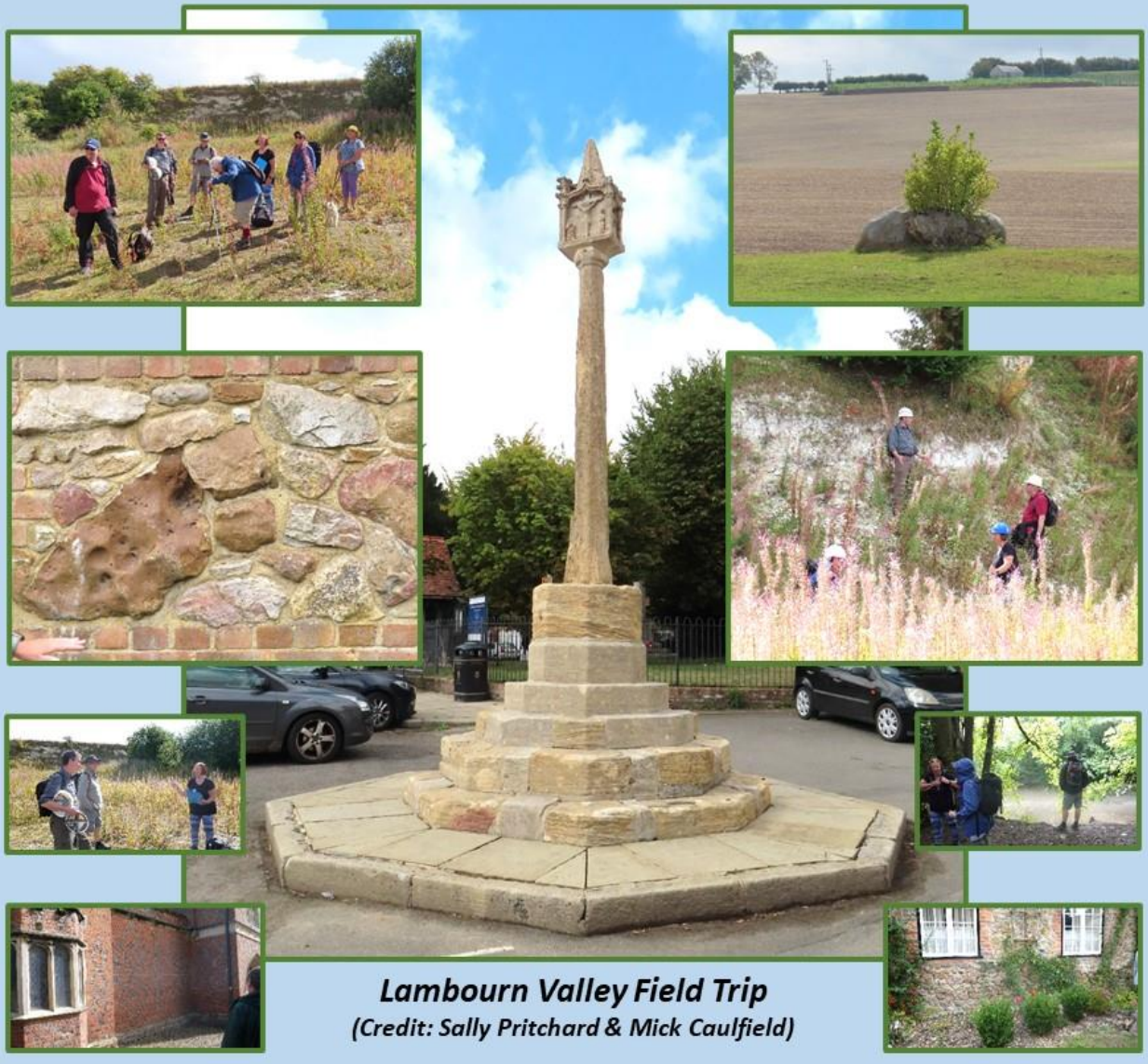
Newsletter of

The Farnham Geological Society

Volume 29, Number 2, May 2026



Lambourn Valley Field Trip
(Credit: Sally Pritchard & Mick Caulfield)

Farnhamia farnhamensis

FARNHAM GEOLOGICAL SOCIETY

Founded 1970

GEOLOGISTS' ASSOCIATION 1858

A local group within the GA

Volume 29, No. 2 | **Newsletter** | **May 2026**

Issue No. 132

www.farnhamgeosoc.org.uk

Editorial

Welcome to the latest edition of the FGS Newsletter. I hope you are all well and enjoying the spring sunshine.

Our next lecture will at **The Methodist Hall** on **Friday, 8 May** at **8:00pm** when we welcome **Dr. Andy Wood** who will be talking to us about the **"Geology Of Oman"** which, I have no doubt, will be an excellent presentation.

This will be followed on **Friday, 12 June** at **The Methodist Hall** with a talk entitled **"Anglesey - The Isle of Ice and Time"** to be given by **GeoMôn's Dr. Rob Crossley.**

On **Friday, 10 July Dr. James Witts** of the **Natural History Museum** will be talking to us about **"Cretaceous Ecosystems and Rapid Climate Change in the UK Chalk Group"** … should be a good one!

The FGS Committee would like to encourage as many members as possible to come along to **The Methodist Hall** to support the excellent speakers assembled by **Janet Catchpole, who take time out of their busy schedules** to travel to Farnham on a Friday evening to **present to the Society.**

I would also encourage members to check out our **Field Trip section** both in the Newsletter and on our FGS website. **Tessa Seward**, our **Field Trip Secretary**, is working hard to organise interesting and accessible trips and I would urge you to join those that interest you, as well as **pass on any suggested trips** that you would like FGS to organise.

We are still looking for members to join the FGS Committee, particularly IT/Sound, as well as help with our Website and our Advertising / Outreach programmes and with the Societies various other outreach activities.

Please contact our Chair Mick Caulfield
(newsletters@farnhamgeosoc.org.uk) **if you are able to help.**

If you have visited a site of geological interest, listened to an interesting Zoom talk, podcast, webinar or TV programme, and would like to share with your fellow Members, then please feel free to get in touch with the **Newsletter Editor**, **Mick Caulfield** (newsletters@farnhamgeosoc.org.uk).

All of the information contained herein, both graphics and text, is for educational purposes only, as part of the Society's objective. There is no commercial gain for their use.

The views and opinions represented in the articles do not necessarily represent the views of the FGS Editorial Board or the FGS Committee.

Contents

Front Cover

Photos of Lambourn Valley FT in August 2025.

This month's **Front Cover** shows the Lambourn Market Cross with various views from the Lambourn Valley Field Trip led by Lesley Dunlop *(see page 6).* They include a lonely sarsen in a field, the group in Fognam Quarry, various flints and sarsen stones in church and building walls and searching for the source of the Lambourn River in Lynch Wood. *(Credit: Sally Pritchard & Mick Caulfield)*

Farnham Geological Society

Committee 2026

Chair	**Mick C**
Treasurer	**Mike M**
Secretary	**Katherine R**
Programme Secretary	**Janet C**
Membership Secretary	**Sally P**
Field Trip Secretary	**Tessa S**
Newsletter Editor	**Mick C**
Web Manager	**Bob R**
Advertising	**Peter C**
IT/Sound	**VACANT**
Without portfolio	**Peter L**
Ad Hoc Member	**Liz A**

Meeting Programme 2026

Please note The Methodist Hall and Zoom only meeting times:
7.30 pm for **8.00 pm start.**

Geology Of Oman
Dr. Andy Wood,
u3a Fri, 8 May

Anglesey - The Isle of Ice and Time
Dr. Rob Crossley Fri, 12 June
GeoMôn

Cretaceous Ecosystems and Rapid Climate Change in the UK Chalk Group
Dr. James Witts Fri, 10 July
NHM

Field Trip Programme 2026

(book via the FGS website)

DAY TRIPS

- **Up & Down the Greensand** *tbc*
  Leader: Alan Smallwood Sat, 30 May

  This would be a guided walk in the Dorking area to view the geomorphological features & explore the area from a geology engineering perspective. It will involve walking up & down some moderate slopes along footpaths & the total walk is likely to be about 3½ miles long, taking about an hour & a half to two hours.

- **Building Stones of Guildford**
  Leaders: Maurice Curry & Mick Caulfield
  Thu, 18 June

  Join us on a couple of kilometres walk along Guildford High Street looking at the various building & pavement / road stones. This short sojourn through the town centre covers around 500 MY of stratigraphy & sedimentary, igneous and metamorphic rock types.

- **Building Stones walk around Chichester**
  Leader: David Bone Sun, 26 July

RESIDENTIAL TRIPS

- **Gloucester Field Trip (Forest of Dean, Wye Valley, Severn Vale)**
  Leader: David Green
  Tue, 20 - Fri, 23 October

Please let our Field Trip Secretary, Tessa Seward (wessa2006@hotmail.co.uk) know if you have other ideas for places of geological interest to visit.

Geologists' Association
Lecture Programme 2026

https://geologistsassociation.org.uk/lectures/

President's Address - Little things can make a big difference (part 2)
Dr. Liam Gallagher Fri, 8 May

tba
Prof. Simon Conway-Morris Fri, 5 June

tba
Dr. Emily Swaby Fri, 3 July

Reading Geological Society
Lecture Programme 2026

https://readinggeology.org.uk/lectures.php

Not So Simple – origin, evolution and ecology of the first vertebrate predators
Dr. Duncan Murdock, Mon, 11 May
Oxford University Museum of Natural History

The Murchison Meteorite
Jim House Mon, 1 June
RGS

RGS Summer Rambles
book via the RGS website
https://readinggeology.org.uk/fieldtrips.php

A local geological stroll in Berkshire or South Oxfordshire
Mon, 6 July & Mon, 3 August

Mole Valley Geological Society
Lecture Programme 2025

http://mvgs.org.uk

The Sunken Lanes Of Southern England
Prof. John Boardman, Thu, 14 May
Environmental Change Institute Oxford University.

Venus' Past, Earth's Future?
Professor Richard Ghail, Thu, 9 July
Royal Holloway,
University of London

Horsham Geological Field Club
Lecture Programme 2026

http://www.hgfc.org.uk/

AGM and "Geology Degree at the University of Portsmouth: Part 2"
Tessa Collins, *Wed, 13 May*
Consultant Engineering Geologist at Atkins

West Sussex Geological Society

West Sussex Geological Society
Lecture Programme 2026

https://www.wsgs.org.uk/

What has Geology ever done for Pembrokeshire?
Peter Webster, HGFC Fri, 15 May

Advances in Jurassic correlation using Ammonites
Robert Chandler, NHM Fri, 19 June

The Open University Geological Society
Wessex Branch
Field Trip Programme 2026

https://ougs.org/wessex/

Geology of Alderney
Dr. Dave Went 16-17 May
Precambrian igneous to Quaternary deposits on Alderney.

Whatley Quarry
Adel Avery Fri, 19 June

Forthcoming Talks

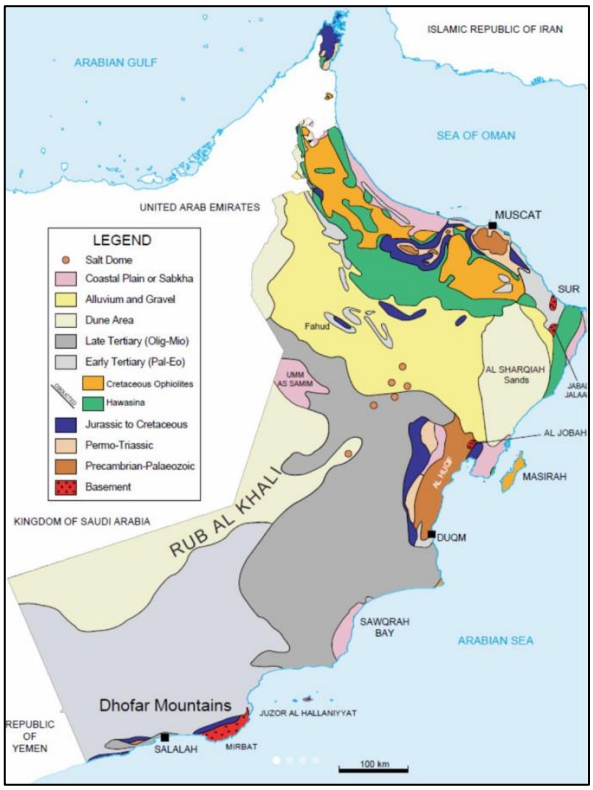
8 May 2026

On Friday, 8 May we welcome Dr. Andy Wood to The Methodist Hall.

"The Geology of Oman"

It was exploration for oil in the years before the Second World War that first drew the serious attention of geologists to Oman. Although occupying a significant part of the Arabian Peninsula, the Sultanate's geology is not only quite distinct from that of its neighbours but is in many ways unique in global terms. Spanning 800 million years of Earth's history, it provides a fascinating record of changing climates, shifting continents and closing oceans, all dramatically exposed in the mountains and plains and wadis of this beautiful country.

Dr. Andy Wood *has a bachelor's degree from Cambridge (Natural Sciences – Geology; 1975) & doctorate from Oxford (1980). He is a geoscientist with over 35 years oil industry experience, including 30 years at Shell. Postings to the Netherlands (4x, lastly as Head of Global Exploration), Nigeria, the UK (2x, including as Head of New Business Development) & Oman (3x, most recently as Country Chair).*
Andy runs the Farnham u3a "Geology 4 Non-Geologists" with the FGS Chair Mick Caulfield and is a keen sailor.



Simplified geological map of Oman
(Credit: https://www.instagram.com/p/CLyxUN8pJjS/)

12 June 2026

On Friday, 12 June we welcome Dr. Rob Crossley to The Methodist Hall.

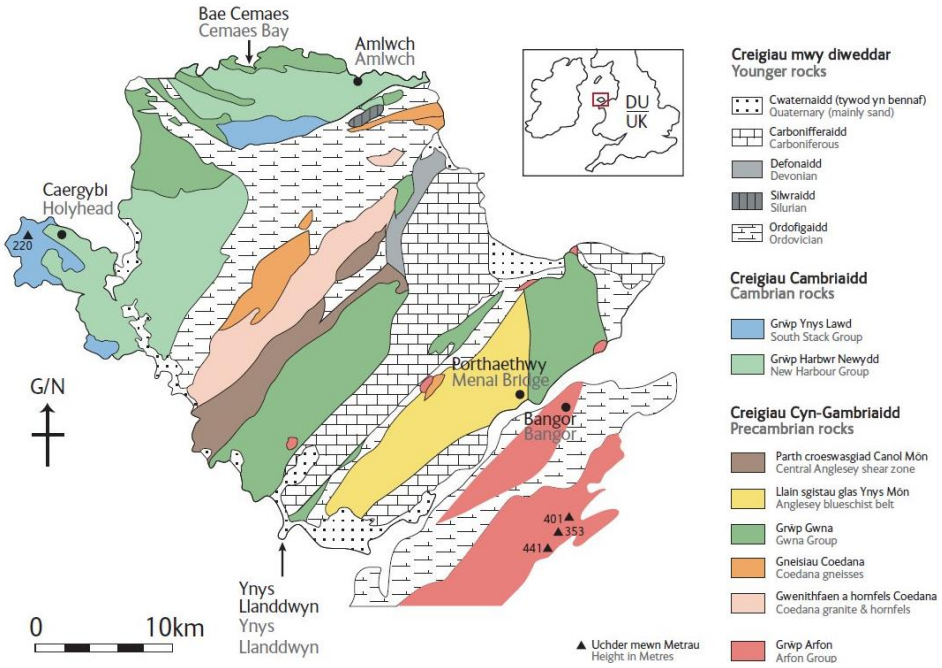
"Anglesey – The Isle of Ice and Time"

There are so many stories to tell about the geology of Anglesey - these are the threads Rob Crossley will try to weave into the evening's talk:

- A geological genius mapping the rocks of Anglesey gave Darwin the context for his theory of evolution.
- Study of the pillow lavas of Llanddwyn Island is leading to exploration for huge quantities of geothermal resources beneath deep waters of the world's oceans.
- Recent work by GeoMôn on the Holyhead mammoth has shown it to be the oldest post-glacial mammoth discovered in Britain.

Rob graduated from Reading University in 1972, then started research at Bedford College and the University of Lancaster.

After completing his PhD in the Kenya Rift Valley, Rob moved further south along the African Rift System to teach geology at the University of Malawi for nine years, before joining Robertson Research (now Viridien) in North Wales 40 years ago.
Exploration for oil and gas consumed much of his activity for 33 years, before turning to assessment of, and exploration for, geothermal energy.



GeoMôn Geology of Anglesey map 2020

Recently, Rob was a co-author of the White Paper with the UN's International Seabed Authority to help set the "ground rules" for exploration and exploitation of geothermal resources in international waters.
The whole of Anglesey is one of UNESCO's global geoparks and is promoted by GeoMôn, which is unique amongst the ~200 global geoparks in being an entirely volunteer-led organization.
As a Trustee of GeoMôn, Rob spends much of his spare time on geological activities across the Island.

Reference:
https://www.geomon.org.uk/

Cartoon

As suggested by Janet Catchpole.

Reference: https://www.stonechatproductions.co.uk/page2.html

FGS Field Trip Report

Lambourn Valley, Berkshire

Sunday, 31 August 2025

Leader: **Lesley Dunlop**

Report by Angela Snowling and Nick Stronach

Meeting Point

(Location SU 32642 78933, postcode RG17 8XU, w3w///update.lands.chainsaw)

Six FGS members and two members of the Wessex Geological Society met Lesley in front of the church of St. Michael's and All Angels adjacent to the Lambourn Market Cross (Fig. 1) in glorious sunshine. Lesley noted that the cross was most likely to be Taynton Limestone Formation sitting on a base of Jurassic Chipping Norton Limestone (with strong cross stratification). Both these formations are part of the Great Oolite Group in the Cotswolds.

Figure 1: Lambourn Market Cross dates back to 1446, when Lambourn was granted the right to hold a market.

Morning session: Lambourn Market Cross to Lynch Wood springs

The aims of this session were to explore the different building materials used in the village and the springs at the source of the River Lambourn.

Building materials

As we passed the houses Lesley noted the origins of the different building materials used: chalk blocks, sarsens and bricks. The chalk used here was mainly grey. Sarsens are blocks of cemented sandstone derived from the Reading Beds of the Lambeth Group, but which lie locally as erosional remnants on the Chalk landscape. The Reading Beds formed around 60Ma and cementation took place within 5Ma, most likely as silcretes. These beds were eroded during the Miocene and in the Quaternary.

Members debated their origin. It was noted that some of the sarsen stones retain a concretionary habit, but some appeared rounded and possibly transported (Fig. 2). Indeed, there are water transported boulders in the River Lambourn (Fig. 6). It was speculated as to whether they may have formed originally in river bars, so may even have been exhumed and eroded very close to the time of deposition. Lesley noted that although they weather orange to red this is just a superficial effect due to the iron rich cement. When a fresh surface is revealed, it is grey.

Figure 2: Large sarsens in recently rebuilt wall. Note concretionary habit of large boulder.

Figure 3: House constructed of bricks & dressed sarsens.

Lesley noted how difficult they were to cut before the advent of modern saws, so houses such as in Fig. 3 are uncommon. Sarsens were used at the base of walls as they do not soak up water, unlike the chalk blocks above.

A decorative silvered finish was created by firing the hand-made bricks in the kiln in a controlled reducing atmosphere to create a vitreous finish (Fig. 4).

Figure 4: Silvered finish to bricks.

The source of the River Lambourn

We walked into Lynch Wood just as the heavens opened! The spring, when we visited, was merely a puddle on the forest floor due to the very dry summer season (Fig. 5). We also observed the River Lambourn nearby was at an all-time low. (It is classified as a winterbourne being dry for the remainder of the year). The site under normal conditions would show water bubbling through from the chalk below as observed in other chalk streams in west Berkshire.

Figure 5: Source of the River Lambourn

The spring is not located at a geological contact rather it is located at a low point in the water table within the chalk. Higher flow conditions appear to be indicated by the presence of transported sarsen clasts within the river bed (Fig. 6), although it cannot be absolutely certain that these are not discarded building materials.

We returned via the back roads to the church of St. Michael's and All Angels and observed the rendered walls constructed of a mix of chalk and flint. Buttresses and doorways are made of stronger blocks of Cotswold limestone (Fig. 7). As an interesting historic aside we were shown how to spot a

witch's mark by one of the Wessex members, who said they were carved at doorways to ward off evil spirits from entering the church.

Figure 6: Reworked sarsen clasts in River Lambourn (size of principal clast approx. 0.5m)

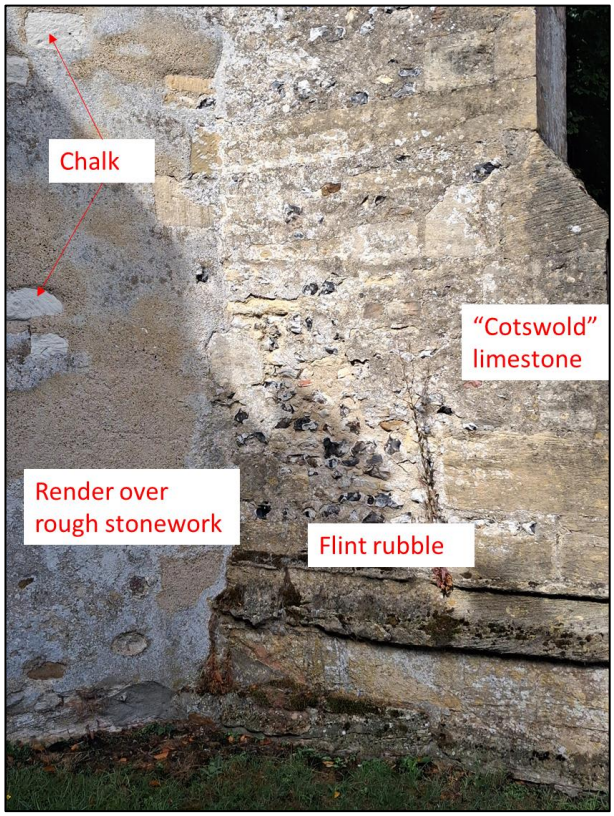


Figure 7. Buttress of St Michaels & All Angels Church, showing mix of building stone used in construction.

Afternoon session in Fognam Quarry

(Location SU 296798, 80249, RG17 8RB, w3w///milkman.emulated.changed)

After lunch we drove to this SSSI area in the abandoned quarry south of Fognam Farm and noted the rich biodiversity. The sunshine had returned and we explored the fossils present in the nodular chalk of the New Pit Chalk Formation. Members were successful in finding examples of terebratulid brachiopods, ammonites and possible fragments of inoceramid bivalves.

Lesley highlighted the importance of hard grounds, two of which were visible and represented periods of slower sedimentation and possible uplift of the chalk. These were hard to discern over much of the face but could be seen at the far western end (Fig. 8) as alternations of more massive, cemented units (starred on Fig. 8) and more rubbly, nodular chalk.

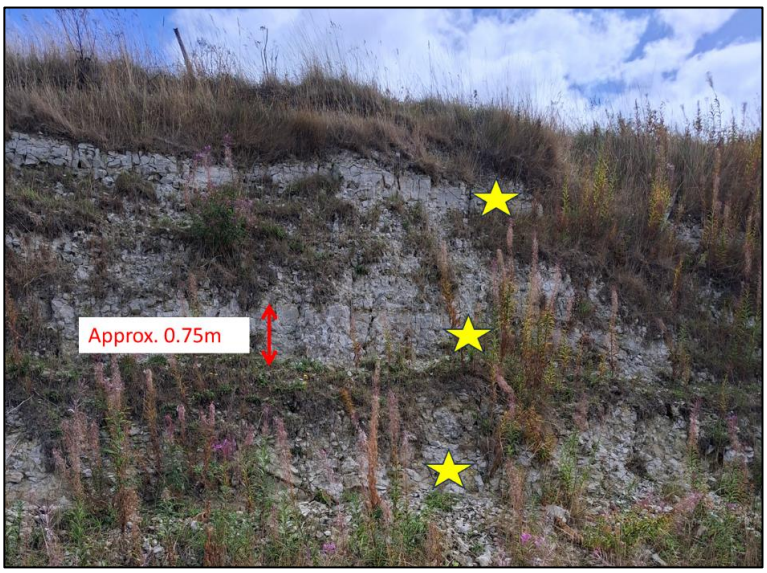


Figure 8: View of quarry & hardgrounds. Stars indicate massive, cemented units associated with hardgrounds.

Conspicuous by their absence were flint bands. Only one large nodule was observed in the cliff face (Fig. 9), with a small scattering on the slope below. Lesley also noted the presence of pyrite nodules, as small 1-5cm rounded dark concretions which could be found at the western end of the quarry.

Figure 9: Isolated flint nodule in chalk (to left of key).

Afternoon session on Fognam Down

Location to the northwest of the quarry and south of Ashdown House (SU 290807)

The aim of this session was to observe the location of some very large sarsens and debate their mode of transport which one of the Wessex members noted was most likely due to solifluction (*pers comm.* Professor Roger Cordiner). They appear throughout the Lambourn Valley and valleys to the west of Lambourn but not in valleys further east. Many hundreds can be seen in the fields in front of Ashdown House. Holes found within them could be due to roots of magnolia-like trees or to pebble scouring.

Lesley noted the work of Professor Peter Worsley on the large sarsens found in Wiltshire (Worsley P. 2019) (Worsley P. 2021), which include wider discussion of the geological, geomorphological and geochemical evidence to support theories of how, where and when different silicified concretions formed.

The unconformity between the end of the Cretaceous to the start of the Upnor Formation of the Lambeth Group spans 15Ma. Sarsens here rest on top of the karsted chalk surface, are derived from the Reading Formation and consist of river fill sands and allied distributary channels, within which siliceous concretions can be found as progenitors of sarson stones. The silicification of the sarsens here has been dated as 55.5Ma during the Paleogene-Eocene thermal maximum (PETM) just prior to the end of the deposition of the Reading Beds.

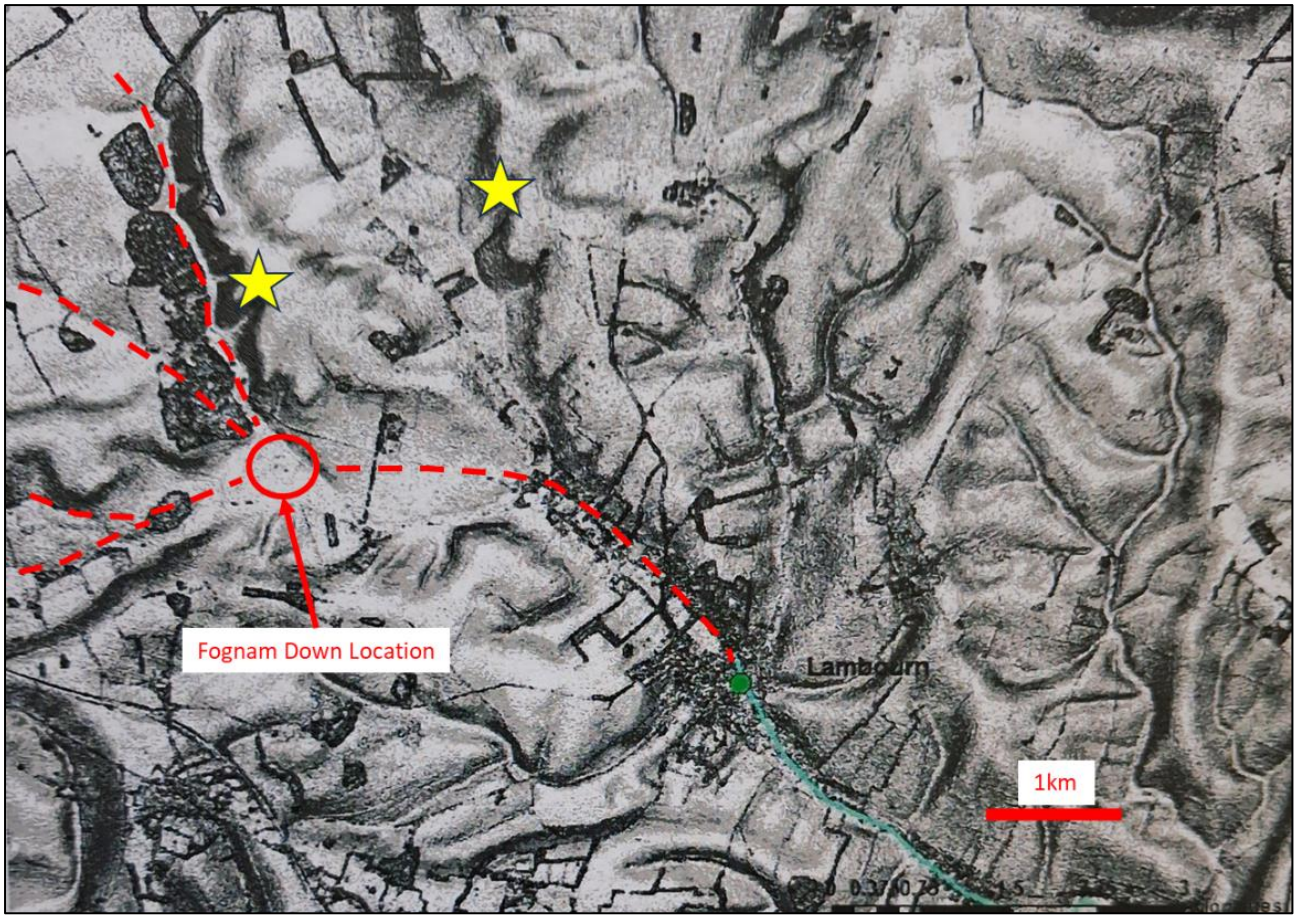


Figure 10: Digital elevation model (provided by Lesley Dunlop). Shows location of Fognam Down at confluence of valleys, and preferentially steep slopes (starred) on northeast side of dry valleys.

Figure 11: Isolated sarsens within a field.

The concentration of sarsens appears to be at a confluence of three valleys draining from the northwest and west (Fig. 10). The presently dry valleys are noted by the preferentially steep slopes

on the northeast sides (starred in Fig. 10). The reason for this was unclear, but Lesley suggested it might relate to preferential freeze-thaw, solifluction and erosion on slopes more southerly-facing.

The sarsens in the Lambourn Valley formed during a periglacial period during the Quaternary and although it would have experienced flash floods from the margins of the ice sheet it is more likely that the loess-like matrix, in which the sarsens accreted, acted as a slide plane during solifluction, before being eroded away. The final location of sarsens appears both as a result of natural (Fig. 11) and man-made (Fig. 12) activities.

Figure 12: Sarsen in field northeast of Fognam Quarry on top of man-made round barrow.

The field trip concluded here. Tessa thanked Lesley for giving the group her time and the benefit of many years working in the Lambourn area. Copies of the BCG guide and of Lesley's notes were distributed for further reading.

***Lesley Dunlop** is a Geologist with over 40 years of experience who has most recently worked at Northumbria University lecturing in geophysics, geology, and geoconservation. In recent research she has used techniques such as palynology, ground penetrating radar and passive seismics. In addition to this she has led many field trips in the UK and Western Europe for universities, geology groups and others. Also, Lesley is currently Chair of the Geological Society of London's Geoconservation Group, the Northern Regional GeoConservation UK, and the English Geodiverity Forum and is active in local groups in Berkshire and Oxfordshire as well as ProGEO (International Geoheritage).*

References

Berkshire Geoconservation Group (2019) Ed. Dunlop L. *Building Materials of Berkshire*.

Dunlop, L. & Greenaway, D. 2011. Around the 3 Valleys: An exploration of the geology, landscape and history of Lambourn, Kennet and Pang valleys in West Berkshire.

Worsley, P. 2021. The Sarsens of the West Woods, Marlborough Downs and Stonehenge. *Mercian Geologist*, v.20, p. 120-129.

Worsley, P. 2019. Geology of the Clatford Bottom catchment and its sarson stones on the Marlborough Downs, *Mercian Geologist*, v19, p. 242-252.

Photographs

Angela Snowling & Nick Stronach

FGS Lecture Summary

12 September 2025

On Friday, 14 September 2025, 22 FGS members welcomed Prof. Ian Jarvis to The Methodist Hall and 10 on Zoom including members of other associated societies including Reading, Harrow & Hillingdon, & Mole Valley.

"Defining and refining the geological time scale: integrated stratigraphy for the last 77 Myr of the Mesozoic Era".

***Prof. Ian Jarvis** is an Emeritus Professor of Geochemistry of the Dept. of Geography, Geology & the Environment at Kingston University London and Chair of the sub-committee for Cretaceous Stratigraphy.*

Review by Katherine Rusbridge

If you are very observant and know where to look, you might be able to find a disc on an exposed rock face with the letters **GSSP** on it. The letters stand for **Global Boundary Stratotype Section and Point.** The disc is the globally-agreed marker of the lower boundary of a stage in a geological sequence.

Background

By the mid to late 19th Century, the Cretaceous period had been divided into twelve stages, based almost exclusively on the fossil record, often the appearance of new forms of ammonite. In 1977, the **International Commission of Stratigraphy** set about refining these boundaries, by including techniques where necessary not available to the earlier geologists. The process is based on working groups who collect and assess data. They pass a recommendation to the relevant sub-committee who vote on whether to accept the findings. It is then passed up through the hierarchy and is finally accepted by the **Union of Geological Sciences**. Then and only then is a **"golden spike"** driven into a chosen rock face marking the lower boundary of a stage. (*See Ref. 1 as a general summary*)

Establishing a GSSP

In simple terms, you can think of the process of getting to the stage of hammering in the golden spike in three stages. Firstly, you need to identify primary and supporting markers for the bottom of a geological stage in one location. Secondly, you need to confirm that this is consistent with similar sections at different locations – in other words that this does represent a Global Boundary. Lastly, you need to choose a suitable location for the actual spike, typically this would be in a nature reserve or geopark. It would be no good to choose a quarry which could be flooded after a few years.

Techniques used

The fossil record is still an important primary marker at many locations in deciding where one stage ends and another starts – but there are also other approaches available now and our speaker took us through those in detail. The following is just a simplified summary of two of these.

Paleomagnetism: this relies on the fact that the polarity of the magnetic field of the Earth has reversed many times during its history. In other words, the magnetic North Pole changes to be close to the geographic South Pole and similarly the magnetic South Pole changes to be close to the geographic North Pole. The minerals deposited during one of these reversals will align in the opposite sense to normal, making in effect a time-barcode of magnetic polarities in sections of rock. This is particularly useful for the GSSP project as the signature is the same everywhere, whereas the evolution of ammonites may have been different in different conditions.

Comparison of the concentrations of two stable carbon isotopes, specifically C12 and C13. Their concentrations are expressed as their ratio, referred to as δC13. Its value in sedimentary rock samples is controlled by the processes of photosynthesis in the surface regions of oceans and the subsequent sedimentation of the organic material. The chemical reactions of photosynthesis favour the uptake of C12, the lighter of the two isotopes, hence the δC13 value in sedimentary rocks is generally different from that in the atmosphere. However, the complicated interactions of changes to the climate, atmospheric composition and burial of C12-rich organic material can alter the proportion of C13 in sea water and hence in the sedimentary rocks formed at that time. It is beyond me to explain these processes. The key point is that the changes to the isotopic carbon signature of rocks is a useful indicator in chronostratification. (*See Ref. 2 for details*)

Finding the GSSP for the Campanian - Santonian boundary

The talk concentrated on identifying the lower boundary of the Campanian stage, in the Upper Cretaceous Series. In the 1850s when this boundary was first defined, it was based on the fossil record in the Champagne region of northern France which included a wide range of bivalves and ammonites. Over time and as more locations were researched, doubt was cast on these as valid primary markers.

The primary marker is now the magnetic polarity of the rocks. It is defined by the end of an unusually long period of magnetic stability, referred to as Chron C33r. This makes it very distinctive, unlike at other times when the magnetic polarity changed more frequently so that the record, conventionally displayed as black and white bands, really does look like a barcode.

A secondary marker is an “excursion” in the δC13 value. This is shown in Fig. 6 of Ref. 3. for Bottaccione near Gubbio in Italy (Bottaccione was chosen as the site of the GSSP). It does not look that distinctive to the untrained eye, however it is more obvious at auxillary sites notably Seaford Head, sufficiently so to be included as a secondary marker.

There are also 20 indicators in the fossil record which help to confirm the boundary level. See Ref. 3 from page 13.

To justify the status as Global Boundary, the same primary marker and most of the secondary markers must be present at other sites. Seaford Head has already been referred to above. The others are Bocieniec (Poland), Postalm (Austria), Smoky Hill, Kansas (U.S.A), Tepayac (Mexico)

With all the data assembled (see Ref. 3) the point for the GSSP golden spike was ratified in October 2022. The actual insertion of the golden spike was on July 26th 2023. This was a significant event and there was quite a ceremony for the occasion, with the Chair of the International Subcommission on Cretaceous Stratigraphy and the Chair of its Campanian Working Group amongst others having the honour of helping to hammer the spike into place (Ref. 4).

References

1. https://stratigraphy.org/gssps/
2. https://en.wikipedia.org/wiki/%CE%9413C
3. https://stratigraphy.org/gssps/files/campanian.pdf
4. https://cretaceous.stratigraphy.org/news/campanian-ceremony

---

9 January 2026

On Friday, 9 January 2026, 28 members welcomed Tom Sharpe on Zoom. The FGS together with members from other associated societies including Reading, Harrow & Hillingdon, & Mole Valley enjoyed an excellent talk.

“Mary Anning and her Sea-Dragons”

***Tom Sharpe** is a graduate of the universities of Glasgow and Leicester, and is a Fellow of the Geological Society, a Chartered Geologist, and a Fellow of the Museums Association. He was Curator of Palaeontology and Archives at the National Museum of Wales for 35 years and taught geology classes and led fieldtrips for the lifelong learning departments of the universities of both Cardiff and Bristol. Subsequently, he worked in the expedition travel industry, mainly in the polar regions. He is a past Chair of the History of Geology Group of the Geological Society and has published on the history of the geological exploration of Antarctica, and on Henry De la Beche, William Smith and Mary Anning.*

Summary by Tom Sharpe

Perhaps the most iconic image of early nineteenth century palaeontology is *Duria antiquior [An earlier Dorsetshire]*, a c.1830 reconstruction of Jurassic life in Dorset (Fig.1). Its centrepiece is a large ichthyosaur munching through the long neck of a plesiosaur while another species of ichthyosaur snacks on a fish, *Dapedium*. Pterosaurs fly through the air, although one unfortunate beast is being snatched out of the sky by a plesiosaur. Ammonites float on the sea's surface, and the sea floor is littered with dead shells and bones. Amongst them, coprolites accumulate as they drop from the rear-ends of many of the reptiles and fish. Drawn by Lyme Regis geologist Henry De la Beche (1796–1855), *Duria* features many of the animals found as fossils by his friend, Mary Anning for whose benefit these lithographic prints were produced and sold.

Figure 1: Duria antiquior by H.T. De la Beche, lithograph, c.1830.

Mary Anning (Fig.2) was born on 21 May 1799 in Lyme Regis. She was the fifth of the nine children of Richard Anning (1766–1810) and his wife Mary Moores (1763–1842) and was named after a four-year old sister who had burnt to death at home at Christmas 1798. Only two of the Annings' nine children survived to adulthood. Richard Anning was a carpenter and cabinet maker who had moved

to Lyme in the early 1790s when the town was growing as a popular tourist destination, as the middle classes sought the health benefits of sea bathing. Good coach connections with Bath and Bristol brought tourists who, then as now, wanted souvenirs to take home to remind them of their visit. Richard supplied them with 'curios' from the foreshore rocks – fossils (Refs: Torrens 1995; Sharpe 2020).

Lyme Regis sits at the southern end of the long swathe of the Jurassic outcrop which stretches from the Yorkshire coast through the East Midlands, Oxfordshire and Gloucestershire to Somerset and Dorset. The eastward regional dip of these rocks on the Dorset coast exposes Lower Jurassic (Lias) strata in the west, with successively younger beds at shore level eastwards around Lyme Bay so that by the Isle of Portland Upper Jurassic rocks form the coastal cliffs. This section is now part of the Jurassic Coast UNESCO World Heritage Site. Cretaceous rocks overlie the Jurassic strata unconformably, overstepping onto older beds westwards. In the vicinity of Lyme Regis, the Blue Lias Formation, an alternating sequence of thin mudstones and limestones has its base in the uppermost Triassic but is mostly Hettangian–Sinemurian in age. This is overlain by the Sinemurian–Pliensbachian Charmouth Mudstone Formation where mudrocks dominate. The Lias beds are internationally renowned for their fossils which have been collected for over 250 years (Ref: Sharpe 2024).

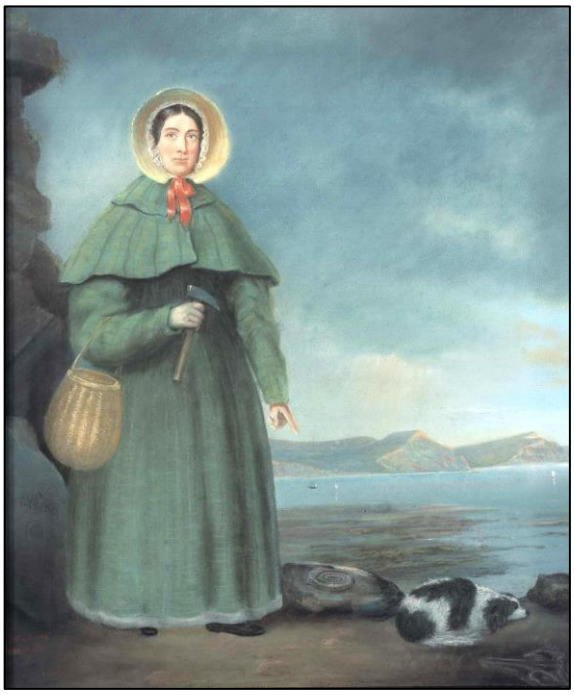


Figure 2: Mary Anning by B.J.M. Donne, 1850. Reproduced courtesy of the Geological Society.

The cliffs around Lyme are famously unstable and landslips are a major feature of the coastal geomorphology, especially at Black Ven between Lyme and Charmouth to the east. Fresh fossil-bearing rock is in almost constant supply as it tumbles or slips to beach level, especially after heavy rains and winter storms when the sea erodes the base of the cliffs. Cliff retreat at Lyme Regis has been of concern to the townsfolk since the early nineteenth century when erosion was exacerbated by foreshore quarrying of the Blue Lias limestone ledges and cliff retreat began to bring down graves from the churchyard above. However, this combination of natural erosion and stone extraction gave rich pickings to fossil hunters such as Richard Anning and his family.

There is some evidence to suggest that Richard Anning's fossil business was doing well; in 1808–09 the family moved house, Richard took out a lease on a plot of land, and he contributed to a fund for a sea wall to protect part of the town. So, the family was not as poor as we have previously thought. But everything changed in November 1810 when Richard died of consumption following a fall on Black Ven. Then poverty struck; with debts and no income, his widow with her three children, Joseph, Mary and a newborn, Richard (who survived a little over a year), was reliant at times on parish poor relief. A chance sale of an ammonite by young Mary to a woman fossil collector offered hope of further financial relief and may have encouraged Mrs Anning to continue with the family fossil business from the autumn of 1811, if not earlier.

Ichthyosaurus

In the autumn of 1811 Joseph found the large skull of what was then thought to be a fossil crocodile, and about twelve months later his sister recovered parts of the post-cranial skeleton. This specimen they sold to a local collector, Henry Hoste Henley (1766–1833) for £23 which must have gone some

way towards alleviating their debts. Henley passed the fossil to William Bullock (c.1773–1849) for his new museum on Piccadilly where it was seen by the comparative anatomist Everard Home (1756–1832) of the Royal College of Surgeons who described it in the *Philosophical Transactions of the Royal Society* in 1814. Between 1814 and 1820 Home published six papers in the *Philosophical Transactions* as he tried to make sense of this new fossil animal using further examples, mostly from Lyme Regis, as they came to light during that period. One, a near-complete specimen discovered by the Annings in 1818 and purchased by Colonel Thomas James Birch (1768–1829), showed that the animal had four paddle shaped limbs. By 1819, Home decided that this new fossil animal was related to *Proteus*, the salamander, so he named it *Proteosaurus*. However, a year earlier, Charles Konig (1774–1851) of the British Museum had named it *Ichthyosaurus*, and that name was readily adopted by Henry De la Beche (1796–1855), an enthusiastic young geologist in Lyme Regis, and a friend of the Annings.

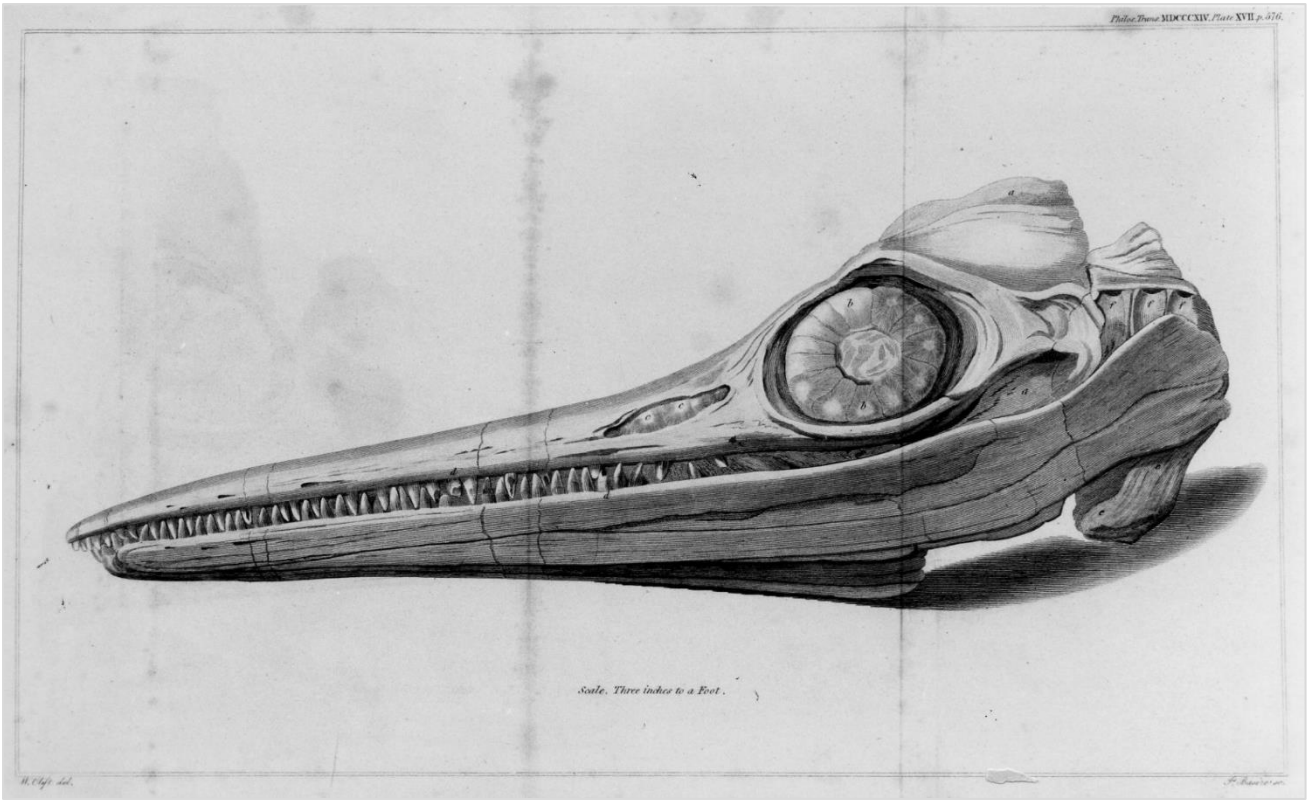


Figure 3: Ichthyosaur skull found by the Annings in 1811 and figured by Home in 1814.

From 1818 De la Beche studied a range of ichthyosaur material in the possession of fossil collectors in the southwest and was able to identify three species on the basis of their teeth: *Ichthyosaurus platyodon, I. communis* and *I. tenuirostris* and recognised that amongst the bones he had examined were some which belonged to a different fossil animal. During the course of his research, De la Beche met William Daniel Conybeare (1787–1857) in Bristol and in 1821, with only partial skeletal material available, they named this new fossil reptile *Plesiosaurus*, although Conybeare had considered calling it *Engistosaurus birchii* as the best specimens were in the collection of Colonel Birch who had probably obtained them from the Annings (Ref: De la Beche and Conybeare 1821). In the summer of 1819 Birch visited the Annings and found them in such financial difficulties that they were about to sell their furniture to pay their rent. To help them, Birch sold his fossil collection, mostly of fossil bones from Lyme Regis, and gave them the proceeds.

From about 1820, Mary Anning junior seems to have become the major figure in the family business, newspaper reports in May 1821 mentioning ‘Miss Mary Anning’ by name and describing her ‘as this persevering and successful collector of extraneous fossils’, implying a reputation built up over a

number of years prior to this discovery. Little of the Annings' correspondence survives from this time, but in a letter to Charles Konig at the British Museum in 1821, Mrs Mary Anning tells him, 'I am a widow woman and my chief dependence for supporting my family being by the sale of fossils'. This suggests that while her daughter searched the shore for fossils, Mrs Anning dealt with their sales. In fact, we see references as early as April 1813 to 'Mrs Anning's curiosity shop', and as she was also Mary Anning, it is possible that pre-1820 mentions of 'Mary Anning' may refer to Mrs Anning. Joseph had by about 1817 finished an apprenticeship and was working as an upholsterer, although he maintained an involvement in the family fossil business.

Although known locally in Lyme as the 'discoverer of the *Ichthyosaurus*', Mary Anning's association with that first specimen found in 1811–12 and described by Everard Home in 1814 was quickly lost in scientific circles. Having passed from Henley to Bullock to the British Museum in 1819, the fact that the specimen had been found by a couple of children was not worth recording. A hundred and fifty years would pass before the Annings' first ichthyosaur was recognised in the Natural History Museum.

Plesiosaurus

On 10 December 1823, at the foot of Black Ven, Mary Anning discovered the fossil that firmly established her fame, the first near-complete *Plesiosaurus* (Ref: Sharpe 2025). Although a skull had been found in the Lias of Somerset and was described by Conybeare in 1822, Anning's new fossil was the first to show that the small head of *Plesiosaurus* was attached to its body by an unexpectedly long neck. Anning notified her friend, Oxford geologist William Buckland (1784–1856), of her discovery and sent notice, with a sketch, to several of her clients, including Sir Henry Bunbury (1778–1860), James Johnson (c.1764–1845) in Bristol, and Colonel Birch. Word had also reached the Duke of Buckingham (1776–1839), probably via Buckland who was then asked to go to Lyme to examine the specimen on the Duke's behalf. This he did in January 1824, stopping on the way to inform Conybeare in Bristol. Once in Lyme, Buckland asked Anning to send a drawing to Conybeare who received it on Friday 30 January 1824, just in time for it to be shown at a meeting of the Bristol Philosophical Society that evening. The first announcement of the specimen appeared in the Bristol newspapers, which recorded that 'this hitherto unknown animal was lately discovered at Lyme, by Mary Anning, and, at the recommendation of Mr. Buckland, has

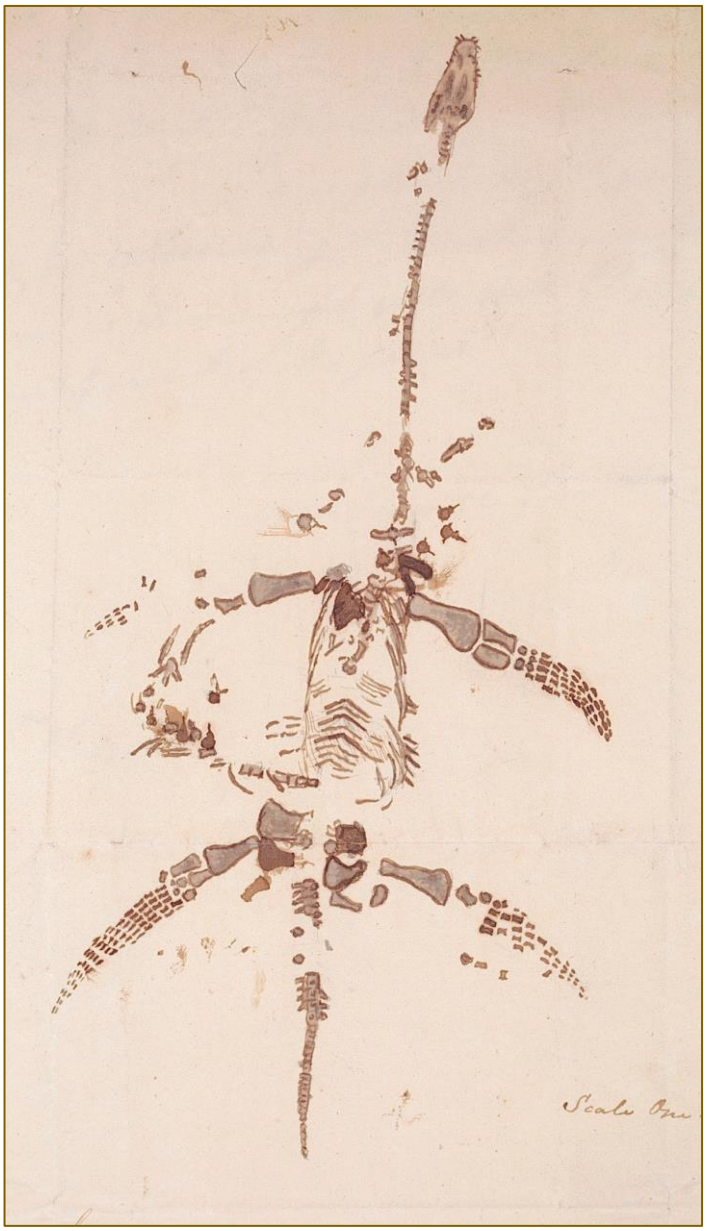


Figure 4: Mary Anning's sketch of her 1823 plesiosaur.

been purchased by the Duke of Buckingham. The price was £110, an unprecedented price paid for a fossil.

The Duke agreed that the specimen could be exhibited at the Geological Society, so Buckland arranged for Anning to send it by sea from Lyme to London and for Conybeare to travel to London to meet it, lest it fall into the hands of Everard Home. Conybeare arrived in London on 5 February, but the ship was delayed and the specimen did not arrive until about 18 February. Fortuitously, this was just in time for a regular meeting of the Geological Society on 20 February. The meeting was much anticipated; in a letter to Adam Sedgwick (1785–1873) at Cambridge, Conybeare told him, 'I have been waiting in town a fortnight to examine two perfect specimens of the Plesio Saurus which turn out to be the most wonderful wonder ever discovered having a neck as long as its body & tail together … the crates are at length arrived & I expect an overflowing meeting at the G.S. on Friday Evg to be lectured thereon'.

Interestingly, Conybeare refers to two specimens. Anning had found a second *Plesiosaurus*, just a week after the first. It was missing its head and two limbs, but the vertebral column was largely complete. This was purchased by Buckland and is still in the collections at Oxford. In fact, there was a third *Plesiosaurus* found in Lyme Regis in December 1823, this by retired naval officer Captain Henry Waring (1771–1837), a day before Anning found her near-complete specimen. Waring's *Plesiosaurus* was purchased in July 1824 for George Cuvier's museum in Paris where it remains today.

When Anning's specimen arrived at the Geological Society's apartments, then at 20 Bedford Street in Covent Garden, there was a problem. Measuring ten feet by four feet, the fossil proved impossible to carry upstairs to the meeting room. As anticipated, the meeting was packed with members and guests keen to hear Conybeare's paper, but he had to give much of his account with the specimen in the narrow hallway downstairs. Named by Conybeare (1824) *Plesiosaurus dolichodeirus* for its long neck, the specimen remained at Bedford Street for several months before being taken to the Duke of Buckingham's house at Stowe.

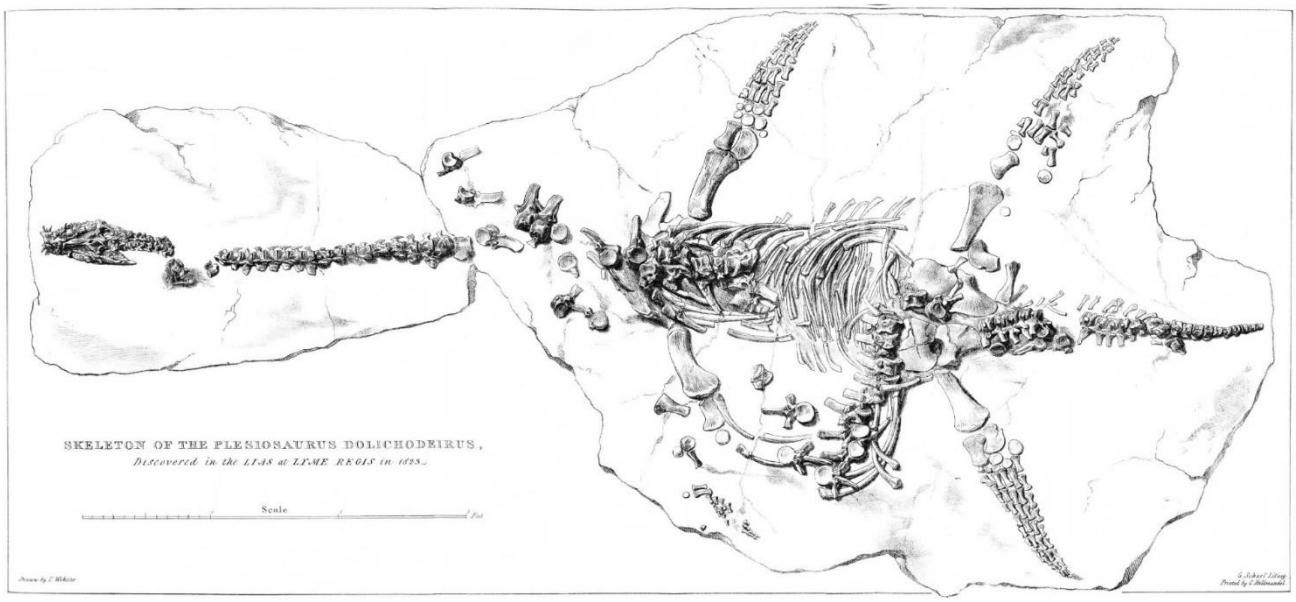


Figure 5: Plate of Plesiosaurus dolichodeirus, Transactions of the Geological Society, 1824.

The fossil had caught the attention of artist and collector George Cumberland (1754–1848) in Bristol who had seen a drawing Anning had sent to Cumberland's friend James Johnson. He was not convinced that the body and the long neck belonged to the same animal, especially as they were on separate blocks of rock. Cumberland copied the drawing and sent it to Charles Konig at the British Museum for his opinion. In his reply, Konig told Cumberland that he had seen the specimen and that

it was ‘no doubt perfectly genuine, in spite of the apparent disproportion of the parts’. Cumberland next sent a drawing to Europe’s leading comparative anatomist, Georges Cuvier in Paris and got Johnson to do the same. Conybeare had also been in contact with Cuvier who, spurred on by Cumberland’s letter, queried if Conybeare was sure that the specimen was not a mix of several individual animals. Conybeare reassured Cuvier that it was indeed a single animal with a uniquely long neck, so by the end of April 1824, newspapers could report that ‘the great Cuvier … congratulates the British Nation on having such a grand specimen, and says that the contents of the blue lyas at Lyme are so numerous and extraordinary, that he shall not be surprised at any discovery that may be made there’.

Despite Cuvier’s support for Conybeare, Cumberland remained unconvinced. Cumberland’s doubts were not in any way directed at Mary Anning whom he had met and whom he respected but were motivated by his personal animosity towards Conybeare. The pair had been engaged in an acrimonious dispute in a Bristol newspaper about *Ichthyosaurus* so Cumberland saw the plesiosaur’s neck as an opportunity to discredit and humiliate Conybeare, if he could find the support of others, especially Cuvier. However, some at the Geological Society meeting in February 1824 must also have shared Cumberland’s concerns that the neck and body belonged together as it seems that the specimen was taken apart for examination. The novelty of the long neck – there was no animal known like this – necessitated careful scientific scrutiny. Within the joint between the block of rock with the body and that with the neck, a fossil shell was found, seemingly as part and counterpart, showing that the blocks did indeed fit together and that the neck and body were from one animal.

What Mary Anning knew of the debate at the time is unclear, but her discovery of this remarkable animal and Cuvier’s endorsement, cemented her fame as a fossilist and that of Lyme Regis as a repository of spectacular fossils. Amongst the visitors who flocked to Lyme over the next few years were Charles Lyell who accompanied French geologist Constant Prévost who was on a mission for Cuvier to buy specimens for the Paris museum.

When Anning found a further fine example of *Plesiosaurus dolichodeirus* in 1829 she was keen that it be offered to the British Museum. Word had reached her that Konig had been offended not to have had first refusal of her 1823 specimen. The museum bought the new specimen for £100, but in so doing turned down the pterosaur she had discovered in December 1828, although this was subsequently purchased through the intervention of William Buckland.

Yet another plesiosaur, this time a new species, turned up in early 1830 and was snapped up by one of Anning’s long-standing clients, William Willoughby Cole, Lord Cole (1807–1886), who paid the record sum of £200 for it. It was subsequently described by Buckland as *Plesiosaurus macrocephalus*.

In 1848, Anning’s 1823 *Plesiosaurus* joined her 1829 specimen at the British Museum when it was bought for the museum by Buckland for just eight guineas at the auction of the Duke of Buckingham’s collection. In the 1880s, Anning’s *Plesiosaurus macrocephalus* joined them when the museum acquired the collection of Lord Cole, by then the 3rd Earl of Enniskillen. All three plesiosaurs, together with the skull of the 1811 ichthyosaur, and other ichthyosaur specimens, including a large specimen found in 1832 and acquired by the British Museum through its purchase in 1834 of the collection of Somerset collector Thomas Hawkins (1810–1889), can be seen in the Natural History Museum today.

Palaeontology’s Black Swan

Since antiquity, a common metaphor for an impossibility was ‘a bird as rare upon the earth as a black swan’. Everyone knew that all swans are white, so a black swan is impossible. That was until 1697 when a Dutch ship sailed into the mouth of a river in Western Australia and met with something completely unexpected – an abundance of black swans.

The long neck of the first near-complete *Plesiosaurus* was a complete surprise and so unlike any animal living today that it is understandable that Cumberland, even without the motivation of his dislike

for Conybeare, along with Cuvier and others found it hard to believe that it was real. Such a long-necked animal seemed impossible. But once it was clear that this animal did indeed possess a neck as long as the rest of its body, and restorations such as *Duria antiquior* portrayed its life appearance, palaeontological minds were opened to a more ready acceptance of further, even stranger, fossils discovered later in the nineteenth century. In that the plesiosaur's neck was a surprise beyond normal expectations, that it had a major impact on palaeontology and could, with hindsight, be rationalised, it can be argued that Mary Anning's discovery meets the criteria of a Black Swan Event (Ref: Taleb 2010).

References

- Conybeare, W.D. 1824. On the discovery of an almost perfect skeleton of a Plesiosaurus. Read February 20, 1824. *Transactions of the Geological Society of London, Second Series,* v.1, 380–387.
- De la Beche, H.T. & Conybeare, W.D. 1821. Notice of the discovery of a new fossil animal, forming a link between the Ichthyosaurus and Crocodile, together with general remarks on the osteology of the Ichthyosaurus. Read April 6, 1821. *Transactions of the Geological Society of London, First Series,* v.5(2), 559–594.
- Sharpe, T. 2020. *The Fossil Woman A Life of Mary Anning*. Wimborne: The Dovecote Press
- Sharpe, T. 2024. The Early Jurassic Sequence of Lyme Regis, Dorset, England and its place in the history of geology and palaeontology. In Clary, R.M., Pyle, E.J. & Andrews, W.M. (eds) *Geology's Significant Sites and their Contributions to Geoheritage*. Geological Society, London, Special Publications 543, 253–265.
- Sharpe, T. 2025. 'The most wonderful wonder ever discovered': Mary Anning's 1823 *Plesiosaurus. Earth Sciences History,* v.44(1), 29–50.
- Taleb, N. N. 2010. *The Black Swan: The Impact of the Highly Improbable.* London: Penguin Books.
- Torrens, H.S. 1995. Mary Anning (1799–1847) of Lyme; 'the greatest fossilist the world ever knew'. *British Journal for the History of Science*, v.28, 257–284.

AGM Summary

10 April 2026

On Friday, 10 April 2026, 20 attendees in The Methodist Hall and a further 16+ via Zoom welcomed our Chair Mick Caulfield, along with the FGS Committee members, in holding our AGM.

This was followed by a fascinating talk from FGS Member Nick Stronach.

Report by Mick Caulfield, FGS Chair

There were 36 attendees and 1 apology for absence from Mike Millar.

The 2025 AGM minutes were approved with no matters arising.

FGS Treasurer Mike Millar's report was given by our Chair Mick Caulfield. He gave a brief report on FGS Society accounts. The accounts are for 1st December 2024 to 31st March 2026, which covers the change of the financial year in the revised Constitution. Going forward annual accounts will be from 1st April to 31st March. A financial statement was presented and a credit balance of £1,689.13 was reported.

Subscriptions for 2026 have been kept at existing levels, on the assumption that there are no new requests for an increase in expenditure.

As required by the FGS Constitution auditors for the coming year, Mike Mitchell and Liz Aston, were unanimously approved.

Committee members reported on their areas of responsibility. The key items were:

Mick Caulfield, Chair: 2025 was another successful year in terms of

- the monthly talks continue to be of a very high standard,
- finances are in good shape,
- membership is up, which is a positive sign, and
- our Field Trips are varied and in areas of great geological interest, with reasonable attendances.

Mick thanked all the Committee for the excellent work each of them have put in over the past year or so. And gave particular thanks to **Katherine Rusbridge** for taking on the role of Secretary. He also gave a big thank you to **Janet Burton** for continuing to provide refreshments at The Methodist Hall.

Judith Wilson / Katherine Rusbridge, Secretary: 2025 saw 11 meetings, 5 by Zoom and 6 in The Methodist Hall. Attendance varied between 26 to 51, with an average of 36. These include attendees from other geological societies (particularly via Zoom) such as Reading, Mole Valley, Harrow & Hillingdon and Horsham. In addition, 3 committee meetings were held in the year.

Janet Catchpole, Programme Secretary: in a similar way to the previous year, 2025 started on Zoom but moved to The Methodist Hall in April with Zoom an option for members who were unable to get to Farnham. We returned to Zoom in November.

Topics ranged across a variety of geological subjects:

- Jonathan Hannam (FGS) - “The Suez and Corinth Canals – a short history”.
- Dr. Cindy Howells (National Museum of Wales) - “Dinosaurs and Deserts in Wales”.
- Dr. Michael Doel (Sussex Mineral & Lapidary Society) - “Fluorescent Minerals”.
- Dr. Andrew Hart (Atkins Realis) - “Remote monitoring of an active urban mud volcano”.
- Dr. Nick Stronach (FGS) - “What Makes a Good Carbon Sequestration Reservoir?”.
- Dr. Ian Jarvis (Kingston University) - “Building of the International Geological Timescale with examples from the Cretaceous”.
- Dr. Alison Ure (Citizen Scientist) – “Discovery of a Meteorite Impact Crater off the coast of Turkey”.
- Dr. Chris Damon (Geo-Supplies) - “Evolution of the North Atlantic Igneous Province”.
- Ros Mercer (Essex Geological Society) - “Flint – an amazing mineral”.
- Tom Sharpe (Author) - “Mary Anning and her fossil reptiles”.
- Dr. Bob Spicer (Open University) - “Lost Landscapes of Tibet & how they changed the World”.
- Dr. Doreen van Seenus (Kent Geological Society) - “The Toba Super Eruption in Indonesia”.

Zoom has worked well, benefiting older and more distant members but is a disappointment for others. Janet found it easier to get a wider selection of speakers, with Zoom as an option in the winter.

Janet thanked Mike Millar for organising all the IT & Zoom facilities without which the Society would not be able to function.

The 2026 programme is available to view on the FGS website.

The committee have decided to continue to use Zoom for November to March inclusive and then to hold hybrid meetings at The Methodist Hall and on Zoom for the rest of the year. We continue to have a good relationship with the local geological societies of Reading, Harrow & Hillingdon, Mole Valley and Horsham which will continue in 2026 and into 2027.

Sally Pritchard, Membership Secretary: membership stands at 63 having gained 6 new members since March 2025. This represents a 7% increase from last year’s AGM.

We are very sad to report the death of ***John Williams***, who died on the 18 October 2025 after a short illness. John was a long standing, active member of the society who led a number of field trips both in Britain & abroad, including North America & the Cyclades. His last field trip was an interesting & informative Building Stones of Guildford walk, held on a lovely July evening in 2019.

Former member ***Shirley Stephens*** very sadly died on the 4 November 2025 aged 93. She was secretary of the FGS for many years, until around 2011 & a member from the late 1970's. She stopped attending the society some 11 years ago, after the death of her husband David.

We also sadly lost former member ***Kate Jemmett*** on 24 March 2024 after a long illness. For many years she had been an active member of Farnham Geological Society. She loved geology and held the Farnham Geological Society in high regard. She is remembered with fondness and had many happy times on field trips, etc. with the Society.

On behalf of the Society, we send our sincerest condolences to all the family and friends of John, Shirley and Kate.

Tessa Seward, Field Trip Secretary: the **2025 field trips** were well received. We ran **3 one-day field trips** & **1 residential trip:**

- A visit to **The Devils Punch Bowl** in March, led by our Chair, Mick Caulfield. This was an easy and interesting half day walk which traversed the Lower Cretaceous rocks and looked at the various geological and geomorphological features.
- A day trip to the **Lambourn Valley** in August, led by Lesley Dunlop, during which we explored the building materials of Lambourn Village, the springs at the source of the River Lambourn, the chalk and fossils of Frognam Quarry and the Sarsens on Frognam Down.
- A day trip to the **Oxford University Museum of Natural History**, in September which included an introduction by Emma Nicholls to the palaeontology collection and a look behind the scenes of the collection.
- A residential trip to **Anglesey**, in October led by Robert Crossley. During this trip we had the opportunity to examine pillow lavas, the Llandwynn mélange, fossil stromatolites and the Anglesey blueschist.

We have a number of trips planned for **2026**:

Day-Trips:

- 29 April Silcretes in Cobham, Kent. *Leader – Geoff Downer*
- 30 May Up and Down the Greensand. *Leader – Alan Smallwood*
- 18 June Guildford Building Stones walk. *Leaders – Maurice Curry & Mick Caulfield*
- 26 July Building Stones walk around Chichester. *Leader – David Bone*

Residential Trip:

- 20 - 23 October Gloucester (Forest of Dean, Wye Valley, Severn Vale). *Leader – Dave Green*

Our trips were enjoyed by everyone who attended, although FGS attendance on the field trips which ran still averaged at about 7 members, as per 2024.

Discussions were held with Field Trip Secretary of Reading Geological Society. We have agreed on closer communication and members of both societies are generally welcome on each other's trips where space allows.

Our trips are also being publicised to other geology groups to try & ensure that sufficient numbers are reached to make trips viable.

Tessa would like to thank the Committee for their support this year and also our members in general.

Mick Caulfield, Newsletter Editor: the Newsletter is published quarterly with news of Society events, technical and geological news items and the occasional crossword, quiz, cartoon, etc. Mick is pleased to receive articles and summaries of FGS talks and field trips and other geological news from members so please continue to send them.

Bob Rusbridge, Website Report: during the past year, routine updates - newsletters, flyers for talks, field trips, etc. - have been applied to the website but no significant issues have been reported. A total of 40 such changes were made in 2025, 13 so far this year.

Thanks to **Walter Bonnici** for ongoing support. We would be interested to hear from any member with **experience of web maintenance at the HTML/CSS level** who could **spare a little time to assist in updates** and future development of the website. The volume of work is not onerous; it's more about backup and cover when individuals are away. Please contact Bob via the website if interested.

Both hosting and web domain name have been renewed with the same vendor at the same price as previously.

Suggestions for improvement are always welcome and can be made in person or through the contact page on the website.

Mike Millar, IT/Sound: continue to liaise with Janet and Bob to have updated information for the forthcoming meetings on the website.

Set-up Zoom meetings & set-up audio-visual equipment in The Methodist Hall and liaise with speakers regarding meeting arrangements. Send meeting arrangements to Sally for distribution to members & friends.

We are still looking for a volunteer to take over this role, who will be able to investigate possible changes/improvements such as:

- Improve Zoom experience for those unable to attend Methodist Hall meetings.
- Record talks via Zoom and share with members.
- Review whether Zoom is the right tool going forward.

These would need to be considered in terms of their potential cost as well as their feasibility. Please contact **Mike** (mike.millar27@btinternet.com) if you are interested.

Peter Crow, Publicity Report: FGS tri-fold publicity leaflets were again distributed via members of the society and left in the Farnham Tourist Information, Library and Adult Education Centre. Beyond Farnham, copies were also left at the Sussex Mineral Show and the GA Festival. Electronic copies of the FGS leaflet were sent to Farnham, Farnborough and Alton colleges.

The “Round & About” magazine has again offered to support the FGS and have received copies of the current programme of talks.

The Gilbert White Museum will be approached over the summer to see if they would hold some leaflets.

Publicity is a very important function for FGS. Working full-time and juggling other family / domestic commitments, PC is struggling to find the time that the post deserves. **PC is willing to stand again if nobody else is able to take on the role. But he would prefer to step down or perhaps have someone to work alongside him.**

The 2026 Committee was elected by a clear majority of the members present:

• Chair	Mick Caulfield
• Secretary	Katharine Rusbridge
• Treasurer	Mike Millar

- Programme Secretary — Janet Catchpole
- Membership Secretary — Sally Pritchard
- Field Trip Secretary — Tessa Seward
- Newsletter Editor — Mick Caulfield
- Website Manager — Bob Rusbridge
- IT/Sound — *vacant*
- Publicity — Peter Crow
- Without Portfolio — Peter Luckham
- Ad-hoc Member — Liz Aston

Should anyone else like to be considered to serve on the 2026 Committee, **particularly IT/Sound**, **Website Assistant and Publicity** please contact Mick Caulfield (newsletters@farnhamgeosoc.org.uk).

Under **AOB** there was a proposal to make the following FGS members **Honorary Members**:

- Judith Wilson — former Secretary

Judith has given exceptional service to the Society over the last 10 years or so.

The proposal was passed by the vast majority of the FGS members present.

Volunteers were asked to help with the **Churt Fete** on **13 June 2026** and the **GA Festival of Geology** on **7 November 2026.**

Date of next AGM: Friday, 9 April 2027

FGS Lecture Summary

10 April 2026

The following is an overview of the talk presented by Nick Stronach to the Farnham Geological Society on 10 April 2026, after the Society AGM. It is based on a visit to Australia and field observations made in Autumn 2025, but it is not by any means an "expert" view, rather just an extended geotravelogue. Please consult the references herein for further information. Both the talk and this write-up are brief. Please feel free to contact the author with comments, questions or any other follow-up.

The Pinnacles: A Western Australian Enigma

Summary by Nick Stronach

Introduction

Western Australia contains a wealth of sites of geological interest, ranging in age from the deep Proterozoic to the Present Day (Fig. 1). The area of interest for this article is in the thin wedge of sediments on the coast that fringes the Western Australian Proterozoic Craton, which contains rocks of Palaeozoic to Holocene age, but here we are focussing on the Pleistocene. The Pinnacles are part of this Quaternary interval and form an unusual landscape some 150km north of Perth in the Nambung National Park. They contain, as their name suggests, many hundreds of limestone pillars, roughly 2-3m in height, set in a sandy semi-desert landscape (Fig. 2). This covers an area many 10s of km^2, although not continuously. They have caused controversy, and it is only in recent years, with detailed modern study of all of their characteristics, that a consensus appears to be emerging.

Controversy

By coincidence, a LinkedIn thread appeared some months ago on the subject of The Pinnacles, which elicited comments from various people who had visited or had other knowledge. The following are some quotes extracted from this comment thread:

- “The Pinnacles formed as a combination of solution pipes around roots and karst”
- “The majority are residual karst features”
- “Dominated by root casts and remnants of trunks”
- “Roots absorb water the residual pore water is supersaturated with calcite, and the sand grains are cemented together. Not karst”
- “Are they remnants of joint intersections?”
- “Maybe limestone leaching into the cracks in the soil, or even an ancient forest”.

These posts show the variety of opinion and theory of their origin that have been expounded. Further confusion results at the site itself, where the “official” handouts and the displays offer different interpretations (Fig. 3), one emphasising the Pinnacles as solution remnants and the other as the result of preferential cementation around tree trunks. Both do agree, however, that they originated from a rock mass composed of calcareous dune sands.

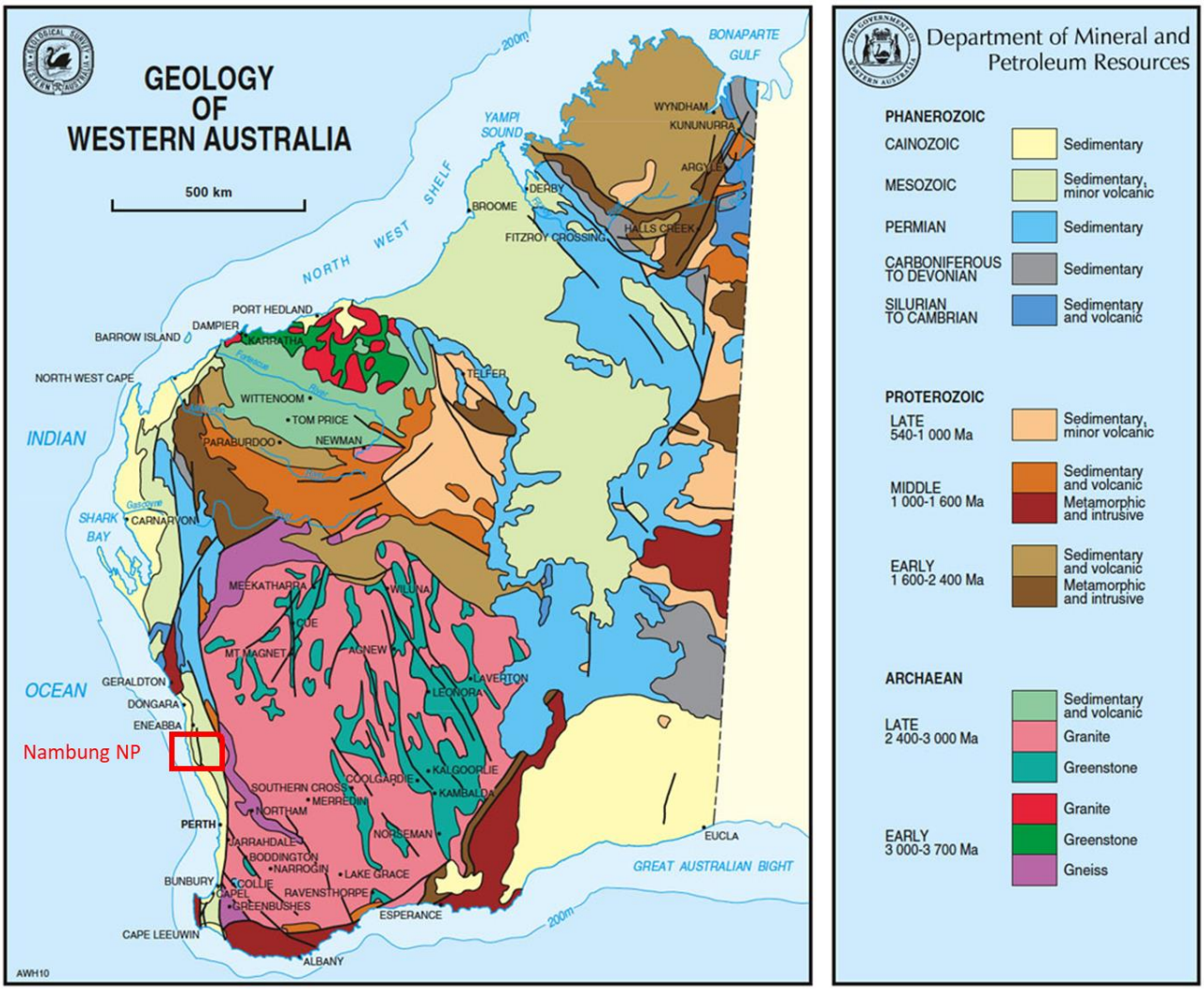


Figure 1. Geological map of Western Australia, showing location of Nambung National Park. Geological Survey of Western Australia, accessed through: https://www.geo.utexas.edu/courses/381R/Western%20Australia03.html/

Figure 2. Overview of Pinnacles. Note the uniformity displayed here is not completely typical. (Photo NJS)

Figure 3. Alternative models of formation presented at Park Visitor Centre. (Display and leaflet materials, Nambung Park Visitor Centre)

What can be observed?

So as with all geological conundrums, the solution lies in making observations from the rocks themselves. What do they show?

Fig. 4 shows the Google Earth image of the area. The Pinnacles can be seen as the small dots in the desert. Overall, they are limestone pillars located within a sandy desert, whose floor is comprised of quartz-rich sand. This image immediately seems to rule out any obvious structural control or alignment to the features. There are clusters, but no clear control on what might determine them. Also seen is a small outlier of younger sediment – more of this later.

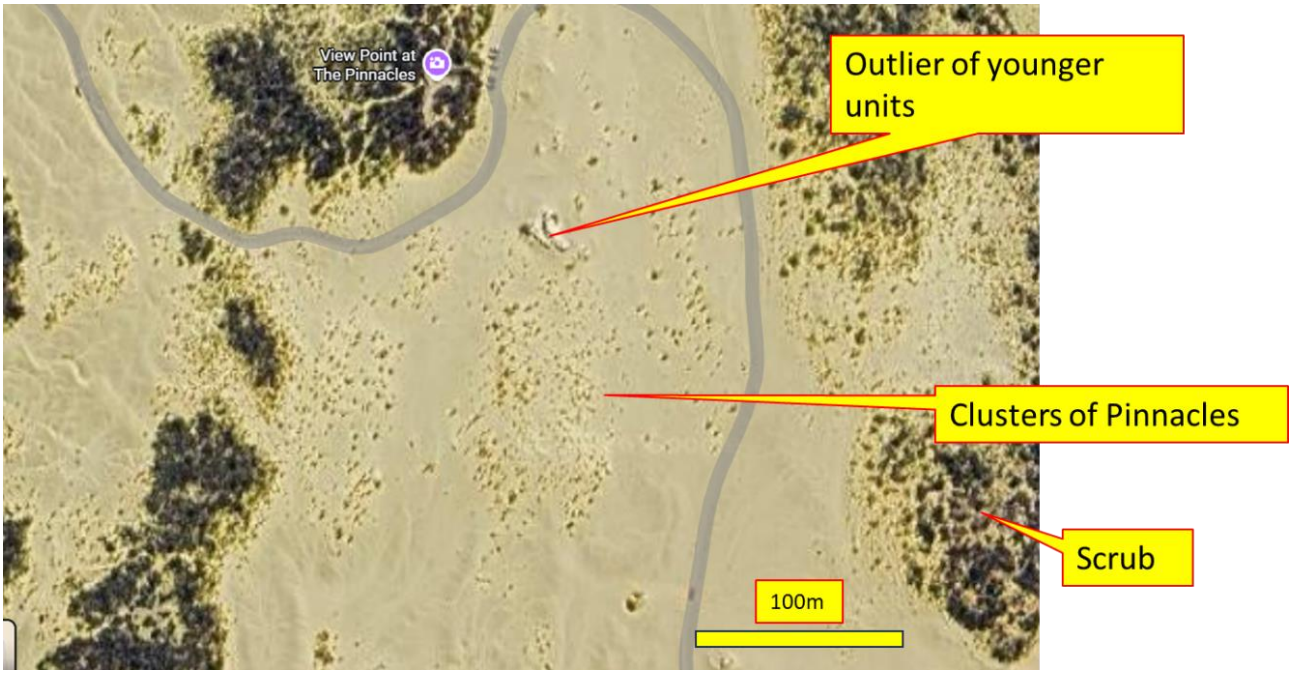


Figure 4. Google Earth image of part of Pinnacles Desert. (Credit: Google Maps website)

Fig. 2, above, shows a view of part of the Pinnacles Desert where there is a great similarity in the size, shape and layering of the pillars over a large area. It seems to indicate that although separate now, they may have been linked as correlative layers. Broadly a lower "base" can be seen, a middle section and a cap composed of cemented rock, possibly inferred as a hard calcrete layer that formed within the original rock. There is some indication of bedding in these Pinnacles, but not obvious, along with the sand texture composed of calcareous shell fragments.

In other areas, however (Fig. 5), the form and size of the Pinnacles is much more diverse and arguments about correlation cannot be so readily made. It is understanding this variation

Figure 5. General view showing area of diverse Pinnacle structure. (Photo NJS)

that is a key to studying their origin.

Fortunately, there are some key features in this second type of Pinnacle where the original laminated rock, comprising a wind or water borne dune lamination, abuts against and is truncated by a later rock mass (Fig. 6). In places the later rock has a vertical, irregular lamination that has been interpreted as a result of microbial lamination, akin to that seen in stromatolites, that may have formed in solution pits developed in the original rock.

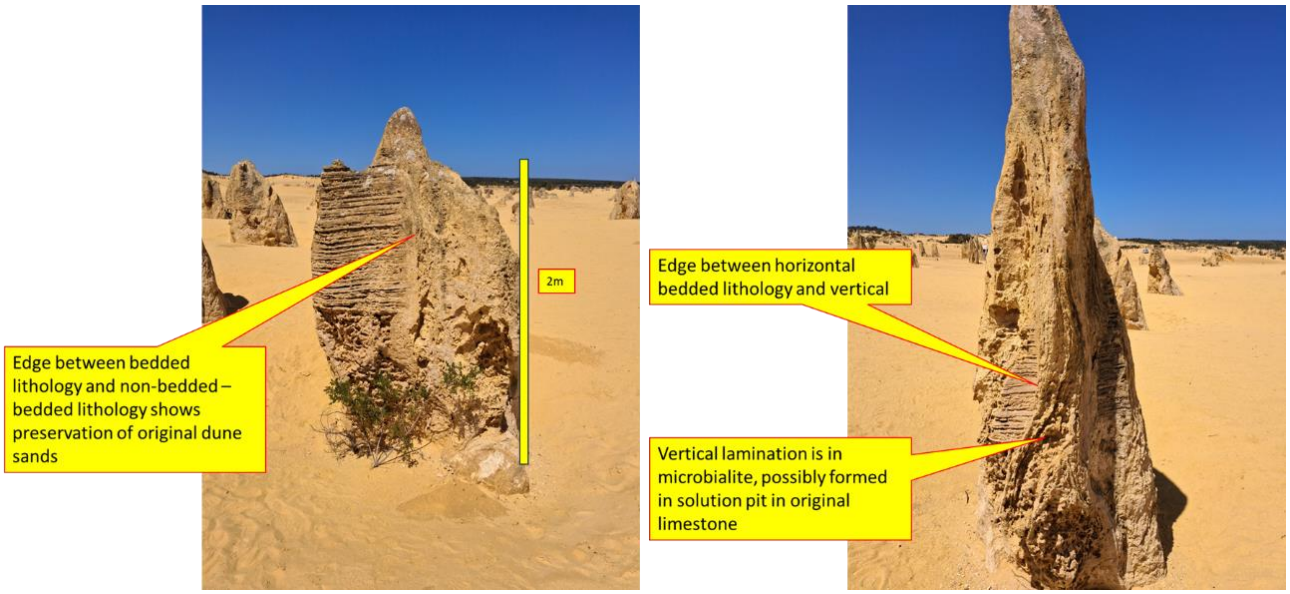


Figure 6. Preservation of original sedimentary structure within Pinnacle, adjacent to ?later cavern/solution pit infill, the latter in part showing vertical microbial lamination. (Photos NJS)

Other features that can be observed within the Pinnacles themselves are the traces of roots as calcite-cemented *"rhizoconcretions"* on the surface of the bodies (Fig. 7). It is unclear if these form part of the mass of The Pinnacles, but it shows that plants were instrumental in the area at some point after their formation.

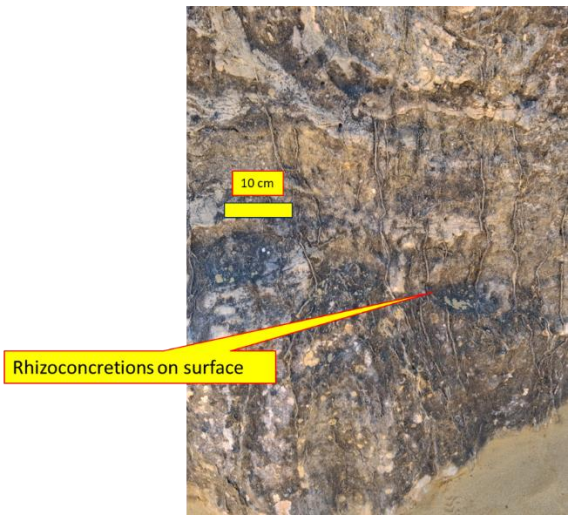


Figure 7. Preservation of rhizoconcretions ("roots") on surface of Pinnacle. (Photo NJS)

Finally, as noted earlier, there is an outlier of younger rock that is comprised of quartzose sandstone, overlain by a small interval of new carbonate dune sands. The former would appear to indicate the source of the sands that now cover the desert floor, as a final piece of the jigsaw.

It is emphasised that the above was gleaned in no more than a few hours walking around the desert and that much more could be, and indeed has been, done *(see below).* But overall, the following would seem to be key features of these enigmatic bodies:

- Preservation of original cross bedding shows the original depositional setting of the limestone as aeolian dunes.
- Two sorts (at least) of Pinnacle
    - i) Those with widespread correlative three layers in limestones – are these a remnant of karst dissolution of more extensive rock layers? They commonly contain a possible calcrete cemented layer on top.

- ii) Local and variable Pinnacles with vertical microbial lamination formed in possible caverns/solution pits, subsequently cemented.
- Rhizoconcretions present on surface of Pinnacles
- Sandstone buried them and then was eroded to leave scattered outliers

Overall model

Fortunately, there is an excellent reference which pulls these and other observations together, which was published around 10 years ago, but not long enough to quell ongoing controversy it seems *(Ref. 1: Lipar and Webb, 2015).*

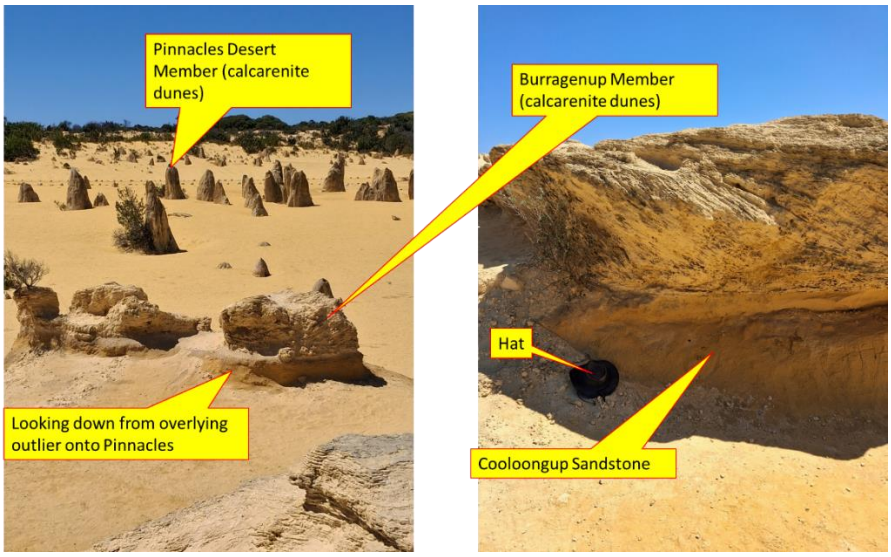


Figure 8. Outlier of younger sediment stratigraphically and topographically above field of Pinnacles. (Photos NJS)

Placing the limestone Pinnacles in their stratigraphic context (Fig. 9), shows them to be part of the appropriately named Pinnacles Desert Member, with the overlying sandstone, whose remains surrounds them, as the Coolongup Sandstone (the intervening Grey Member does not appear to be present in the area of the Nambung National Park). The uppermost unit seen at the top of erosional outliers is the Burragenup Member, a return to limestone sedimentation in most Recent times. All of these are part of regular cycles that characterise the Pleistocene.

As well as placing the units in their proper stratigraphic context, the paper also provides age dating, both of the carbonates and the clastics. This is important because it links the sedimentary cyclicity to that of the Pleistocene glaciation. This is shown on Fig. 9, via the standard Marine Isotope Stages (MIS) *(see, for example, Railsback et al., 2015, Lisiecki and Raymo, 2005)* that are used to divide the Pleistocene. What is significant is that deposition of the Pinnacles Desert Member took place during an interglacial period (MIS 7), and the Coolongup Sandstone in a glacial

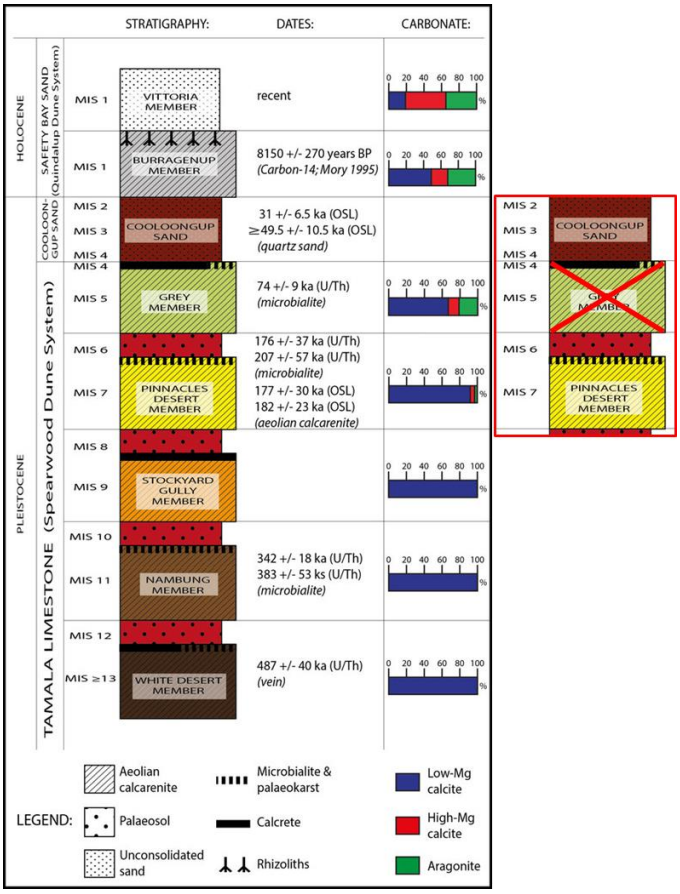


Figure 9. Stratigraphic column of Pleistocene sediments in area of Nambung National Park, (Lipar and Webb, 2015).

period (MIS 2-4), including the time of the Late Glacial Maximum (LGM). Thus, the formation of the Pinnacles in their present form took place in the intervening period.

As it is processes of solution and karst formation which seem mostly to have driven their genesis, it is thought that this would have occurred during relative "pluvial" events of high rainfall. Other literature points to peak monsoonal activity during some of the glacial-interglacial transition phases, notably those in MIS 5.

Although patterns of glacially-generated cyclicity definitely played a part in the various stages of formation of The Pinnacles, there is no simple model. Very broadly however, it is inferred that they formed according to the following model:

Stage 1: Deposition of carbonate sand dunes. MIS 7. Approx 200,000 yrs BP (Fig. 10)

- Interglacial phase therefore high relative sea level.
- Extensive calcareous marine shelf formed from which beaches and wind-blown material as dunes progressed onto the land surface. Fig. 11 illustrates the modern environment that represents this phase.
- Relatively arid, so calcrete cemented layer formed at or near top of dune surface.

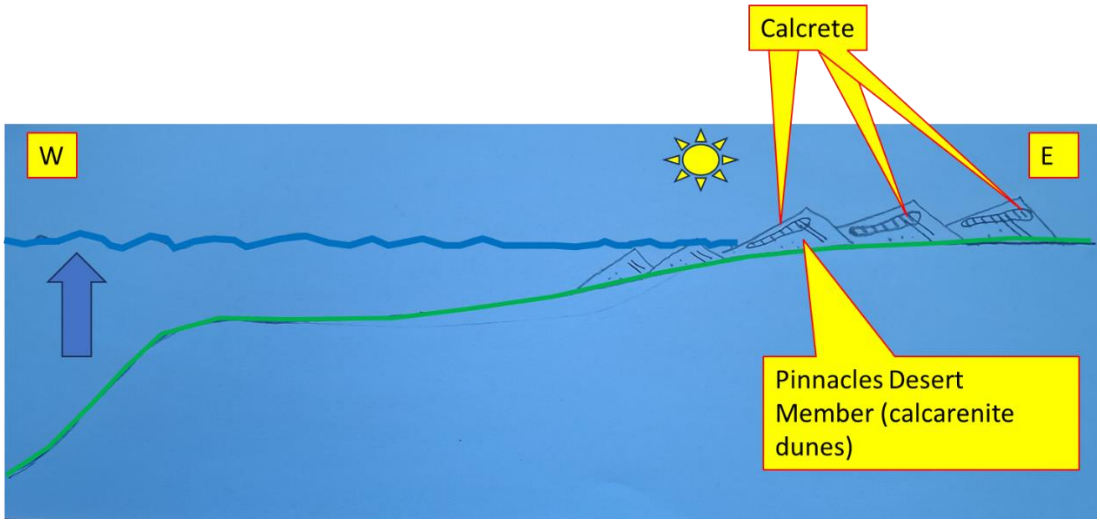


Figure 10. Sketch showing possible configuration during Stage 1 of Pinnacle Formation.

Figure 11. Modern dunes as analogue for Pinnacles Desert Member (minus the sledging holidaymakers!). (Photo NJS)

Stage 2: Solution of limestones. MIS 5. Approx 75,000 – 125,000 yrs BP (Fig. 12)

- Glacial to interglacial transitions therefore relative sea level low but possibly rising. No calcareous sediment supply onto the land surface.
- Lowering of water table, permitting underground flow of water.
- Relatively humid with high rainfall, so solution of limestone proceeded.
- Initial solution is of localised pits. These filled with water in which microbial sediments accumulated, subsequently cemented, along with surrounding country rock, to create hard masses.
- Later more widespread solution leads to wholesale solution of country rock leaving Pinnacles as isolated remnants, both of the cemented solution pits and of relict country rock.
- Localised plant establishment around partially buried Pinnacles.

Stage 3: Burial of Pinnacles. MIS 2-4. Approx 20,000 – 60,000 yrs BP

- Glacial phase therefore low sea level. No supply of carbonate sediment onto land surface.
- Arid, so burial of Pinnacles by terrigenous wind-derived quartz sand.

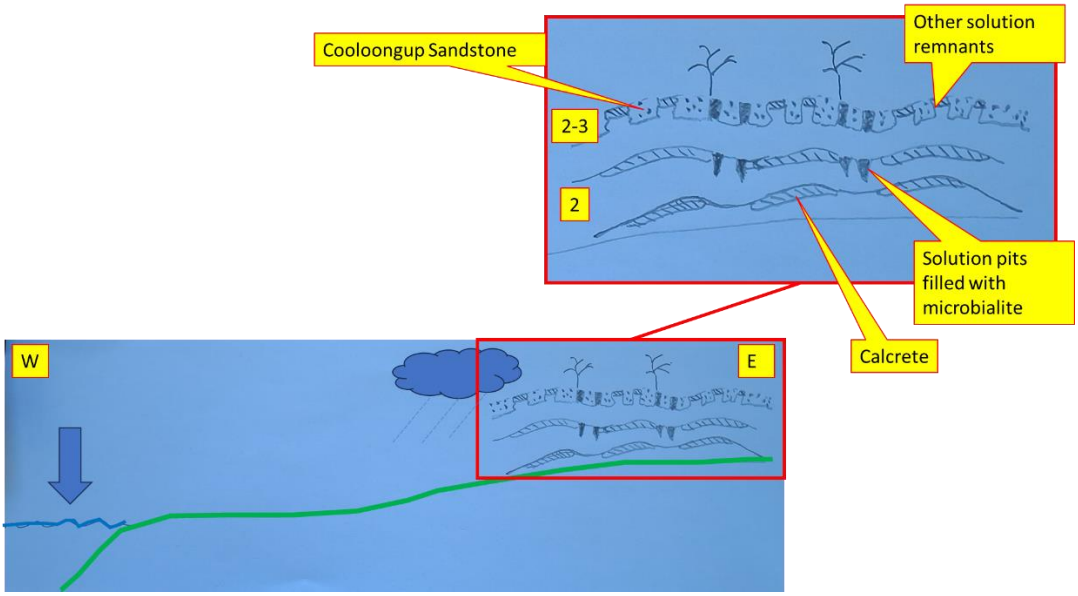


Figure 12. Sketch showing possible configuration during Stages 2-3 of Pinnacle Formation.

Stage 4: Erosion and exposure of Pinnacles. MIS 1. Approx 0 – 5,000 yrs BP.

- Wind and /water erosion to remove most of the sandstone to leave the Pinnacles in their current form.

A traditional view

Thus far this article has considered a geologist's view, but The Pinnacles have long figured in the traditions of the Nyoongar People, the original custodians of this landscape. The Nambung National Park area ("Nambung" means "crooked river") and the Pinnacles Desert contain sacred locations, especially for rites involving solely the women of the society. Apparently, according to legend, young men, intrigued by these activities, would visit secretly and attempt to see what was occurring, incurring the wrath of the gods and being punished by burial alive. The Pinnacles are petrified relicts of their arms, fingers, or weapons being waved in useless appeal to the divine authorities.

Nyoongar tradition talks of a distant time when "the land was soft" and although I have found different versions of the meaning of this, it is possible that it may refer to the time of extensive shifting desert sands, responsible for the burial of the unfortunate young men (and The Pinnacles themselves).

Although this is not definitive by any means, I find it interesting that a society has a cultural memory and legend that reaches back into the geological past, something that we don't have here in Farnham!

Conclusions

- The Pinnacles are a spectacular feature and intriguing in their origin.
- Overall, they are an extreme karst feature formed by:
    - Deposition of carbonate dune sands followed by cementation in an arid environment.
    - Phases of solution to create a relict karst environment, but in multiple stages. Early phases seem to allow deposition of microbial sediment in solution pits before ultimate and more widespread dissolution.
    - Burial by sandstone.
- The phases of their formation can be broadly related to glacial changes in relative sea level and associated shifting climate patterns of rainfall.
- As such they show how glacial cycles, represented in Southern England by advance and retreat of ice sheets, are manifest in a tropical setting.
- Although this overview broadly describes a model of their formation, the reader is referred to the key reference for more information on The Pinnacles. There remain some questions, however and I am sure that the story will not end here…

References:

1. Lipar, M. and Webb, J.A., 2015 The formation of the pinnacle karst in Pleistocene aeolian calcarenites (Tamala Limestone) in southwestern Australia. *Earth-Science Reviews*, v. 140, p. 182-202.
2. Lisiecki, L.E. and M.E. Raymo, M.E., 2005 A Pliocene–Pleistocene stack of 57 globally distributed benthic $\delta^{18}O$ records. *Paleoceanography*, v.20, p. PA1003
3. Railsback, L.B., Gibbard, P.L., Head, M.J., Voarintsoa, N.R.G. and Toucanne, S., 2015 An optimized scheme of lettered marine isotope substages for the last 1.0 million years, and the climatostratigraphic nature of isotope stages and substages. *Quaternary Science Reviews*, v. 111, p. 94-106.

Image Of The Day: Earthset

The Artemis II crew captured this view of Earth setting on April 6, 2026, as they flew around the Moon. As the astronauts flew over the Moon's far side, the crew photographed and described terrain features formed as the Moon slowly evolved over time.

They also noted differences in colour, brightness and texture, which provide clues that help scientists understand the composition and history of the lunar surface.
(Image credit: NASA)

Reference:

https://www.nasa.gov/image-article/earthset/

From The Archive

Enormous fossil collection donated to University of Portsmouth

BBC Science ***1 September 2022***

The collection includes fossil, mineral and rock specimens. (Image: University of Portsmouth)

A collection of more than 5,000 specimens of fossils, minerals and rocks has been donated to the University of Portsmouth.

The items include a plesiosaur thorax, Jurassic starfish, ammonites and prehistoric flint hand axes. They were donated by the widow of renowned geologist Dr. Paul Olver who died last year.

The university's Prof. David Martill said it would be a "fantastic resource" for teaching. The items - some of which dates back to the Proterozoic Eon some 1,500 million years ago - were amassed by Dr. Olver over several decades.

The collection has been brought to the University of Portsmouth where it will be used for teaching earth sciences students. (Image: University of Portsmouth)

Dr. Paul Olver amassed the collection over several decades. (Image: Earth Heritage Trust)

His widow, Susan, said much of the collection was made up of specimens he saved from being "put into the skip" at the closure of the St Mary's College London University geology department in 1995.

Dr. Olver was awarded the **Geologists Association's prestigious Foulerton Award** in August 2021 in recognition of his work in teaching and leading field trips, before his death in October.

Mrs Olver said she wanted the extensive collection to continue to be of value to students in earth sciences.

Prof. Martill from the university's School of Environment, Geography and Geosciences said it took three truck loads to bring the "enormous" collection to Portsmouth from the Olvers' home in Herefordshire. He said it contained "impressive specimens".

"There is a plesiosaur thorax, which is very rare, and often compared with reconstructions of the Loch Ness Monster. There's a beautiful starfish that's split right through the middle so you can see all the little segments in its arms and there's a very impressive ice age mammoth tooth.

"Paul spent his whole life as a dedicated geologist who was passionate about sharing his enthusiasm for earth history with others. It's very fitting that his collection will now be used to inspire our current and future students," he added.

Current palaeontology students are dividing the collection into fossils, minerals and rocks ready for the start of the new academic year.

References:

https://www.bbc.com/news/uk-england-hampshire-62750298

https://www.farnhamgeosoc.org.uk/newsletters/2023_2028/v28n4nov2025.pdf

https://www.port.ac.uk/study/courses/undergraduate/bsc-hons-earth-science

---

DISTANT THUNDER — Onshore exploration

Geologist and science writer Nina Morgan discovers a successful solution to a sticky situation

As suggested by Janet Catchpole

A long- forgotten report, published back in 1962, about the discovery of economically viable amounts of treacle in sediments in Cumbria offers useful lessons for all resource exploration companies hoping to exploit onshore mineral and hydrocarbon resources.

An essential ingredient in puddings, especially those calorie-rich hot puddings, typically prepared under high pressure / high temperature regimes, and served with custard in works canteens during the hottest days in summer, treacle has typically been obtained from foreign sources.

In light of Brexit and with no specific trade deals yet in place to ensure continued supplies of this important culinary resource, the exploration, development and successful extraction of this essential ingredient has now become more important than ever.

Hence, the aforementioned report summarised and quoted below that describes, among other things, the geological history and setting of treacle deposits takes on a new significance.

Geological setting

The formation of native treacle deposits probably occurred sometime between the late Plasticene and early Obscene periods, a time of intense volcanic activity. It was also a time when the great land mammals, such as the ugly plated twenty-one piece dinosaurs roamed the great forests.

Under these volcanic conditions, and in successive cycles of genesis and nemesis around and in the swamps and shallow seas of Cumbria, there was thus ample carbonaceous matter for the production, assisted by the heat from contemporaneous lava flows, of large quantities of sucrose, comatose, dextrose, and ambidextrous, and the subsequent consolidation into treacle bearing schists. These deposits form by far the largest source of economically exploitable treacle deposits.

A typical section includes (from top to bottom) Alluvium and Effluvium; Sham Rock; Short Coal Measures; Lager and Limestone Beds (Carlsberg Series); Treacle Bearing Schists (the target reservoir rock!); Matrimonial Beds (Wedlock Series); Gneiss; Gnasty; Hire Purchase Deposits; and Old Red Flagstone (Stalinite). The schists are to be found immediately above the Matrimonial Beds of the Wedlock Series, from which they are occasionally separated by dogmatic intrusions—though care must be taken to distinguish between these intrusions and the volcanic necks of the Teenage Tuffs.

Where folding of the rock strata has occurred, it is possible that small quantities of the very viscous fluid treacle were previously obtained by the sinking of wells, for while there is frequent reference in folklore to wells, no reliable evidence of springs in the Matrimonial Beds has been found.

Public relations

Onshore exploration, discovery and production of essential mineral resources is one thing. But as companies such as Cuadrilla know only too well, attempts to develop hydrocarbon and mineral resources, particularly in onshore locations, often proves problematic — not least because of environmental objections and public scepticism about the motives of the companies involved. To counter this, establishing good public relations with local communities near the areas affected by the developments is essential. Resource companies with onshore exploration and production programmes need to spend much time and effort in explaining the rationale behind their operations to anyone who will listen and pointing out the benefits that they hope will ensue.

They also need to offer guided tours of the operation sites and be willing to present talks in local schools and community centres.

There is no record of mass protests against the mining of treacle in Cumbria to date. This suggests that the operators of the Cumbrian Treacle mines were extraordinarily successful in their public relations campaigns. And, given that there appears to be no shortage of UK produced treacle, one can only assume that the un-named mining company involved has been able to successfully and economically exploit their treacle resources in an environmentally friendly manner. At any rate—they certainly seemed to have found ways to keep the local population sweet. No fooling!

End notes: The geology and history of the Cumbrian Treacle mines was first described by an anonymous author in an article published in the ***Appleby Frodingham News, 15, no. 2, summer 1962***. I thank Philip Powell of the Oxford University Museum of Natural History for drawing my attention to this article. **I made up the rest!**

Nina Morgan is a geologist and science writer based near Oxford. Her latest book, "The Geology of Oxford Gravestones", is available via www.gravestonegeology.uk

*26 | **APRIL 2019** | WWW.GEOLSOC.ORG.UK/GEOSCIENTIST*

https://geoscientist.online/wp-content/uploads/2022/10/Geo_APRIL2019_WR.pdf

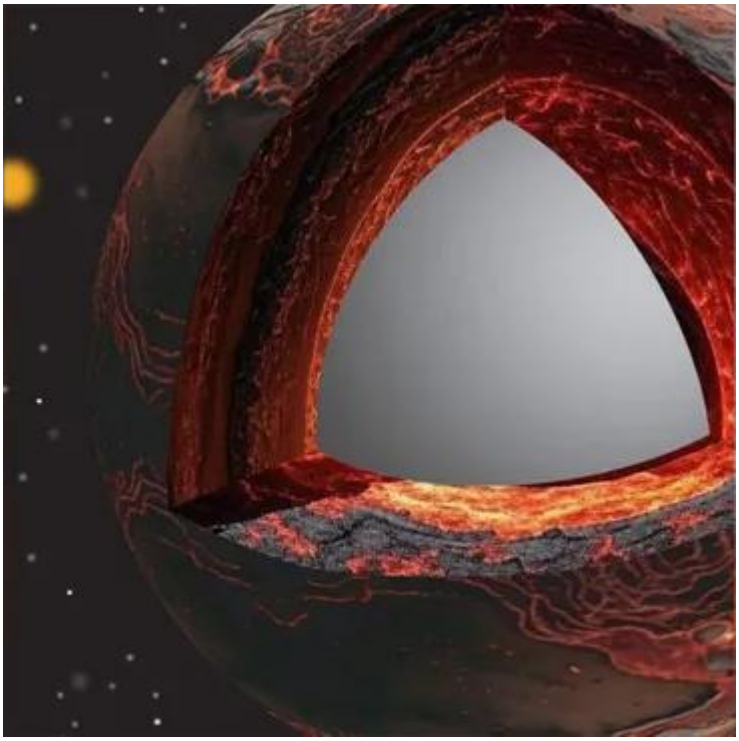
---

News

Mysterious lava puddles in Earth's mantle may hold clues about the origin of life: 'These are not random oddities'

Stefanie Waldek, Space.com ***26 November 2025***

Two perplexing structures deep inside Earth might be ancient remnants of our early planet.



An artist's interpretation of the interior of early Earth. (Image credit: Illustration by Yoshinori Miyazaki/Rutgers University)

Two mysterious blobs deep inside Earth may hold clues about the origin of life on our planet, new research finds.

Deep beneath Earth's crust, in the mantle, lie two continent-sized blobs. These gigantic "lava puddles" cling to the planet's core, some 1,800 miles (2,900 kilometres) beneath the surface — and according to current theories of planetary evolution, they shouldn't be there.

Intrigued by the mystery, researchers sought to better understand exactly what these enigmas are and why they exist.

Humans cannot travel to the centre of the planet to get a good look at this pair of unusual mantle structures, which are located beneath the Pacific Ocean and the African continent. However, scientists can "see" them by measuring seismic waves that travel through our planet. As these waves traverse the mysterious structures, known as large low-shear-velocity provinces and ultra-low-velocity zones, they slow down dramatically, indicating that the structures have some sort of unusual composition compared with the mantle around them.

"These are not random oddities," Yoshinori Miyazaki, a geodynamicist at Rutgers University who led the work, said in a statement. "They are fingerprints of Earth's earliest history. If we can understand why they exist, we can understand how our planet formed and why it became habitable."

In its early life, billions of years ago, Earth was a magma ocean. When that ocean cooled, models suggest, the mantle should have formed distinct layers — not the massive amorphous structures we see today. Miyazaki and his colleagues suggest the answer might lie in Earth's core. If silicon and magnesium leaked from the core into the mantle, that would have created a chemical mixture that cooled unevenly. Thus, the anomalous structures could be early remnants of this "basal magma ocean," providing insight into ancient Earth.

Such core-mantle interactions might have affected the evolution of the planet — including its cooling, volcanic activity and the development of Earth's atmosphere — and thus might explain why the planet can support life, the scientists explained in their research

"This work is a great example of how combining planetary science, geodynamics and mineral physics can help us solve some of Earth's oldest mysteries," study co-author Jie Deng, an assistant professor of geosciences at Princeton University, said in the statement. "The idea that the deep mantle could still carry the chemical memory of early core-mantle interactions opens up new ways to understand Earth's unique evolution."

A paper on the research was published on September 12 in ***Nature Geoscience***.

Reference:

https://www.space.com/astronomy/earth/mysterious-lava-puddles-in-earths-mantle-may-hold-clues-about-the-origin-of-life-these-are-not-random-oddities?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe4763876a779b0361304855882d8f&utm_campaign=58E4DE65-C57F-4CD3-9A5A-609994E2C5A9&utm_medium=email&utm_content=F84AA119-9805-4409-86EE-E6EB89CD02D5&utm_source=SmartBrief

Volcanic eruption triggered 'butterfly effect' that led to the Black Death, researchers find

Kristina Killgrove, LiveScience ***4 December 2025***

A volcanic eruption in 1345 may have kicked off a series of events that led to the Black Death sweeping through medieval Europe.

An unknown volcanic eruption in the mid-14th century may have set the stage for the spread of the Black Death in Europe, according to a new study. By triggering a cool and overcast period in the Mediterranean, the eruption started a domino effect that led to a downturn in agricultural production, which required merchants to import grain — and the bacterium *Yersinia pestis* that causes bubonic plague — via the Black Sea.

The bubonic plague pandemic, more commonly known as the **Black Death**, reached Europe in 1347 and quickly affected Italian port cities. The plague then spread throughout Europe over the next few years, resulting in the deaths of between 30% and 60% of the population.

Martin Bauch, a historian at the Leibniz Institute for the History and Culture of Eastern Europe in Germany, told *Live Science* in an email that one very specific aspect of the plague pandemic intrigued him: "How and why did the Black Death reach Italy from the Black Sea at precisely this moment?"

To answer this question, Bauch and Ulf Büntgen, a geographer at the University of Cambridge, investigated climate-driven changes in the Mediterranean that could explain the sudden appearance of the Black Death in 1347. Their research was published Thursday (Dec. 4) in the journal ***Communications Earth & Environment***.

When combing through contemporaneous historical accounts, the researchers noticed reports of reduced sunshine, increased cloudiness and a dark lunar eclipse, all independently reported by observers in parts of Asia and Europe between 1345 and 1349. All of these astronomical and weather phenomena could be attributed to a large-scale volcanic aerosol layer, which has been known to cause cold spells as the sulfate aerosols reflect sunlight back into space.

Paleoclimate data gave the researchers a clue: High amounts of sulfur in polar ice cores suggested one or more eruptions of a previously unknown volcano around 1345.

"We cannot say very much about the volcanic eruption," Bauch said. "From the ice cores, we know that the eruption must have taken place in the tropics, because sulfate was found in similar concentrations in the ice of both the North and South Poles."

The researchers also looked at tree-ring data from around Europe and discovered that the summers of 1345, 1346 and 1347 were much colder than normal while the autumns were much wetter, causing soil erosion and flooding. Historical records also confirmed that changes in the environment had decreased the yield of a number of crops, including the grape harvest and grain production in Italy, requiring merchants to begin importing products from the Black Sea area to prevent famine.

"Upon return in the second half of 1347 CE, the Italian trade fleets, however, not only brought grain back to the Mediterranean harbours, but also carried the plague bacterium Yersinia pestis most likely via fleas that were feeding on grain dust during their long journey," the researchers wrote in the study.

The first cases of plague in humans were reported in Venice just a few weeks after the arrival of the last grain ships. "This initiates the typical infection cycle," Bauch said. "Rodent populations are infected first; once they die off, the fleas shift to other mammals and ultimately to humans."

Importing grain after several years' worth of volcano-induced climate change therefore prevented a Mediterranean-wide famine but also introduced the Black Death into Europe, the study authors proposed.

"This study brings in new information on the 1345 volcano, which helps explain why the Black Death — that is, the epidemic well-documented in sources from 1346 to 1350 — happened when it did," Monica H. Green, an independent scholar and expert on the Black Death who was not involved in the study, told *Live Science* in an email. "But it happened how it did — with a 'plague infrastructure' of rodents and insect vectors already established — because local reservoirs had already been established."

The onset of the Black Death resulted from a unique-but-random combination of short-term factors, like climate, and long-term factors, like the grain distribution system in Italy, the researchers wrote in the study.

Even though the Black Death resulted from a rare confluence of environmental and social factors, it's important to gain a better understanding of the causes of past pandemics, the researchers wrote, because "the probability of zoonotic infectious diseases to emerge and translate into pandemics is likely to increase in both a globalised and warmer world."

Reference:

https://www.livescience.com/planet-earth/volcanic-eruption-triggered-butterfly-effect-that-led-to-the-black-death-researchers-find?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe4763876a779b0361304855882d8f&utm_campaign=368B3745-DDE0-4A69-A2E8-62503D85375D&utm_medium=email&utm_content=859B0CE2-046A-4BB5-A3D7-ECE7688E31C4&utm_source=SmartBrief

---

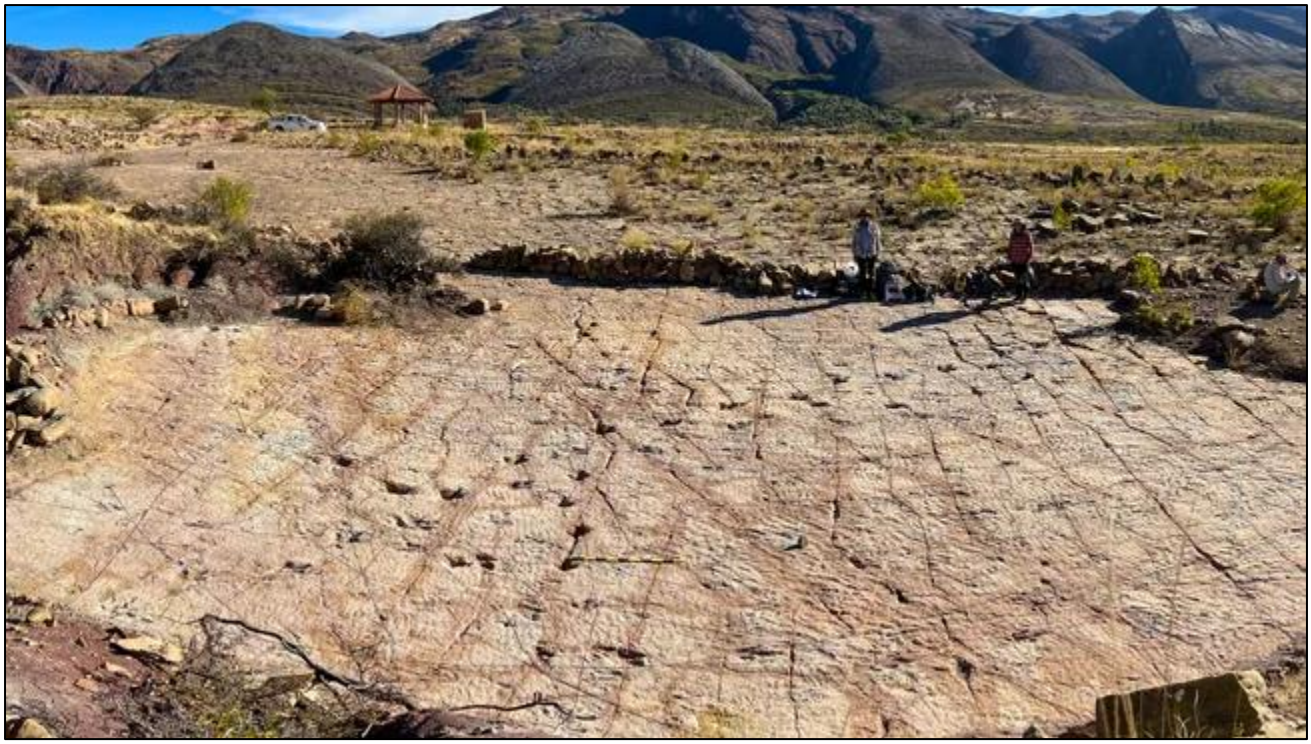
18,000 dinosaur tracks discovered along ancient Bolivian coastline — and they set a new record

Sascha Pare, LiveScience ***4 December 2025***

Researchers have counted 16,600 fossilized dinosaur footprints and 1,378 swim tracks at a site in Bolivia that showcase a variety of behaviours and different theropods from the Cretaceous period.

Scientists have discovered a record-breaking number of fossilized dinosaur footprints and swim tracks in a national park in central Bolivia.

The tracksite sits along what was once an ancient coastline, with ripple marks extending alongside the footprints and other imprints in a northwest-southeast direction, according to a new study. Most of the tracks belong to bipedal, three-toed dinosaurs known as ***theropods*** that lived at the end of the Cretaceous period (145 million to 66 million years ago), but many bird tracks are also preserved, the scientists noted in the paper, which was published Wednesday (Dec. 3) in the journal ***PLOS One***.



With the discovery, Carreras Pampa in Bolivia has become one of the premier dinosaur track sites in the world. (Image credit: Raúl Esperante)

"This is the highest number of dinosaur footprints ever found for a single tracksite thus far," study co-author Jeremy McLarty, a palaeontologist and associate professor at the Southwestern Adventist University in Texas, told ***Live Science*** in an email. "In addition to preserving the most dinosaur tracks worldwide, it also preserves the highest number of swim trackways in the world."

In total, McLarty and his colleagues counted **16,600 theropod footprints** and **1,378 swim tracks**. These were found in Bolivia's Carreras Pampa tracksite, which was already known but hadn't been properly studied or documented.

Carreras Pampa extends across 80,570 square feet (7,485 square meters) in Torotoro National Park. The initial work involved sweeping debris off the dinosaur imprints with brooms, clearing the tracksite of rocks and removing sediment in places where additional tracks were likely to be found.

The team discovered a huge variety of footprint shapes and sizes, indicating that many types of theropod dinosaurs roamed along the ancient coastline. Several tracks had footprints shorter than 4 inches (10 centimetres), which is rare in the fossil record, according to the study. It's unclear if these footprints were made by small theropod species such as *Coelophysis* or by juveniles of larger species, the researchers wrote.

The largest footprints were more than 12 inches (30 cm) long, and the team thinks these may have been made by mid-size theropod dinosaurs such as *Dilophosaurus* or *Allosaurus*. Large theropods such as *Tyrannosaurus rex* and *Giganotosaurus* typically leave 16-inch-long (40 cm) footprints, the researchers noted.

Carreras Pampa is unique because the footprints show different dinosaur behaviours, such as walking, running, swimming, tail-dragging and making sharp turns. "It preserves evidence of several types of unusually preserved locomotive behaviours and preserves one of the highest numbers of dinosaur tail traces anywhere in the world," McLarty said.

Carreras Pampa preserved tracks from theropods, which are bipedal dinosaurs with three toes. (Image credit: Jeremy McLarty (left) and Raúl Esperante (right))

The swim tracks are straight or comma-shaped grooves that often have one or two similar but smaller grooves next to them, McLarty said. The main groove is from theropods scratching the sediment at the bottom of the water with their middle toe, while the smaller grooves are from the other toes. Unlike other sites that preserve only individual dinosaur swim tracks, Carreras Pampa preserves alternating left and right tracks, he said.

The abundance of imprints shows that Carreras Pampa was a prehistoric highway, and the parallel orientation of some trackways suggests some dinosaurs travelled in groups.

Bolivia is known for being a dino track hotspot. "The tracksite with the next highest number of tracks is also in Bolivia," McLarty said. "The Cal Orck'o tracksite is located in an active quarry as a nearly vertical wall and is long and thin. The Carreras Pampa tracksite is spread out across a wider area."

Reference:

https://www.livescience.com/animals/dinosaurs/18-000-dinosaur-tracks-discovered-along-ancient-bolivian-coastline-and-they-set-a-new-record?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe4763876a779b0361304855882d8f&utm_campaign=368B3745-DDE0-4A69-A2E8-62503D85375D&utm_medium=email&utm_content=859B0CE2-046A-4BB5-A3D7-ECE7688E31C4&utm_source=SmartBrief

---

Geology 101

What Are the Different Types of Faults in Geology?

A Complete Scientific Guide to Fault Classification, Mechanics, and Tectonic Significance

GeologyPage

20 December 2025

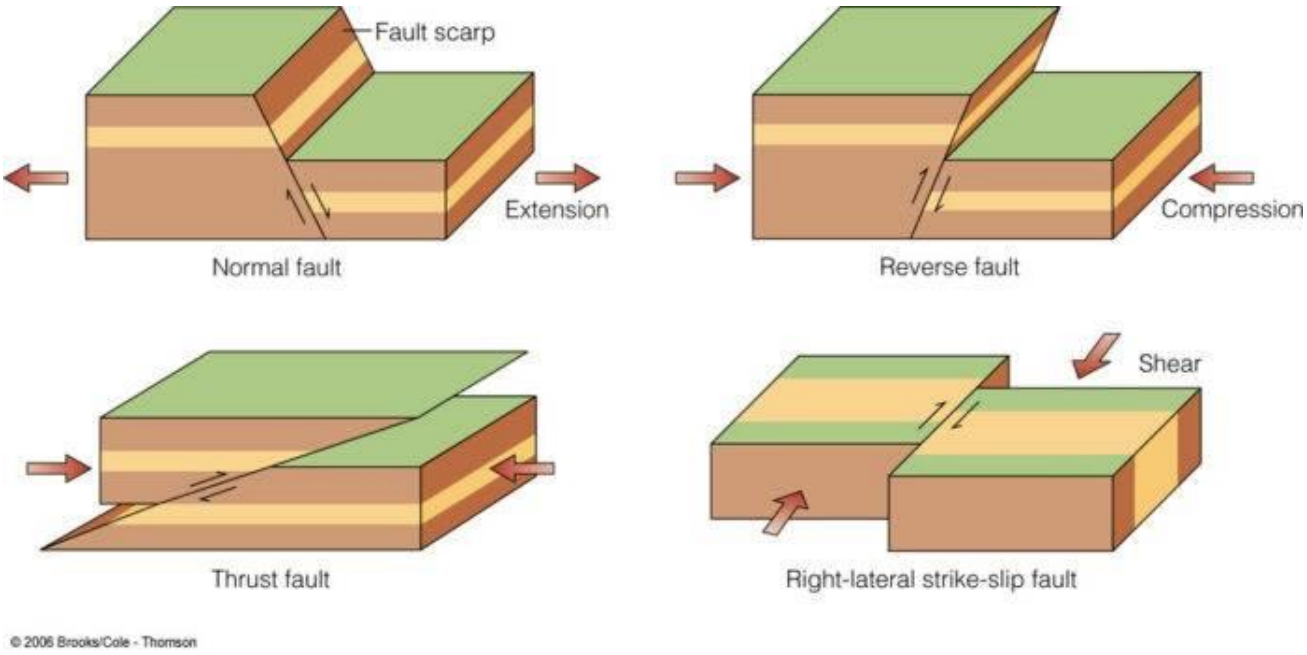
Types of Faults in Geology — How Earth's Crust Breaks, Moves, and Evolves

In geology, faults are fractures or zones of fractures in the Earth's crust along which measurable displacement has occurred. The study of faults is central to structural geology, tectonics, seismology, and engineering geology, because faults control mountain building, basin formation, earthquakes, and the mechanical behaviour of the lithosphere.

Understanding the types of faults allows geologists to interpret:

- Regional and global stress regimes
- Plate tectonic environments
- Earthquake mechanisms and hazards
- Crustal deformation through geological time

Faults are classified primarily based on the direction of movement, orientation of the fault plane, and the stress field responsible for deformation.



Faults, Stress, and Rock Mechanics — The Physical Basis

Before classifying faults, it is essential to understand the three principal stresses acting on rocks:

- σ_1 (maximum principal stress)
- σ_2 (intermediate stress)
- σ_3 (minimum principal stress)

Faulting occurs when applied stress exceeds the shear strength of rocks, as described by the Mohr–Coulomb failure criterion. The orientation of σ_1 and σ_3 determines how rocks break and slide, directly controlling the type of fault that forms.

Main Types of Faults in Geology

Geological faults are grouped into four fundamental categories, each linked to a specific tectonic stress regime.

1. Normal Faults

A normal fault forms when the crust is subjected to extensional stress, causing it to stretch and thin. In a normal fault, the hanging wall moves downward relative to the footwall.

Key Characteristics

- Associated with tensional (extensional) stress
- Hanging wall moves down
- Fault plane typically dips 45–70°
- Produces fault scarps and horst–graben systems

Geological Settings

- Continental rift zones
- Mid-ocean ridges
- Back-arc basins

Geological Significance

Normal faults accommodate crustal extension and are fundamental to the formation of rift valleys and sedimentary basins.

Examples

- East African Rift System
- Basin and Range Province (USA)

Normal faulting dominates regions where σ_3 is vertical and σ_1 is horizontal.

2. Reverse Faults

A reverse fault develops under compressional stress, where the hanging wall moves upward relative to the footwall.

Key Characteristics

- Compression shortens and thickens the crust
- Hanging wall moves up
- Fault plane dips steeply (>45°)
- Commonly associated with folding

Geological Settings

- Convergent plate boundaries
- Continental collision zones
- Active orogenic belts

Reverse faults are crucial indicators of crustal shortening and are often associated with large-scale mountain building.

3. Thrust Faults (Low-Angle Reverse Faults)

A thrust fault is a special type of reverse fault with a low dip angle, typically less than 30°. Thrust faults can transport rock masses tens to hundreds of kilometres.

Key Characteristics

- Low-angle fault plane
- Older rocks may overlie younger rocks
- Formation of nappes and duplex structures

Geological Importance

Thrust faults are dominant in fold-and-thrust belts and represent some of the most dramatic crustal displacements on Earth.

Examples

- Himalaya thrust systems
- Alps and Zagros Mountains

Thrusting reflects a stress regime where σ_1 is horizontal and σ_3 is vertical.

4. Strike-Slip Faults

A strike-slip fault is characterized by horizontal movement parallel to the fault's strike, driven by shear stress.

Subtypes of Strike-Slip Faults

Right-Lateral (Dextral) Faults

- The opposite block moves to the right.

Left-Lateral (Sinistral) Faults

- The opposite block moves to the left.

Key Characteristics

- Vertical or near-vertical fault plane
- Horizontal displacement dominates
- Linear valleys, offset streams, sag ponds

Tectonic Settings

- Transform plate boundaries
- Continental shear zones

Examples

- San Andreas Fault (USA)
- Alpine Fault (New Zealand)

Strike-slip faulting reflects a stress regime where σ_1 and σ_3 are horizontal.

Oblique-Slip Faults

An oblique-slip fault combines vertical and horizontal movement, meaning both dip-slip and strike-slip components are present.

Why Oblique Faults Are Common

Natural stress fields are rarely perfectly aligned, so many faults record mixed displacement.

Geological Significance

Oblique-slip faults are common along:

- Oblique plate boundaries
- Continental margins
- Reactivated ancient faults

Fault Zones vs Single Fault Planes

In reality, most faults are not single surfaces but fault zones, consisting of:

- Multiple fault strands
- Fracture networks
- Fault breccia

- Fault gouge

These zones may be metres to kilometres wide and strongly influence fluid flow, mineralization, and seismic behaviour.

Special Fault Types in Structural Geology

- **Listric Faults**

  Curved normal faults that flatten with depth, common in sedimentary basins.

- **Growth Faults**

  Active during sediment deposition, producing thickened strata on the downthrown side.

- **Detachment Faults**

  Large, low-angle normal faults associated with crustal extension.

- **Blind Faults**

  Do not reach the surface but can still generate large earthquakes.

Faults and Earthquakes

Earthquakes occur when accumulated elastic strain is suddenly released along faults.

- Normal faults → shallow extensional earthquakes
- Reverse/thrust faults → large, destructive earthquakes
- Strike-slip faults → lateral rupture and surface offsets

Fault geometry and slip rate control earthquake magnitude and frequency.

How Geologists Identify and Study Faults

Faults are analysed using multiple complementary approaches:

- Field mapping (slickensides, offsets, breccias)
- Seismic reflection and refraction
- Remote sensing and LiDAR
- Palaeoseismology
- Microstructural analysis

Each method helps constrain fault kinematics and evolution.

Engineering and Environmental Importance of Fault Types

Fault classification directly affects:

- Tunnel alignment and support design
- Dam and foundation safety
- Groundwater flow and contamination pathways
- Landslide susceptibility
- Seismic hazard assessment

Faults often act as barriers or conduits for fluids, depending on their internal structure.

References:

1. Anderson, E. M. (1951). *The Dynamics of Faulting and Dyke Formation*. Oliver & Boyd.
2. Twiss, R. J., & Moores, E. M. (2007). *Structural Geology*. W.H. Freeman.
3. Scholz, C. H. (2019). *The Mechanics of Earthquakes and Faulting*. Cambridge University Press.
4. Fossen, H. (2016). *Structural Geology*. Cambridge University Press.

5. Sibson, R. H. (1977). “Fault rocks and fault mechanisms.” *Journal of the Geological Society*, 133, 191–213.
6. Davis, G. H., Reynolds, S. J., & Kluth, C. F. (2012). *Structural Geology of Rocks and Regions*. Wiley.

https://www.geologypage.com/2025/12/what-are-the-different-types-of-faults-in-geology.html

News

THE CONVERSATION
Academic rigour, journalistic flair

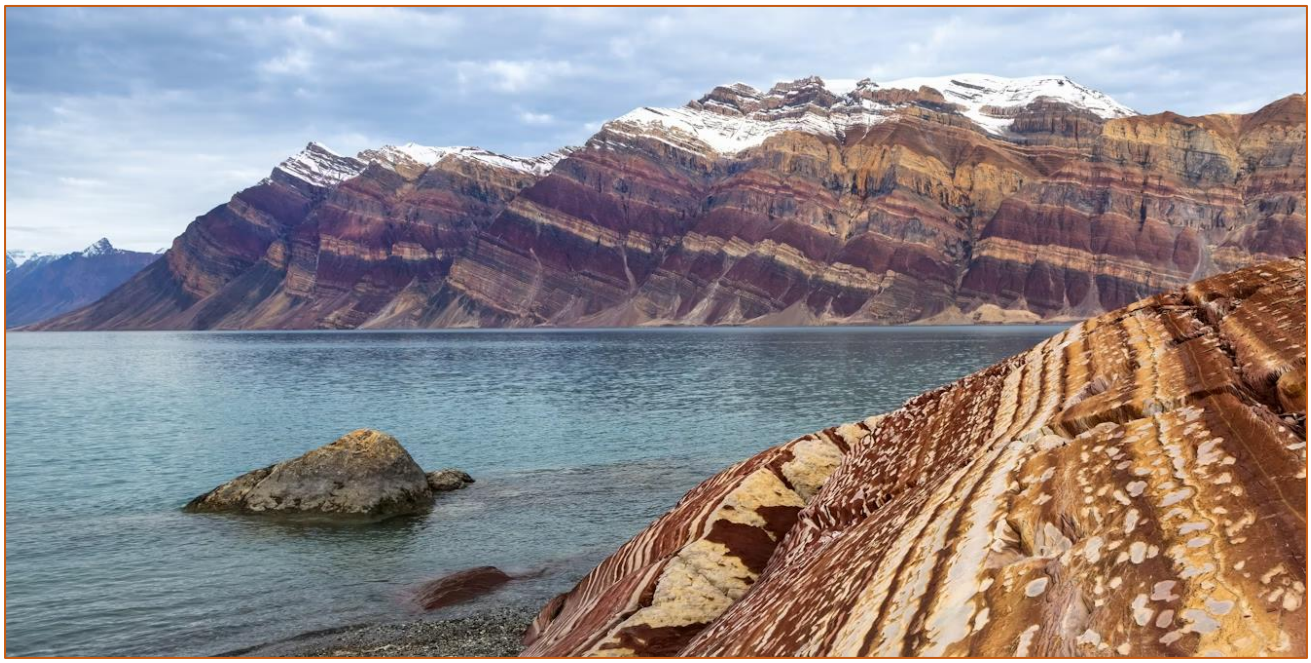
Greenland is rich in natural resources – a geologist explains why

Jonathan Paul, Associate Professor in Earth Science, Royal Holloway, University of London
8 January 2026

Greenland, the largest island on Earth, possesses some of the richest stores of natural resources anywhere in the world.

These include critical raw materials – resources such as lithium and rare earth elements (REEs) that are essential for green technologies, but whose production and sustainability are highly sensitive – plus other valuable minerals and metals, and a huge volume of hydrocarbons including oil and gas.

Three of Greenland’s REE-bearing deposits, deep under the ice, may be among the world’s largest by volume, holding great potential for the manufacture of batteries and electrical components essential to the global energy transition.



Greenland’s concentration of natural resource wealth is tied to its hugely varied geological history over the past 4 billion years. (Credit: Jane Rix/Shutterstock)

The scale of Greenland’s hydrocarbon potential and mineral wealth has stimulated extensive research by Denmark and the US into the commercial and environmental viability of new activities like mining. The US Geological Survey estimates that onshore northeast Greenland (including ice-covered areas)

contains around 31 billion barrels of oil-equivalent in hydrocarbons – similar to the US's entire volume of proven crude oil reserves.

But Greenland's ice-free area, which is nearly double the size of the UK, forms less than a fifth of the island's total surface area – raising the possibility that huge stores of unexplored natural resources are present beneath the ice.

Greenland's concentration of natural resource wealth is tied to its hugely varied geological history over the past 4 billion years. Some of the oldest rocks on Earth can be found here, as well as truck-sized lumps of native (not meteorite-derived) iron. Diamond-bearing kimberlite "pipes" were discovered in the 1970s but have yet to be exploited, largely due to the logistical challenges of mining them.

Geologically speaking, it is highly unusual (and exciting for geologists like me) for one area to have experienced all three key ways that natural resources – from oil and gas to REEs and gems – are generated. These processes relate to episodes of mountain building, rifting (crustal relaxation and extension), and volcanic activity.

Greenland was shaped by many prolonged periods of mountain building. These compressive forces broke up its crust, allowing gold, gems such as rubies, and graphite to be deposited in the faults and fractures. Graphite is crucial for the production of lithium batteries but remains "underexplored", according to the Geological Survey of Denmark and Greenland, relative to major producers such as China and South Korea.

But the greatest proportion of Greenland's natural resources originates from its periods of rifting – including, most recently, the formation of the Atlantic Ocean from the beginning of the Jurassic Period just over 200 million years ago.

Greenland's onshore sedimentary basins such as the Jameson Land Basin appear to hold the greatest potential of oil and gas reserves, analogous to Norway's hydrocarbon-rich continental shelf. However, prohibitively high costs have limited commercial exploration. There is also a growing body of research suggesting potentially extensive petroleum systems ringing the entirety of offshore Greenland.

Metals such as lead, copper, iron and zinc are also present in the onshore (mostly ice-free) sedimentary basins, and have been worked locally, on a small scale, since 1780.

Difficult-to-source rare earth elements

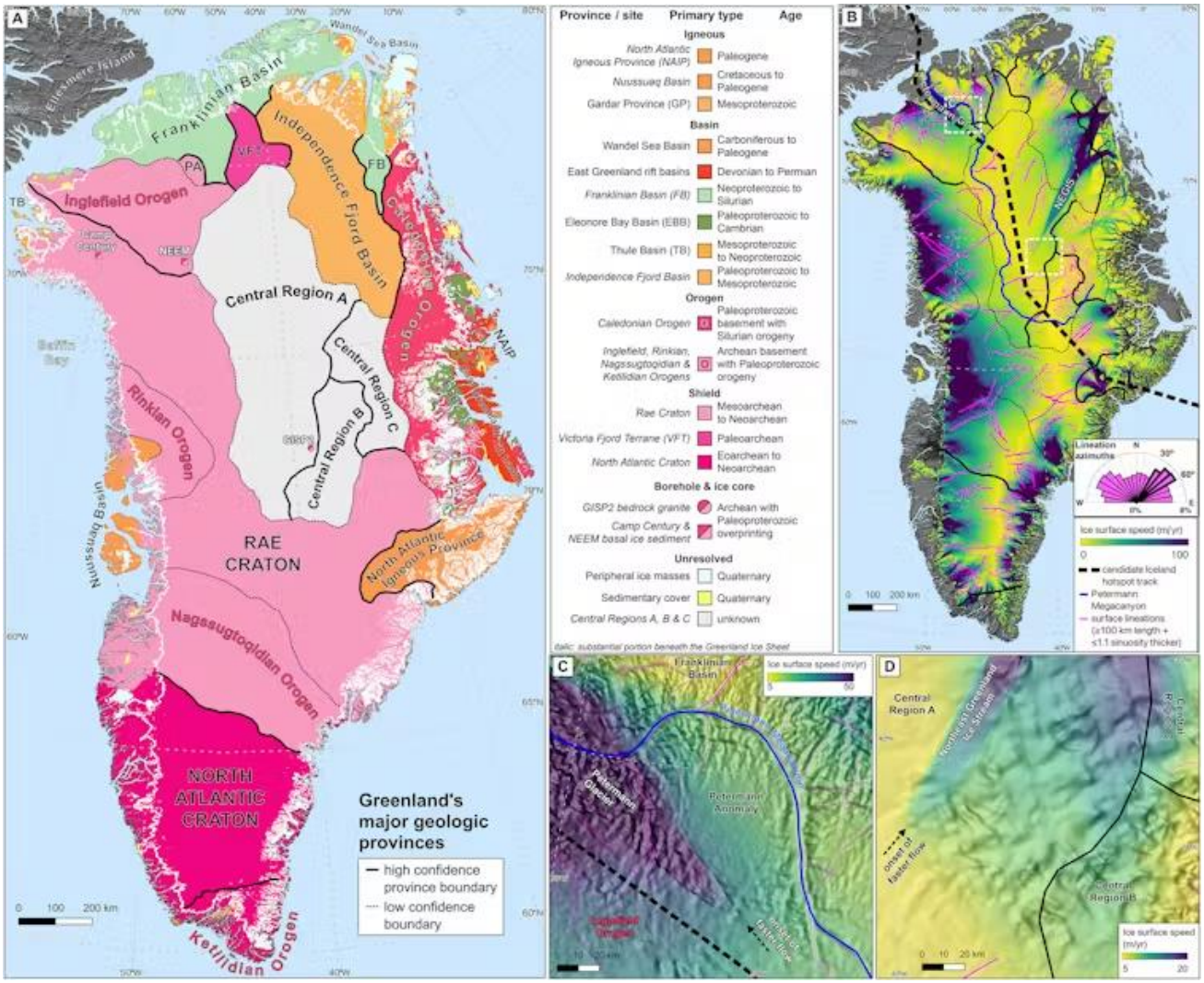
While not as intimately related to volcanic activity as nearby Iceland – which, uniquely, sits at the intersection of a mid-ocean ridge and a mantle plume – many of Greenland's critical raw materials owe their existence to its volcanic history.

REEs such as niobium, tantalum and ytterbium have been discovered in igneous rock layers – similar to the discovery (and subsequent mining) of silver and zinc reserves in south-west England, which were deposited by warm hydrothermal waters circulating at the tip of large volcanic intrusions.

Critically among REEs, Greenland is also predicted to hold sufficient sub-ice reserves of dysprosium and neodymium to satisfy more than a quarter of predicted future global demand – a combined total of nearly 40 million tonnes.

These elements are increasingly seen as the most economically important yet difficult to source REEs because of their indispensable role in wind power, electric motors for clean road transport, and magnets in high-temperature settings like nuclear reactors.

The development of known deposits such as Kvanefield in southern Greenland – not to mention those not yet discovered in the island's central rocky core – could easily affect the global REE market, owing to their relative global scarcity.



Greenland's major geologic provinces with rock types and ages. (Credit: Geophysical Research Letters, CC BY-NC-SA)

An unfortunate dilemma

The global energy transition came about due to increasing public recognition of the manifold threats of burning fossil fuels. But climate change has major implications for the availability of many of Greenland's natural resources that are currently blanketed by kilometres of ice – and which are a key part of that energy transition.

An area the size of Albania has melted since 1995, and this trend is likely to accelerate unless global carbon emissions fall sharply in the near future.

Recent advances in survey techniques, such as the use of ground-penetrating radar, allow us to peer with increasing certainty beneath the ice. We are now able to obtain an accurate picture of bedrock topography below up to 2 km of ice cover, providing clues as to the potential mineral resources in Greenland's subsurface.

However, progress is slow in prospecting under the ice – and sustainable extraction is likely to prove even harder.

Soon, an unfortunate dilemma may need to be addressed. Should Greenland's increasingly available resource wealth be extracted with gusto, in order to sustain and enhance the energy transition? But doing so will add to the effects of climate change on Greenland and beyond, including despoiling

much of its pristine landscape and contributing to rising sea levels that could swamp its coastal settlements.

Currently, all mining and resource extraction activities are heavily regulated by the government of Greenland through comprehensive legal frameworks dating from the 1970s. However, pressures to loosen these controls, and to grant new licences for exploration and exploitation, may increase amid the US's strong interest in Greenland's future.

Reference:

https://theconversation.com/greenland-is-rich-in-natural-resources-a-geologist-explains-why-273022?utm_medium=article_native_share&utm_source=theconversation.com

How Earth's orbit might help us find oil reserves within the planet

Stefanie Waldek, Space.com ***12 January 2026***

Subtle shifts in Earth's orbit shaped ancient lake climates — and where oil-rich shale formed as a result.

Today, science can narrow down potential oil reserves with surprising accuracy — especially when it comes to shale oil, found embedded within sedimentary rock. By studying sediments in China's Sichuan Basin, researchers found that variations in the Earth's orbit can help prospectors better predict where shale oil is most likely to form.

Unlike crude oil, which pools in subterranean reservoirs, shale oil is found within shale rocks. Shale forms from layers of fine sediment deposited in ancient lakes or seas, where low-oxygen conditions allow organic matter to accumulate and, over millions of years, generate oil within the rock.

In the past, shale oil reserves were difficult to pinpoint because scientists lacked a complete understanding of how these rocks formed. The new research fills in a key piece of that puzzle. By combining measurements of different elements in Earth's crust and mantle, rock core observations, and natural gamma-ray data from Jurassic-era lake mudstones, the team reconstructed how environmental conditions changed through time. Those changes, they found, linked up with Milankovitch cycles.

Milankovitch cycles are regularly occurring variations in Earth's orbit and tilt that influence our planet's long-term climate, including the timing of ice ages. The cycle of orbital eccentricity — the stretching and shrinking of Earth's elliptical orbit — operates over hundreds of thousands of years.

The rock record revealed that during periods of high orbital eccentricity, stronger seasonal contrasts produced warmer, wetter conditions that boosted nutrient delivery to lakes. Biological productivity surged, leading to the deposition of finely layered, organic-rich mudstones — the types of rocks most favourable for shale oil.

When eccentricity decreased, the climate shifted toward drier conditions. Lake levels dropped, sediment supply changed, and sand-rich deposits spread across basin slopes and into deeper waters, transported by gravity-driven flows. Together, these alternating wet and dry phases created a predictable stacking pattern of rock types across the basin.

The study also showed that sediment accumulated at an average rate of just over four centimetres per thousand years, allowing researchers to align individual rock layers with specific orbital cycles. Using a newly-developed framework based on this research, scientists can better identify where high-quality shale reservoirs are likely to occur.

It's worth noting that shale oil is not only a fossil fuel, but is also extracted through hydraulic fracturing, or fracking, which carries environmental concerns. Still, until the world fully transitions to renewable

energy, oil will remain a major energy source — and combining astronomy with geology is emerging as one of the most powerful tools for finding it.

The team's research was published in the **Journal of Paleogeography *(Chinese edition)*** on Sept. 30, 2025.

Reference:

https://www.space.com/astronomy/earth/how-earths-orbit-might-help-us-find-oil-reserves-within-the-planet?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe4763876a779b0361304855882d8f&utm_campaign=58E4DE65-C57F-4CD3-9A5A-609994E2C5A9&utm_medium=email&utm_content=C18BCA15-2824-46E0-9CAC-CC02658658CE&utm_source=SmartBrief

---

T. rex took 40 years to become fully grown

An analysis of growth rings in the leg bones of 17 Tyrannosaurus rex individuals reveals that the dinosaurs matured much more slowly than previously thought, and adds to the evidence that they weren't all one species

James Woodford, New Scientist ***14 January 2026***

Tyrannosaurus rex was a late bloomer. (Credit: Science Photo Library / Alamy)

The largest-ever analysis of *Tyrannosaurus rex* fossils suggests the giant and fierce Cretaceous predator was a late bloomer, taking 35 to 40 years to reach maturity.

The findings also further the debate about whether there were several *T. rex* species instead of just one and whether smaller specimens, once thought to be juveniles, are in fact a more diminutive species called *Nanotyrannus.*

Based on studies done two decades ago, it had been thought that *T. rex* reached its maximum weight of 8 tonnes in around two decades and that the animals probably only lived until they were 30 years old.

“The last big *T. rex* growth studies were done in the early 2000s, based on, at most, seven specimens,” says Holly Ballard at Oklahoma State University. “This wasn’t the fault of the researchers, this is just what was available at the time.”

This time, Ballard and her colleagues were able to sample the thigh and shin bones of 17 individuals, ranging in age from juvenile to fully-grown adults, making it the largest collection of growth data ever assembled on *T. rex*.

The scientists studied bone tissue microstructure, including growth rings that form annually like those in a tree trunk. However, the earliest growth rings are destroyed as the bone marrow cavity gets larger, so the team needed access to as many specimens as possible with overlapping growth stages.

“That’s why our sample size and age spread is so important and what makes it different from earlier studies,” says Ballard.

The analysis reveals that *T. rex* grew more slowly than previously thought and that its growth rate was variable depending on environmental conditions.

However, it isn’t possible to determine the maximum age of *T. rex* because once the animals reached maturity, they ceased laying down growth rings. “We can say the most successful *T. rex* lived to about 40, but there were very few that made it to that age – only two specimens in our sample had reached adult size,” says Ballard.

Another two of the specimens grew more slowly than the others, opening the possibility that they may be other species, such as *Nanotyrannus*, or part of a “*Tyrannosaurus* complex”, says Ballard. “We propose, based on their growth differences, they are either a different species, or perhaps they are sick or injured *T. rex*, or perhaps dwarfed for some environmental reason.”

Lindsay Zanno at the North Carolina Museum of Natural Sciences says it is the most thorough examination of *Tyrannosaurus* growth yet conducted. Her study of a dinosaur fossil from Montana, published last year, concluded that the specimen was a small tyrannosaur that was fully grown at about 20 years old, tentatively named *Nanotyrannus lancensis*.

“It’s exciting to finally have a growth curve for *Tyrannosaurus* that we can feel confident in,” says Zanno. “It’s also thrilling to see yet another study validate our work on *Nanotyrannus* in just the past few months.”

Thomas Carr at Carthage College in Wisconsin is cautious about whether *T. rex* should be split into different species, but he anticipates that the study will have broad ramifications for dinosaur researchers.

“I expect that the estimates of growth curves of other dinosaurs will now have to be revisited,” says Carr. “Overall, we’ll see a shift in our understanding of dinosaur development across the board.”

Journal reference*:* *PeerJ* DOI: 10.7717/peerj.20469

Reference:

https://www.newscientist.com/article/2511500-t-rex-took-40-years-to-become-fully-grown/?fbclid=IwY2xjawPVgM1leHRuA2FlbQIxMABicmlkETA2UWFvVFZpa3VucFM4QWRDc3J0YwZhcHBfaWQQMjIyMDM5MTc4ODIwMDg5MgABHrZnarxov-2ZxiKCB5RfgsVZNGDFwnzNOI9FCPQ2xkqa26jZGtf3ibMQodg9_aem_3NBaTthq6sQMUt8LDt7tnw

Fossil dating back 410 million years joins museum collection

Ken Gibson, BBC Scotland ***21 January 2026***

A 410-million-year-old fossil of a giant prehistoric organism which once loomed over north-east Scotland has been added to the collections of National Museums Scotland (NMS).

The example of *Prototaxites* was discovered in a sedimentary deposit near the village of Rhynie in Aberdeenshire. At 26ft (8m) high, it would have towered over other plants and animals.

Once thought to be a form of fungus, scientists now believe it to be a distinct evolutionary branch of life which is now extinct. The fossil will be kept and cared for at the NMS collection centre in Edinburgh.

The Prototaxites fossil was discovered in a sedimentary deposit near the village of Rhynie in Aberdeenshire. (Credit: Neil Hanna)

The fossil was found by a local landowner in an area known as the Rhynie chert, a sedimentary deposit.

In a new paper, researchers said the fossilised sample backs up the theory that *Prototaxites* were an entirely different form of life no longer found on Earth.

Dr Sandy Hetherington, co-lead author and senior lecturer in biological sciences at the University of Edinburgh, said: "It's really exciting to make a major step forward in the debate over *Prototaxites,* which has been going on for around 165 years.

"They are life, but not as we now know it, displaying anatomical and chemical characteristics distinct from fungal or plant life, and therefore belonging to an entirely extinct evolutionary branch of life. Even from a site as loaded with palaeontological significance as Rhynie, these are remarkable specimens and it's great to add them to the national collection in the wake of this exciting research."

Dr Nick Fraser, keeper of natural sciences at NMS, said the museum was delighted to add the fossil to its collections which "document Scotland's extraordinary place in the story of our natural world over billions of years to the present day".

"This study shows the value of museum collections in cutting-edge research as specimens collected over time are cared for and made available for study for direct comparison or through the use of new technologies" he added.

References:

https://www.bbc.co.uk/news/articles/cg7yvxm0759o?utm_source=firefox-newtab-en-gb

https://www.sciencefocus.com/news/whole-new-type-life-prototaxites

A drying climate is making East Africa pull apart faster

Stephanie Pappas, LiveScience ***25 January 2026***

A switch from a humid to a dry climate has led the Eastern African Rift Zone to pull apart more freely, new research finds.

Over the past 5,000 years, East Africa has dried out. Now, new research finds that this change may be making the continent pull apart faster.

Faults in the East African Rift Zone have sped up since the levels of large lakes have dropped, according to research published in November in the journal **Scientific Reports**.

The findings highlight the two-way relationship between the climate and plate tectonics, said study senior author Christopher Scholz, a geologist, physicist and professor emeritus at Columbia University.

"Usually, it is something we think about the other way around: Mountains build, and that changes the local or regional climate," Scholz told ***Live Science***. "But it can work the other way around too."

Scholz and his colleagues conducted their research at Lake Turkana in Kenya, which is 155 miles (250 km) long, 19 miles (30 km) wide, and up to 400 feet (120 meters) deep in places. That's nothing, however, compared with the level more than 5,000 years ago, when the lake was up to 500 feet (150 m) deeper.

Aerial view of the Nabuyatom Volcano at the edge of Lake Turkana in northern Kenya showing its almost uneroded caldera, more than a kilometre wide. Black lava covers the land to the horizon. (Image credit: Paul & Paveena Mckenzie/Getty Images)

That was during the African Humid Period, when much of Africa was wetter than it is today. In East Africa, this period persisted from about 9,600 years ago to 5,300 years ago, with drier conditions prevailing over the past 5,300 years. The researchers studied lake-bed sediments to determine ancient water levels and sediment flows into Lake Turkana. In the process, they noticed many small faults and the fingerprints of long-ago earthquakes in the sediments.

The tectonic plate that underlies Africa is pulling apart in eastern Africa and may one day split into two plates with an ocean between them. The deep, narrow lakes in the region — including Lake Turkana and nearby waterways, such as Lake Malawi in Tanzania and Mozambique — are the result of this rifting process, which is creating a deep valley in the region.

Scholz and his team wanted to know if the changes in the lakes themselves were influencing this rifting process. Water matters to tectonics: when glaciers retreat, for example, the lifting of their weight actually causes the land beneath to spring up like rising bread — a process called isostatic rebound. Large amounts of water similarly press down on the crust beneath, potentially affecting processes like earthquakes.

The researchers found that after the end of the African Humid Period, the faults in Lake Turkana began to move faster, at an average rate of 0.007 inches (0.17 millimetres) of extra movement per year. In general, Africa is rifting apart at 0.25 inches (6.35 millimetres) per year.

Using computer simulations, the researchers figured out that this seismic speedup likely has two causes. One is that with less water pressing down on the crust, the faults have more freedom to move: imagine a vice loosening around two slabs of wood. The other cause is more indirect. On an island in the south side of Lake Turkana is a volcano with an active magma chamber. The removal of water from the African Humid Period decompresses the mantle under this volcano, leading to more melting.

That melt, in turn, moves into the volcano's magma chamber, inflating it and leading to more tectonic activity on nearby fault lines.

"We see enhanced faulting during this time interval, so more pronounced earthquakes are presumably prevalent in this broader region now compared to 8,000 years ago" Scholz said.

The researchers are now working on a project at Lake Malawi looking at water level changes going back 1.4 million years, hoping to get a better sense of how the climate affects the separation of continents.

"This information about these huge changes in water volumes in these lakes is a really important part of the story" Scholz said.

Reference:

https://www.livescience.com/planet-earth/a-drying-climate-is-making-east-africa-pull-apart-faster?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe4763876a779b0361304855882d8f&utm_campaign=368B3745-DDE0-4A69-A2E8-62503D85375D&utm_medium=email&utm_content=40E90063-2D51-45FB-88BB-EB243A845D3F&utm_source=SmartBrief

---

THE CONVERSATION

Academic rigour, journalistic flair

Why does the Green River slice straight through a mountain range? After 150 years, scientists finally know

Adam Smith, Postdoctoral Research Associate, School of Geographical & Earth Sciences, University of Glasgow

2 February 2026

The Gates of Lodore mark the beginning of the Green River's path through the Uinta Mountains. (Scott Alan Ritchie / Shutterstock)

The western US is a geologists' dream, home to the Rocky Mountains, the Grand Canyon, active volcanoes and striking sandstone arches. But one landform simply doesn't make sense. Rivers normally flow around barriers. The Danube River, for example, flows between the Alps and the Carpathians, twisting and turning to avoid the mountains.

But in north-western Colorado, one river does the opposite. The intimidatingly named Gates of Lodore marks the entrance to the 700-metre-deep Canyon of Lodore that slices straight through the Uinta

Mountains as if the range wasn't there at all. It was created by the Green River, the largest tributary of the Colorado River (of Grand Canyon fame).

The Green River carves its way through the Uintas in Dinosaur National Monument, on the border of Colorado and Utah. (Eric Poulin / Shutterstock)

For more than 150 years, geologists have debated why the Green River chose such an unusual path, creating a spectacular canyon in the process.

In 1876, John Wesley Powell, a legendary explorer and geologist contemplated this question. Powell hypothesised that the river didn't cut through the mountain but instead flowed over this route before the range existed. The river must have simply maintained its course as the mountains grew, carving the canyon in the process.

Unfortunately, geological evidence shows this cannot be the case. The Uinta Mountains formed around 50 million years ago, but we know that the Green River has only been following this route for less than 8 million years. As a result, geologists have been forced to seek alternative explanations.

And it seems the answer lies far below the surface.

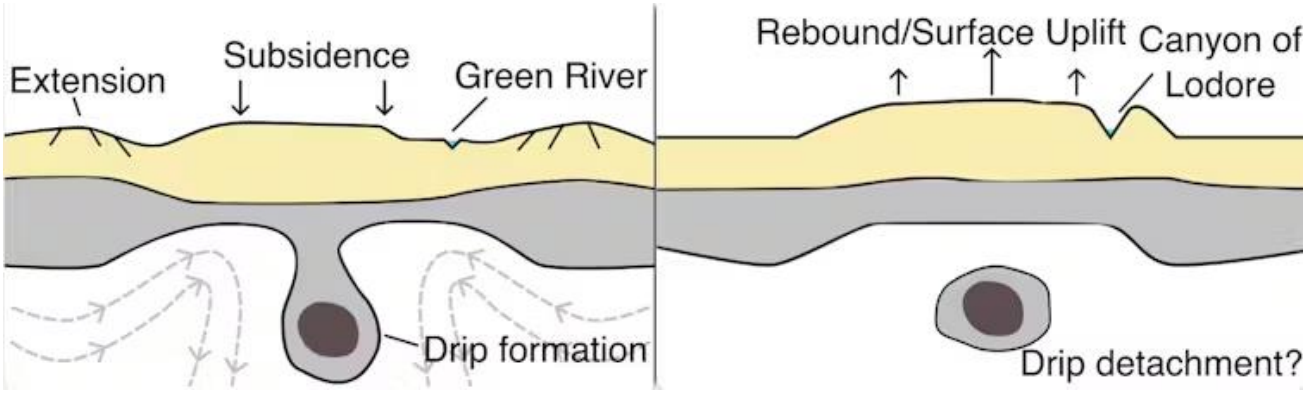
Drip drip

Colleagues and I have found evidence for a process in which part of the Earth's crust becomes so dense that it begins to sink into the mantle beneath it. This phenomenon, known as a "lithospheric drip", occurs deep in the Earth, but can have profound effects on the surface.

Drips often form beneath mountain ranges. The sheer weight of the mountains raise temperatures and pressures at the base of the crust, causing dense minerals to form. As these minerals accumulate, the lower crust can become heavier than the mantle it "floats" on. At this point, the crust begins to detach, or "drip", into the mantle.

At the surface, this causes two things. Initially as the drip forms, it pulls the crust down, lowering the height of the mountain range above. Then as the drip detaches, the crust springs or rebounds back. The whole process is like pulling a trampoline down and then letting it go again.

For the Green River, this temporary lowering of the Uinta Mountains appears to have removed a critical barrier. The river was able to cross the range during this low period, and then, as the range rebounded, it carved the Canyon of Lodore as it continued on its new course.



Dripping (left) then rebounding (right). (Smith et al (2026))

A geological bullseye

Our evidence for the lithospheric drip comes from the river networks around the Uinta Mountains. Rivers record a record of past changes to landscapes, which geomorphologists can use to assess how the elevation of a mountain range may have changed in the distant past. The rivers around the Uintas show that the range had recently (in geological terms) undergone a phase of renewed uplift.

By modelling these river networks, we were able to map out the uplift. The result was striking: a bullseye-shaped pattern, with the greatest uplift at the centre of the mountain range, with things decreasing further from the centre. Around the world, this same pattern represents the telltale sign of a lithospheric drip. Similar signals have been identified in places such as the Central Anatolian Plateau in Turkey, as well as closer to the Uinta Mountains on the Colorado Plateau or the Sierra Nevada of California.

To test whether such a process was occurring beneath the Uintas, we turned to seismic tomography. This technique is similar to a medical CT (computerised tomography) scan: instead of using X-rays, geophysicists analyse seismic waves from earthquakes to infer the structure of the deep earth.

Existing seismic imaging reveals a cold, round anomaly more than a hundred miles below the surface of the Uintas. We interpreted this huge feature, some 30-60 miles across, as our broken-off section of the drip.

By estimating the velocity of the sinking drip, we calculated it had detached between 2 and 5 million years ago. This timing matches the uplift inferred from nearby rivers and, crucially, perfectly matches separate geological estimates for when the Green River crossed the Uinta Mountains and joined the Colorado River.

Taken together, these different bits of evidence point towards a lithospheric drip being the trigger that allowed the Green River to flow over the Uintas, resolving a 150-year-old debate.

A pivotal moment in the history of North America

When the Green River carved through the Uinta Mountains, it fundamentally changed the landscape of North America. Rather than flowing eastwards into the Mississippi, it became a tributary of the Colorado River, and its waters were redirected to the Pacific.

This rerouting altered the continental divide, the line that divides North American river systems that flow into the Atlantic from those that flow into the Pacific. In doing so, it created new boundaries and connections for wildlife and ecosystems.

The story of the Green River shows that processes deep within the Earth can have profound impacts for life on the surface. Over geological timescales, movements of country-sized lumps of minerals many miles below the surface can reshape mountains, redirect rivers and ultimately influence life itself.

Reference:

https://theconversation.com/why-does-this-river-slice-straight-through-a-mountain-range-after-150-years-scientists-finally-know-274888?utm_medium=email&utm_campaign=Latest+from+The+Conversation+for+February+2+2026+-+3662437419&utm_content=Latest+from+The+Conversation+for+February+2+2026+-+3662437419+CID_b2f844b0d21ec09b3a819aa5b675c9e1&utm_source=campaign_monitor_uk&utm_term=Why+does+this+river+slice+straight+through+a+mountain+range+After+150+years+scientists+finally+know&fbclid=IwY2xjawPxw5dleHRuA2FlbQIxMQBzcnRjBmFwcF9pZBAyMjIwMzkxNzg4MjAwODkyAAEeCQ4m4XGgHa_DXN11icfUFs6wU68bhFp7P2EUuGrgLcLIc7iB_aaHAZ78NyI_aem_7kD-JPgISQOej8SbF5n_3g

---

What are critical minerals and why do countries need them?

Esme Stallard, BBC Climate and Science reporter ***5 February 2026***

Countries are racing to obtain the critical minerals and rare earths needed to make everything from smartphones to electric cars.

US President Donald Trump has made access to these minerals a priority, with potential mining deals part of his plans for both Greenland and Ukraine.

But it is China which dominates processing and upon which the world relies for usable supplies.

What are critical minerals?

Critical minerals are those which a country considers vital for its economy, or national security, but which it may struggle to get hold of.

Some of the common critical minerals expected to see the biggest growth in demand in the coming years are:

- copper - used in energy infrastructure and construction
- lithium - energy storage
- cobalt - portable batteries and high-strength alloys, often used for wind turbines
- graphite - fuel cells, batteries, lubricants and nuclear power

Critical minerals lists vary between nations, depending on the resources they have and the industries they run. For example, while copper is on the most recent critical minerals list for the US, it is not on the UK's. The UK has 34 materials on its critical minerals list, including aluminium, cobalt, and helium.

What are rare earth elements?

Rare earth elements appear on the critical minerals lists of many countries. With important electrical and magnetic qualities, rare earths consist of 17 elements in the lanthanide group of the periodic table, plus scandium and yttrium.

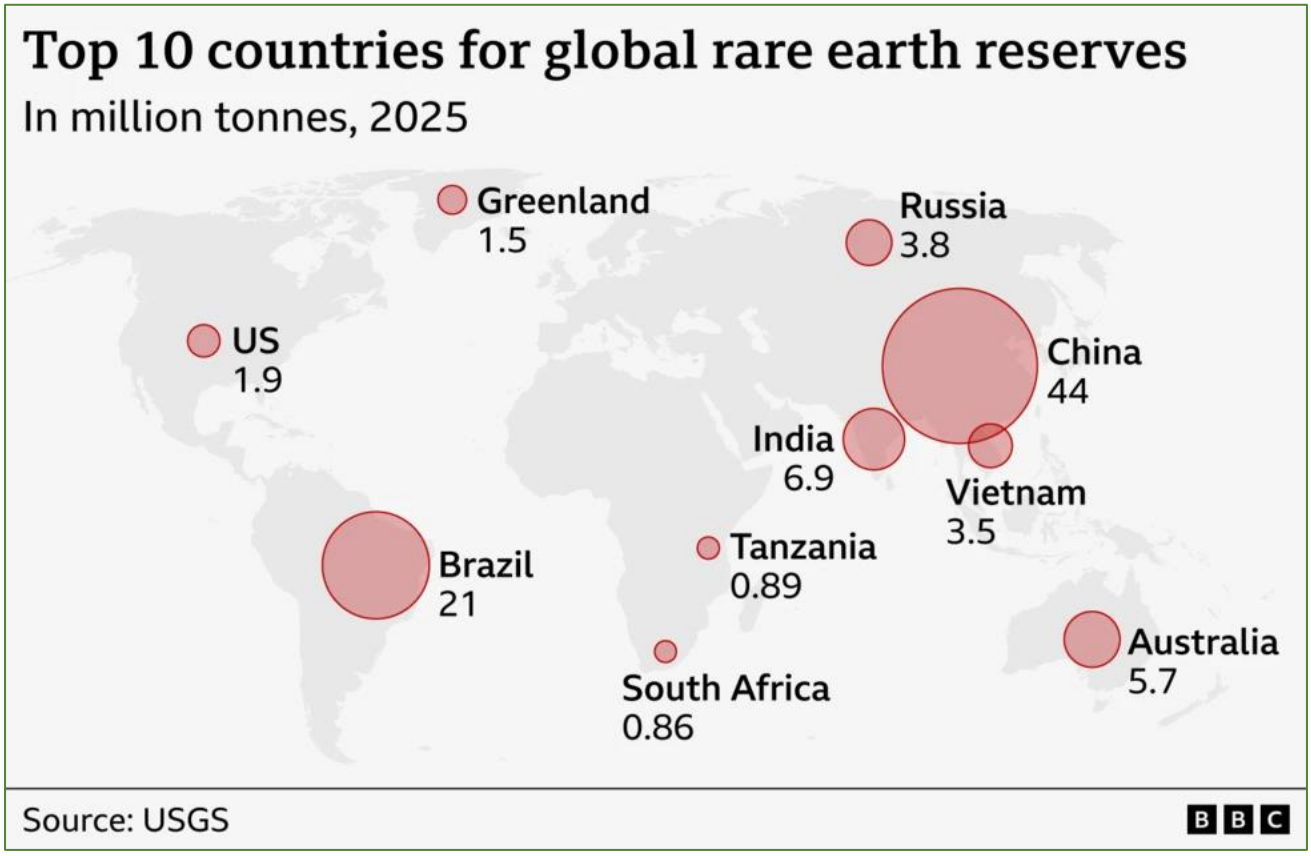
They are vital in microchips, which are crucial for almost every sector from defence to healthcare.

Other uses include:

- Yttrium - laser technology used in communications and medical procedures
- Neodymium - permanent magnets for electric vehicles and renewable energy
- Lanthanum - rechargeable batteries

With the explosion of AI and green energy the demand for these minerals has soared and is expected to increase, according to the International Energy Agency.

However, despite their name, rare earth elements are not that rare. For example, neodymium is found at 20 parts per million in the Earth's crust, in comparison copper is at 27.



Where are critical minerals found?

The most common critical minerals are distributed globally, although some countries have particularly large reserves. China is estimated to have 44 million tonnes of rare earth reserves, while Brazil has 21 million tonnes and Australia about six million. Australia, Indonesia and Chile are just some of the countries that have significant mining operations.

Australia is the leading producer of iron ore, gold, zinc, nickel, cobalt, and lithium, whilst Indonesia accounts for half of the global production of nickel. Chile is the leading copper exporter, according to analysts S&P Global.

The International Energy Agency has said that current mining projects would meet demand in most cases, but that from the 2030s both copper and lithium could face deficits.

Why does China dominate production?

The presence of minerals under the surface of the Earth is not the only factor that affects supply, it is also how easy they are to access and process.

Many countries do not have capacity to process critical minerals. For example, the UK critical minerals assessment said that while silicon metal is mined in more than 30 countries, only three can process it into the polysilicon used in microchips.

It is China that dominates the processing of many critical minerals including rare earths, lithium and cobalt.

The Democratic Republic of Congo produced 70% of the world's supply of cobalt in 2021, yet 90% of this went to China to be refined, according to research body the Faraday Institution.

More than 75% of the world's supply of lithium in 2021 came from Australia and Chile, yet 72% of the refining happens in China, according to the World Economic Forum.

For some rare earths, China is responsible for more than 95% of the processing.

Bob Ward, of The London School of Economics (LSE) Grantham Research Institute on Climate Change and the Environment, has told **BBC News** that China recognised the growth in green energy 10 years ago and "strategically pursued" processing. This has left the US and other countries highly reliant on China and potentially vulnerable.

A 2023 report by a US Government Select Committee warned that the failure of the US to shore up its critical minerals supply chains could cause "defence production to grind to a halt and choke off manufacturing of other advanced technologies".

In 2025, the European Central Bank said that the "pivotal" role of China in the supply chain of rare earths highlighted "vulnerabilities to geopolitical disruptions".

President Trump has made it clear that he wants to bolster the US' production of minerals to reduce this dependency. In October 2025, the US signed a critical minerals deal with Australia, at which Trump declared: "In about a year from now, we'll have so much critical mineral and rare earths that you won't know what to do with them."

Although the US has rare earth mineral reserves, just over 2% of global supply according to the US Geological Survey, it could take years to establish processing capabilities.

"No single country currently possesses the financial resources or technical capabilities to independently outpace China's dominance," said Gracelin Baskaran, director at the Centre for Strategic and International Studies think tank.

Lower environmental standards in China around its mining and processing activities has helped it to keep costs lower than competitors. **BBC News** has recently documented uncovered toxic waste ponds, deforestation and soil erosion at rare earth mines in Northern China.

Reference:

https://www.bbc.co.uk/news/articles/cj6wwx7zxd9o

History of Geology

David Bressan

29 January 1773, birthday of German mineralogist Carl Friedrich Christian Mohs.

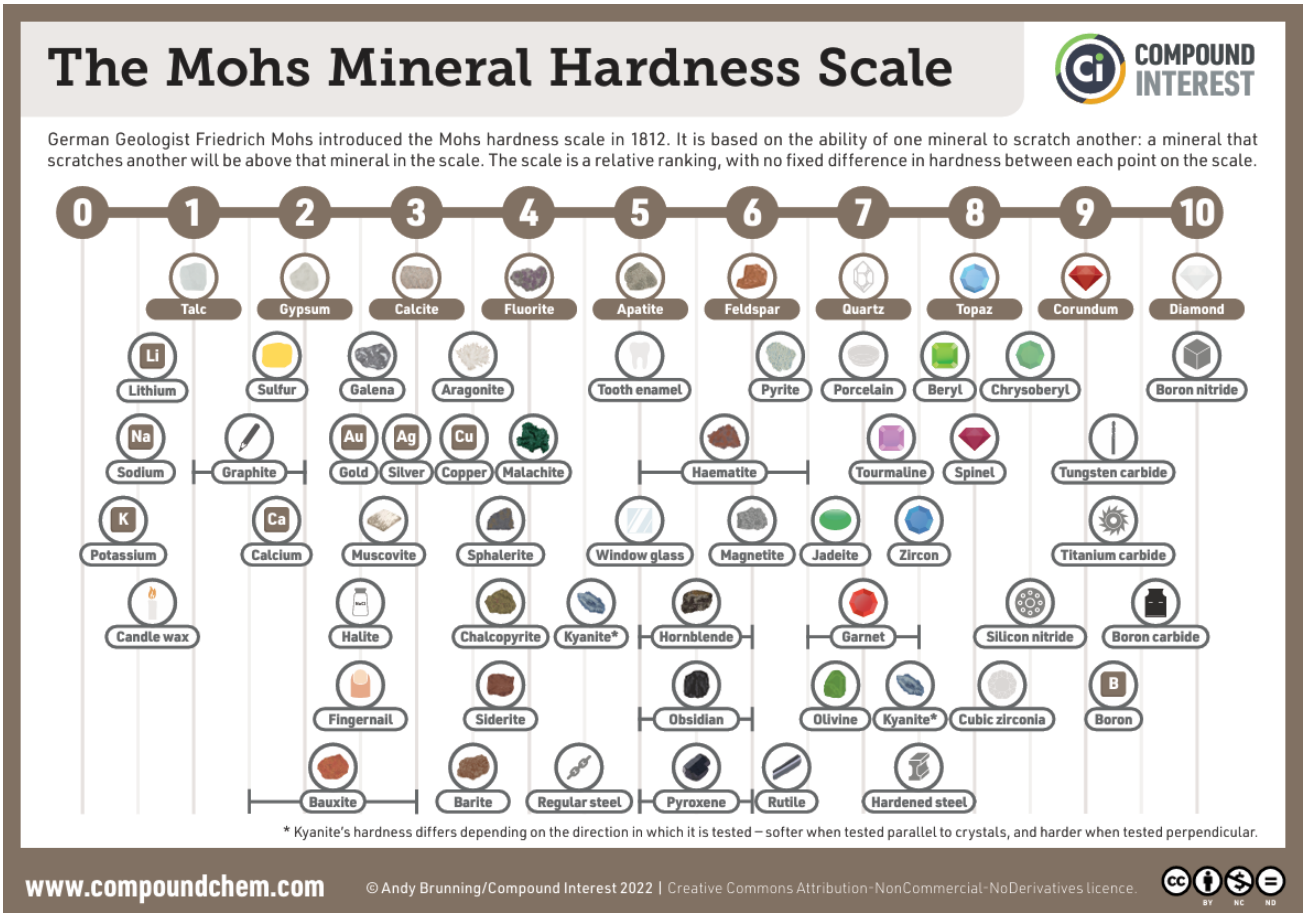
He published some of the first popular field-guides for mineral identification. Unlike other publications at the time - often requesting complex chemical analysis - Mohs focused on easy to identify properties of minerals like crystal shape, colour, even taste and odour.

Based on his experience in the mines of the Harz mountains and as a consultant to wealthy mineral collectors, in 1818 he published a first version of his mineral hardness scale. The Mohs hardness scale ranks minerals by how easily they scratch one another or can scratch common materials.

It's a relative hardness scale running from 1 (softest) to 10 (hardest). It can be useful to identify quickly minerals that superficially may look similar, like quartz (with a hardness of 7 it will scratch glass and metal) and calcite (with a hardness of just 3 it will be scratched by glass and metal).

The Mohs Mineral Hardness Scale

1. Talc (very soft and friable)
2. Gypsum (you can scratch it with a fingernail)
3. Calcite (you can scratch it with a copper coin)
4. Fluorite
5. Apatite (the blade of a pocket knife scratches minerals up to hardness 5 to 6)
6. Orthoclase Feldspar
7. Quartz (minerals above 7 will scratch glass and metal)
8. Topaz
9. Corundum (scratches hardened steel)
10. Diamond (hardest natural mineral)



Reference:

https://www.facebook.com/groups/293131130735001/

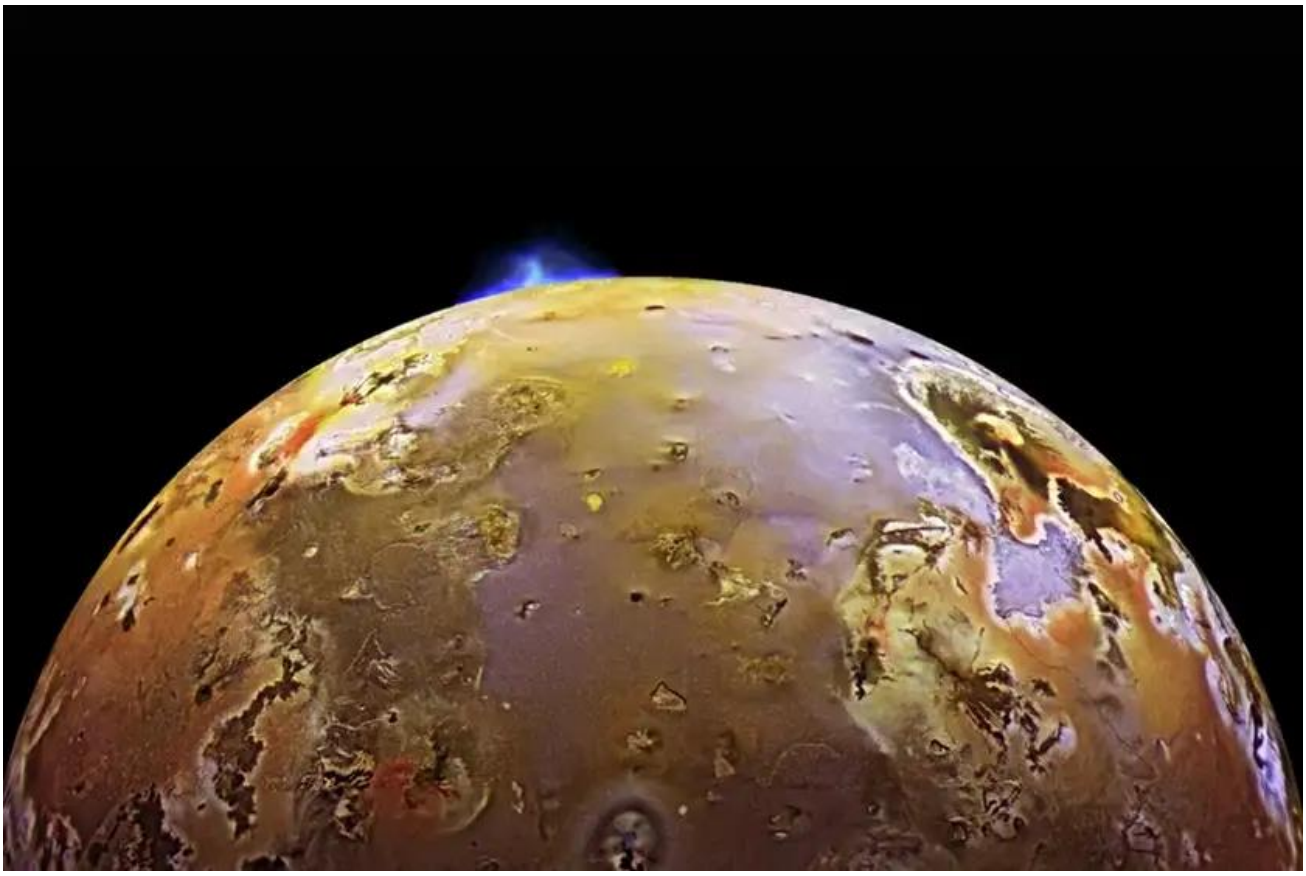
https://www.compoundchem.com/2022/11/28/mohs-hardness-scale/

News

Synchronised volcanic eruptions on Io hint at a spongy interior

Five volcanoes on Jupiter's moon Io erupted simultaneously, spewing a mind-boggling amount of lava onto the surface and giving us clues to what may lie underneath

Leah Crane, New Scientist ***6 February 2026***



A volcanic eruption on Io photographed by the Galileo spacecraft. (Credit: NASA/JPL/DLR)

Five volcanoes on Jupiter's moon Io erupted all at once in a cataclysm of lava. This means that they are probably all connected to the same underground magma network, which will help solve the mystery of Io's insides.

At the end of 2024, researchers monitoring Io via NASA's Juno spacecraft saw an unusually enormous lava flow near its south pole. "There was this one gigantic eruption and lava flow, and that's what first caught our eye, but on second look, all these other hotspots lit up as well," says Jani Radebaugh at Brigham Young University in Utah. "There's so much magma that we can't quite wrap our minds around it."

The erupted lava spanned an area of about 65,000 square kilometres and released more energy than any eruption previously spotted on Io. "Picture standing at the edge of one of these features, and the valley that has been cold suddenly fills up with an entire lake of lava. As it fills up, you turn and look over your shoulder, and another massive crack opens up in the ground and fills with lava at exactly the same time," says Radebaugh. "It would be terrifying, and so beautiful."

The question, though, is where all that magma came from – we know very little about Io's interior structure, so it is a tough one to answer. Previous work has shown that, contrary to researchers' long-held expectations, Io doesn't have a global magma ocean buried under its crust, so it is unclear how so much magma could bust through the surface all at once.

Radebaugh and her colleagues suggest that a sort of magma sponge may sit below huge regions of the surface, forming an interconnected network of pores that fill with lava and then spurt it out through the hotspots. We will need more observations to confirm this, though, and with Juno having moved further away from Io, it is unlikely we will get them anytime soon.

Despite Io's small size – it is only slightly larger than Earth's moon – the extreme nature of these eruptions makes them similar to volcanic events on Earth. "This is actually like early Earth when it was much hotter and more active, so Io can tell us a lot about our past," says Radebaugh. While the source of this wildly powerful series of eruptions may remain a puzzle for now, when it's solved it could help fill in a chapter of our own story.

Journal reference: ***JGR Planets*** DOI: 10.1029/2025JE009047

Reference:

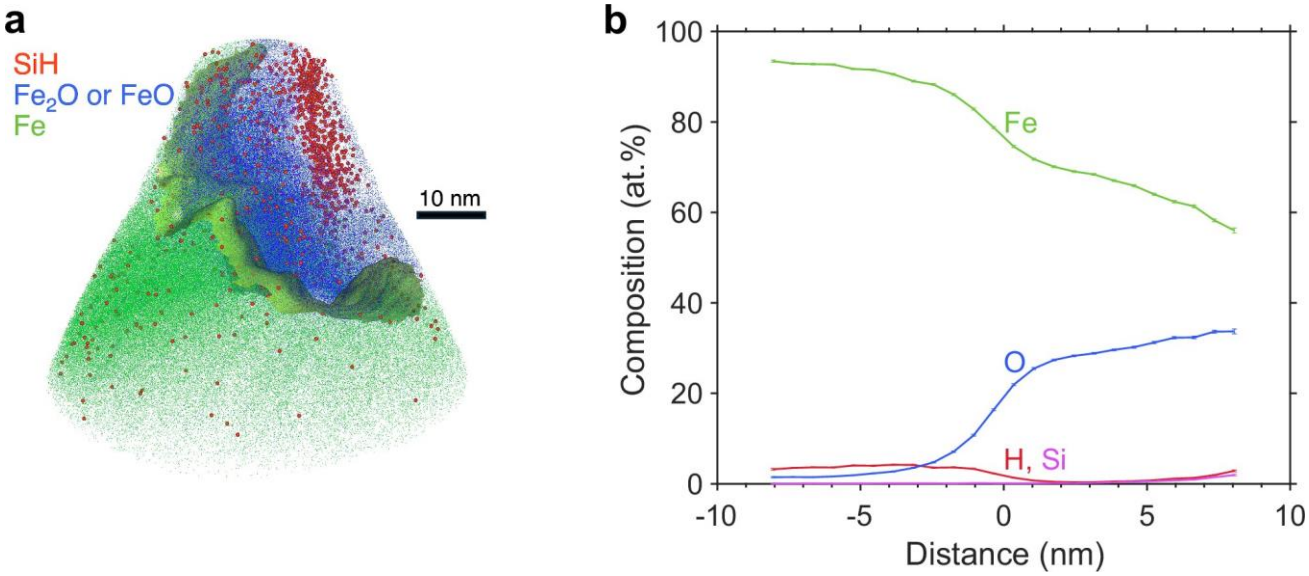
https://www.newscientist.com/article/2514419-synchronised-volcanic-eruptions-on-io-hint-at-a-spongy-interior/?utm_source=nsnew&utm_medium=email&utm_campaign=nsnew_120226&utm_term=Newsletter%20NSNEW_Weekly

---

New experiments suggest Earth's core contains up to 45 oceans' worth of hydrogen

Krystal Kasal, Phys.org ***11 February 2026***

Scientists have long known that Earth's core is mostly made of iron, but the density is not high enough for it to be pure iron, meaning lighter elements exist in the core, as well. In particular, it's suspected to be a major reservoir of hydrogen. A new study, published in **Nature Communications**, supports this idea with results suggesting the core contains up to 45 oceans' worth of hydrogen. These results also challenge the idea that most of Earth's water was delivered by comets early on.



APT analysis of another recovered metal sampling the surface of the Si-O-H-rich nanostructure. (Credit: Nature Communications (2026). DOI: 10.1038/s41467-026-68821-6)

Simulating Earth's core for a deeper look

Because of the extreme conditions in Earth's core and its distance from the surface, analysing its composition presents difficulties. Additionally, many techniques are inadequate for resolving hydrogen because it is the lightest and smallest element. Earlier estimates relied on indirect methods, such as inferring hydrogen composition from lattice expansion in iron hydrides. These difficulties have led to highly uncertain estimates of hydrogen in the core, spanning four orders of magnitude.

The team involved in the new study took a different approach, using laser-heated diamond anvil cells to simulate high-pressure, high-temperature core conditions, up to 111 GPa and around 5100 Kelvin. The team placed core-like iron samples and hydrous silicate glass, representing Earth's early magma oceans, in the diamond anvil cells to induce melting, similar to conditions in the core.

They then used atom probe tomography (APT) to create a 3D compositional map at nanoscale resolution. This helped the team identify how much silicon, oxygen, and hydrogen were in the samples and the Si-O-H-rich nanostructures formed during quenching.

The team found that the silicon to hydrogen molar ratio in these structures was close to 1:1. This information allowed them to determine an estimate of the hydrogen percentage in the core since the amount of silicon is relatively well known. Their results suggested that Earth's core contains around 0.07–0.36 wt.% of hydrogen, which is equivalent to 9–45 oceans of water.

The origins of Earth's water

One of the major implications of the work is that most of Earth's water seems to have been acquired during early accretion as the hydrogen interacted with oxygen. This is in contrast to the theory that it is mostly from later cometary delivery. The team explains that hydrogen would mostly be found in Earth's shallower layers if cometary delivery of hydrogen had occurred. But a hydrogen reservoir within the core indicates that hydrogen was more likely delivered before the core was fully formed.

"That Earth accreted most of its water in situ along its formation is plausible from a dynamical point of view, with water delivered by planetesimals and planetary embryos, and is compatible with a hydrogen in gassing model involving interaction between a primordial atmosphere and a magma ocean. It is also consistent with the idea that Earth may have been built mainly from enstatite chondrite-like materials, which, apart from their isotopic similarities to Earth, contain sufficient amounts of hydrogen to deliver more than three oceans of water and Earth-like H isotopic signatures," the study authors write.

The team cautions that there were limitations with the study. For example, residual hydrogen in the APT chamber may have artificially inflated the content of measured hydrogen. There are also some uncertainties in the silicon content of the core and the assumption of sufficient hydrogen during Earth's accretion. Fracturing of the samples may have also resulted in APT data collection errors.

References:

Dongyang Huang et al, Experimental quantification of hydrogen content in the Earth's core, **Nature Communications (2026)**. DOI: 10.1038/s41467-026-68821-6

https://phys.org/news/2026-02-earth-core-oceans-worth-hydrogen.html?utm_source=nwletter&utm_medium=email&utm_campaign=daily-nwletter

https://www.livescience.com/planet-earth/geology/the-largest-reservoir-of-hydrogen-on-earth-may-be-hiding-in-its-core?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe4763876a779b0361304855882d8f&utm_campaign=368B3745-DDE0-4A69-A2E8-62503D85375D&utm_medium=email&utm_content=5FC7E64C-88F0-48A5-BBAD-9EEECC27F4FE&utm_source=SmartBrief

New species of ancient crocodile named in honour of Welsh school teacher

Josh Davis, NHM ***13 February 2026***

Looking a little like a reptilian greyhound, Galahadosuchus jonesi lived on land and was fast-moving, with slender, elongated limbs. (©Matt Dempsey)

A new species of crocodylomorph dating to around 215 million years ago has been described from the UK. It has been called *Galahadosuchus jonesi* in recognition of David Rhys Jones, a secondary school physics teacher from Ysgol Uwchradd Aberteifi who gave inspiration and encouragement to one of the authors to pursue a career in science.

A strange-looking ancient relative of crocodiles used to roam what is now the southern UK.

The Late Triassic fossil of a type of crocodylomorph was unearthed in southwestern England in 1969 but has been sitting in our collections just waiting for its significance to be realised. Now, a team of researchers have named this animal as a new species called *Galahadosuchus jonesi.*

Looking a little like a reptilian greyhound, this animal lived on land and was fast-moving, with slender, elongated limbs. It would have stalked the undergrowth for small reptiles, amphibians and early mammals when this part of the world was an upland surrounded by hot, arid plains.

The first part of the species name comes from Galahad, a knight renowned in Arthurian legend for his moral uprightness, as a reflection of the crocodylomorph's upright stance. But the second part of the name honours David Rhys Jones, a schoolteacher at Ysgol Uwchradd Aberteifi in Cardigan, Wales, who taught the lead author of the paper.

"We named it after my secondary school physics teacher," says Ewan Bodenham, a PhD student and lead author of the new paper. "Mr Jones was just such a good teacher, not only in being able to explain things well, but you could tell that he was genuinely interested in the sciences. I think that really inspired me. He also didn't let me settle. He was very good at challenging people and helping students be the best they can be. Above all, he's a very funny, genuine, nice guy."

The new species has been described and named in the journal **The Anatomical Record**.

Ancient early ecosystem

The remains of the ancient crocodile came from a series of geological features known as the fissure deposits, which are found on both sides of the Bristol Channel in southern Wales and southwest England.

During the Late Triassic, this region would have been a coastal environment dominated by a limestone karst system. This is when the ground is made up of soft limestone, which over time becomes riddled with sinkholes and caves, a bit like those seen across the Balkan peninsula or throughout much of southeast Asia.

The fossil of the new species has been in our collections after it was unearthed in southwest England in 1969. (© Bodenham et al. 2026)

This means that the remains of animals that died on the surface were washed into these caves and then covered with sediment. Over time the fissures were filled with the bones of all sorts of animals that lived in the region between about 230 and 200 million years ago.

This includes the remains of some of the earliest known dinosaurs, such as *Thecodontosaurus* and *Pendraig*, but also a whole range of other animals that they lived alongside. There is an incredible selection of smaller reptiles like *Cryptovaranoides*, which is thought to be one of the earliest known lizards, *Threordatoth*, a horned lizard-like animal, and *Kuehneosaurus*, a gliding reptile.

Also among these remains was an animal known as *Terrestrisuchus*. This belonged to the same larger group as modern-day crocodiles, known as Crocodylomorpha, but is one of the group's earliest ancestors. Unlike today's crocodiles and alligators, it had long, slender legs and would have lived its entire life on land.

Our collections contain multiple fossils of *Terrestrisuchus*, including those originally used to describe the species. It was while going through these fossils that the researchers noticed that one of the specimens wasn't quite like the others.

"My PhD project is looking at the evolutionary relationships of these early crocodiles," explains Ewan. "So, we conducted a detailed anatomical description of this specimen, making comparisons to other early crocodiles to determine if it was another specimen of *Terrestrisuchus* or if it was something new."

The team found 13 key differences between the fossils significant enough to name the specimen an entirely new species. Several of these related to the wrists of the animal, with the new species having wrist bones that are shorter and stockier when compared to the known species.

It adds another piece to the growing diversity of animals living in this region during the Late Triassic. This period preceded the Triassic–Jurassic mass extinction event, which led to huge changes in the animals and plants that inhabited the world as an increase in volcanic activity altered the climate and environment. By documenting what animals were around before this event and how they responded to it, researchers can better understand how species react in the face of massive change and upheaval.

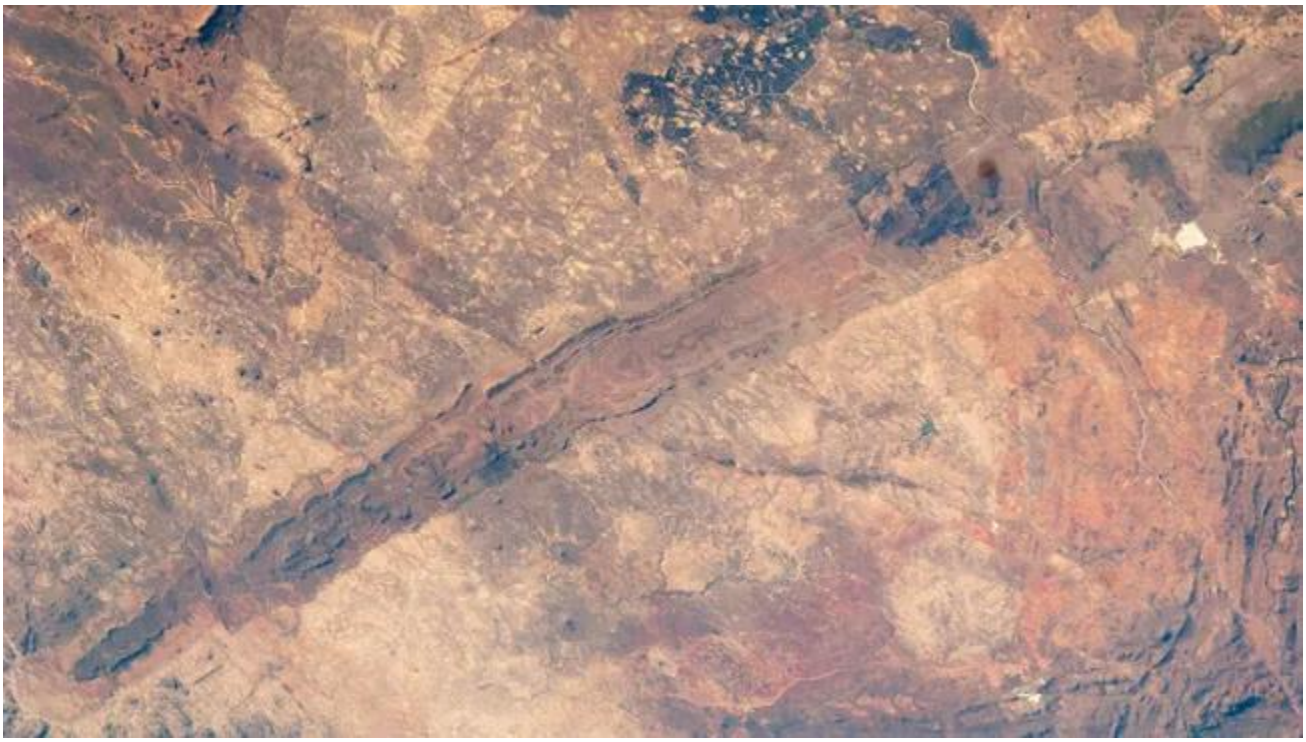
Reference:

https://www.nhm.ac.uk/discover/news/2026/february/new-species-ancient-crocodile-named-after-welsh-school-teacher.html

Hidden beauty of Zimbabwe's 2.5 billion-year-old 'geological marvel' revealed in striking astronaut photo — Earth from space

Harry Baker, LiveScience ***17 February 2026***

A 2010 astronaut photo shows off the astonishing scale of the Great Dyke of Zimbabwe, which stretches over 340 miles (550 kilometres). The lengthy structure, which is not actually a dike, is full of extremely valuable minerals that fuel a massive mining industry.



An unnamed astronaut on board the International Space Station snapped this striking photo of the southernmost section of the Great Dyke of Zimbabwe. Parts of the structure have been offset from one another by tectonic movements since it formed 2.5 billion years ago. (Image credit: NASA/ISS program)

This intriguing astronaut photo reveals the hidden beauty of the expansive Great Dyke of Zimbabwe, a massive seam of ancient magmatic rock that's chock-full of valuable minerals.

The Great Dyke stretches approximately 342 miles (550 kilometres) across central Zimbabwe, from outside the capital city, Harare, in the northeast, to near the country's second-largest city, Bulawayo, in the southwest. It ranges from 2 to 8 miles (3 to 13 km) wide and contains hills that rise up to 1,500 feet (450 meters) above the surrounding plateaus, according to **NASA's Earth Observatory**.

Despite its name, the gigantic structure is not actually a dike — a vertical sheet of frozen magma that cuts through existing rock layers. Instead, it is a lopolith, which is similar to a dike but forms parallel to existing rock sheets and is both flatter and more lenticular, or saucer-shaped.

The Great Dyke is thought to be the longest continuous igneous intrusion, or structure of elevated magmatic rock, anywhere on Earth, according to the Zimbabwe Geological Survey.

The astronaut's snap shows the southernmost tip of the structure, around 78 miles (125 km) from Bulawayo. In 1983, astronauts on board the space shuttle Challenger also captured a striking photo of the structure's southern half, and in 2003, NASA's Terra satellite imaged the lopolith's entire length *(see below)*.

NASA's Terra satellite snapped the entire length of the Great Dyke of Zimbabwe (centre right) in 2003. The structure is roughly 342 miles (550 kilometres) long. (Image credit: NASA/Terra)

Geologists think the lopolith formed around 2.5 billion years ago, when magma from Earth's mantle gradually seeped upward through tectonic plate faults. This means the structure has existed for more than half of Earth's roughly 4.5 billion-year history.

This magma was full of valuable minerals that are normally locked deep below Earth's crust, which has made the area a hotspot for mining. Today, there are at least half a dozen major mines along the lopolith's length, according to Mining Zimbabwe magazine.

The Great Dyke is full of important metals, including gold, nickel, copper, titanium, iron, vanadium and tin, according to the Earth Observatory.

However, it is best known for its expansive platinum deposits, which are collectively the third largest of their kind on Earth, as well as its unusually pure chromite, which contains high levels of chromium — a key component in the production of stainless steel, according to Mining Zimbabwe.

The Great Dyke is also rich in rocks that are used for sculpting, "resulting in an artist's paradise akin to the Greek marble quarries," local artist Michael Nyakusvora wrote on their website.

"The Great Dyke of Zimbabwe is more than a line on a map — it's a lifeline of economic opportunity [and] a geological marvel," according to Mining Zimbabwe.

Reference:

https://www.livescience.com/planet-earth/geology/hidden-beauty-of-zimbabwes-2-5-billion-year-old-geological-marvel-revealed-in-striking-astronaut-photo-earth-from-space?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe4763876a779b0361304855882d8f&utm_campaign=368B3745-DDE0-4A69-A2E8-62503D85375D&utm_medium=email&utm_content=8689DDB5-5906-4841-9BB6-024F4DE85AD6&utm_source=SmartBrief

95 million-year-old Spinosaurus had a scimitar-shaped head crest and waded through the Sahara's rivers like a 'hell heron'

Kenna Hughes-Castleberry, LiveScience ***19 February 2026***

Researchers have identified a new Spinosaurus species with a blade-like crest in Niger, changing our understanding of dinosaur evolution and behaviour.

An illustration shows Spinosaurus mirabilis standing along a river's edge over its prey some 95 million years ago. (Image credit: Artwork by Dani Navarro)

Around 95 million years ago, a *Spinosaurus* dinosaur with a tall, blade-like crest on its head and a large sail on its back lived in what is now Niger, a new study finds.

The newfound species, which the researchers have named *Spinosaurus mirabilis* ("astonishing Spinosaurus" in Latin), lived far inland, in river country — which could be the key to settling a debate about whether this dinosaur and its relatives were swimmers, the team reported Thursday (Feb. 19) in the journal **Science**.

"There's just no way that you're going to find … essentially an aquatic animal hundreds of miles from the shoreline, buried … right in a river deposit," study first author Paul Sereno, a palaeontologist at the University of Chicago who led the team that found the fossil, told **Live Science**.

Sereno's team made the discovery thanks to a Tuareg guide, a member of a local nomadic population that live in the Sahara Desert, who led them to the remote site on an hours-long trek back in 2019. Upon seeing the fossils, the Paleontologists noted a peculiarity: the bones were black, caused by an increased concentration of phosphate in the bone. Sereno said that, in his 25 years of fieldwork, he'd never seen fossils that colour in the Sahara Desert.

The crest points to a new species

At first, Sereno and the team couldn't figure out how some of the bones fit together with the rest of the skeleton. "We didn't recognize the crest," Sereno said." It was just so weird [and] asymmetrical."

When a larger team returned to the same site in 2022 and uncovered a skull with a partial crest attached, it all clicked. While running CT scans of the fossil and using computer models, the team found lots of fossilized blood vessels inside, plus a surface texture that suggested a keratin sheath covered the bone in real life, which would have made the crest stand up to 20 inches (0.5 metres) tall.

In the paper describing their findings, the researchers called it the tallest crest known in any meat-eating dinosaur and argued it played a decorative role, possibly allowing the animal to identify potential mates or rivals while wading along riverbanks.

So … was Spinosaurus a swimmer?

In recent years, some researchers have argued that *Spinosaurus* — a genus that includes *S. mirabilis*, as well as its relatives, such as *S. aegyptiacus* — chased prey underwater as a marine hunter. For instance, *S. mirabilis* has the iconic teeth of a fish hunter, with those on the lower jaw protruding outward and fitting neatly between the sharp teeth on the upper jaw, the team reported.

Yet, based on the fossil's location — buried next to two long-necked sauropods in a river bed, and its body shape — Sereno sees "this dinosaur as a kind of 'hell heron' that had no problem wading on its sturdy legs into two metres [6.5 feet] of water but probably spent most of its time stalking shallower traps for the many large fish of the day," he said in a statement.

The back sail would have added so much weight to *Spinosaurus'* body that it would have made it difficult to move, Sereno noted. So, it's unlikely that any members of the genus swam, he said. "It's sacrificing … aspects of its agility for this, but it's an important feature," Serano told **Live Science**.

A full body rendering of Spinosaurus mirabilis showing its scimitar-like crest and large back sail. (Image credit: Artwork by Dani Navarro)

In the paper, the researchers compared *S. mirabilis'* body shape with other living and extinct predators and placed it between semiaquatic waders like herons and aquatic divers like penguins.

"It shows the process of science evaluating evidence and new evidence appearing," Sereno said.

Article Sources

C. Sereno, P. C. S., Vidal, D., P. Myhrvold, N., Johnson-Ransom, E., Ciudad Real, M., Baumgart, S. L., Sánchez Fontela, N., L. Green, T., T. Saitta, E., Adamou, B., Bop, L., Keillor, T. M., Fitzgerald, E. C., Dutheil, D. B., Laroche, R. a. S., Demers-Potvin, A. V., Simarro, Á., Gascó-Lluna, F., Lázaro, A., . . . Ramezani, J. (2026). Scimitar-crested Spinosaurus species from the Sahara caps stepwise spinosaurid radiation. Science, 391(1), eadx5486. https://doi.org/10.1126/science.adx5486

Reference:

https://www.livescience.com/animals/dinosaurs/95-million-year-old-spinosaurus-had-a-scimitar-shaped-head-crest-and-waded-through-the-saharas-rivers-like-a-hell-heron?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe4763876a779b0361304855882d8f&utm_campaign=368B3745-DDE0-4A69-A2E8-62503D85375D&utm_medium=email&utm_content=907D79F4-D869-43F3-95B2-95938D4A5F2E&utm_source=SmartBrief

TV Review

The Dinosaurs review – Morgan Freeman's narration is so soothing, you could use this as a relaxation aid

'Handsome to look at' … The Dinosaurs. (Photograph: Courtesy of Netflix)

Yes, there are plenty of big-budget visual effects of prehistoric creatures in Steven Spielberg's natural history show. But the voiceover is the real draw

Jack Seale, The Guardian ***6 Mar 2026***

It's difficult these days to make a nature documentary that isn't like all the others. Spectacular landscapes, crisp closeup photography, tales of predation and survival, birth and death: whether you go for Pixar cuteness, crimson claws or environmental crisis, it's been done 100 times before. Watching **The Dinosaurs**, it's hard not to sense the same problem starting to affect factual shows about the animal kingdom as it was millions of years ago. Impressive as it is that big-money dino documentaries boast visual effects that look similar to footage of Earth today, we are getting used to it.

Before the opening titles roll, cliches from two genres have been cross-bred. From regular animal shows, there's the one where a lone male tries to muscle in on a family unit, forcing the existing patriarch to fight for his status against a younger, stronger rival. Our friend who looks as if he's about to be fatally pushed aside is a *pachycephalosaurus*, but the dynamic is the same. Then the two males' head-smashing battle is interrupted by a familiar sight from dinosaur documentaries: the animal posing a threat is suddenly bitten in two by a *Tyrannosaurus rex*, leaping unbidden through the undergrowth with a camp flourish. The *pachycephalosaurus* clan, led by their relieved dad, scurry happily away to the sound of the interloper's cracking skull.

There are cute creatures in The Dinosaurs too. (Photograph: Courtesy of Netflix)

On voiceover is Morgan Freeman, a reliable provider of grand Hollywood vibes whose gravelly folk-tale delivery is starting to slide into self-parody, but no less pleasing for that. He has a lovely habit of bringing us home in the last half-syllable of a line by modulating down into a bassy growl, not unlike the satisfied sigh of a sated apex predator. With him talking us through it, you could conceivably use the audio of **The Dinosaurs** as a relaxation tape.

Life isn't relaxing for many of the creatures featured, however, since the story is an endless churn of species struggling to establish themselves before being superseded by nastier, toothier new arrivals. Then everyone is killed by climate change – flood, drought, ice, another flood – and the cycle starts again. It all begins 235m years ago on the vast supercontinent of Pangea, which is initially dusty and inhospitable: "Saaaandstorms," intones Freeman, sounding as if there's one in his larynx.

The ancient reptiles give way to a new wave, the dinosaurs, whose evolution is kickstarted by the diminutive *marasuchus* avoiding being eaten by getting up on two legs and running. One of them excitingly manages to nibble on a carcass by tiptoeing up to it while the bigger animal that killed it is taking a nap. **The Dinosaurs** loves its tiny underdogs, comparing the dinkier dinosaurs to turkeys, chickens and chihuahuas, but in no time at all – just 10 or 20m years – these critters have become giants, the sort of megabeasts Freeman refers to as the greatest dinosaurs in history; or, when he gets to *T rex* and *triceratops*, "the most iconic dinosaurs of all time". Elsewhere, there is a *dilophosaurus* (the one with the twin red crests on his skull; you remember, he ate Newman from Seinfeld in the original Jurassic Park movie) doing a dance to impress a mate, and a *hadrosaur* mother leaving her babies behind in the creche-like environment of the herd while she finds food, but then sprinting back to save them when an aerial predator swoops towards the nest.

It's handsome – the geology and meteorology are powerfully rendered, while the dinosaurs are only a notch below the very best photorealist simulations we have seen. If there's an issue, apart from the

well-worn storytelling, it's the pace and depth of the narrative. The show is keen not to overload us with science but, in the demographic of people willing to spend several hours watching a factual show about dinosaurs, a significant percentage are amateur experts: a lot of folk who like dinosaurs know an awful lot about them, in a way that viewers who might casually tune in to a show about lemurs or dolphins probably do not. They might be frustrated by how little cutting-edge detail there is on each species and era, as the show pitches itself more towards families. The children of those families will, however, come away with a good grounding in evolution, and in what havoc can be wreaked by shifts in the climate.

There is, of course, a belter of an ending. "Aaaasteroid," booms Freeman at a frequency low enough to crack one in two, as bigger dinosaurs chew idly on smaller dinosaurs' limbs and wonder what that object in the sky is. They have had a good run but, 66m years later, this version of their story feels a little old.

- **"The Dinosaurs" is a four-part docuseries on Netflix.**

Reference:

https://www.theguardian.com/tv-and-radio/2026/mar/06/the-dinosaurs-review-morgan-freemans-narration-is-so-soothing-you-could-use-this-as-a-relaxation-aid

---

Opens **22 May 2026**, entry from 10:00-16:30 daily Adult off-peak tickets from £15.

Meet the legends of Earth's prehistoric oceans, from the Pliosaur – a gigantic, gnarly toothed creature – to the ichthyosaur, a majestic and speedy, dolphin-like predator. Not to mention, the fiercest hunter to ever rule the waves, *T. rex* of the sea, the mighty mosasaur. Packed with all the monsters you want to see as well as millions-of-years-old fossils, bite-sized science and gigantic fun, **Jurassic Oceans: Monsters of the Deep** is our latest exhibition. Explore how marine reptiles rose to dominance and decide who really was the most ferocious of them all. It's the perfect blend of prehistoric monsters, memory-making moments and hands-on discovery from our expert palaeontologists.

Reference:

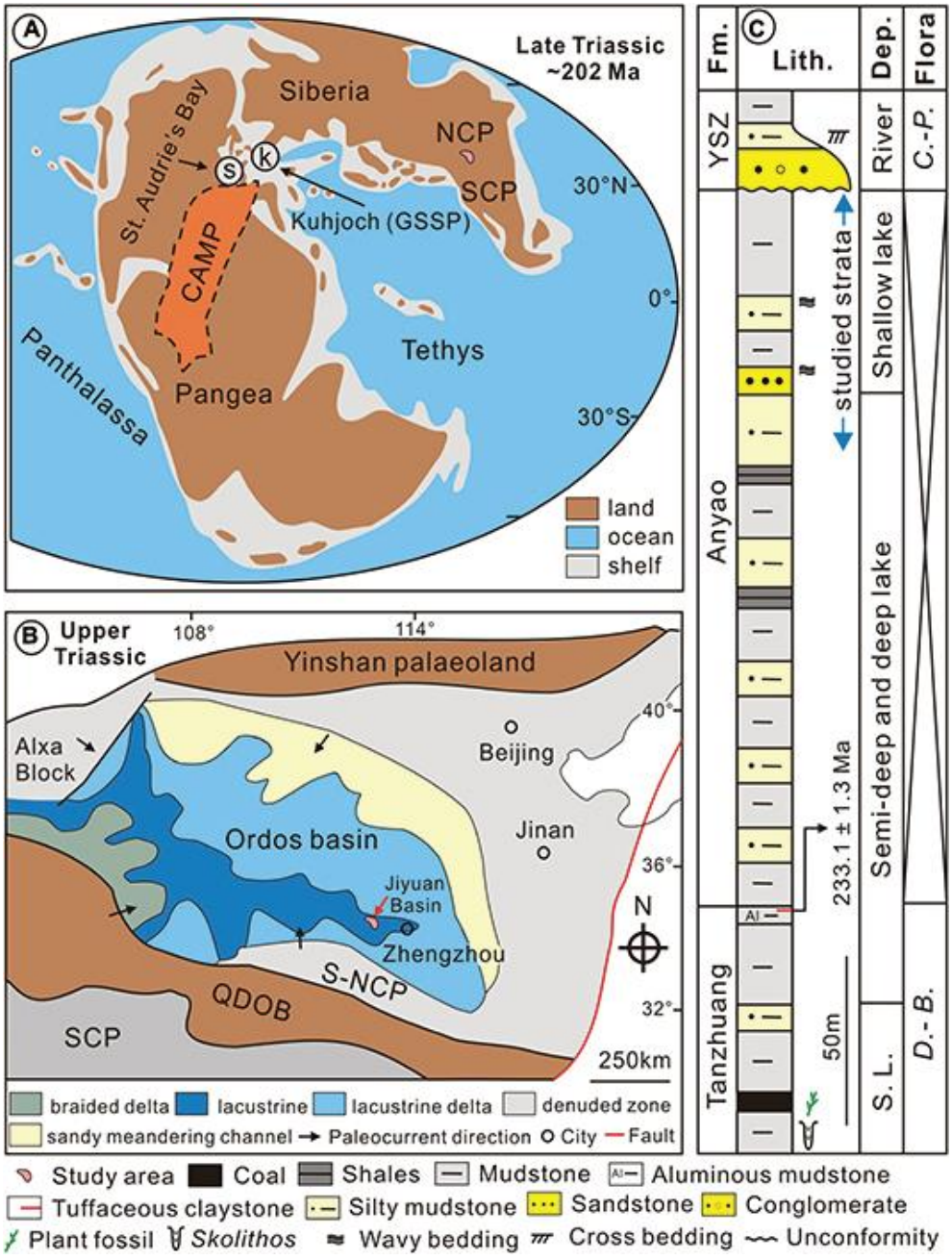
https://www.nhm.ac.uk/visit/exhibitions/jurassic-oceans.html?utm_content=header-cta1&utm_campaign=j-oceans&utm_medium=email&utm_source=%202734981_ma_JO_announcement_general_20260318&utm_term=KNSE_FA_&id1=d7a9a069d798b6a9efaf67ebfa44d312f7859a6006ae9ea1f4ee36b1dfa6d224&id2=4d93896f3637934aa0be57399fd3f196cb625be89329e4e2ed6f036fe14258b4&dm_i=2XEG,1MMBP,9JPOI2,6MXY0,1,0,0,0

NEWS

Were massive undersea volcanic eruptions the cause of Triassic extinctions?

Down to Earth extra ***16 April 2026***

Volcanism has been seen as a contributing factor to the end Triassic extinction event, for some time. Now a team of scientists from China and Australia have come to the conclusion that such volcanic activity may have been the cause of some lower order and more frequent extinction events during the Triassic.



The Central Atlantic Marine Province (CAMP) is thought to be primary driver for the end-Triassic extinction event - but were other LIPs responsible for lesser extinctions?

Online publication Sci-News reports:

“Mass extinctions are extremely catastrophic events on Earth,” said Dr. Jian-Jun Fan and colleague from Jilin University and Curtin University. “Throughout Earth’s evolutionary history, numerous mass extinctions have occurred, with five major mass extinctions being particularly representative.”

“These extinctions have reshaped the course of life’s evolution on Earth. In addition to the five major mass extinctions, many frequent, lower-order extinctions have also taken place on Earth, such as the Norian-Rhaetian extinction during the Triassic period.”

“Regarding the triggering mechanisms of extinctions, the five major events have been relatively well studied. However, the triggering mechanisms of the frequent lower-order extinctions remain unclear.”

In the new study, the authors analysed oceanic island, seamount, and plateau remnants in the Tibetan Plateau that trace the evolution of Meso- and Neo-Tethys oceans.

During the Triassic, three major episodes of marine large igneous provinces (LIPs) formed at 250-248, 233-231, and 210-208 million years ago. By integrating geological records of these LIP episodes with Triassic geological datasets, the researchers demonstrated a correlation between marine LIPs and at least four extinctions in marine biota, driven by the resultant anoxic-euxinic events.

“Marine LIPs account for half of the extinctions with an identifiable geological trigger during the Triassic,” the scientists said. “This indicates that marine LIPs are a key driver of Triassic extinctions. Marine LIP eruptions on Earth are frequent; however, evidence of ancient marine LIPs is likely significantly reduced by subduction during ocean basin closure. This destruction renders such records difficult to identify and, even when identified, challenging to interpret and date precisely.”

“Orogenic belts (i.e., remnants of vanished ancient ocean basins) contain many unidentified ‘ghost’ marine LIPs, and these marine LIP eruptions likely constitute a key driver of other Phanerozoic extinctions that were previously under-recognized in Earth system models.”

Reference:
https://www.sci.news/paleontology/massive-undersea-volcanism-frequent-extinctions-triassic-period-14516.html

The team’s paper appears in the journal *Geology:*
https://pubs.geoscienceworld.org/gsa/geology/article-abstract/doi/10.1130/G53406.1/724643/Marine-large-igneous-provinces-Key-drivers-of

Massive insect body size 300 million years ago may not have been due to high atmospheric oxygen

Arizona State University ***25 March 2026***

Three-hundred-million years ago, Earth was very different. The continents had coalesced into Pangea, which was dominated in its equatorial regions by vast coal-swamp forests. With high atmospheric oxygen levels, wildfires were common.

The waters teemed with fishes, the land was dominated by amphibians, reptiles, crawling arthropods and giant cockroaches, and the skies were ruled by flying insects, some of which took on truly gigantic proportions.

Among them were giant mayfly-like species with 17-inch (45 cm) wingspans and enormous dragonfly-like species with 27-inch (70 cm) wingspans. These "griffinflies" were first discovered as fossilized impressions in fine-grained sedimentary rock in Kansas nearly a century ago.

Challenging the oxygen-size theory

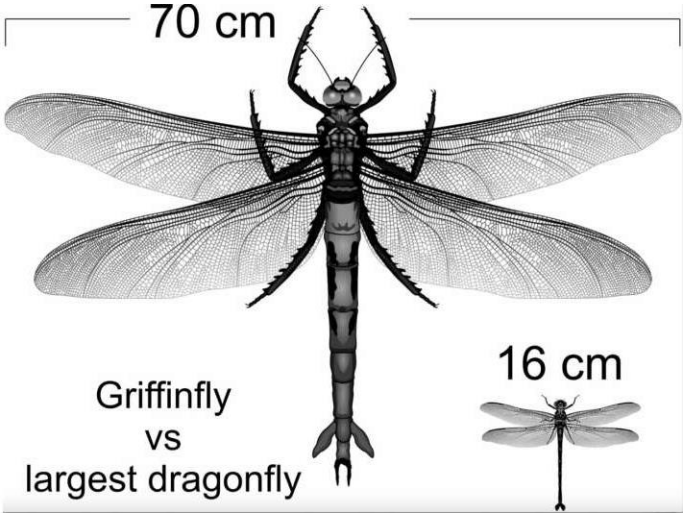
Now, a new study by an international team of researchers, including ASU School of Life Science professor Jon Harrison, has provided strong evidence refuting the long-held theory that gigantic dragonfly-like insects could only have existed 300 million years ago because atmospheric oxygen levels were about 45% higher than they are today.

In the 1980s, a new technique emerged that allowed geochemists to reconstruct the gas composition of past atmospheres. Their striking finding was that a period of high atmospheric oxygen occurred 300 million years ago.

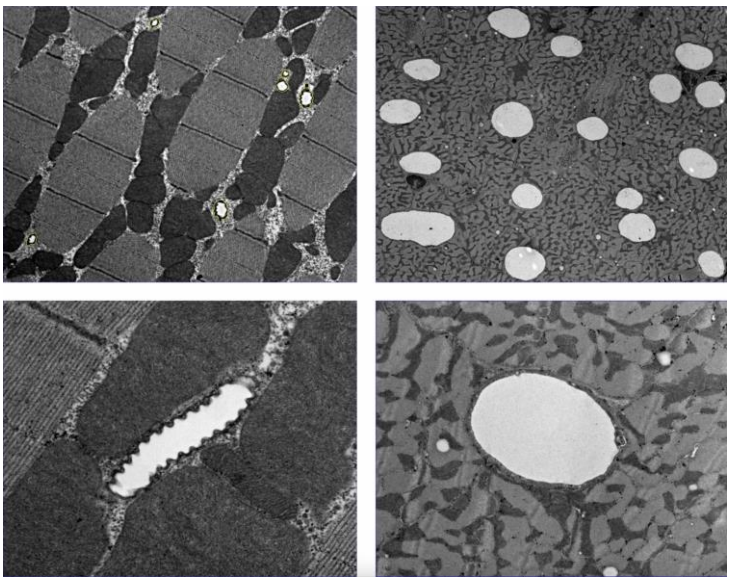
In a 1995 study published in **Nature**, scientists pointed out that this period of high atmospheric oxygen coincided with the occurrence of giant insects. They proposed that a higher demand for oxygen and larger body sizes of giant-sized Palaeozoic insects ought to require a higher atmospheric oxygen concentration.

This made sense, because insects obtain oxygen through their unique tracheal system, which is a branching tree-like system of airways leading to their ends, the tracheoles.

Oxygen must move by diffusion down concentration gradients through the tracheoles to fuel the flight muscle cells. Scientists reasoned that a flying insect of such gigantic proportions could not exist now, because the level of oxygen in the present atmosphere is too low to support the high demand for oxygen in the flight muscles.



Comparison of an extinct griffinfly alongside one of the largest living dragonflies, the giant petaltail. (Credit: Estelle Mayhew, adapted from image by Aldrich Hezekiah)



Insect flight muscle (left) compared against mammalian cardiac tissue (right), contrasting the different size and space needed to accommodate the oxygen-supply structures of insects (tracheoles; profiles outlined in yellow) versus mammals (capillaries). Credit: Antoinette Lensink and Edward Snelling

New microscopy study on tracheoles

In a new study, published in **Nature**, a team led by Edward (Ned) Snelling of the University of Pretoria used high-power electron microscopy to assess how body size affects the number of tracheoles in flight muscle.

They found that the space occupied by tracheoles in the flight muscle is typically only 1% or less in most species, and that this observation holds when the relationship is extended to the 300-million-year-old, gigantic 2-feet and larger griffinflies. This suggests that the flight muscles of insects are not

constrained by atmospheric oxygen levels as they could easily add tracheoles in the muscle, since they take up so little space.

"If atmospheric oxygen really sets a limit on the maximum body size of insects, then there ought to be evidence of compensation at the level of the tracheoles," said lead author Edward (Ned) Snelling, associate professor, and Faculty of Veterinary Science at the University of Pretoria. "There is some compensation occurring in larger insects, but it is trivial in the grand scheme of things."

"By comparison, capillaries in the cardiac muscle of birds and mammals occupy about ten-times the relative space than tracheoles occupy in the flight muscle of insects, so there must be great evolutionary potential to ramp up investment of tracheoles if oxygen transport were really limiting body size," said Professor Roger Seymour of Adelaide University.

Some scientists counter-argue that oxygen flow upstream of the tracheoles, or in other parts of the body, could still limit body size, so the theory of oxygen-constrained insect maximal size may not be dead yet.

Regardless, these new data definitively show that diffusion in the flight muscle tracheoles cannot provide such a limit. Scientists will have to look elsewhere for why these giants existed.

If oxygen does not limit maximal insect size, then perhaps other culprits are responsible for the small size of insects, such as predation by vertebrates, or biomechanical support limits on the exoskeleton itself.

References:

https://phys.org/news/2026-03-massive-insect-body-size-million.html?utm_source=nwletter&utm_medium=email&utm_campaign=weekly-nwletter

Publication details:

Edward Snelling, Oxygen supply through the tracheolar muscle does not constrain insect gigantism, Nature (2026). DOI: 10.1038/s41586-026-10291-3. www.nature.com/articles/s41586-026-10291-3

TotalEnergies and Neo Next combine to become the UK's 'largest producer'

The deal was announced in December after months of speculation.

Ryan Duff, Energy Voice ***30 March 2026***

TotalEnergies has completed its merger with Neo Next in a move that sees the French supermajor end its time as a UK operator. The deal, initially announced in December, confirms TotalEnergies as the 47.5% owner of the firm now called Neo Next+. The French oil giant shares ownership with Norway's HitecVision, which accounts for 28.875% of the new independent operator, and Spain's Repsol, which controls 23.625%.

Upon the completion of the deal, Neo Next+ declared itself **"the largest producer on the UK Continental Shelf,"** a title rival Adura had previously claimed when it formed from the coming together of Shell and Equinor's UK assets last year.

Patrick Pouyanné, chief executive of TotalEnergies, said: "The completion of this merger and the creation of Neo Next+ marks an important step in TotalEnergies' long-term commitment to the UK oil and gas sector. While contributing to the country's energy supply, the size and asset portfolio of Neo Next+ will foster synergies and enhance the cash flow generation of the company."

Previously, Pouyanné had made it clear that he sought to vacate the UK, having said his company had "little future" in the UK. Its choice to derisk its portfolio by divesting its UK assets may have come

as little surprise, as in 2024 it was revealed that TotalEnergies was the UK North Sea's largest taxpayer.

"As the new largest shareholder of Neo Next+, we are pleased to bring our extensive UK North Sea operational experience to the new company," the TotalEnergies boss added. TotalEnergies employs 600 people in the UK and has a base in Aberdeen's Westhill.

The delivery of this deal now leaves Neo Next+ with three Granite City offices, Repsol's building on Holburn Street, Neo Energy's workspace in the same building Adura is based in, the Silver Fin, and the French firm's Westhill base of operations.

John Knight, executive chair of Neo Next+, and senior partner of HitecVision, commented: "The Neo Next+ strategy is 'Resilience, Yield and Growth', and we intend to play a leading role on the UK Continental Shelf for many years to come."

Repsol's chief executive added his two cents when he said the combination of the three businesses made "a more competitive, more resilient North Sea operator with improved scale and a stronger operating footing".

Josu Jon Imaz added: "The combined portfolio is better balanced and positioned to face a volatile environment, creating long-term value for our shareholders."

In July last year, Repsol combined its UK business with the HitecVision-backed Neo Energy. At the time, HitecVision controlled the majority of the firm, as it claimed a 55% stake in what was then called Neo Next.

However, rumours of yet more mergers quickly spread as TotalEnergies was tipped to join the newly formed firm at Aberdeen's Offshore Europe conference in September.

Reference:

https://www.energyvoice.com/oilandgas/north-sea/594873/totalenergies-and-neo-next-combine-to-become-the-uks-largest-producer/?utm_campaign=259678411-Energy%20Voice%20Breaking%20News&utm_medium=email&_hsenc=p2ANqtz-9Zwemd6PdtYErF6WIC7vQxhO87nz-fDWIpCSiFQIDSSJ1Kqu-Gefh2UGkAfTcne1fTduvWFjzu-FTxkSF-dmygv4sNew&_hsmi=132224090&utm_content=132224090&utm_source=hs_email

Japan on high alert for 'huge' second quake after lifting tsunami warning

Chika Nakayama, Kurumi Mori , BBC Tokyo correspondent and Flora Drury ***20 April 2026***

Officials in Japan have warned of an increased risk of a "huge" earthquake in the next week after a 7.7 magnitude quake struck off the north-east coast, triggering an evacuation order and warnings of 3m (10ft) tsunami waves.

Thousands of people were told to leave coastal areas for higher ground after the quake in waters off Iwate prefecture, 530km (330 miles) north of the capital Tokyo.

The biggest tsunami waves measured 80cm. Tsunami warnings and advisories were lifted hours after the quake on Monday. But Japan's meteorological agency has warned that quakes "causing even stronger shaking" could occur in the next week, producing bigger waves.

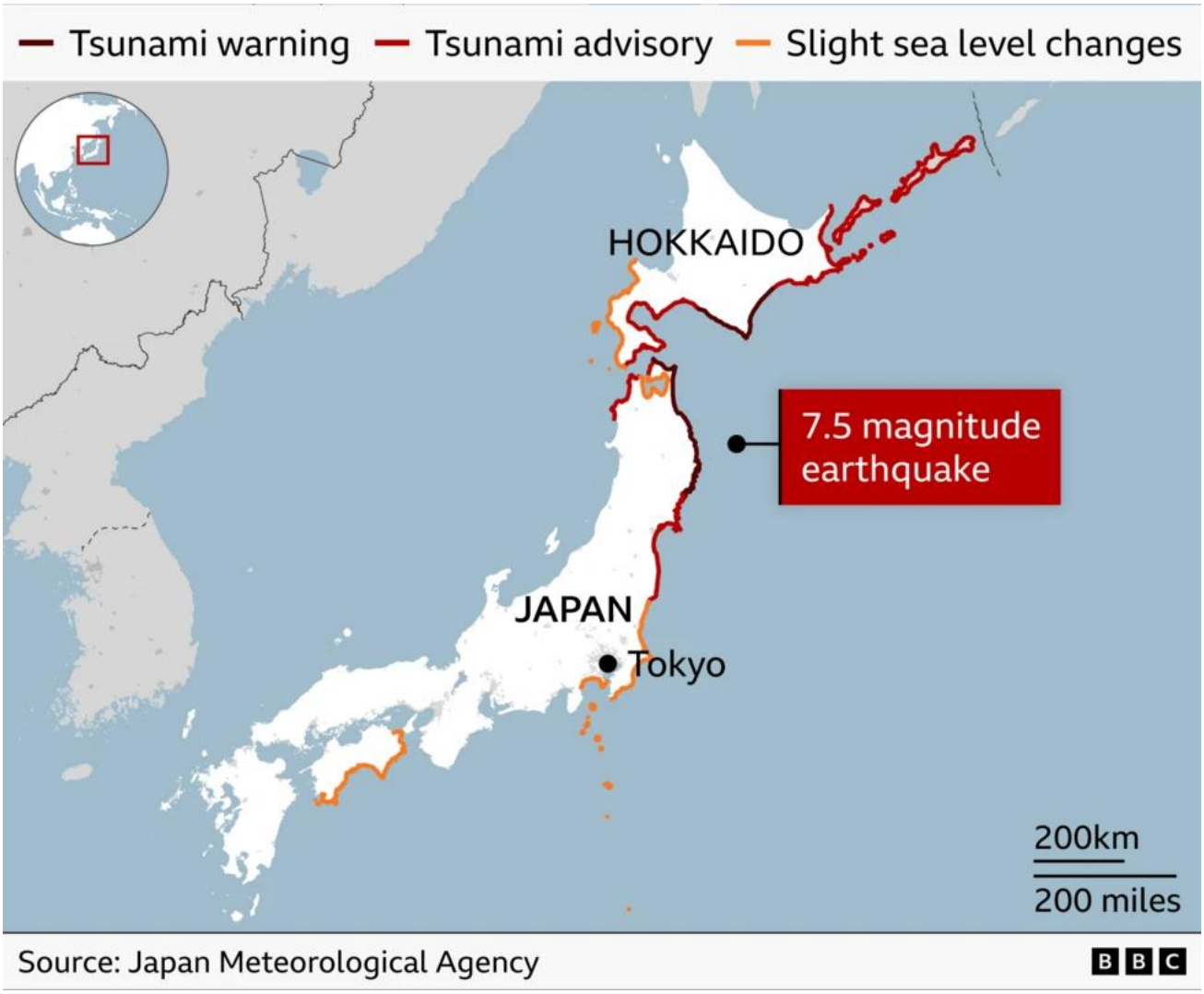
Authorities said the risk of a quake measuring 8.0 magnitude or higher was "relatively higher than during normal times".

People in Japan are still scarred by memories of a huge quake in 2011 that triggered a tsunami which killed more than 18,000 people and caused a meltdown at the Fukushima nuclear plant.

After Monday's undersea quake, recorded at a depth of 10km, warnings of possible bigger waves were issued to residents in areas nearest the epicentre - in Japan's main island, Honshu, and the northern region of Hokkaido. Tremors were felt as far away as Tokyo.

In Hokkaido tsunami alerts remained in place hours after the quake struck at 16:52 local time (08:52 BST). "As soon as we heard the earthquake alert, everyone ran downstairs," Chaw Su Thwe, a Myanmar national living in Hokkaido, told the BBC. "However, this time the shaking was relatively mild. Right now, local authorities are using loudspeakers in the neighbourhood to warn people about a possible tsunami and to stay alert," she added. "Office workers have been allowed to leave work early."

A number of bullet trains were affected, and 100 homes were without power, Japan's Cabinet Secretary Minoru Kihara told reporters. He said there were no immediate reports of major damage or injuries. Train services resumed on Monday night.



Map of Japan labelled with Hokkaido and Tokyo, showing coastal tsunami warnings issued after a 7.4 magnitude earthquake. Black coastal lines indicate tsunami warnings, red lines show tsunami advisories and orange lines mark areas of slight sea level changes.

More than 170,000 people across several prefectures were ordered to evacuate after tsunami warnings were issued across parts of Japan's east coast.

The warning was the second-highest of three levels of alert, with people being told to leave coastal and riverside areas and move to higher ground or an evacuation building.

"Tsunami waves are expected to hit repeatedly. Do not leave safe ground until the warning is lifted," Japan's Meteorological Agency (JMA) told reporters in the hours after the quake - a plea echoed by Prime Minister Sanae Takaichi, who urged people to get to "higher, safer places".

It was later downgraded to a tsunami alert, before being removed entirely shortly before midnight local time.

Japan's precarious location on the Ring of Fire means it experiences about 1,500 earthquakes a year, and accounts for 10% of quakes measuring 6.0 magnitude or higher worldwide.

In March 2011, Japan was hit by the devastating 9.0-magnitude earthquake off the coast to the south of Iwate province, the most powerful earthquake it had ever recorded. The meltdown at Fukushima was one of the worst nuclear disasters in history. Since then, the government issues warnings and advisories for people to get to higher ground.

Reference:

https://www.bbc.co.uk/news/articles/czd7m7d699do?fbclid=IwY2xjawRULaVleHRuA2FlbQIxMABicmlkETBtNkVHRG45VTRvODIlazdoc3J0YwZhcHBfaWQQMjIyMDM5MTc4ODIwMDg5MgABHpoR5WaRyTTKG0zuPCcpcddtqJGS40k3LXMOwgQH20A0WY5XnX78-EAJhLI8_aem_f3e21HNVBooPlRJsTwhQqQ

Earth Sciences

M 7.4 - 100 km ENE of Miyako, Japan 20th April 2026

"The April 20, 2026, M 7.4 earthquake offshore of Miyako, Japan, occurred as the result of thrust faulting near the subduction zone interface plate boundary between the Pacific and North America plates. Moment tensor solutions are consistent with the east-west oriented compression expected in this region and suggest slip occurred along the plate interface. At the location of this earthquake, the Pacific plate moves approximately westward relative to the North America plate at a velocity of 83 mm/yr, subducting beneath Japan at the Japan Trench and dipping to the west beneath Japan. Note that some researchers divide this region into several microplates that together define the relative motions among the larger Pacific, North America, and Eurasia plates; these include the Okhotsk and Amur microplates local to this earthquake that are part of North America and Eurasia, respectively.

While commonly plotted as points on maps, earthquakes of this size are more appropriately described as slip over a larger fault area. Reverse (thrust) faulting events of the size of the April 20, 2026, earthquake are typically about 70 km long by 35 km wide in size.

The region around this M7 April 20, 2026, earthquake is active and has hosted many larger (M7+) earthquakes. In the past 100 years, 36 earthquake M7 and larger have occurred within 250 km of this event. Notably, this April 20, 2026, earthquake occurred 192 km to the north of the March 11, 2011, M9.1 Tohoku earthquake. The much larger March 2011 M9.1 earthquake generated a deadly tsunami that led to extensive destruction along the Japanese coast and propagated throughout the Pacific Ocean basin. Approximately 16,000 people perished because of the earthquake and subsequent tsunami. More recently, the M7.6 December 8, 2025, Aomori Prefecture earthquake occurred 137 km to the north-northwest of this April 20, 2026, event and resulted in at least 32 injuries and 4000 buildings damaged."

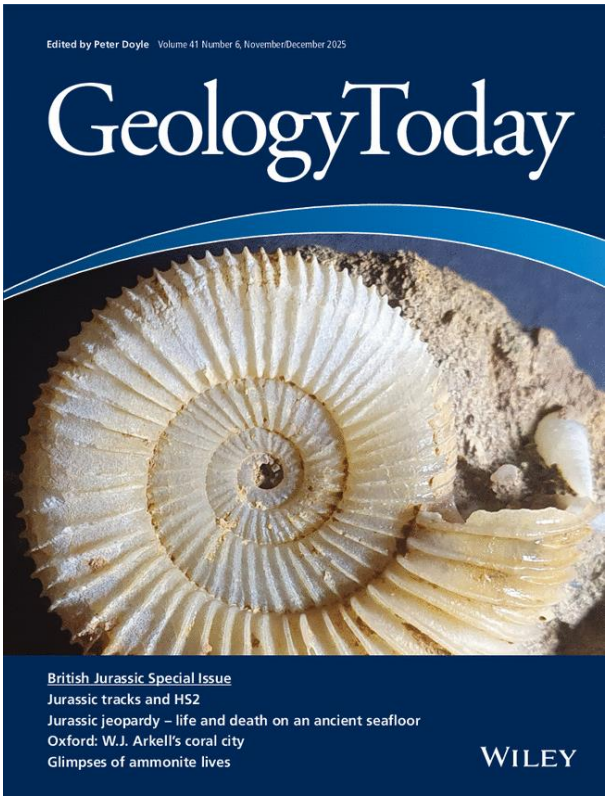
Source:

https://earthquake.usgs.gov/earthquakes/eventpage/pt26110000/executive?fbclid=IwY2xjawRUN6VleHRuA2FlbQIxMABicmlkETBtNkVHRG45VTRvODIlazdoc3J0YwZhcHBfaWQQMjIyMDM5MTc4ODIwMDg5MgABHsxClKdckywYUEDYzsbC11LdU2E3tSBfNSLMHlniMiXL2bXjPNJ-rsjGeOdL_aem_9S1WAqVTmCCjzivsE86njA

Further Reading

Geology Today

Volume 41, No. 6 Nov/Dec 2025



https://onlinelibrary.wiley.com/toc/13652451/2025/41/6?campaign=woletoc

A huge helium shortage is looming — but ancient rocks in Earth's crust may be hiding massive reservoirs

Sascha Pare, LiveScience

5 December 2025

For decades, helium has been produced with natural gas, generating huge carbon emissions. Now, geologists are looking for new helium sources — and finding enormous "carbon-free" reservoirs that could revolutionize the industry.

https://www.livescience.com/planet-earth/geology/a-huge-helium-shortage-is-looming-but-ancient-rocks-in-earths-crust-may-be-hiding-massive-reservoirs?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe4763876a779b0361304855882d8f&utm_campaign=368B3745-DDE0-4A69-A2E8-62503D85375D&utm_medium=email&utm_content=1EC1362D-C21E-4336-A13F-15C3693787F9&utm_source=SmartBrief

Earth's crust hides enough 'gold' hydrogen to power the world for tens of thousands of years, emerging research suggests

Sascha Pare, LiveScience

9 December 2025

Reservoirs of hydrogen gas that form naturally in Earth's crust could help humans decarbonize. The challenge now is finding these accumulations and working out how best to mine them, experts say.

https://www.livescience.com/planet-earth/geology/earths-crust-hides-enough-gold-hydrogen-to-power-the-world-for-tens-of-thousands-of-years-emerging-research-suggests?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe4763876a779b0361304855882d8f&utm_campaign=368B3745-DDE0-4A69-A2E8-62503D85375D&utm_medium=email&utm_content=8998D35F-87E2-441A-B633-C1753D00B43D&utm_source=SmartBrief

Giant structure discovered deep beneath Bermuda is unlike anything else on Earth

Stephanie Pappas, LiveScience

12 December 2025

A thick layer of more than 12 miles of rock may explain why Bermuda seems to float above the surrounding ocean.

https://www.livescience.com/planet-earth/geology/giant-structure-discovered-deep-beneath-bermuda-is-unlike-anything-else-on-earth?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe4763876a779b0361304855882d8f&utm_campaign=368B3745-DDE0-4A69-A2E8-62503D85375D&utm_medium=email&utm_content=C9461D84-DA02-4B59-92F3-2F9D9C8517C8&utm_source=SmartBrief

Tiny bump on 7 million-year-old fossil suggests ancient ape walked upright — and might even be a human ancestor

Sophie Berdugo, LiveScience

9 January 2026

The way *Sahelanthropus tchadensis* moved has long been debated. The discovery of a small bump on the front of the thigh bone is "beyond convincing" evidence this ape was bipedal.

Sahelanthropus tchadensis' (centre) knees and hips functioned more like humans' (right) than chimpanzees' (left). (Image credit: Williams et al, Science Advances (2026) CC-BY-4.0)

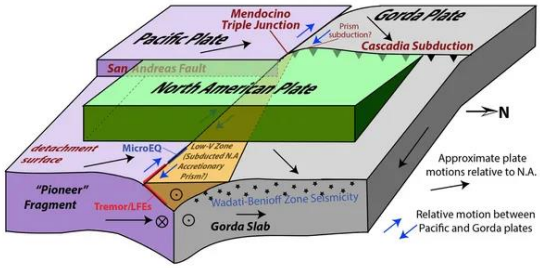
https://www.livescience.com/archaeology/human-evolution/tiny-bump-on-7-million-year-old-fossil-suggests-ancient-ape-walked-upright-and-might-even-be-a-human-ancestor?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe4763876a779b0361304855882d8f&utm_campaign=368B3745-DDE0-4A69-A2E8-62503D85375D&utm_medium=email&utm_content=B9F6F8DB-483F-4E1D-B711-080DF8786267&utm_source=SmartBrief

Fragment of lost tectonic plate discovered where San Andreas and Cascadia faults meet

Stephanie Pappas, LiveScience

15 January 2026

A hidden chunk of an ancient tectonic plate is stuck to the Pacific Ocean floor and sliding under North America, complicating earthquake risk at the Cascadia subduction zone.



The Mendocino Triple Junction is the meeting point of three tectonic plates. Using data from tiny earthquakes, researchers propose a new model for this seismic zone. The Pacific plate is dragging the Pioneer fragment under the North American plate as it moves north. At the same time, a fragment of the North American plate has broken off and is being subducted with the Gorda plate. (Image credit: David Shelly, USGS)

https://www.livescience.com/planet-earth/earthquakes/fragment-of-lost-tectonic-plate-discovered-where-san-andreas-and-cascadia-faults-meet?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824

f6df096d90a0be8fe4763876a779b0361304855882d8f&utm_campaign=368B3745-DDE0-4A69-A2E8-62503D85375D&utm_medium=email&utm_content=873A4AF8-8606-4D6B-9AD7-3E82488BCCEF&utm_source=SmartBrief

---

Geology Bites.

20 January 2026

Michael Manga on **Wet Eruptions**

In the podcast, Michael Manga talks about the various ways in which the presence of water can affect eruptions, both here on Earth and elsewhere in the Solar System. Most dramatically, it can vastly amplify the explosive power of a volcanic eruption. The 2022 Hunga Tonga eruption, the most powerful eruption in a lifetime, was a good example of this.

Manga is a Professor in the Earth and Planetary Science department of the University of California, Berkeley.

https://www.geologybites.com/michael-manga

11 February 2026

Sara Pruss on the **First Reef Builders**

The first multicellular animals to build reefs lived in the Early Cambrian around the time of the Cambrian explosion. They were sponges called *archaeocyaths.* In the podcast, Sara Pruss suggests that the rise of the *archaeocyaths* fostered an increase in animal diversity. But they were relatively short-lived, dying out in the Middle Cambrian. But over geological time, reef-building organisms appear and disappear again and again until the corals we have today appeared in the Middle Triassic, about 240 million years ago.

Pruss is a Professor of Geosciences at Smith College.

https://www.geologybites.com/sara-pruss

6 March 2026

Hal Levison on the Mission to Jupiter's Trojan Asteroids

A key question about the early history of the Solar System is whether the giant planets formed roughly at the distances from the Sun they presently occupy, or, as some theories predict, much closer to the Sun. The discovery of other solar systems with radically different configurations of planets has made this question more pressing, since it appears that the configuration of the Solar System might be atypical.

In the podcast, Hal Levison explains why the Trojan asteroids of Jupiter offer us the best opportunity to discriminate between the various models of Solar System evolution. And that is why a spacecraft called Lucy is now well on its way to a rendezvous with these asteroids.

Hal Levison is the Principal Investigator of the Lucy mission. He studies the dynamics of astronomical objects and, in particular, the formation and long-term behaviour of solar system bodies. He is one of the original proponents of the Nice model (named after the city where it was conceived), a scenario that proposes the migration of the giant planets from an initial compact configuration closer to the Sun to their present positions. He is Chief Scientist in the Department of Space Sciences at the Southwest Research Institute in Boulder, Colorado.

https://www.geologybites.com/hal-levison

26 March 2026

Esther Sumner on Turbidity Currents

In this episode, Esther Sumner from the University of Southampton talks about turbidity currents. The common occurrence of turbidites in the geological record indicates how important such flows are. A single flow can extend over a thousand kilometres and last for days. That's because these flows can travel down minute gradients (less than one degree) and be self-sustaining, with the initial flow

triggering new flows as it barrels down a submarine canyon. From wave tank experiments Sumner has replicated some of her team's underwater observations by generating a turbidity current and intruding another turbidity current into it. She also tells about the day her team accidentally flew a remotely operated vehicle into a live turbidity current in the Mendocino canyon off the Californian coast.

https://www.geologybites.com/esther-sumner

People, not glaciers, transported rocks to Stonehenge, study confirms

Sascha Pare, LiveScience

23 January 23 2026

A new analysis of mineral grains has refuted the "glacial transport theory" that suggests Stonehenge's bluestones and Altar Stone were delivered to Salisbury Plain by glaciers.

Stonehenge's megaliths were not transported by glaciers to their current location, researchers say. (Image credit: Captain Skyhigh via Getty Images)

https://www.livescience.com/archaeology/people-not-glaciers-transported-rocks-to-stonehenge-study-confirms?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe47638765a779b0361304855882d8f&utm_campaign=368B3745-DDE0-4A69-A2E8-62503D85375D&utm_medium=email&utm_content=89566834-EFA4-405E-92CE-FDE6508277BB&utm_source=SmartBrief

https://theconversation.com/grains-of-sand-prove-people-not-glaciers-transported-stonehenge-rocks-271310

https://www.nature.com/articles/s43247-025-03105-3?utm_medium=affiliate&utm_source=commission_junction&utm_campaign=CONR_PF018_ECOM_GL_PBOK_ALWYS_DEEPLINK&utm_content=textlink&utm_term=PID1612532&CJEVENT=e810202dfd1211f0831702010a18b8f6&countryCode=de

Rock climbers in Italy accidentally discovered evidence of an 80 million-year-old sea turtle stampede

Jeanne Timmons, LiveScience

27 January 2026

Scientists say grooves on a rock face overlooking the Adriatic Sea may have been made by sea turtles fleeing an earthquake.

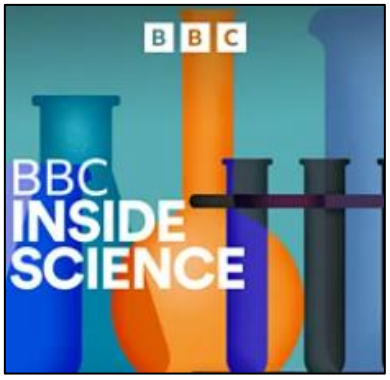
The grooves that may be evidence of a sea turtle stampede were found on a rock face in Italy by climbers. (Image credit: Paolo Sandroni)

https://www.livescience.com/animals/extinct-species/rock-climbers-in-italy-accidentally-discovered-evidence-of-an-80-million-year-old-sea-turtle-stampede

How rare are Greenland's rare earth elements?

BBC Inside Science, 8 January 2026

President Trump has his sights set on Greenland. If he succeeds, what mineral wealth will he find there? Adrian Finch, Professor of Geology at St Andrews University has been visiting Greenland for more than 3 decades and explains what so called 'rare earth elements' are found in Greenland and why.



Professor Danny Altmann talks to Tom Whipple about a new project to understand the genetic and metabolic similarities between two illnesses: Long Covid and ME.

And Lizzie Gibney, senior physics reporter at Nature brings her pick of the best new science this week.

https://www.bbc.co.uk/sounds/play/w3ct8txt

Huge fossil bonanza preserves 512-million-year-old ecosystem

A treasure trove of Cambrian fossils has been discovered in southern China, providing a window on marine life shortly after Earth's first mass extinction event.

James Woodford, New Scientist
28 January 2026

An artist's illustration of life in Earth's oceans at the time of the Huayuan biota. (Credit: Dinghua Yang)

https://www.newscientist.com/article/2513485-huge-fossil-bonanza-preserves-512-million-year-old-ecosystem/

Visit the North Sea oil field used to store greenhouse gas

Adrienne Murray, BBC Technology
30 January 2026

"Prepare for an offshore landing," the pilot announces, before landing on a platform 250km (155 miles) from Denmark's west coast.

The helicopter has just circled around Nini, a nearby rig rising up from the choppy waters of the North Sea.

The rig sits over an almost-depleted oilfield that's about to get a second life as a massive carbon storage project called Greensand Future. The plan is to pump thousands of tonnes of climate-warming CO2 into the old oil field.

https://www.bbc.co.uk/news/articles/cq5y7dd284do

Ammonites survived asteroid impact that killed off dinosaurs, new evidence suggests

Paul Arnold, Phys.org ***7 January 2026***

In the aftermath of the giant asteroid that crashed into the Yucatan Peninsula about 66 million years ago, approximately 75% of all species on Earth were wiped out, including the dinosaurs. Among those thought to have perished at this K-Pg (Cretaceous-Paleogene) boundary were the **ammonites**. These were coiled-shelled molluscs with long tentacles related to modern octopuses and squids, and they are known today for their distinctive spiral-shaped fossils.

However, a new study published in **Scientific Reports** suggests that these marine creatures survived the initial mass extinction event.

https://phys.org/news/2026-01-ammonites-survived-asteroid-impact-dinosaurs.html?utm

Life may have rebounded 'ridiculously fast' after the dinosaur-killing asteroid impact

Skyler Ware, LiveScience 31 January 2026

After the asteroid smashed into Earth around 66 million years ago, it didn't take life that long to rebound, a new study finds.

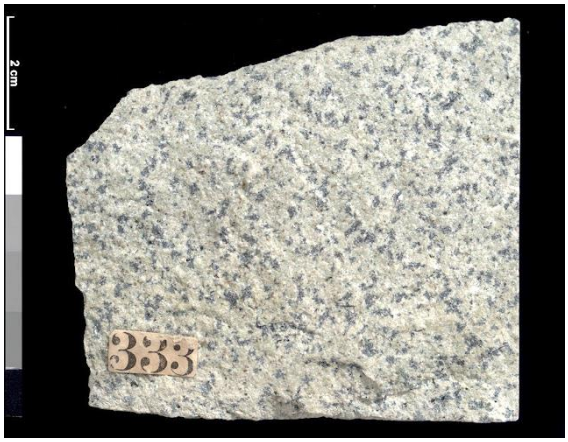
https://www.livescience.com/planet-earth/evolution/life-may-have-rebounded-ridiculously-fast-after-the-dinosaur-killing-asteroid-impact?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe4763876a779b0361304855882d8f&utm_campaign=368B3745-DDE0-4A69-A2E8-62503D85375D&utm_medium=email&utm_content=D25D31C6-ABD2-4D5E-B7DF-781448E20519&utm_source=SmartBrief

British Geological Survey

Curling is dominating the **Olympics coverage** today, 4 February 2026. Did you know that Olympic curling stones come from just one tiny, uninhabited island in Scotland?

Granite from **Ailsa Craig** has been used to make Olympic curling stones since 1924 and is prized for its strength.

Granite from Ailsa Craig, Scotland



Rock specimen of riebeckite granite. Ailsa Craig, Firth of Clyde, Ayrshire, Scotland. (BGS Image ID: P521397)

The sample is a pale-coloured coarse-grained igneous rock with a distinctive granitic texture. It is technically a microgranite dominated by pale alkali feldspar crystals embedded in dark riebeckite amphibole and grey quartz.

The distinctive granite of Ailsa Craig forms part of the vast Tertiary Igneous Province of northern Britain.

The sample is a pale-coloured coarse-grained igneous rock with a distinctive granitic texture and is technically a microgranite.

Learn more about Ailsa Craig's rocks on *BGS' Geoheritage* page:

https://britgeoheritage.blogspot.com/2014/02/granite-from-ailsa-craig-scotland.html

https://www.scientificamerican.com/article/the-quirky-geology-behind-olympic-curling-stones/?utm_source=Live+Audience&utm_campaign=bb58891d65-nature-briefing-daily-20260212&utm_medium=email&utm_term=0_-33f35e09ea-500911261

The historiography of dinosaur footprints of the Lower Cretaceous Wealden Group on the Isle of Wight, UK

Open Access - Review Article
Available Online 06 February 2026

Megan L. Jacobs

Abstract

The Isle of Wight, UK, often called 'Dinosaur Island', preserves one of Europe's most extensive Early Cretaceous dinosaur records. From pioneering 19th century discoveries to modern photogrammetry and 3D modelling, ichnological research has enhanced the understanding, and provided key evidence of the composition and paleoecology of the Wealden Group dinosaur assemblage. The accessibility and year-round visibility of many track sites has promoted geotourism, highlighting their dual scientific and educational significance. This paper provides the first comprehensive review of Isle of Wight dinosaur ichnology, synthesising dispersed

literature and providing a foundation for future research.

https://www.sciencedirect.com/science/article/pii/S0016787826000040?dgcid=raven_sd_aip_email

---

TWO Digging for Britain

Medieval Murder and Roman Pets
Series 13 Episode 5 of 6

BBC 2: Featuring a vast first-century Roman compound, the warhorses that changed the course of history, a medieval murder mystery, the thriving farmstead belonging to Isaac Newton's mother, thousands of animal bones from a Roman farm, and **a 300-million-year-old forest that built the modern world, *i.e. Brymbo Fossil Forest*.**

https://www.bbc.co.uk/programmes/m002pl5g

https://www.brymboheritagetrust.org/

https://en.wikipedia.org/wiki/Brymbo_Fossil_Forest

Martian meteorite that fell to Earth is full of ancient water, new scans reveal

Harry Baker, LiveScience 5 February 2026

A new study has revealed that the iconic Black Beauty meteorite contains much more hidden water than previously suspected. The rock, which fell to Earth from Mars, could reveal clues about the Red Planet's watery past.

NWA 7034, a.k.a. "Black Beauty," is a roughly 11-ounce (320 grams) and exceptionally dark meteorite that originated on Mars. (Image credit: NASA)

https://www.livescience.com/space/mars/martian-meteorite-that-fell-to-earth-is-full-of-ancient-water-new-scans-reveal?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe4763876a779b0361304855882d8f&utm_campaign=368B3745-DDE0-4A69-A2E8-62503D85375D&utm_medium=email&utm_content=BB1BC87B-9E22-4C09-A0BB-742602E15785&utm_source=SmartBrief

---

How an ancient seafloor turned Arkansas into 'Sharkansas,' a shark fossil hotspot

Cal Poly Humboldt, Phys.Org
9 February 2026

A reconstruction of a new species of shark, the Cosmoselachus mehlingi, based on a fossil found at the Fayetteville Shale. (Credit: Mick Ellison)

Most shark fossils are just teeth—their cartilage skeletons usually decay long before they can fossilize. But in northwestern Arkansas, a series of geological sites known as the Fayetteville Shale has preserved dozens of rare, three-dimensional shark skeletons dating back more than 300 million years. In a new study published in ***Geobios***, researchers reveal why: these fossils formed on a low-oxygen, highly acidic seafloor that preserved cartilage instead of destroying it.

https://phys.org/news/2026-02-ancient-seafloor-arkansas-sharkansas-shark.html?utm_source=nwletter&utm_medium=email&utm_campaign=weekly-nwletter

Football-sized fossil creature may have been one of the first land animals to eat plants

Field Museum, Phys.Org 10 February 2026

Life on Earth started in the oceans. Sometime around 475 million years ago, plants began making their way from the water onto the land, and it took another 100 million years for the first animals with backbones to join them. But for tens of millions of years, these early land-dwelling creatures only ate their fellow animals, rather than grazing on greenery.

In a paper in the journal **Nature Ecology & Evolution**, scientists describe the 307-million-year-old fossil of one of the earliest known land vertebrates that evolved the ability to eat plants.

https://phys.org/news/2026-02-football-sized-fossil-creature-animals.html?utm_source=nwletter&utm_medium=email&utm_campaign=daily-nwletter

Fossil discovery suggests giant pythons once roamed Taiwan

Paul Arnold, Phys.Org 10 February 2026

Pythons are a common sight across much of Asia, especially in the tropical jungles and wetlands of countries like Vietnam, Thailand and Indonesia. But one curious exception has been the main island of Taiwan, where there are none of these reptilian constrictors. So, did they ever reach the island when sea levels were lower, or did they arrive and then vanish later?

A single bone

Recent evidence may have given us part of the answer. A paper published in the journal **Historical Biology** reports the discovery of a single fossil trunk vertebra from a python found in the Chiting Formation, a fossil-rich area in Tainan. It dates back to the Middle Pleistocene (between 800,000 and 400,000 years ago), and calculations suggest it belonged to a python at least four meters long. The biggest snakes today in Taiwan are around two to three meters in length.

Scientists from National Taiwan University identified the specimen from a distinctive combination of vertebral features, including the shape of the zygosphene, a bony structure that helps lock the snake vertebrae together and limit twisting. In pythons, the zygosphene has a wide, wedge-like shape that can help distinguish it from other snakes.

The team only had one part of the python to work with but were still able to calculate its size by using measurements from the vertebra and statistical models based on modern snakes.

https://phys.org/news/2026-02-fossil-discovery-giant-pythons-roamed.html?utm_source=nwletter&utm_medium=email&utm_campaign=daily-nwletter

Geology Today

Volume 42, No. 1 Jan/Feb 2026

https://onlinelibrary.wiley.com/toc/13652451/2026/42/1?campaign=woletoc

Life on Earth is lucky: A rare chemical fluke may have made our planet habitable

Samantha Mathewson, Space.com

10 February 2026

Without the right oxygen balance, phosphorus and nitrogen vanish — and life can't take hold.

Life on Earth may exist thanks to an incredible stroke of luck — a chemical sweet spot that most planets miss during their formation but ours managed to hit.

A new study shows that Earth formed under an unusually precise set of chemical conditions that allowed it to retain two elements essential for life as we know it: phosphorus and nitrogen. Without a perfect balance of these elements, a rocky planet could appear habitable on the surface yet be fundamentally incapable of supporting biology, according to the study.

https://www.space.com/space-exploration/search-for-life/life-on-earth-is-lucky-a-rare-chemical-fluke-may-have-made-our-planet-habitable?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe4763876a779b0361304855882d8f&utm_campaign=58E4DE65-C57F-4CD3-9A5A-609994E2C5A9&utm_medium=email&utm_content=4128553A-BEE5-4007-8D54-67EEBD6367C8&utm_source=SmartBrief

THE CONVERSATION

Academic rigour, journalistic flair

Snowball Earth wasn't fully frozen: ice-free oases sheltered early life

Chloe Griffin & Thomas Gernon

12 February 2026

To an astronaut today, the Earth looks like a vibrant blue marble from space. But 700 million years ago, it would have looked like a blinding white snowball. This seems an unlikely cradle for life, yet new evidence suggests the frozen ocean featured restricted ice-free oases that provided a lifeline for our earliest complex ancestors.

https://theconversation.com/snowball-earth-wasnt-fully-frozen-ice-free-oases-sheltered-early-life-275240?utm_medium=email&utm_campaign=Latest%20from%20The%20Conversation%20for%20February%2013%202026%20-%203673137534&utm_content=Latest%20from%20The%20Conversation%20for%20February%2013%202026%20-%203673137534+CID_b2fdb154f198da1eb62f641c16a115d6&utm_source=campaign_monitor_uk&utm_term=Snowball%20Earth%20wasnt%20fully%20frozen%20ice-free%20oases%20sheltered%20early%20life

'Impossible' mantle earthquakes actually occur all over the world, study finds

Stephanie Pappas, LiveScience

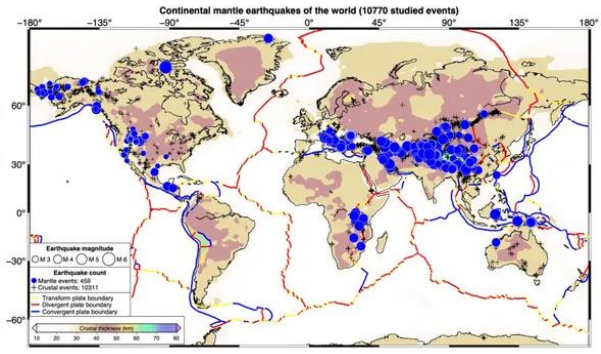
13 February 2026

Researchers were once unsure whether mantle earthquakes existed. Now they have a global map of this mysterious phenomenon.

Earthquakes that jiggle Earth's middle layer may be more widespread than scientists thought.

A new map of these mysterious deep earthquakes shows that they occur all around the world and that they may have a variety of causes. That's interesting, said study senior author Simon Klemperer, a geophysicist at Stanford University, because mantle earthquakes were once thought to be impossible, or at least rare. These quakes originate below a border known as the Mohorovičić discontinuity, or "Moho" — the line

between the brittle crust and the hotter, gooier mantle.



Continental mantle earthquakes happen around the globe. (Image credit: Axel Wang)

https://www.livescience.com/planet-earth/earthquakes/impossible-mantle-earthquakes-actually-occur-all-over-the-world-study-finds?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe47638765a779b0361304855882d8f&utm_campaign=368B3745-DDE0-4A69-A2E8-62503D85375D&utm_medium=email&utm_content=A6633356-AE7D-406A-9E2E-B775D1B6D91E&utm_source=SmartBrief

THE ETCHES COLLECTION

MUSEUM OF JURASSIC MARINE LIFE

A unique, modern museum of amazing fossils - the marine life of Jurassic Dorset. Learn about Life and Death in the Kimmeridgian Seas 157 million years ago during the age of the Dinosaurs….

https://www.theetchescollection.org/

A new home for BIG SARA

As seen on the BBC 1 documentary, 'Attenborough and the Giant Sea Monster', The Etches Collection has been home to the amazing Pliosaur skull for over a year now. But while this Sea Rex was ruling the oceans, who was the top dog on land?

Meet Big Sara, the newest and largest addition to The Etches Collection's fossil family. Big Sara is an Allosaurus skeleton, cousin of the T-Rex, and top of the dinosaur food chain during the Kimmeridgian period. Spanning 10 metres long, this spectacular specimen has approximately 70% of her original bones intact, making Big Sara one of the most complete Allosaurus skeletons in the world. She was discovered in Wyoming in 2015 and is thought to have roamed the earth 150 million years ago during the upper Jurassic period - the very same time period that our Sea-Rex was dominating the seas!

Big Sara will be on loan to The Etches Collection for the next 2 years courtesy of The Richmond Group. Do not miss your chance to meet this incredible Allosaurus, she'll be on display at The Etches Collection from Saturday 28th February 2026 in our Clore Room hall and is FREE to visit as part of your museum admission ticket. (Please Note:- we advise planning your visit to see Big Sara to coincide with when the Clore Room hall is open).

Why not come and examine her for yourself, although looking at her 8-inch killer claws, I wouldn't get too close…

https://www.theetchescollection.org/bigsara

Archaeopteryx, one of the world's first proto birds, has a set of weird, never-before-seen features, new study reveals

Aristos Georgiou, LiveScience

13 February 2026

Iconic transition species between dinosaurs and birds may have had weird 'teeth' on roof of its mouth and a highly mobile tongue, study reveals.

A reconstruction of Archaeopteryx, with the oral papillae on the roof of its mouth and a highly mobile tongue visible. (Image credit: Illustration by Ville Sinkkonen.)

https://www.livescience.com/animals/dinosaurs/archaeopteryx-one-of-the-worlds-first-proto-birds-has-a-set-of-weird-never-before-seen-features-new-study-reveals?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe47638763876a779b0361304855882d8f&utm_campaign=368B3745-DDE0-4A69-A2E8-62503D85375D&utm_medium=email&utm_content=1B7E693C-40B9-4730-A232-B39FA0C2073D&utm_source=SmartBrief

Vanishing lakes in Tibet may have triggered earthquakes by awakening faults in Earth's crust

Colin Barras, LiveScience

17 February 2026

Nam Co Lake in Tibet. The region was once home to much bigger lakes that stretched for more than 125 miles. (Image credit: wx-bradwang / Getty Images)

Shrinking lakes in Tibet likely woke up long-dormant tectonic faults, a new study finds. The findings strengthen the link between climate change and earthquakes.

https://www.livescience.com/planet-earth/earthquakes/vanishing-lakes-in-tibet-may-have-triggered-earthquakes-by-awakening-faults-in-earths-crust?utm_term=8DEBC9E5-6C7F-4337-AFFF-D9A51CC6C2C0&lrh=840a98cbe34ba22d824f6df096d90a0be8fe47638763876a779b0361304855882d8f&utm_campaign=368B3745-DDE0-4A69-A2E8-62503D85375D&utm_medium=email&utm_content=3F7908F1-3048-4A3A-A112-230AB287D7A2&utm_source=SmartBrief

GEL delivers UK's first-ever geothermal electricity

Jessica Casey, Editor Energy Global

27 February 2026

Geothermal Energy Lithium (GEL) has delivered the UK's first-ever geothermal electricity 24/7 from its United Downs plant in Cornwall, marking a huge breakthrough for the nation's renewable energy mix and for UK geothermal power. Octopus Energy has signed a long-term deal to purchase at least 3 MW of constant, weather-independent power from United Downs – enough to supply 10 000 homes.

https://www.energyglobal.com/other-renewables/27022026/gel-delivers-uks-first-ever-geothermal-electricity/

https://www.bbc.co.uk/news/articles/cewzg77k721o

Can the world catch China in the rare earths race?

BBC World Service ***26 Feb 2026***

The Inquiry

Control of critical minerals is becoming a source of geopolitical tension. They are essential to modern technology and industries around the world, and China currently dominates the mining and processing industry.

As demand grows, governments in the United States and elsewhere are looking at ways to reduce their reliance on Chinese supply chains. That means investing in new mines and processing facilities even though they are expensive and environmentally toxic.

Ultimately, the US and EU have a goal of diversifying the control of these lucrative elements.

This week on **The Inquiry**, Tanya Beckett explores whether the rest of the world can catch up with China in the race for rare earths.

https://www.bbc.co.uk/sounds/play/w3ct723z?at_mid=BY5vHDNbfg&at_campaign=The_Inquiry_Can_the_world_catch_China_in_the_rare_earths_race&at_medium=display_ad&at_campaign_type=owned&at_nation=NET&at_audience_id=SS&at_product=sounds&at_brand=p029399x&at_ptr_name=bbc&at_ptr_type=media&at_format=image&at_objective=consumption&at_link_title=The_Inquiry_Can_the_world_catch_China_in_the_rare_earths_race&at_bbc_team=BBC&at_creation=news

Fake teeth

This grinning stone is a fossilized ancient organism and not a chance zoomorphic object.

The teeth-like ‘beads’ are fossilized parts of the stem of a marine animal called a crinoid. Crinoids are part of the phylum Echinodermata, which includes sea urchins and sea cucumbers. Crinoids first appeared about 500 million years ago, and versions of them still exist today. Christine Clark was hunting for fossils on Holy Island of Lindisfarne, UK, when a tiny pebble seemed to be smiling at her. “It looked like someone’s fake teeth,” she said. *(Credit: Tony Jolliffe/BBC)*

https://www.nature.com/immersive/d41586-026-00597-7/index.html?utm_source=Live+Audience&utm_campaign=957ed308b3-nature-briefing-daily-20260304&utm_medium=email&utm_term=0_-33f35e09ea-500911261

How Reality Destroyed Europe's Green Energy Dreams

Just a few years ago, European economies were united in pushing for green energy at any cost — what changed?

Bjorn Lomborg, The Free Press
4 March 2026

https://www.thefp.com/p/how-reality-destroyed-europes-green

3.3 billion-year-old crystals reveal a shockingly active early Earth

New evidence reveals a surprisingly dynamic Hadean / Archean Earth already forging continents and recycling crust.

Science Daily 4 December 2025
Source: GFZ Helmholtz-Zentrum für Geoforschung

Fresh evidence suggests early Earth wasn't locked under a rigid stagnant lid but was already experiencing intense subduction. Ancient melt inclusions and advanced simulations point to continents forming far earlier than expected. The findings overturn long-held assumptions about the planet's infancy and reveal a surprisingly active Hadean / Archean world.

For many years, researchers believed that Earth remained in a "stagnant lid" state until at least the end of the Hadean / beginning of the Archean. According to this idea, the planet was capped by a stiff, unmoving outer shell while heat-driven convection took place deeper in the mantle. In this scenario, the early planet lacked subduction (the process in which crust sinks into the interior) and did not yet produce the continental crust seen in today's plate tectonic system.

Now, scientists from the ERC Synergy Grant Project "Monitoring Earth Evolution through Time" (MEET) -- a collaboration between geochemists from Grenoble (France) and Madison (USA), and geodynamic modelers from GFZ Helmholtz Centre for Geosciences in Potsdam (Germany) -- are offering a different interpretation.

In a study published in **Nature Communications,** the MEET research team reports evidence that both subduction and continental crust formation were not only active during the Hadean but may have been more intense than previously assumed. The Grenoble group analysed strontium isotopes and trace elements in melt inclusions trapped inside Archean aged 3.3-billion-year-old olivine crystals, providing rare geochemical snapshots of early Earth. At the same time, the GFZ group applied advanced geodynamic models to understand how these geochemical patterns relate to ancient tectonic activity.

Their combined results point to a far livelier early Earth, suggesting that widespread subduction and the growth of continental crust may have begun several hundred million years earlier than earlier theories proposed.

https://www.sciencedaily.com/releases/2025/12/251204024245.htm

1 March 2026

https://doi.org/10.18814/epiiugs/2026/02601s04

Copyright © International Union of Geological Sciences.

Women in Geology: An Historical Review

Martina Kölbl-Ebert
Ludwig-Maximilians-Universität München, Department of Earth and Environmental Sciences, Luisenstraße 37, 80333 Munich, Germany

This is an **Open Access article** distributed under the terms of the Creative Commons Attribution Non-Commercial License (http://creativecommons.org/licenses/by-nc/4.0) which permits unrestricted non-commercial use, distribution, and reproduction

in any medium, provided the original work is properly cited.

Abstract

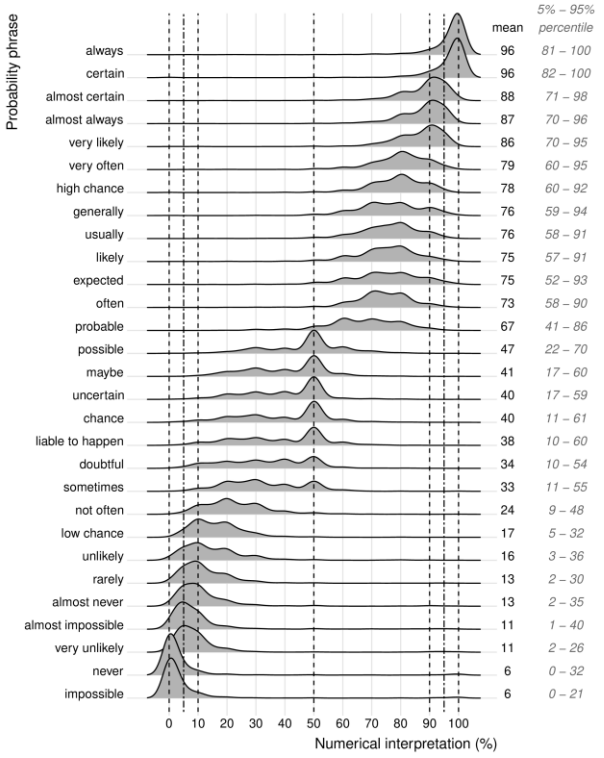
The paper provides an historical review of the transition from geology as private pursuit for women to professionalization and their ensuing struggle for access to the professional world of geoscientists. Geology was popular among women in early 19th-century Britain. The still non-professionalized scientific culture allowed these women some participation. However, they were excluded from universities and membership in the more prestigious societies. In the second half of the 19th century, the increasing professionalization of the natural sciences pushed women out of the field in the UK as well, and globally the first professional female geologists only appeared after university education became available to women. By this time, women were already seen as unwelcome competition by their future male colleagues. The typical early professional female geologist was unmarried and worked in specialized fields considered particularly 'feminine', such as paleontological collection curator, micropalaeontologist, petrographer, computer or chemical laboratory technician, or she worked in niche specializations without competition. Possibly due to language barriers, but little is known about female geoscientists from non-Western cultures. To this day, female scientists struggle for equal participation and recognition.

https://www.episodes.org/journal/view.html?volume=49&number=1&spage=17&vmd=Full&fbclid=IwY2xjawQaY_lleHRuA2FlbQIxMABicmlkETBtNkVHRG45VTRvODllazdoc3J0YwZhcHBfaWQQMjIyMDM5MTc4ODIwMDg5MgABHsn2zFke4_Fa0F-14LqRaneB1QtxQb-tr9iKZO8VDwMSwg5-UacWIyX2eYAU_aem_LZS26dU7kh7ornURQCywGA

Variability in the interpretation of probability phrases used in Dutch news articles — a risk for miscommunication

Sanne Willems, Casper Albers, Ionica Smeets

Verbal probability phrases are often used in science communication to express estimated risks in words instead of numbers. In this study we look at how lay people and statisticians interpret Dutch probability phrases that are regularly used in news articles. We found that there is a large variability in interpretations, even if the phrases are given in a neutral context. Also, statisticians do not agree on the interpretation of the phrases. We conclude that science communicators should be careful in using verbal probability expressions.



Density plots, mean values, and 5% and 95% percentiles of the numerical interpretations (in percentages) given by all participants for each phrase in the survey.

Willems, S., Albers, C. and Smeets, I. (2020). Variability in the interpretation of probability phrases used in Dutch news articles — a risk for miscommunication JCOM 19(02), A03. https://doi.org/10.22323/2.19020203

https://jcom.sissa.it/article/pubid/JCOM_1902_2020_A03/

World's largest acidic geyser wakes up in Yellowstone from six-year slumber

Max Matza, BBC Science ***3 March 2026***

The world's largest acidic geyser is putting on a show again, erupting for the first time in six years after a quiet hiatus, officials at Yellowstone National Park say.

The Echinus Geyser - located in the park's famous Norris Geyser Basin - had been in slumber since 2020, and it's unknown whether the eruptions will continue into the summer.

Researchers say geysers can sometimes become active for a month or two before falling dormant again.

(Image source: USGS)

https://www.bbc.co.uk/news/articles/c39w4mexvwyo

NSTA grants consent for carbon storage appraisal well

06 March 2026

Carbon storage in the UK has taken another step forward after the NSTA granted consent to drill a carbon storage appraisal well which could become a build-out of the Endurance project off the coast of Teesside.

It is another important step forward in helping the growing industry reach first injection and meet government targets of storing 100 million tonnes of CO2 per year, which the Climate Change Committee calculates is vital for the UK to meet net zero by 2050.

The government signalled its support by committing up to £21.7 billion in funding for the industry, which could create 50,000 jobs in the long-term.

The NSTA is currently offering 14 locations in the UK's second carbon storage licensing round building on the 21 licences awarded in the first round in 2023.

The Endurance project, off the coast of Teesside, was awarded the first carbon storage permit in December 2024, with HyNet in the East Irish Sea, awarded three permits in April 2025.

The appraisal well which is managed by NZNSS Ltd on CS licence CS006 in the Southern North Sea is due to spud on 7 March and drilling and the comprehensive data acquisition and analysis programme is scheduled to take approximately 90 days in total. The consent term is two years.

https://www.nstauthority.co.uk/news-publications/nsta-grants-consent-for-carbon-storage-appraisal-well/

Climate change is slowing Earth's spin at unprecedented rate compared to past 3.6 million years

PhysOrg ***12 March 2026***

Climate change is lengthening our days because rising sea levels slow Earth's rotation. Researchers from the University of Vienna and ETH Zurich now show that the current increase in day length—1.33 milliseconds per century—is unprecedented in the past 3.6 million years.

An exact 24-hour day is not a given—day length changes due to gravitational effects of the moon, as well as various geophysical processes acting within Earth's interior, at its surface, and in the atmosphere.

Today's climate change also affects day length: prior work showed that from 2000 to 2020 our days were lengthened by a rate equivalent to 1.33 milliseconds per century due to climate-related factors, especially the continental-ocean mass redistribution due to

the melting of polar ice sheets and mountain glaciers.

In a new study, appearing in the **Journal of Geophysical Research: Solid Earth**, Mostafa Kiani Shahvandi (University of Vienna) and Benedikt Soja (ETH Zurich) demonstrate that this rapid rise in day length is unparalleled over the last 3.6 million years.

https://phys.org/news/2026-03-climate-earth-unprecedented-million-years.html?utm_source=nwletter&utm_medium=email&utm_campaign=weekly-nwletter

Eighty-four earthquakes registered in Tenerife as officials launch plan for disaster

Matt Jackson, Maria Ortega ***MSN***

Tenerife recorded 84 earthquakes over the weekend as officials have launched a "plan for disaster". According to the National Geographic Institute (IGN) the earthquakes were detected in the western part of Las Canadas on the island.

They were able to precisely locate around 59 of the seismic events, which they say took place around Mount Teide. The most significant activity were two low-frequency pulses around the Canary Island.

https://www.msn.com/en-gb/travel/news/eighty-four-earthquakes-registered-in-tenerife-as-officials-launch-plan-for-disaster/ar-AA1YPBON

https://www.express.co.uk/news/world/2183238/eighty-four-earthquakes-registered-tenerife-officials

https://www.mirror.co.uk/news/world-news/tenerife-records-84-earthquakes-two-36881891

Hidden Ancient River System Found Deep Under The Surface of Mars

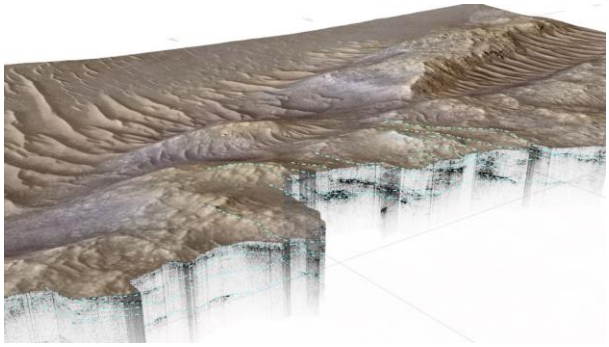
Michelle Starr, ScienceAlert

19 March 2026

Far away, alone in a crater on a planet inhabited only by robots, NASA's Perseverance rover explores a dry landscape that was once a river system billions of years ago.

According to a new discovery, however, the Jezero Delta on Mars is not the sole remnant of abundant water that once flowed across the surface. Perseverance's RIMFAX instrument has now probed deeper than ever beneath the Jezero crater, revealing a vast delta system fed by flowing water that existed long before the one the rover now explores.

In turn, this indicates that water flowed across the surface of Mars for much longer than the surface alone implies – a finding with important implications for the planet's past habitability.



Ground-penetrating radar reveals a long-lost river system hidden under the surface of Mars. (NASA/JPL/UCLA/UiO/ETH Zurich)

https://www.sciencealert.com/hidden-ancient-river-system-found-deep-under-the-surface-of-mars

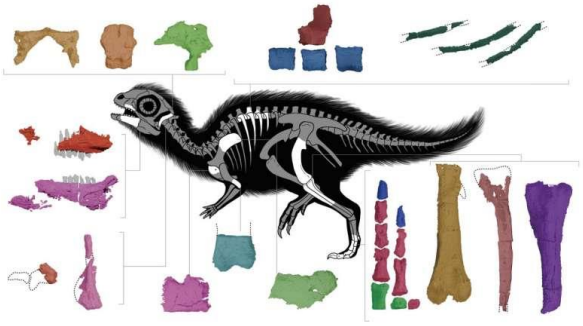
https://www.science.org/doi/10.1126/sciadv.adz6095

Fossil X-ray reveals new species of baby dino named for iconic Korean cartoon

University of Texas PhysOrg ***19 March 2026***

Cute, green, and sporting two sprigs of hair on his head, a mischievous baby dinosaur named Dooly is one of the most beloved cartoon characters in South Korea. So, when researchers from The University of Texas at Austin and the Korean Dinosaur Research

Center discovered a new species of baby dinosaur from Korea's Aphae Island, they knew exactly what to call it: *Doolysaurus.*



The skeletal anatomy of a juvenile Doolysaurus huhmini. The graphic highlights the fossil bones that were found with the dinosaur. (Credit: Janet Cañamar, adapted from Jung et al 2026)

"Dooly is one of the very famous, iconic dinosaur characters in Korea. Every generation in Korea knows this character," said Jongyun Jung, a visiting postdoctoral researcher at UT's Jackson School of Geosciences who led the research. "And our specimen is also a juvenile or 'baby,' so it's perfect for our dinosaur species name to honour Dooly."

The baby dinosaur is the first new dinosaur species discovered in Korea in 15 years.

https://phys.org/news/2026-03-fossil-ray-reveals-species-baby.html?utm_source=nwletter&utm_medium=email&utm_campaign=daily-nwletter

---

THE CONVERSATION
Academic rigour, journalistic flair

Why do some people eat soil? From a prisoner's lifeline to a modern tasting menu, the history of geophagy

Zander Simpson ***25 March 2026***

When I ask people if they have ever eaten soil before, they tend to give me a strange look. But geophagy – the deliberate ingestion of any kind of soil – is a practice that archaeological evidence from Kalambo Falls in Zambia suggests has been part of human history for at least 2 million years.

In Amsterdam's Museum of Edible Earth, researcher and artist masharu has brought together more than 600 soils used in geophagy.

The museum is now in the UK for the first time. Adult visitors to Somerset House in London are being invited to sample a "tasting menu" of its soils and even contribute their own tasting notes.

https://theconversation.com/why-do-some-people-eat-soil-from-a-prisoners-lifeline-to-a-modern-tasting-menu-the-history-of-geophagy-278691?utm_medium=email&utm_campaign=Latest%20from%20The%20Conversation%20for%20March%2025%202026%20-%203716938014&utm_content=Latest%20from%20The%20Conversation%20for%20March%2025%202026%20-%203716938014+CID_27fcd2ccf77b5b0b2e315c329151151b&utm_source=campaign_monitor_uk&utm_term=Why%20do%20some%20people%20eat%20soil%20From%20a%20prisoners%20lifeline%20to%20a%20modern%20tasting%20menu%20the%20history%20of%20geophagy

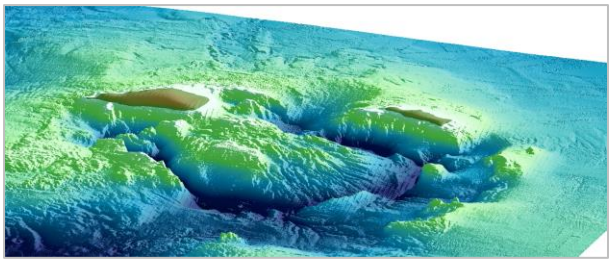
---

Japan's giant caldera volcano is refilling 7,300 years later

Kobe University ***27 March 2026***

The magma reservoir of the largest volcanic eruption of the Holocene is refilling. This Kobe University insight on the Kikai caldera in Japan allows us to understand giant caldera volcanoes like Yellowstone or Toba more generally and gets us closer to predicting their behaviour, too.

The magma reservoir of the largest volcanic eruption of the Holocene is refilling. This Kobe University insight on the Kikai caldera in Japan allows us to understand giant caldera volcanoes like Yellowstone or Toba more generally and gets us closer to predicting their behaviour, too.



We know very little about the processes that lead to a re-eruption of super volcanoes, such as the mostly underwater Kikai caldera in Japan, and are therefore ill-equipped to make predictions. (Credit: Seama Nobukazu)

Some volcanoes erupt so violently, ejecting more magma than could cover all of Central Park 12 km deep, that all that's left is just a wide and rather shallow crater, a so-called "caldera." Examples of such super volcanoes are the Yellowstone caldera, the Toba caldera and the mostly underwater Kikai caldera in Japan, which last erupted 7,300 years ago in what was the largest volcano eruption in the current geological epoch, the Holocene.

It is known that these volcanoes can and do re-erupt but very little is known about the processes that lead up to an eruption and are therefore ill-equipped to make predictions.

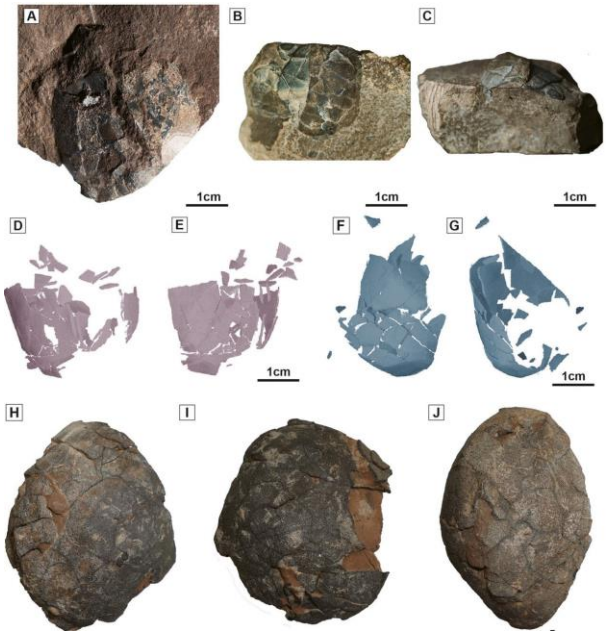
"We must understand how such large quantities of magma can accumulate to understand how giant caldera eruptions occur," says Kobe University geophysicist Seama Nobukazu.

https://phys.org/news/2026-03-japan-giant-caldera-volcano-refilling.html?utm_source=nwletter&utm_medium=email&utm_campaign=daily-nwletter

Tiny fossil eggs provide first physical evidence of Cretaceous bird-like dinosaurs in Korea

Paul Arnold, Phys.org ***25 March 2026***

A major gap in South Korea's prehistoric record has been filled with the discovery of *Onggwanoolithus aphaedoensis*, the first known bird-type dinosaur eggs from the Cretaceous period of South Korea. The find, which is detailed in a paper published in **Palaeogeography, Palaeoclimatology, Palaeoecology**, is a significant milestone because it is the first physical evidence of the bird-like dinosaurs thought to have left behind many of the region's fossil footprints.



Photographs and micro-CT scanned models of the preserved egg specimens from the Aphaedo site. (A) Holotype egg of Onggwanoolithus aphaedoensis (KDRCSA-E001). (B–C) Onggwanoolithus aphaedoensis specimen KDRC-SA-E002. (D-E) Micro-CT scanned models of the holotype KDRC-SA-E001 in two orientations. (F-G). Micro-CT scanned models of specimen KDRC-SA-E002 in two orientations. (H-J) Dendroolithid specimens from Area 2, including KDRC-SA-E003 (H), E004 (I), and E005 (J). Credit: Palaeogeography, Palaeoclimatology, Palaeoecology (2026). DOI: 10.1016/j.palaeo.2026.113653

While it is only speculation at this stage, the researchers are hopeful that further excavations will yield even more complete fossils. The fact that such delicate, thin-shelled structures survived for 100 million years suggests that the conditions were perfect for preserving fragile remains.

https://phys.org/news/2026-03-tiny-fossil-eggs-physical-evidence.html?utm_source=nwletter&utm_medium=email&utm_campaign=daily-nwletter

GA Smokejacks Field Meeting

Sunday, 4th October 2026

Leaders: Ed Jarzembowski & Peter Austen

Ewhurst brickworks (Smokejacks) exposes 25 m of sediment within the Lower Cretaceous upper Weald Clay, covering a timespan of around 300,000 years (1). The lower 15 m are thought to represent sedimentation in a shallow lake or lagoon in which the salinity fluctuated, and consist of mudstones and shaly mudstones with sporadic lenses of sideritic mudstone and siltstones within which insects (2, 3, 8), crustaceans (including spinicaudatans (clam

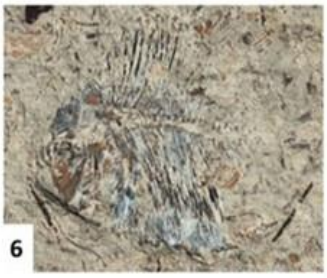

1


2


3


4


5


6


7


8


9


10

shrimps)), ostracods (seed shrimps), isopods (*Cymothoidana*) (4), prawns (5), fish/sharks (6, 7) and plants are preserved. The upper 10 m are considered to reflect deposition on mudflats and in sluggish river channels and include laterally variable beds of mudstone and sandstone that have yielded the remains of crocodiles, dinosaurs (9), land plants (10), and amber. Around 30 new species of insect have been described from Smokejacks, three of which represent new orders for Smokejacks and the Weald as a whole (archaic earwig, mayfly larva and stick insect). The site is perhaps best known for the discovery of the theropod dinosaur *Baryonyx walkeri* in 1983 (11). Specimens 4 (isopod) and 8 (wasp) were found on the 2025 GA field meeting.

Please arrive by 10.15 a.m. ready for a Site Safety Induction at 10.30 a.m. Directions and site map will be issued after booking. Hard hats, reflective jackets and protective goggles are mandatory plus footwear suitable for a claypit. We will leave the site at 4.00 p.m.

BOOKING INFORMATION - Numbers are limited to 21

COST: Members £5 / Non-Members £15

TO RESERVE A PLACE: contact the GA Office (020 7434 9298)

or visit the GA Website: *https://geologistsassociation.org.uk/ukfield/*


11