to have a copy of Wegener's 1915 book, in which he advanced the hypothesis that the continents had drifted apart, so he sent the lady an image of the title page which seems to have excited her considerably. She was quite unaware of Wegener's pivotal role in the development of ideas which led eventually to the formulation of the plate tectonic theory in the 1960s.

Wegener's proposition was just that, an idea. In 1915 he was unable to provide (a) any proof that the continents had actually moved apart or (b) ideas or evidence on what might have driven such tectonic movements. Arthur Holmes, Professor of Geology at Durham and Edinburgh, had been fascinated by Wegener's hypothesis and in the 1940s suggested that convection flows in the Mantle could be the drivers (now apparently discounted, or much elaborated on).

It transpired that the lady in question runs the Tree House Bookshop in Kenilworth and had seen Jon's tweets through the shop's own Twitter: @TreeHouseBkshop. Jon mentioned this remarkable coincidence during our recent (October 2020) Zoom talk by Marco Maffione (University of Birmingham) on plate tectonic theory and its history, in which Alfred Wegener featured majorly. So, Ann and Ian Fenwick, armed with Ann's copy of the 1944 edition of Arthur Holmes' book *Principles of Geology*, called in to see her. This book summarises Wegener's ideas, and reproduces his original maps showing how he envisaged the world to have looked in the Late Carboniferous, the Eocene and the Early Pleistocene.

Reconstruction of the world map according to the 'displacement' theory for three periods.



Victoria Mier, for that is the lady's name, was very excited to see this outline of his ideas. The connection with Alfred Wegener is on her grandmother's side. It was her father who told them that they were related. Her father's family came to the UK in 1929 as followers of Rudolf Steiner and anthroposophy - her grandfather was involved in the movement for biodynamic agriculture. Victoria says that the family name was Mirbt but changed it to Mier as they felt that a more English name would help in the 1930s, as easier to pronounce and presumably to sound less German at a time when there were tensions between the two nations. She is still proud of being part of Alfred's family tree.

This is a remarkable story with a local connection, and a tribute to the power of social media. So, with a little bit of continental drift, it seems that Alfred Wegener and Kenilworth have come into a surprising juxtaposition!

Editor's comments: Alfred Wegener – the back story

Alfred Wegener (1880 - 1930) was a meteorologist and climatologist. Has it ever struck you as odd that a meteorologist came up with one of, if not the, major revolution in geology in the 20th century? Although separate disciplines were well established when Wegener began his academic career in the early 20th century, the academic world was small enough for contacts to be easily made across disciplines.

Two contacts were very significant for Wegener. If you look in your atlas for a map of World Climatic Regions it may well say 'after Koppen', and the map shows the link between plant growth and climatic type (e.g., Humid Tropics). Alfred was a student of Wladimir Koppen (and he married Koppen's daughter)



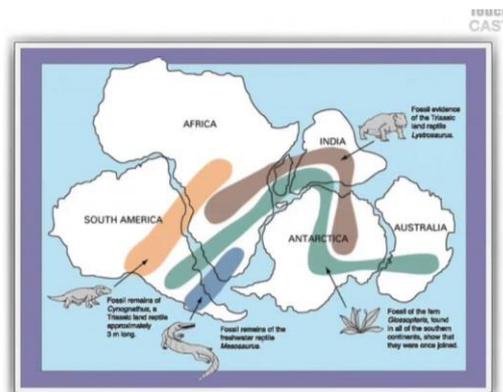
Figure 1. Else, daughter Hilde (age two) and Alfred Wegener (in uniform) at Marburg in 1916, the year after the 1st edition of *The Origin of Continents and Oceans* was published (Schwarzbach 1986).

The other was Milutin Milankovitch. He worked on past climates and on the cyclical nature of changes in the earth's rotation and orbit around the sun (and now best associated with how that affects the rhythm of cold periods and warm periods within Ice Ages).

Two ideas came together: geological evidence of past plant growth could give evidence of past climates, which in turn would give evidence of location – especially latitude (Tropical, Temperate and Polar). Geologists already had evidence of similar patterns of plant (and animal) fossil distributions in South America, South Africa and India, and also similar rock formations.

A cartoon of the recognised similarities across continents.

- Fossils of ancient plants/animals
- Climate change and glaciers
- Rock types-Appalachian and Europe's Mts
- Continents seem to fit together
- Coal fields



Geological connections: most of the terms in the key are phonetic: but –
Faltung = folding;
Grenze = boundary;
Hebungen = uplift;
Becken = basin;
Kreide = Cretaceous
spät (late) and *früh* (early).



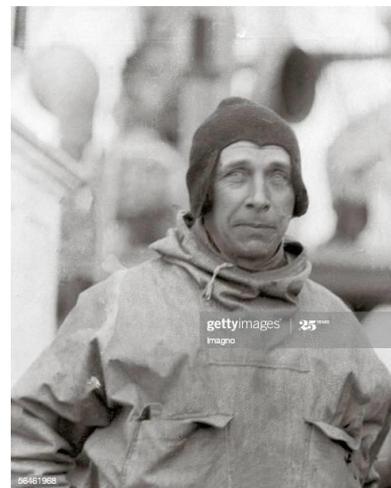
- | | | |
|---------------------|------------------------------------|---------------------------------|
| Kreide u. Eozän | Silur, Devon u. Karbon | Granit |
| Gondwana | spät-eozänisch u. früh-paläozoisch | Grenze d. Mesosaurus |
| Posttriass Hebungen | Gondwaniden u. Kap-Faltung | Andine Faltung |
| | | Brasiliden u. Post-Nama-Faltung |

Suess had already proposed that these areas must have been located close to each other in a supercontinent he called Gondwanaland (now usually called Gondwana). However, geologists could not agree on the explanations of how Gondwanaland came apart. Wegener's insight and imaginative breakthrough was to see that you could explain the breakup by moving the continents (Kontinentalverschiebung - literally continental displacement but translated as Continental Drift). As a meteorologist he had the advantage of not being bound by, the then, competing geological dogmas. It took 40 years, or more, to unravel the mechanisms and establish Plate Tectonics as a core concept in geology.

Alfred Wegener was also an explorer. Starting in 1906 he took part in three expeditions to Greenland and led a fourth in 1930.



Wegener as an explorer



*He researched polar climates, and pioneered measuring wind flow using kites and tethered balloons. He produced a standard textbook on meteorology as well as his better remembered book on *The Origin of Continents and Oceans* (fully revised edition 1922). He died on the fourth expedition while attempting to rescue some stranded and starving colleagues. It is interesting that he is remembered on the Austrian memorial stamp as 'Grünland Forscher' - Greenland Researcher/(Explorer).*

Austrian postage stamp from 1980 - presumably for the 50th anniversary of Wegener's death.



Monitoring Warwickshire's Geology SSSI

Brian Ellis

Towards the end of October 2020, we learnt that Natural England (NE) was about to offer contracts to monitor many of the English geology Sites of Special Science Interest. The approach to take up the opportunity to bid came through the Geology Trust (GT) which is a consortium of local geology groups. Julie Harrald acted as overall coordinator and carried a huge burden to liaise with NE on behalf of County groups across England. WGCG were contracted to monitor five sites in Warwickshire. In return, WGCG will receive a small income from fees and expenses. The downside is that we received a large amount of briefing paperwork and the bad news that the monitoring should be completed by the end of January 2021. NE records were out-of-date and efforts to gain owners details and obtain permissions to access on private land and working quarries in order to prevent casual visits was time consuming. In the end, the deadline proved unrealistic and so this is only an interim report to members. It was an opportunity to put into practice the experience gained through the Conservation Committee in condition monitoring WGCG's Local Geological Sites (LGS). Max Down (CC Chair) looked after the task of liaising with Julie Harrald and Natural England.

This report identifies the **features which qualify the locations for designation as SSSIs**. When the survey is completed, we anticipate that there will be more detailed accounts of the monitoring in the Autumn Newsletter and on the WGCG website.

1 Griff Hill Quarry (Griff No.4) SSSIID 2000082

This quarry is on Gypsy Lane north of Bedworth. It is a site of national importance due to its excellent sections through a 20 - 30-metre-thick sill of Lower Palaeozoic age (Ordovician?), intruded into Middle Cambrian "Stockingford Shales Group". **It is the best exposed sequence of alkaline igneous differentiation in England** (although it may be simply described as a diorite). Differentiation took place as crystals settled, leading to a coarser, ultramafic black rock at the base of the sill, and a finer, less dense, paler rock above. Shale beds at and near the sill contact are thermally metamorphosed.

Griff Hill Quarry: *the main dark face to left and in the distance is the diorite; foreground are the Cambrian rocks.*

Photo credit:
Paul Akers



2 Napton Hill Quarry SSSIID 1002121

Napton on the Hill is an outlier of the major escarpment of the Middle Lias in south-east Warwickshire. The SSSI is an old brick-pit capped by the Marlstone Rock Bed consisting of a ferruginous, sandy, shell-detrital limestone, which is oolitic in patches. The beds below the Marlstone Rock Bed comprise mostly siltstones and silty mudstones with impersistent beds of ferruginous limestone and sandstone. The brick pit has **magnificent suites of Lower and Middle Lias fossils worthy of palaeontological and biostratigraphical study**. However, the Lower Lias is no longer exposed.

Napton Hill Quarry in its working days – the Marlstone Rock is the dark bed at the top of the face.

Photo credit:
Warwickshire County
Council collection



Napton Hill Quarry (January 2021) showing extent of vegetation growth and talus masking the face. The Marlstone Rock can be seen at the top.

Photo credit:
Deborah Parke



3 Cross Hands Quarry SSSSID 1001270

This disused quarry exposes carbonate sediments of Middle Jurassic age (170 million years ago). It has some of the most **extensive and most northerly exposures of the Clypeus Grit** (Upper Inferior Oolite). This comprises approximately 3.5 metres of pale cream to bluff-coloured, fossiliferous limestones with interbedded, less-resistant marl units. Within the Clypeus Grit, bivalve molluscs and brachiopods are particularly abundant. The overlying Hook Norton Limestone represents **the basal units of the 'Great Oolite Group'** and comprises approximately 2.5 metres of fawn, oolitic limestone. The fauna is poorer than in the Clypeus Grit; bivalves predominate, along with fragments of wood (ginko).

The site is of **considerable value in any palaeogeographical and palaeoecological reconstruction for this part of the Middle Jurassic and is a key research and teaching locality.**

Cross Hands quarry: *the two beds described are clearly distinguished.*

Photo credit:
Brian Ellis



4 Wolston Gravel Pit SSSIID 1003027 Grid reference SP411747

The pit, subsequently infilled, exposed the sediments deposited during the penultimate glaciation in the British Isles. They consisted of the sequence Baginton Sands, Thrusington Till and Wolston Clay. The deposits were investigated by the local geologist, Professor Fred Shotton and the SSSI is **the type location for the ice advance he termed the Wolstonian**. The feature of interest in the SSSI is the conserved south face of the quarry. As a conservation measure, because the soft sediments are unstable, the face of the quarry is protected by an earthen ramp which obscures most of the sequence.

Wolston Gravel Pit: *the conserved face is on the right; the landfill, now pasture, is on the left.*

Photo credit:
Larry Wooding)



5 Ryton and Brandon Gravel SSSIID 1002826

This SSSI consists of three units (parcels) which **illustrate different aspects of the relationship between the Wolstonian sediments (described above) and the River Avon terrace deposits.**

(i) Brandon Reach Grid reference SP384762

This is an **'excavation reserve'** of untouched Baginton Sands and Gravel in a bund between two old, infilled sand pits and conserved as a pristine, unexposed example of those sands. It is on land now leased by the Warwickshire Wildlife Trust (WWT).

(ii) Ryton

This is a disused quarry adjacent to the A45, which exposes excellent sections of the Baginton Sands. They contain lenses of organic material, which could allow them to be dated. The sands show **evidence of disturbance (cryoturbation)** as the climate cooled – [presumably culminating in the deposition of the Thrussington Till, but which is not present here].

Ryton Pit: *the red sands show evidence of frost heaving with the hollows infilled with slumped grey gravels.*

Photo credit
Brian Ellis



(iii) Brandon

This is also an abandoned Baginton Sands quarry, adjacent to the entrance to WWT headquarters at Brandon Marsh. **The distinguishing feature is that the sands are overlaid, unconformably, by the upper terraces of the River Avon** (possibly Terrace 4). This marks the erosion, at a much later date, of the upper members of the Wolstonian succession and the deposition by the Avon of terrace deposits. The dating is problematic but is likely to be during and/or just before the Devensian (i.e., the third and ultimate glaciation in the British Isles).

Notes

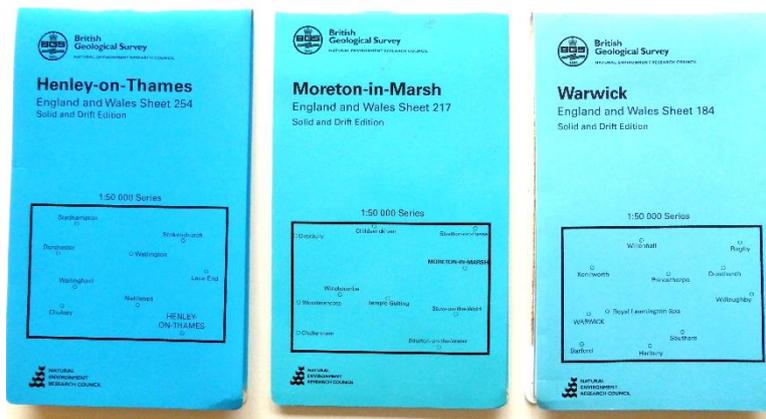
Only two locations are accessible along public footpaths: Wolston Gravel Pit and Brandon Reach. Other locations are privately owned or managed and are not accessible to the public.

Details of SSSIs can be found on <https://designatedsites.naturalengland.org.uk/>

The Geology of Your Street

Norman Dutton

In our last edition of the newsletter, we had six delightful accounts of the geology in and around member's homes. To discover your local geology, it has been traditional to buy a printed 1:63,360/1:50,000 geological map from BGS. They can be available flat or folded in blue covers. Many sheets have an associated memoir, and these can also be purchased from the BGS shop, in person or online. Larger scale maps at 1:10,000 can be bought but are very expensive.



With regard to geological maps, the BGS website now has interactive resources to entertain. From the *Home* page, using the *Discovering Geology* tab and following the path *Maps and resources* and then *Maps*, the web page below can be seen.

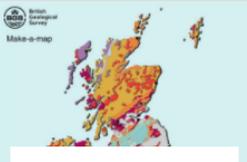
Browse our resources



Geology of Britain viewer

The Geology of Britain viewer is a simple tool, aimed at the general public, which helps you explore the geology where you live.

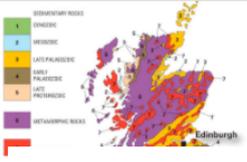
[→ Show more](#)



Make-a-map

Make-a-map is an interactive geological map of the British Isles. It is intended for amateur geologists, students and teachers looking for an overview of the geology of the British Isles.

[→ Show more](#)



Colour-in geology map of the UK and Ireland

Are you puzzled by the Periods or do you have errors by your Eras? Did you know that two or more Periods comprise a geological Era? Two or more Eras form an Eon?

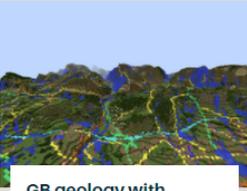
[→ Show more](#)



GeoUK and Ireland map

The UK and Ireland host a wide range of fascinating geology providing 'secret' walks through breathtaking scenery, literary inspiration, idyllic holiday destinations and the building materials for historic monuments.

[→ Show more](#)



GB geology with Minecraft world

Free download of the geology of mainland Great Britain as a Minecraft world. The world shows the Ordnance Survey map data on the surface and the rough position of the real geology beneath.

[→ Show more](#)

The *Make-a-map* resource has a simple U.K. map but also provides images, which can be saved or copied, of timechart information for geological periods, sub-dividing them into epochs, dates and those difficult-to-pronounce ages. There is a *Colour-in geology map of the U.K. and Ireland* to be completed using a colour by numbers system. A *GeoUK and Ireland map* shows local trails, heritage sites, museums and geology groups. It is good to see WGCG well represented here with access to all our printable trails, newsletters etc. by links to our website. What initially looks to be the most useful is the *Geology of Britain Viewer*. This can also be accessed from the *Data* tab and then *Map Viewers*. Unfortunately, when the surface geology is shown, it is often difficult to read the base map information to discover where you are, and then as you zoom in the geology disappears! Personally, I have found the borehole information far more useful on this viewer, as the original records have been scanned. A similar BGS resource is the *GeoIndex (Onshore) map viewer* which allows a wider selection of data to be displayed. This is accessible from the *Data* tag on the *Home* page and can then be selected from the short list of *Map viewers*.

None of these resources are a substitute for the printed geological map of where you live, but there is a BGS resource that provides views of all 1:63,360/1:50,000 maps online. It is called the **Maps Portal** and can be accessed through the *Data* tab on the *Home* page, then *Map viewers* (or just Google “BGS maps portal”). Click *View online* at the bottom of the web page and click the England and Wales link.

Geological Survey of England and Wales 1:63,360/1:50,000 geological map series, New Series

The current 1:63,360/1:50,000 map series for England and Wales. Sheetlines are based on the Ordnance Survey One-inch New Series topographic maps. Sheets 1-360. Sheet 1 starting at the Scottish border and the numbering moving southwards to Cornwall and finally Scilly Isles. In the Northern Counties the early Quarter sheets Sheets 1-73 New Series were the same as Sheets 91 to 110 of the Old Series. These early geological maps carry two numbers referring to the Old and the New Series respectively. A small number of early sheets were hand-coloured and the New Series consists of mainly colour-printed sheets. Sheets were traditionally issued at 1:63,360 and in 1972 sheets started appearing at 1:50,000. From 1972-1999 sheets were variously newly published/reprinted at 1:63,360 or 1:50,000. 1:50,000 sheets are of two types: 1:63,360 maps photographically enlarged to 1:50,000 to form facsimile enlargements; or, new cartography at 1:50,000 - the latter bearing the additional series designation: 1:50,000 Series. A number of 'special sheets' are associated with this series e.g. Anglesey.

The listing below shows only the most up to date editions. Follow the link in the 'See also' box for earlier editions.

The 'Special sheets' can be found at the end of the listing.

Buy the maps

Maps that are in-print for this series can be purchased through the [BGS shop](#).

Out of print maps or earlier editions can be purchased 'print on demand'. To purchase follow the link on a maps *Full entry* page.

Find:

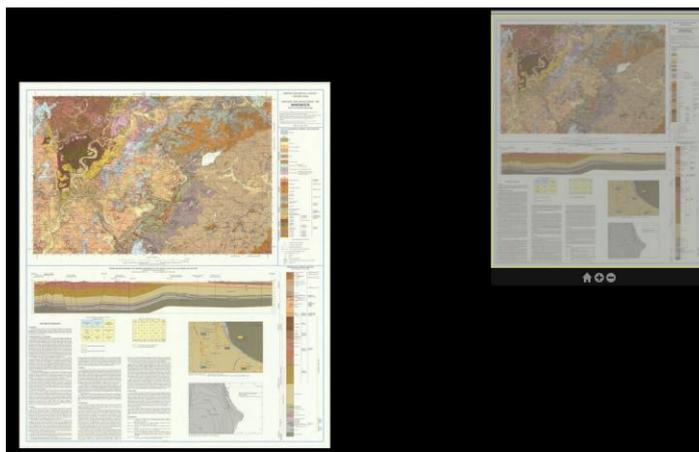
Showing 1 - 100 of 390 | [Show all](#) | [Map index](#) 1 2 3 4 [Next](#)

Sheet number	Sheet title	Map type	Scale	Published year	View record
1 & 2	Berwick-on-Tweed, Norham and Scremston.	Solid alongside Drift	1:50 000	1977	Full entry
3	Ford.	Drift	1:50 000	1979	Full entry
3	Ford.	Solid	1:50 000	1976	Full entry
4	Holy Island.	Drift	1:63 360	1970	Full entry
4	Holy Island.	Solid	1:50 000	1974	Full entry
5	The Cheviot.	Solid and Drift	1:50 000	1976	Full entry

There is a map index to access at the bottom of the web page. The daunting task of finding the number of the map you wish to view can be alleviated by knowing that the main sheets covering Warwickshire are:

- | | | |
|-------------------------|--------------|-----------------------|
| Birmingham 168 | Coventry 169 | Market Harborough 170 |
| Redditch 183 | Warwick 184 | Northampton 185 |
| Stratford Upon Avon 200 | Banbury 201 | Chipping Norton 218 |

Having located a potentially useful map, click '*Full Entry*' on the right and then '*View map*' amongst the details given. The image of the full map sheet should appear with a smaller version top right.



The full map image can be manipulated by zooming in and out and by changing the area visible on screen. The thumbnail of the whole sheet at the top right-hand corner is for reference and shows on which part of the map the screen area is located. The maximum zoom should give a good image for your street and its surrounding area. There is no facility to save or copy this image except by pressing **prt sc** on the keyboard, which places an image of your screen on your device’s clipboard. I usually open a blank document in *Microsoft Word*, change from portrait to landscape, select narrow margins and right-click paste and the screenshot appears. By clicking on the image of the map, a box of lines and small circles appears around the edge and an extra *Picture Format* tab appears on the top line of the toolbar at the top of the screen. With the *Picture Format* tab, it is possible to wrap text and click ‘tight’ to re-position it on the page. The size of the image can be increased by clicking on the bottom right-hand corner circle and dragging to the right and down. There could also be value in cropping and making corrections to brightness and colour. With an image in a *Word* document, it is also possible, by right-clicking, to save the image as a jpeg picture if desired.

These online images are often not the latest geology maps, as illustrated by the absence of newer housing estates compared with the printed maps; perhaps as an encouragement to purchase the real thing. With the full sheet available, there is access to geological sections, keys and other useful information too. The memoir for each sheet can also be viewed online. The current path is *Data – Information hub - Publications – Publications viewer – Regional UK and Ireland – England – Sheet Memoirs new series*. After finding the required sheet it is again a case of *View record* on the right and *View online* in the details presented.

Memoirs of the Geological Survey (District)

Beginning with the Geological Survey’s first memoir De la Beche’s ‘Report on the geology of Cornwall, Devon and West Somerset’ this series is composed of monographs on a particular geographic/geological region. Two districts were published as part of De la Beche’s serial publication started in 1844: Memoirs of the Geological Survey of Great Britain and of the Museum of Practical Geology. That is Geology of North Wales v. III (1866) and Geology of Basin v. IV (1872). All other District memoirs can be found in this series.

Showing 1 - 10 of 27

1 2 3 Next

Search this series

Title, code and description:

Author:

Published year	Title	View record
1903 DI100A	The geology of the Isle of Man	Full entry
1903 DI100G	Economic geology of the Isle of Man	Full entry
1921 DI10A	A short account of the geology of the Isle of Wight (1994 reprint)	Full entry
1990		

Local Geological Sites – Condition Monitoring 2020

Philip Henser

After the regrettable 2-year hiatus, the Conservation Committee planned a programme of monitoring for 2020 and recruited willing volunteers. Despite Covid-19, 10 sites were monitored and many thanks to members who have submitted their reports, photographs and travel claims.

We have started on the process of publishing edited versions of the monitoring reports on the website. At the moment there are 42 of these 'Resurveys' and so if you have taken part in LGS monitoring over the last four or five years then go onto the WGCG website to see the results of your labours. The link <https://lgs.wgcg.co.uk/LoGS-list.html> will take you right place.

There are still approximately 30 sites which are due to be monitored over the next two years but some of the larger quarries are difficult to gain access to, for health and safety reasons. If you would like to know what is involved in monitoring, then please send an email to philiphenser@gmail.com and I will send you an information pack.

Also, conditions permitting, we hope to restart some clearance work on LGS, where the monitoring surveys have shown deterioration, for example through vegetation growth. Again, carrying out this work depends on members volunteering. Plans for proposed clearance work will be posted on the website and via emails.



*No. 88
Edge Hill
Farm
Quarry*

*No. 30
Rock Mill
Quarry*



*No. 43
Baginton
Garden
Centre*

*No. 54
Mows
Dingle*

