



Down to Earth *extra*

Issue 85 January 2020

NEWS FLASH!

- Late vacancies on Portugal and Norway to fill!
- New local geology online course for everyone!
- Winter online learning open!
- 2020 day schools now open!



Superb folding in the Carboniferous slates of Boscastle North Cornwall. Look at the details of the folding here, especially in the hinges. Whilst most beds manage to make it around the tight folds, some actually snap. There's also evidence of axial planar cleavage.

It's amazing what you can see when you look carefully! (Photo: Chris Darmon)

From the Editorial team...

At the start of a new decade, with the General Election behind us, it's time to move on. Whatever your view on the thorny issue of Brexit, the British people have now decided and we will be leaving the EU, beginning the process at the end of January.

We all have to trust the politicians when they tell us that things will all work out. At least some of the immediate uncertainties are out of the way and perhaps you are now in the mood to 'escape to the country' whether it's countryside here in the UK or abroad. Tourism bosses say that the past few months have seen fewer than normal of us booking up holidays. We hope that you are made of sterner stuff and if you haven't already, you are now ready to book one (or more) of our trips for 2020. Sadly, we've got a couple of vacancies due to ongoing medical issues, so we hope to fill those places as a priority - see elsewhere in this issue for details. There are also vacancies on other trips.

With some of the Brexit issues now resolved, it's time for us to concentrate on the much more fundamental challenges surrounding global climate change. We'll be looking at our own field trip provision with a view to suggesting ways in which we can reduce our own impact. This will range from ideas that see us reduce our use of plastics and non renewable resources in things like packed lunches to positive encouragement for you to use public transport rather than your car. On day trips we may also actively encourage car sharing.

Whilst these may not by themselves amount to a lot, as they say at Tesco 'every little helps'. We don't want you stop enjoying geology in the field, we just want you to feel better about doing it!

May 2020 be everything you want it to be. Here's to some great geology!

Chris Darmon & Colin Schofield

The Down to Earth extra Editorial team

See page 8 for what's available for you to study this Winter!



news update

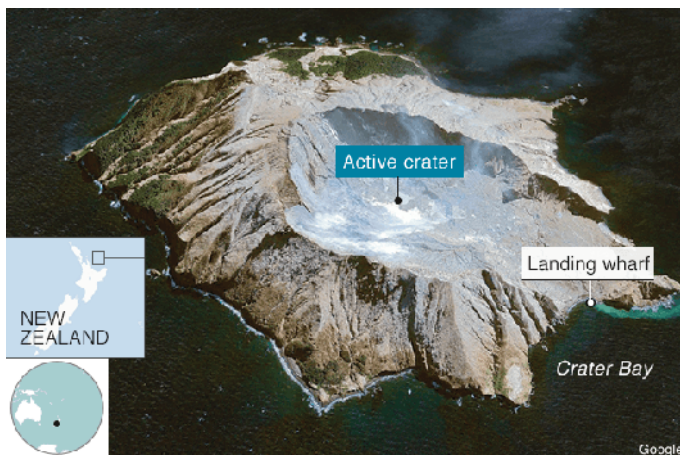
Deadly eruption kills 19 on New Zealand's White Island...

At 14.11 local time on December 9th. the active stratovolcano that is White Island (Whakaari) began a deadly phreatic eruption. The island, which lies some 48 km from the coast is an extremely popular tourist attraction and is visited annually by tens of thousands of day excursionists. At the time of the eruption, there were 47 people on the island. Meanwhile 25 survivors are still in various stages of recovery, many with extensive and life changing burns, in various hospitals across New Zealand.

The world was shocked to hear of the 19 deaths that have occurred as a result, and to witness the immense destruction caused, including the image of a helicopter with its rotors snapped. A search for two missing people has been abandoned (December 24th.) with the bodies presumed to be in the water.

The island covers an area of approximately 325 ha, which is only the peak of a much larger submarine volcano. It is New Zealand's most active cone volcano, and has been built up by continuous volcanic activity over the past 150,000 years. The island has been in a nearly continuous stage of releasing volcanic gases, at least since it was sighted by James Cook in 1769. Whakaari erupted continually from December 1975 until September 2000, marking the world's longest historic eruption episode, according to GeoNet, and also in 2012, 2016, and 2019.

Sulphur was mined on the island until the 1930s. Ten miners were killed in 1914 when part of the crater wall collapsed. The main activities on the island now include guided tours and scientific research. Access to the island is allowed only as a member of a tour run by a registered tour operator.



White Island/Whakaari showing the site of the most recent eruption and the landing wharf where the survivors and victims were taken off. (Image courtesy of Google/BBC)

This is based on material from Wikipedia:

Whakaari/White Island is part of the Taupo Volcanic Zone, and is a direct result of the westerly subducting Pacific Plate. It is an andesite-dacite stratovolcano that consists of two overlapping

**Down to Earth extra is designed & published by Geo Supplies Ltd.,
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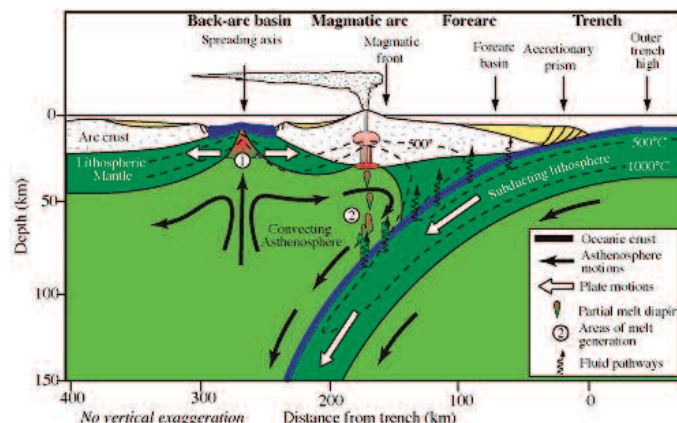


*Aerial view of White Island, still erupting several days after the deadly gaseous blast killed 19 people on December 9th.
(Image courtesy of GeoNet)*

volcanic cones, which are the Ngatoro and Central cones. The Ngatoro Cone is extinct and partially eroded. The amphitheatre-shaped Central Cone is an active cone. The crater of Central Cone is open to the southeast as the result of major, past flank landslides involving hydrothermally altered rock and past phreatic and phreatomagmatic eruptions. Shark, Te Awapuia, and Wilson bays are regarded to be eroded hydrothermal explosion craters. The Ngatoro Cone and Central cones are both constructed of alternating layers of lava flows, tuffs, agglomerates, tephra, igneous dikes, and breccias. Some of these strata have been altered to varying degrees by highly corrosive and acid hydrothermal fluids and gases.

Volcanologists from the GeoNet Project continually monitor the volcano's activity via surveillance cameras. Survey pegs, magnetometers and seismography equipment for early earthquake warnings via radio have also been installed on the crater walls.

Since the modern "alert" system was made operational, the island is typically on an alert level rating of 1 or 2 on a scale of 0 to 5; as Level 2 is the highest alert level before an eruption takes place and indicates 'moderate to heightened volcanic unrest' with the 'potential for eruption hazards'. The alert level was moved from level 1 to level 2 on 18 November 2019. This volcano is monitored by the Deep Earth Carbon Degassing Project. At most times the volcanic activity is limited to steaming fumaroles and boiling mud.



*Cross section through the Taupo Volcanic Zone. White Island is part of the Magmatic Arc.
(Image courtesy of Explore Volcanoes.com)*

However, as we have all witnessed through the dramatic images that have been shared around the world, even low levels of volcanic activity can have deadly consequences. They are a reminder, if ever one was needed, of the unstable Earth we inhabit, something which New Zealanders are only too familiar with.

Fossils claimed to be the oldest trees in the world, discovered in New York State...

A fossil tree discovered more than ten years ago by a team of scientists from Cardiff University, Binghamton University in the USA and New York State Museum is now thought to be two or three million years older than the oldest previously documented. The find was



Show Dates

January 18 & 19 Rock, Gem 'n' Bead Show
The Hop Farm, Paddock Wood, Kent

January 25 & 26 Rock, Gem 'n' Bead Show
Chepstow Racecourse, Monmouthshire

February 15 & 16 Rock, Gem 'n' Bead Show
Lyndhurst Community Hall, Hampshire

February 22 & 23 Rock, Gem 'n' Bead Show
Pavilions of Harrogate, North Yorkshire

February 29 & March 1 Rock, Gem 'n' Bead Show
Kempton Park Racecourse, Sunbury on Thames

March 7 & 8 Rock, Gem 'n' Bead Show
Exeter Racecourse, Devon

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10am - 4pm Sunday**

Admission (one entrance fee covers the whole weekend):

Kempton Park: adults £5.50, seniors £3.00

All other shows: adults £4.50, seniors £2.00

All shows: children 8-16 £1.00, under 8's free

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made at Cairo, in the foothills of the Catskill Mountains. The previous oldest were found at Gilboa, also in New York State.

Over the past ten years the team have mapped over 3,000 square miles of the ancient forest. They have concluded that it was home to at least two types of trees, namely *Cladoxylopsids* and *Archaeopteris*. A third species is yet to be described and fully identified.

Palaeobotanist, Dr Chris Berry from Cardiff University and co-author of the paper which is published in the journal *Current Biology*, said: "This is the oldest place where you can wander around and map out where fossil trees were standing back in the middle part of the Devonian period. It's a very ancient forest from the beginnings of the time where the planet was turning green and forests were becoming a normal part of the Earth's system."



These are large finds in what is a massive quarry. The fossils are laid out on a bedding plane. (Image: William Stein, Chris Berry)

Researchers say they also discovered very long, woody roots that transformed the way plants and soils gather water. As for the reason why the trees have survived, it appears that the forest was wiped out by sudden a flood, burying the trees. The researchers have also found fish fossils on the surface of the quarry.

The tree fossils date from a point in time that marks a transition between a planet with no forests and a planet that is largely covered in trees. Dr Berry is convinced that studying the site can give us a better understanding of how trees evolved and how they draw down carbon dioxide (CO₂) from the atmosphere.

"We're well aware at the moment that having forests is a good thing and burning down forests and deforestation is a bad thing," says Chris.



The working quarry is a novel place to find such important fossils. Here's some of the equipment in use. Many of the finds will be removed for further research and eventual public display.

Prof Howard Falcon-Lang from Royal Holloway, London says there's no doubt this is the earliest fossilised forest that we know of. "It may well be that in the future, something even older pops up - palaeontology is full of surprises! But for the time being, this is incredibly exciting."

Famous Yorkshire waterfall is home to what may be one of the very first amphibians...

We often seem to feature stories where a fossil has lain in a drawer in a museum for years, waiting for someone to come along and study it. This is just such a story, for the fossil in question was discovered more than 40 years ago at the famous Hardraw Force in Yorkshire. The fossil footprints have now been revealed as potentially the earliest



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Hardraw Force, Wensleydale, North Yorkshire, where the footprints were discovered in the 1970s. (Image: Andy Hawkins/Flickr)

prints from an amphibian yet discovered in the UK, and are potentially the oldest from any four-legged animal. They were made over 340 million years ago during the Carboniferous Period, and they help us understand how the continents have shifted over time.

The slab of rock, just 50 centimetres across, has been in the Museum's collection for decades. While it has long been suspected that they were of great interest, their significance has only now been confirmed.



The actual slab of rock is just 50 cm across and the footprints are quite tiny. (Image: The Natural History Museum)

A new analysis has been undertaken using a 3D model of the footprints, was carried out by Hannah Bird from the University of Birmingham in collaboration with Dr Angela Milner, a Scientific Associate at the Museum, in collaboration with colleagues at the University of Birmingham and University of Cambridge.

"This particular specimen is really nicely preserved, but it has only been briefly mentioned in literature before and it seemed a shame that nothing substantial had been published on it," says Hannah. For a previous research project, Hannah had identified it as potentially one of the oldest set of footprints in the UK.

"It was a matter of validating whether this was the case or not, including comparing them to other footprints from other localities across the world to evaluate timescales," explains Hannah.

'From that we concluded that they were the oldest footprints of this type. We can't necessarily say that they are definitely the oldest footprints, as previously specimens were collected with less detailed

information on the rocks they were sourced from, but we can say it is the oldest known that we have managed to find.'

The tracks are thought to have been made when an ancient relative of modern amphibians known as an edopoid temnospondyl walked over some soft sediment of a river delta. These would have looked something like a large salamander, with four digits on the front foot and five on the back.

'You can tell when looking at tetrapod footprints, whether they were made by reptiles or amphibians,' explains Hannah. 'Reptiles have long, slender digits, whereas amphibians generally have shorter, broader digits. So automatically you can tell when looking at this specimen that it has these short, stubby digits that are amphibian.'



*A reconstruction of Temnospondyls, such as this *Chenoprosopus milleri*, are thought to have played similar roles in the Carboniferous ecosystem as crocodiles do today.*

(Image: Dmitry Bogdanov/Wikimedia Commons)

Temnospondyls were highly successful animals, appearing during the Carboniferous and evolving over the next 210 million years into a wide variety of forms. While some were about the same size as modern-day amphibians many grew to enormous sizes.

'Some of these things were large crocodile-like animals at least two metres long with big heads,' explains Angela. 'They have been nicknamed by some of my colleagues as croco-manders, because they look like a crocodile but had the same lifestyle and walked the same way as salamanders.'

Most temnospondyls were semiaquatic, filling a similar role in the swamps of the Carboniferous, Permian and Triassic as crocodiles do today. Despite being some of the first truly large terrestrial tetrapods, all had to return to the water in order to breed.

Material is courtesy of The Natural History Museum.

You can read the full story at:

<https://www.nhm.ac.uk/discover/news/2019/december/fossils-found-in-yorkshire-are-the-oldest-amphibian-footprints.html>

Significant new gold find in Scotland...

Readers will be familiar with the Scotgold Resources Project that has seen the first small amounts of gold mined at the Cononish Mine near to Tyndrum in the Highlands of Scotland. Now the same company has reported what it describes as a significant find, not far away in Glen Fyne.

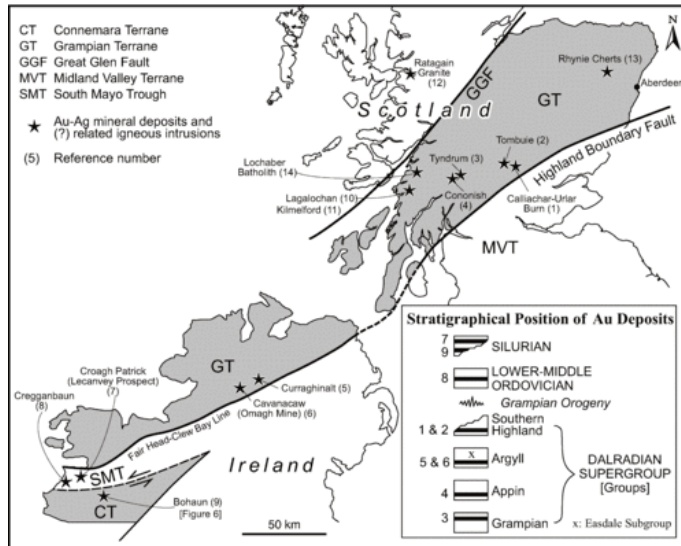
Bonanza grade gold and silver values were announced at the end of August by Scotgold as a prelude to follow up exploration next year.

Best values obtained from outcrop sampling were 217.2 grams/tonne and 196.8 g/t gold and 200 g/t silver at Halladay's Vein; 51.2 g/t gold and 14.4 g/t silver at Coire nan Sionnach.

The company said outcrop sampling was carried out over nine targets within the 100% owned Glen Orchy Licence.

"The recently received results provide confirmation for the significant number of high grade outcrop gold values and the prospectivity of the 250 km² "principal zone of interest" which surrounds the Cononish gold and silver deposit," said Scotgold managing director Chris Sangster.

"The frequency of high grade outcrops in the new and historic datasets, and their alignment with regional structural features, are similar to that at the Cononish project," Sangster said.



The Gold deposits have been found close to the Highland Boundary Fault complex. (Image: Cambridge University Press)

This pattern supports Scotgold's contention that its Grampian gold project has the potential to host a number of other 'Cononish style' gold deposits, in addition to other styles of mineralisation such as the breccia pipes at Beinn Udlaidh. Most of the historic data is centred around Tyndrum and it extends over an area of 250 square kilometres, along the Tyndrum Glen Fyne Fault zone.

The Grampian project, which incorporates Cononish, covers some of the most prospective areas of the Dalradian geological sequence which has been identified by the British Geological Survey as being highly prospective for both significant gold and base metal deposits.

The Dalradian sequence extends to the south west from Scotland into the north of Ireland where it hosts other gold deposits at Cavanacaw which has been operating as an open cut mine since 2006, and Curraghinallt (600,000 oz of gold).

In the meantime, Scotgold have been able to re-evaluate the Cononish project and according to Chief Executive Richard Gray, "It's exciting, We're on the move. We're on schedule on the mining side, the exploration blue sky is significant and our cash position is fine." The first significant Cononish Gold was due to be poured in December 2019, which should herald even greater production in 2020.

Material from Scotgold and other Internet sources.

Denman Glacier is the site of the deepest point on the surface of the Earth, study reveals...

A new map of Antarctica shows that the deepest point on continental Earth has been identified as being under the Denman Glacier. The ice canyon in East Antarctica reaches some 3.5 km below sea level, a depth that's only exceeded in deep ocean rifts. The previous lowest point on the continental surface was some 413 m below sea level on the Dead Sea shore.

The new map has been published following research by a team at the University of California, Irvine. It will be invaluable in studies of the Antarctic continent going forward, especially as the ice melts.

"This is undoubtedly the most accurate portrait yet of what lies beneath Antarctica's ice sheet," said Dr Mathieu Morlighem, who's worked on the project for six years.

The map essentially fills all of the gaps in airborne surveys of the continent. For decades, radar instruments have crisscrossed Antarctica, sending down microwave pulses to peer through the ice and trace the underlying rock topography. But there are still vast areas for which there is little or no data.

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Something new for DtoE extra...

In the last issue of DtoE extra we brought you news of recently released books. A reader asked if that could be expanded to include news of new products and special offers. We're happy to oblige and will bring you this service in each issue from now on.

Unless shown otherwise, products are available from the Geo Supplies website, www.geosupplies.co.uk or by ringing us on: 114 245 5746 or by calling into our shop at 49 Station Road, Chapeltown, Sheffield S35 2XE.

Massive book and map event!

At least 10% off all books and BGS maps, plus a clearance event with discounts of 50% or more! (Available to callers at the shop only)

Over the past couple of years we've accumulated lots of local publications, some of which are now out of print. We want to clear these along with other books and maps, at discounts of 50% or more, so that we can make space for new titles. We invite you to come and browse!

In addition, we're also giving discounts of at least 10% off regular stock. This includes all BGS books and maps. Many of these are titles not discounted by Amazon!

Available to personal callers only until February 29th. 2020.

*See opposite for shop opening hours.
We look forward to seeing you!*

I wonder how many of you got a jigsaw present?

The 1000 piece jigsaw map of the British Isles must have been one of the most unusual Christmas presents this year, but we sold loads of them! Our price may have had something to do with it, as we were £3.00 less than BGS!



Sadly, following a cut in the discount that we get from BGS the price has now had to rise to £22.95 - but they are still great value!

Order one today!

William Smith is the new kid on the jigsaw block!

Hot on the heels of the British Isles Geology Map 1000 piece jigsaw comes another one, this time it's the historic William Smith 1815 map, also in the form of a 1000 piece jigsaw puzzle.

The first production run sold out in a matter of days and we are awaiting copies coming in at the end of January.

Once again, our price of £22.95 including UK postage. You can place your order now, for dispatch as soon as they come in to us!

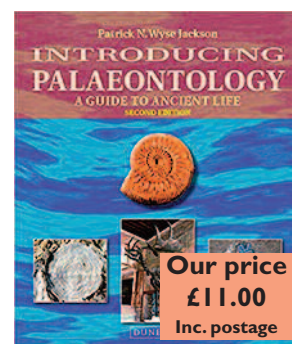
New books for this issue...

Title: Scotland's Mountain Landscapes - a geomorphological perspective
Author: Colin Ballantyne
Publisher: Dunedin Press
ISBN: 978 178046 079 6
Format: Hardback
Cost: £28.00
Level: Adult & general interest
My rating: *****



From our forthcoming review: "This is the first popular book to have focussed on the geomorphology and there's no one better placed to write such a book than Colin Ballantyne."

Title: Introducing Palaeontology A guide to ancient life Second Edition
Author: Patrick Wyse Jackson
Publisher: Dunedin Press
ISBN: 978 1 78046 083 3
Format: Softback
Cost: £9.99
Level: Student & general interest
My rating: *****



"The first edition was a classic, now this revised edition, is even better! This brings palaeontology to life!"

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Winter Day Schools now available to book...

During February and March we'll once again be running a programme of Day Schools in venues around the country. This Winter our Day School venues will be Sheffield, North London, Devizes, Birmingham and Newcastle. If you've not joined us on one of these before, you will be especially welcome. It's enjoyable and informal learning for all!



Wednesday, February 19, Cheshunt, North London **Rockstars, a celebration of famous rocks**

There are some rocks that everyone has heard of, like Portland Stone or Shap Granite and 'local heroes' like Hertfordshire Puddingstone. But why are they famous, what makes them so special? We'll be examining some famous rocks in a practical session and then learning more about them in a lively teaching session during this day of two parts. Included in the price is a hot lunch and hot drinks.

Meeting: YHA Lee Valley, Cheshunt, Herts. at 10.30 Cost: £35.00
(Tube to Tottenham Hale, then frequent train to Cheshunt)

Wednesday, February 26, Devizes, Wiltshire **The Geology of the British Isles in a day**

Come and join us on the journey of a lifetime! It begins more than 3 billion years ago with parts of an ancient continent in what is now Northwest Scotland and ends with the final glacial retreat around 10,000 years ago. Along the way we'll encounter violent volcanoes in Charnwood Forest, dense equatorial forest in South Wales, come face to face with giant dinosaurs on the Isle of Wight and experience one of the world's largest volcanoes on the Isle of Skye. Welcome to what is the geological past of the British Isles! Take part in practical work, and enjoy a video presentation - hang on to your seat, It's going to be a bumpy ride! Full buffet lunch and hot drinks during the day.

Meeting: Devizes Conservative Club at 10.30 Cost £35.00

Saturday, February 29, Chapeltown, Sheffield **The amazing world of minerals**

Minerals are simply the Earth's chemical compounds. Many are beautiful, some are valuable, without them we would have nothing. This day looks at all aspects of minerals, their chemistry, their classification and their many uses. There will be plenty of hands on practical work with some fine specimens to enjoy, as well as some lively teaching time. This is a day for anyone with any interest in learning more about minerals. Hot and cold buffet meal provided, plus hot drinks during the day.

Meeting: Commercial Inn, Station Road, Chapeltown Cost: £35.00

Wednesday, March 4 Birmingham

The amazing world of minerals

See Chapeltown above for details of this course. As we are at the Lapworth Museum we'll be able to enjoy some of their fine specimens as part of the practical session. At this venue only hot drinks and biscuits are available.

Meeting: Lapworth Museum, Birmingham University at 10.30
Cost £20.00

Saturday, March 7, Central Newcastle upon Tyne **How the Earth works, new views of an old planet**

An exciting day that starts with an examination of our planet through its rocks and minerals and then moves on to peer inside to see how it is constructed, before moving on to examine how our understanding of how it works has changed radically in the last 100 years. Includes some practical hands-on rock work and also lots of handouts!

At this venue, only hot drinks and biscuits are included in the price.

Meeting: Commercial Union building, Newcastle upon Tyne at 10.30 Cost £25.00

Winter Distance Learning Courses are here

Commencing in mid-January we'll be running a variety of distance learning courses. They run for around 10-weeks and cost £75.00 in electronic form (either email or via the Moodle platform) or £100.00 in paper form, except Backyard Geology which is £60.00 or £75.00 by post.

You can enrol by entering the online shop at: www.geosupplies.co.uk or by ringing us on 0114 245 5746 ENROL NOW for any course!

NEW COURSE!

"Backyard Geology - and a little beyond"

This is an exciting new venture for us and you! We've often been asked if we have anything that can help you in the study of your home or favourite area, well now we have.

It's an 8-week course that provides you with what can best be described as a 'manual' for discovering more about your area of choice in the British Isles. As part of the course you are provided with a BGS 1:50 000 map which then forms the basis of your study area. From the start, we'll help you to choose your area and with people studying different parts of the country at the same time, this provides the opportunity for interaction on our learning platform Moodle. **ENROL NOW!**

Backyard Geology is also suitable for groups to study at the same time. Ask us about how your U3A or other group can join in, with special group rates available.

"Geology of the British Isles" - a detailed look at the geology of our country taking each period in time (13-weeks).

"Sedimentary rocks" - takes in the rocks and the process that shaped them. It's a while since we offered this, so why not take us up on the offer? (10-weeks).

"Steps towards the Rock Face" - is our beginner's course that covers a wide range of geological topics, from plate tectonics to rocks, minerals and fossils. This is available 'on demand' to commence at any time.

Further information on all courses is available by emailing: downtoearth@geosupplies.co.uk or ring: 0114 245 5746

Our Residential Field Trip Programme for 2020



Why not hop aboard our 'geobus' and go wherever it takes you?
 (Photo: Chris Darmon)

LATEST NEWS: Due to illness related cancellations, we now have a couple of vacancies on the Portugal trip - contact us if you want to join this trip.

We can also accommodate several more people on our trip to Norway. If you haven't been then this is a **MUST!** If you book for a group of at least four people we can offer you an attractive discount!

The Summer School, at the University of Worcester in August, has nearly 20 people already booked - remember that there are plenty of single rooms available. We have vacancies on all of our Autumn trips, including Pembrokeshire and Arran, Forest of Dean and the Yorkshire Dales.

For further details, visit the website or
 Tel: 0114 2455746.

Booking forms are only available direct from us.
 Email: downtoearth@geosupplies.co.uk

The complete 2020 field trip programme...

- Terras de Cavaleiros, Portugal - March 13-20
- Norway revisited - March 27 - April 5
- Raasay & Skye - April 25 - May 2*
- Eigg & Rum - May 3-12*
- Dingle Peninsula - May 31 - June 7
- Shetland Isles - June 20-27*
- Western Lake District - July 4-11
- Summer School - August 15-22
- Pembrokeshire - September 1-8
- Isle of Arran - September 14-21
- Forest of Dean - September 27 - October 1
- The Yorkshire Dales - October 6-11
- The Malvern Hills - October 23-28

*Trips marked * are now fully booked.*

We look forward to hearing from you!

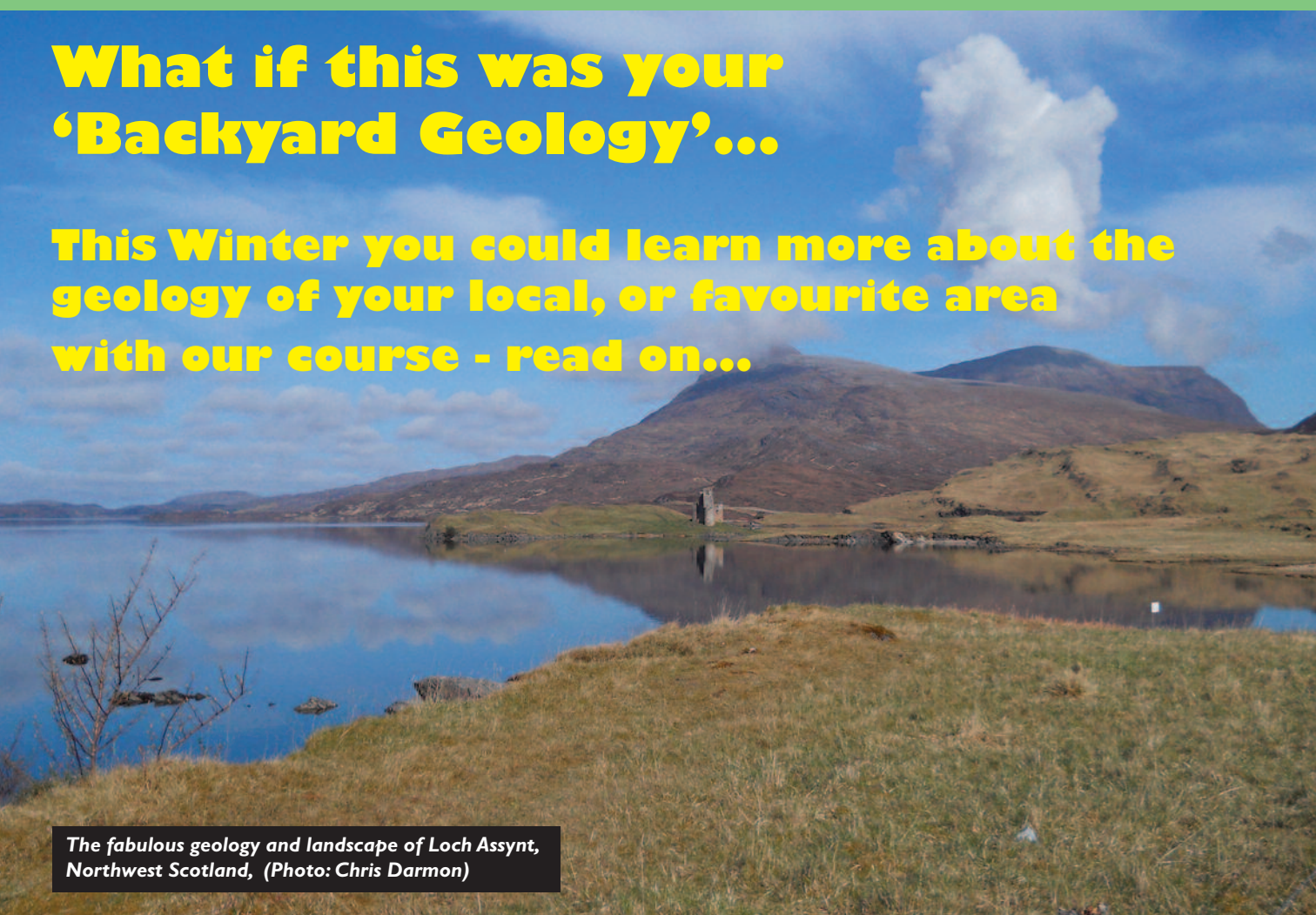


Down to Earth

"Earth science learning for all"

What if this was your 'Backyard Geology'...

This Winter you could learn more about the geology of your local, or favourite area with our course - read on...



The fabulous geology and landscape of Loch Assynt, Northwest Scotland, (Photo: Chris Darmon)

What if somebody could show you how to study the geology of your local or favourite area of the UK? They can!

In just 8-weeks we'll show you how to go about studying the geology of your backyard - wherever you live in the UK. You choose the area you want to study, whether it's your local or a favourite area and we'll show you how to study it's geology and landscape.

It works like this. We provide you with the most suitable BGS 1:50 000 or 1:25 000 map. We then send you 8 weekly Units that guide you through the different aspects of your area, giving you lots of examples and ideas, rather like a geological manual.

- Geology in our own backyard - where to look, what to expect
- Rocks from your patch - how to study them
- Your geological time machine - the geological history of your area
- The record of life - local fossils and what they can tell us
- Geology is everywhere - the geology of the British Isles
- Reading your geological map - how to unlock the information
- Reading rocks and landscape - every picture tells a story
- Fruits of the Earth - the economic geology of your area

You are not alone! We provide online help and encouragement and want you to share your ideas and findings with others on the course. The cost (including the BGS map) is £60.00 by Email or £75.00 for printed materials by post. The course begins on January 20.

View the course introduction and enrol online at: www.geosupplies.co.uk

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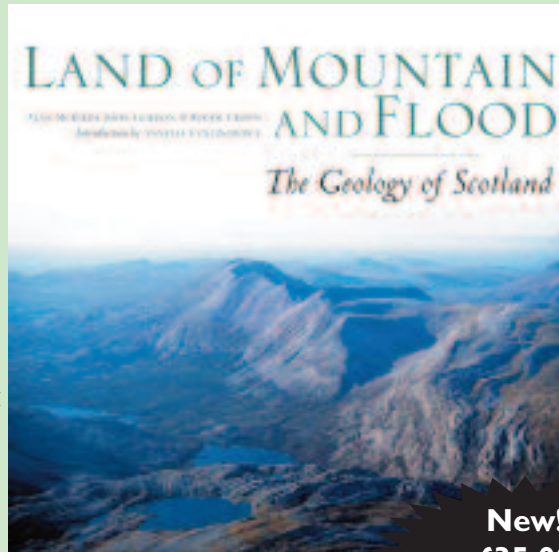


Featured books December - January

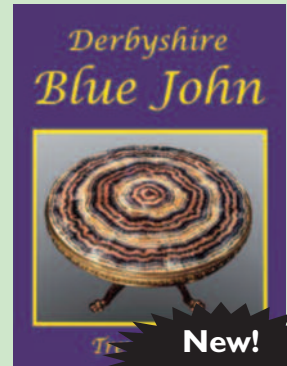
In each issue we are pleased to be able to introduce you to a range of featured books. Where they are being offered at reduced prices, these will be current to the end of the month shown above, provided that stocks are available. Please note, all prices include UK postage.



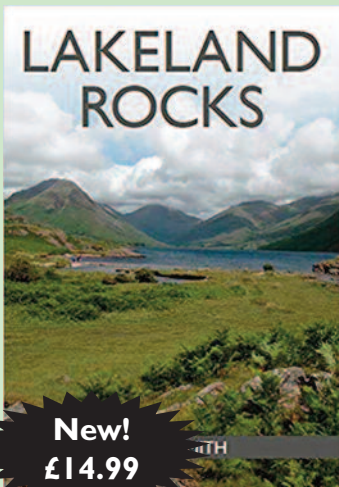
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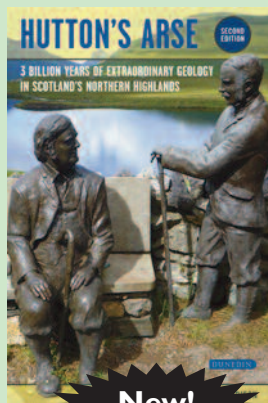
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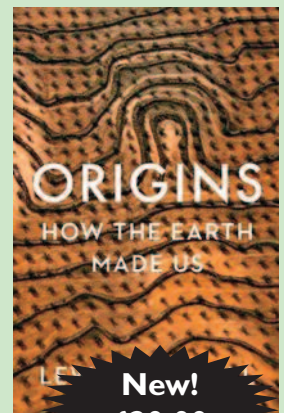
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