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ES2k is promoting earth science in the north of Ireland. A County Tyrone farmer once said to a former colleague trying to explain why he was collecting rocks in a ditch: “It’s well for them that has the time and money to pursue it!” For this image geologists had themselves to blame. We tended to stick to what we knew best and to shy away from public debate. However, things are changing. We now realise that an earth science education gives us a unique perspective of general importance as a style of thinking. The consequence is that we have a responsibility to voice our opinions. As the ES2k Magazine shows, there is a widening range of matters of public interest that are connected to earth science. More and more earth scientists, both professional and amateur, are taking seriously their responsibility to speak out.

We all know that the north of Ireland is one of the best places in Europe to be teaching geology. The sad thing is that anyone here who wants to study geology to degree level must go to a university outside the northern twelve counties of Ireland. Maybe this will change one day. Meanwhile, we believe that geology/geography teachers are especially important to us. If you’re a teacher we’d be glad to hear what you need.

Whatever happens next, ES2k’s future will certainly be exciting. We recently received a proposal from the Irish Geodiversity Forum Steering Group to join us and form what will be an Ireland-wide ES2k. At the recent AGM a gradual expansion was agreed and representatives for the rest of Ireland have been co-opted onto the committee. Just the fact that others have approached us means they recognise our progress. ES2k is going places. Whether your interest is education, industry or conservation please join in and help ensure earth science thrives in Ireland.

Cover Picture - Fabulous Fossils!

These 200 million-year old fossils come from the Dorset coast. It took Andrew Cowap over 350 hours work with fine needles to reveal them all. There are at least 4 species of ammonite amongst the 300 or so shells that lodged against the pieces of driftwood before being buried. The ammonites are characteristic of the Lias rocks which formed in a warm sub-tropical sea. For sheer numbers this block is unique and it is on show at the Ulster Museum (Photo. ©National Museums & Galleries of Northern Ireland).

Patrick John Cowan
Congratulations to Marie and Sean on the birth of Patrick John Cowan at 23.12 on 25th July 2003 weighing 9lb 3oz. And still Marie, our Honorary Secretary, deals with ES2k work as efficiently as ever! All good wishes to the family from ES2k.

Earth Science 2000
Raising awareness of Earth Science across the north of Ireland
WEB SITE: www.ulstermuseum.org.uk/es2k
Chairperson: Philip Doughty; Secretary: Marie Cowan, e-mail: mariecowan@hotmail.com
Treasurer: Jenny McKinley; Committee: Tony Bazley (ES2k Editor), Peter Crowther (Editor Web Site), David Kirk (Publicity Coordinator); Co-opted: Bernard Anderson, John Arthurs, Ian Enlander, William Lynn, Patrick McKeever, John Morris, Matthew Parkes, Karen Parks, Sophie Préseseele, Alastair Ruffell

Editorial

John Arthurs passes on the job of Chairman, Karen Parks the Treasurer’s post and Jasper Knight hands over the Website. The first two have played important roles at a significant time for ES2k and we hope will continue to help lead the way forward. Jasper has been involved from the start and established our Web Site. On behalf of the members ES2k thanks them all and wishes Jasper well for his career across the water; his support for ES2k has been magnificent.

ES2k is making this a diamond issue and reports on the application of radar to geology. The varied articles reflect a healthy interest in geology. Even so, the dropping of geology by Larne Grammar School is a big disappointment.

This issue might be the last that nominally restricts itself to the north of Ireland. There is a need to let the general public know what is going on in earth science in the whole of Ireland. To excite them and emphasise the importance of the subject in every day life. Please comment to the editor on this or any other matter that concerns you.

Thanks to Bernard and Alastair for their help with this issue. Also to all the contributors, including those whose items await the next issue. I hope you enjoy their efforts as much as I have.

Acknowledgements

We could not continue without the generous sponsorship of: The Curry Fund of the Geologists’ Association; The Environment & Heritage Service of the DOE (Northern Ireland); The Geological Society; The British Geological Survey; The Museums & Galleries of Northern Ireland; The Irish Salt Mining & Exploration Company; The Belfast Geologists’ Society. Thank you. If a reader knows a person or company who would like to sponsor or advertise with us please contact the Secretary or Editor.

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John Arthurs

Newsletter printed by Dorman & Sons Ltd. Tel: 028 9066 6700
Ireland has little history of diamonds. One found in County Fermanagh in 1816 (see photo) is maybe a Brazilian import and another ‘reputedly’ came from Co. Kerry. A scenario that is virtually barren. Yet recently two companies explored for diamonds in northern Co. Donegal and Co. Fermanagh. Why?

Tradition

Diamonds were first recognised in India but for over 2000 years were only known as eroded crystals from river gravel. Later Brazil and then South Africa (1867) became important sources, again from river and beach deposits. Finally the rock from which they had weathered was recognised - kimberlite, named after Kimberley in South Africa.

So tradition was that diamonds come from kimberlite, an ultramafic igneous rock of the lamprophyre ‘clan’ of rocks.

Age

The last 20 years has seen tradition turned on its head. Sophisticated dating techniques, using certain inclusions within diamonds, have shown many formed over 3,000 million years ago. They are older than the kimberlite rock in which they are now found. Diamonds formed in the earth’s mantle at the very roots of the continental plates. At depths of more than 150km where the necessary high-pressures and temperatures (about 1,200°C) existed. So how did the diamonds get into the kimberlite?

Kimberlite the scavenger

A scavenger picks useful things out of rubbish. The molten kimberlite magma came from even greater depths (in many cases over 200km) than the diamonds. It rose through the diamond source rocks scavenging diamonds on its way upwards. The magma transported diamonds within sheet-like dykes that, near the surface, fed into pipes with an elliptical cross-section. Transport had to be fast or the diamond inverted to graphite!

New picture

This new picture has brought new prospects. If one type of magma can scavenge diamonds why shouldn’t others? The magma has to have come speedily from great depths so it would probably be from the same lamprophyre clan of rocks as kimberlite. There are four other branches of this ‘clan’. One of them, olivine lamproite, changed diamond exploration strategy when, 20 years ago, it yielded diamonds in northernmost western Australia. Interestingly, lamproite derives from shallower mantle depths than kimberlite.

‘Shallower’ diamonds

Diamonds are very hard but are metastable. They can revert to graphite when reheated. When the margin of one continental lithospheric plate sinks deep into the mantle in a subduction zone (see ES2k Issue 7) there are reduced geothermal gradients with temperatures lower than usual for any pressure (i.e. depth). Here diamonds, in cool subducted slabs, may be preserved below about 120km depth but they have to be scavenged by magma and
transported upwards before the rocks warm to ambient mantle temperatures thus destroying the diamonds.

**Other three clan members**

Kimberlite and lamproite are potentially diamondiferous members of the lamprophyre clan. The others, ultramafic, alkaline and calc-alkaline members, arise from shallower mantle depths. Although generally devoid of diamonds, there is a chance that some might have originated deep enough to scavenge diamonds from cool subducted slabs such as mentioned above. Alkaline basalt and similar rocks might also do this.

**The Irish situation**

The present lithosphere thickness below Ireland exceeds 120km and in some areas was greater at times past. A deep continental root is interpreted to lie just north of Ireland. Subduction certainly featured during Ireland’s geological history.

Kimberlite is unlikely and lamproite has not yet been discovered in Ireland. It is the other lamprophyre clan members or alkaline basalt that are potential diamond carriers. Late Silurian—early Devonian lamprophyres, such as found in County Down and elsewhere, probably originate too shallowly to host diamonds. However, Permo-Carboniferous alkaline lamprophyres and alkaline basalt in northernmost areas could have originated deep enough, hence the search in Counties Donegal and Fermanagh. *Maybe that 1816 alluvial diamond is not an import after all.* Magma of such age could have scavenged diamonds from a cool subducted slab. Similarly some early Carboniferous dykes and pipes in southern areas are of interest.

Upper mantle rock fragments and crystals have been found within lamprophyre and alkaline basalt dykes and pipes at several localities in Ireland. These fragments have been scavenged by rising magma. So far none have included diamonds but a discovery is possible. Examples with mantle inclusions are the alkaline lamprophyres of Inishowen, lamprophyres on Clare Island, the Black Ball Head ‘diatreme’ in West Cork, and an alkaline basalt dyke west of Donegal town. Examples of lamprophyres without mantle inclusions are the calc-alkaline lamprophyres associated with the Ardara, Thorr and Fanad granites of Donegal, the Ox Mountains granodiorite, the Corvock Granite of Co. Mayo, the Galway and Omey granites of Connamara, the Leinster Granite and the Newry Granite. Then there are strange tales of poorly exposed rocks from the Irish Midlands...

Ireland does have a potential for diamonds. **What have the companies discovered?** They have been analysing stream sediments for minerals that are associated with diamonds, the so-called pathfinder minerals. Pyrope garnet and picro-ilmenite are the principal kimberlite pathfinders with, to a lesser degree, chrome diopside. For lamproite the single most important pathfinder is chromite. -So far they are keeping the vital details under wraps. One thing you can be sure, if a company finds a diamond we will hear about it.

Barry Long,

*Geological Survey of Ireland.*

(Anounced with permission of the Director, G.S.I.)
USEFUL WEBSITES

SEDIMENTARY STRUCTURES
http://www.esci.keele.ac.uk/services/education/index.htm

This website provides a range of sedimentary structures that can be useful for teaching in the classroom especially at A2 Level. There are also a series of free geological columns and geohazards maps that can be sent to schools etc. They are small and can be stuck into notebooks.

VOLCANOES
http://www.bbc.co.uk/science/horizon/

Concise summaries are given of some of the recent programmes such as ‘Volcano Hell’ and ‘Supervolcanoes’. It has good links to other volcano sites.

http://www.volcanolive.com/contents.html

Provides a range of excellent images, some simple lesson plans and a range of activities suitable for pupils. It also has very good maps that can be used in a PowerPoint presentation or for making information posters in class.

NATURAL DISASTERS
http://www.bbc.co.uk/science/hottopics/naturaldisasters/index.shtml

Good case studies of recent events but also links to news reports of eg. Mount Etna.

TEACHING RESOURCES
http://www.earthscienceeducation.com/

A number of contact addresses and also a series of PDF files that can be downloaded and used for teaching eg. The rock cycle and plate tectonics.

http://csmres.jmu.edu/geollab/Fichter/Fichter/websites.html

A general website that contains a series of links to sedimentary, igneous and metamorphic rocks and associated theory. Although some of the terms have an American spelling there are excellent diagrams and tables. Can be used at A Level.

http://www.yahooligans.com

This is a younger persons equivalent of a search engine and click on Science and Nature, followed by The Earth to reveal over 250 links to geology. It is good for Key Stage 3 and Key stage 4 research and if it is saved in the favourites or bookmark section allows the pupil to access other sites quickly.

Karen Parks

Geology A Level Results

Pupils from three schools received certificates and book tokens from ES2k at the Ulster Museum on 4th September. Dr David Falvey, Director of the British Geological Survey, made the presentations.

Debbie Boyd from Methodist College Belfast was first in the Northern Ireland Geology A Level examination. Anne Earls designed a special trophy for Debbie; it was made by Tyrone Crystal with a small core of gold-bearing rock mounted at the top of the crystal prism. She is going to Newcastle to study Law. Pamela Wilson from Regent House School, Newtownards was second and is going to St Andrews to study Geology and Chemistry. Sarah Mercer from Foyle and Londonderry College took the third prize. She is taking a year out and working for a local engineering company. The subject officer from OCR, John Greenbank, released the results for both A2 –Upper Sixth and AS –Lower Sixth.

At AS Level, Stephen Montgomery was first followed by Sara Malone and third was Jennifer Scott. They are pupils at Methodist College.

Our thanks to the sponsors of the prizes, the Irish Salt Mining and Exploration Company, and James Stevenson Quarries Ltd.

The photograph above shows Debbie Boyd, who couldn’t attend the main presentation ceremony accepting her prize at Methodist College. Also pictured L to R, Garth Earls, Karen Parks, Dr. Mulryne (Headmaster MCB) and John Arthurs.

Karen Parks

BITTER - SWEET NEWS

It is a very sad to report that Larne Grammar School is dropping Geology. The last exams at GCSE-level were taken this summer. ES2k has asked the Headmaster for comment but none has been forthcoming. We are told it is not due to a lack of pupils wanting to take the subject.

Guess what! The Welsh Examination Board reports that Larne Grammar School students took 1st and 2nd places for Northern Ireland at GCSE-level. Students from Ballyclare High and Methodist College were joint third. So the Larne Geology teacher, Mr Eddie McAuley, goes out with his head held high. ES2k knows that many students at Larne Grammar have benefitted from this inspiring teacher. We will continue to work to keep earth science on the curriculum in spite of the set back. (Editor - information from Karen Parks)
BOOK REVIEWS

A SHORT HISTORY OF NEARLY EVERYTHING

By Bill Bryson
Published June 2003 by Doubleday, 500pp Price £20 (Amazon £10)

Bill Bryson the American author and celebrated Anglophile writing about science? For those readers who have come across Bill Bryson in his travel writing guise, the style of ‘A Short History’ is reassuringly ironic with observational humour and insight in abundance. The book is billed as a personal quest to understand everything that has happened from the Big Bang to the rise of civilization. Consequently it is an all-embracing description of the history of ‘Earth System Science’ in which geology features, rightly and properly, very prominently.

Bryson chronicles this scientific journey in an entertaining style and pitches the level firmly at the interested amateur while retaining the right to dissect the personal characteristics and foibles of some of the world’s famous and less well-known scientists.

To chronicle the voyage of discovery that science has undertaken in explaining some 4.6 billion years of earth history in 423 pages is not an easy task. To make it highly readable, factual and entertaining is tribute to a man whose interest in the planet was sparked by a 1950s school science book in which a cut-away section of the Earth’s interior was displayed. This image so impressed him that he never lost the urge to examine things in greater detail. It is one of the books of the year.

Garth Earls

KRAKATOA - THE DAY THE WORLD EXPLODED

By Simon Winchester
Published June 2003 by Viking Penguin 432pp Price £16.99 (€18)

At 10.02 on August 27th 1883 the East Indian island of Krakatoa exploded, blowing itself 25 miles into the air, causing darkened skies and fiery sunsets around the world. Thousands were burned alive but most of the 36,400 who died were drowned by the huge tsunami which washed across all the coastal villages. The sound was the loudest ever recorded although it was only the fifth most explosive eruption recorded.

This is an account of a remarkable event that will happen elsewhere in the future. It is a lesson in why geological research must continue until early warning of such catastrophes is possible.

Winchester, as in his earlier book about William Smith, allows his account of the event to stray well beyond the fringe of his main narrative. I doubt, however, if his link between the event and the Bali bombings of 2002 would stand much serious examination. That aside, the book is an excellent read and will set your mind racing. Schools would do well to adopt it as an aid to teaching tectonics and vulcanology. Strongly recommended.

William B Davies

Apology.

The picture on the book cover for the review of ‘The North of Ireland’ by Paul Lyle, for some inexplicable reason, didn’t come out in the final printing of ES2k Issue 7.

Apologies to Paul. It is shown here as a way of recompense. Have you got your copy? It is now in the shops and is highly recommended by ES2k - in fact a ‘must’ for anyone even remotely interested in our wonderful landscape. (Editor)

CD-ROM REVIEW- THE THEORY OF PLATE TECTONICS VERSION 2.0

This is written by Ed Tarbuck and Fred Lugens and is a useful teaching aid introducing and describing Continental Drift, the Interior Structure of the Earth and Plate Tectonics. There are two levels, intermediate and advanced, and it could be used at Key Stage 3 and 4 and in the A level Geography and Geology courses. It is self-running and requires no installation. There is a glossary, an index that links to key frames so that particular sections can be easily accessed. It has excellent sequences showing plate movements and has interactive activities eg students can piece together land areas to form Pangaea and there are scored review activities that can be saved to file or printed for teacher assessment. It is very suitable for Geology classes as it is sometimes difficult to find the correct length of video or relevant content. I will be using the CD-ROM in the classroom linked to the data projector for introducing and demonstrating plate movements in the AS Geology syllabus and the GCSE Geology section on plate tectonics and earthquakes.

Karen Parks

KIDS MUST SEE

The recently opened Tyrannosaurus Rex exhibition at the Natural History Museum in London is a ‘must see’ for kids of all ages (up to 80!). The mainstays of the exhibition are two life size animatronic T. Rex’s, which portray the main question – was T. Rex a predator or a scavenger? We are invited to enter into this debate through a series of comparative and contrasting aspects of T. Rex’s anatomy where you draw your own conclusions having viewed the skeletons of known predatory dinosaurs and T. Rex. The limitations of T. Rex as a predator are suggested by its small arms. But with jaws like that who needs arms?

The moving exhibits show T. Rex as scavenger tucking into a dead plant eating dinosaur in gory detail (kids love it) – and on the other stage as a predator chasing a plant eater.

Before exiting, all visitors are asked to enter a competition draw by giving the answer to ‘Was T. Rex a scavenger or a predator - or both?’

Garth Earls
A geology degree, but what do I want to do for the rest of my life? A postgraduate course made up my mind. I was offered a Masters in mineral exploration at the University of Leicester and it all developed from there. As part of the course I had to complete a thesis, which became a competition between class members to see who could find the most exotic location! Thanks to Billy Loughlin I managed to blagg a project in Tanzania. So, in June 1999, as a fresh-faced young student I headed off for 2 months in the East African bush, with no idea of what would greet me.

**Miller in Mwanza**

I finally arrived in Mwanza, on the southern shores of Lake Victoria, to be met by the local geological team who took an avid interest in the copy of FHM magazine I had brought with me for the journey! What Mwanza lacked in amenities it made up for in beauty, although at the start of the hot season it was very annoying not to be able to swim in the lake. This is because Bilharzia, a nasty disease passed on through the eggs of a tiny snail, is endemic in the area. After a few days acclimatising, I mean large holes in the ground and the bathing rooms weren’t really rooms - more places where you washed with a basin of warm water. There was no mains electricity (and someone had stolen the generator the month before I arrived) and the water came from a well behind the village. But once I adapted to this more basic style of living I fell in love with the place and the people, so friendly, so interested and so hard working. As long as you have money you will never starve in Africa and the fresh fruit and vegetables were unlike anything I had ever tasted before (admittedly the meat was a bit tough at times). However most people in Africa don’t have money and just struggle to stay alive. This gave me a much greater appreciation of what we in Britain and Ireland take for granted and how lucky we really are.

**Ugandan sojourn**

When I returned from Tanzania, I promised myself I would return to that part of the world and in January this year I had the opportunity to do so. I was offered a 3-month contract to work with a company exploring for gold in Uganda. I landed in Entebbe, beside the aircraft from the infamous hijacking, which remains there to this day. Entebbe was similar in many respects to Mwanza.

Continues on page 8
and the Ugandan people were equally as friendly. The field camp was just that and life was a little tougher than before, but the scenery of the Western Rift Valley was simply spectacular.

**Back to Belfast**

I am now working for the Geological Survey of NI in Belfast. Even so, I fully intend to return to Africa during my professional career and help those wonderful people to fully realise their potential through the development of their natural resources. Like so many geologists, I have been bitten by the Africa bug -and I don't mean the mosquito!

Anyone at school or college who wants to know a bit more about mineral exploration work can contact me at GSNI (028 9066 6595)

Miller O'Prey

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**GROUND-PENETRATING RADAR**

This article is a synopsis of talks I enjoyed giving in 2003 at the Ulster Museum, UC Dublin and the University of Brighton. It is a selective review of a now widely used geophysical method. Mention ‘geophysical method’ and some readers may quickly move on. Don’t, this method is familiar to many through the radar gun used to detect vehicles exceeding the speed limit. The pulses of high-frequency electromagnetic waves that are sent out from the gun are reflected off the vehicle back to the source. Just turn the gun towards the ground!

What is GPR?

Put the words ‘Ground-penetrating (or probing) radar’ into any web search engine and you will be overwhelmed with websites. Personally I like the no-nonsense approach of Michigan Technical College [http://www.geo.mtu.edu/~jdiehl/GPR.html](http://www.geo.mtu.edu/~jdiehl/GPR.html) who summarise the technique thus:

1. **GPR is a reflection technique that requires very low power. It is similar to depth finders in boats, with an output like seismic reflection data.**

2. **Radar reflections occur at the interface of material with different dielectric constants (a measure of the capacity of a material to store a charge when an electric field is applied).** Dielectric constants for most dry geological materials range from 4 (quartz sand) to 7 (shales and carbonates) but water has a dielectric constant of 81 at 20oC that radically alters the velocity of the radar-wave travelling through materials and can cause serious errors in estimating depth.

3. **Soil conductivity also influences radar-wave interaction with geological media.** Radar works best in low conductivity materials such as dry granites and limestones. Clays with high conductivities are hard on radar waves, and the longest wavelength antennas can only get down 0.5 meters or so in wet clays. Water clearly influences conductivity because of its ability to dissolve salts. GPR can be used to profile fresh-water lakes if the water depth is no more than 10 meters.

4. **Radar surveys are conducted by moving a transducer or antenna of an appropriate wavelength by hand, or behind a vehicle over the area of interest.** Radar waves can generally resolve objects on the order of one-half wavelength and the wavelength of the radar-wave decreases as it encounters higher dielectric material with depth so the resolution increases.

All I should add is that the method is non-destructive, rapid and has a user-friendly output. In researching the topic, I found that there are two main areas of GPR application: arbitrarily the “natural” and “man-made” environments.

**GPR in the “natural” environment**

* Defining the geometry and extent of
fluvial, lacustrine, glacial (periglacial) and marginal marine sedimentary deposits, either currently-forming, Recent or pre-Holocene.

* Locating karst (caves) and palaeokarst.
* Mapping the extent of tree roots.
* Measuring the depth of soil water
* And my favourite: detecting migrating salmon in freshwater (salmon, having saline body fluids make excellent GPR targets in fresh water: work by JR Rossiter and others, Toronto).

**GPR in the “man-made” environment is likewise summarised.**

* Detection and mapping of buried pipes, tanks, culverts (especially non-metal where magnetic or electrical detectors fail).
* Thickness of pavements, overburden, distance left to quarry or tunnel.
* Mapping of contaminant plumes, buried walls and foundations.
* Forensic applications, mostly detection of human, ordnance (e.g. plastic landmines) and fuel dump burials.
* Snow and ice thickness assessment for periglacial roads, avalanche victims.

I have two favourites from the above (1) the work of William Hammon and others (Journal of Applied Geophysics, vol. 45, p.171) who managed to image a complete buried skeleton! And (2) the story of the USAF WWII squadron buried in Greenland, and the subsequent GPR detection of the aircraft, including the now flying “Glacier Girl”.

**Some Examples**

“Natural” examples. Many ES2k readers will be familiar with Scrabo Quarry (Newtownards, Co. Down), where Palaeogene sills and dykes intrude Triassic sandstones. As there are few records of the GPR response from intrusions I thought it would be interesting, with the help of Jenny Scott (a work experience student from Methodist College), to run a profile across a dyke: here is the result.

As well as academic use, the GPR technique can define geotechnical problems. A quarry in the Belfast area has a temporary road used by large haulage vehicles. The stability was questionable and the depth and extent of “poor” rock was unknown. As part of this project I ran a profile that clearly shows the faulting in the rock, helping define where the roadway required repair.

**GPR in Ireland**

In researching material for this article and the talks, I was indebted to Colin Brown (NUI Galway) and Paul Gibson (Maynooth). Before 1995, GPR devices were brought into Ireland for specific tasks. I am interested to hear from ES2k readers when the first GPR signal was intentionally derived in Ireland. I know of studies in 1991 and 1992/3 on forensic cases and at a proposed landfill site at Magheramorne near Larne in N.Ireland; also some ice radar experiments prior to the 1980’s. In 1995 NUI Galway acquired the first device, followed in 1996 by Maynooth and in 1999 Queen’s.

**Photograph courtesy of www.thelostsquadron.com**

**“Man-made” examples.**

Colin Brown, Kevin Barton and Louise Geraghty obtained some superb GPR profiles from Clonmacnoise Castle (Co. Offaly). Sequence stratigraphic analysis of their data will be published in a forthcoming issue of “Archaeological Prospection”. In this we outline our evidence for the former fluvial processes of the River Shannon, the influence of Medieval moat excavation on the landscape and the existence of a post-glacial, pre-Medieval fault.

Perhaps the most challenging recent use of GPR has been my work with Bernd Kulessa from Civil Engineering at Queen’s. We were asked to locate a mine shaft, infilled by and buried beneath some 5-10 metres of glacial till. There are not many geophysical techniques capable of this: microgravity and possibly resistivity. However, the post-acquisition processing of data did show the shaft, as well as defining where culverts beneath a road surface were located.
The future

GPR experiments have been conducted on the Moon and Mars. High-resolution GPR is already used in detecting non-metallic cables and ducts in walls. Micro-GPR is being developed to image weaknesses in human and animal bones and to aid dentists in mapping cavities in teeth. The new range of commercial devices are fully automated, can image in 3-

dimensions to a range of depths and over a period of time. The detection of plastic landmines will become a major use. Thereafter, who knows, but I suspect that a combined GPR – electrical device will soon remotely define ground or soil chemistry and water content.

Thanks to John Meneely, Geoff Warke and Brendan McLean, as well as those mentioned above for their help.

Alastair Ruffell, Queen’s University

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IRISH ‘FIRST’ FOR THÉRÈSE

Congratulations to structural geologist Thérèse Shryane, the first scientist from Ireland ever to sail on ‘JOIDES Resolution’, the scientific drill-ship of the Ocean Drilling Program (ODP), with the ODP. She will be one of a team of 30 scientists from around the world.

‘JOIDES Resolution’ left Bermuda on 9th July for two months on ODP Leg 210 to drill on the Newfoundland margin. The main objectives are to advance studies of the rifting and opening history of the North Atlantic Ocean, and to track climate change by studies of ocean floor sediments.

The ODP is an international partnership of scientists and research institutions organized to explore Earth’s evolution and structure. It began in 1985 and provides researchers access to a vast repository of geological and environmental information derived from far below the ocean surface. ‘JOIDES Resolution’ can drill into the ocean floor in water depths up to 8.2 km and can suspend a 9.15km drill string.

Better known achievements include greatly improved understanding of changes in ocean circulation; studies of extensive sub-seafloor microbial populations and of gas hydrates and validation of plate tectonic theory.

Information about the Ocean Drilling Program (ODP) is available at: http://www.oceandrilling.org

Thérèse Shryane, Dublin, before departure (picture by Sophie Préteseille)

The Integrated Ocean Drilling program (IODP) home page is at: http://www.iopd.org

The Initial Science Program for the IODP is at: http://www.iopd.org/pdf/IODP_Init_Sci_Plan_final.pdf

At the time of writing, Thérése is working in the Geological Survey of Ireland where she is engaged in the Irish Seabed Survey, a 7-year, €32 million project studying the large Irish continental shelf, mainly offshore to the west (http://www.gsiseabed.ie). She has already sailed on three marine science cruises in Irish waters and a carbonate mound has been named after her.

Thérèse returned to Ireland in mid-September and is conducting research on drill core samples while based at the Galway Geofluids Research Centre of NUI Galway, a part of the university’s new Ocean and Earth Science Department.

The Geological Survey of Ireland and Marine Institute are supporting her research.

ODP’s successor, the Integrated Ocean Drilling Program, begins in October 2003 to run for 10 years. Japan has built and launched a massive drill-ship, ‘Chikyu’. The USA will probably refurbish ‘JOIDES Resolution’. Europe will operate a number of ‘mission-specific platforms’. Early targets will include drilling through the ice of the Arctic basin into the Lomonosov Ridge, and into the c. 180km diameter buried Chicxulub impact crater, Yucatan, southern Mexico, associated with the end Cretaceous mass extinction event.

Barry Long, GSI.

(Talking about drilling platforms, we hear that the two offshore platforms that have been dominating the Belfast Harbour landscape will leave for Mexico in October - Editor)

What on Earth?

Monday 8th September to Friday 26th November 2003
From 10.00am to 5.00pm

Exhibition area, Geological Survey of Ireland
Beggar Bush, Haddington Road, Dublin 4

A visual exploration of what geology is about and what geologists do.

Without the Earth to sustain us, none of us would be able to exist. However, the study of the Earth - Geology - is not generally taught in schools and few people have much experience of it. Modern society also insulates most people from the need to have close contact with geology, yet it is an absolutely essential foundation to our lives. This exhibition attempts to show the importance and relevance of geology, what it is all about and what geologists do. We hope you enjoy the experience.

Admission free

Event organised by the Geological Survey of Ireland
Further details on www.gs.ie, see updates
or Di. 678 2673
POST: Countryside Officer with ROSA (Regeneration of South Armagh).

LOCATION: O’Flaich House, Cardinal O’Flaich Square, Crossmaglen, Co. Armagh.

He works towards putting the Ring of Gullion Area of Outstanding Natural Beauty on the tourist map.

A TYPICAL DAY:

9.00 Mail and calls
9.30 Meet with Heritage Lottery Fund regarding Slieve Gullion. Issues include path erosion, potential funding options, land ownership, legal issues and recreational damage.
13.00 ES2k Newsletter interview
14.30 Meet with Bessbrook Development Association regarding the restoration of a tram track as a public walkway.
17.30 Collect daughter from childcare
19.00–21.00 Meet with Newtownhamilton Community Group regarding riverside walk. Issues include environmental assessment of project and EU funding.

BACKGROUND

Marie: You graduated with honours in Geology from The Queen's University of Belfast in 1995, followed by a M.Sc. in Tourism Management from Derrynoid Rural College in Draperstown and in association with the University of Leicestershire and Humberside. Why did you choose this second course?

Anthony: As part of my degree course, I spent time mapping in the Lake District and Wales. I observed how the natural beauty of the area was marketed, in a way that Northern Ireland was not. I contacted Conor Patterson of ABSAG (Area Based Strategic Action Group for South Armagh) regarding the possibility of employment opportunities in this field. He advised me to complete the course in Tourism Management at Derrynoid Rural College in order to acquire training in accounts, human resources, as well as tourism/cultural/heritage management. I followed this with nine months of voluntary work at Slieve Gullion Courtyard. I then successfully signed a twelve-month contract to work on the Donaghmore Workhouse Museum Committee & Vintage Club in County Laois. I was responsible for developing the tourism product, e.g. riverside walks and access to lakes.

Marie: You also worked in Counties Cavan and Monaghan for some time, what were you involved with there?

Anthony: I worked as a Heritage Development Officer for LEADER, this focussed on built natural heritage, in particular working with community groups on individual projects.

CURRENT POST

Marie: When did you begin work in this current post?

Anthony: I began the job as a countryside officer in the Ring of Gullion AONB in January 1999.

Marie: How is your post funded?

Anthony: To date I have been involved with 30 projects and have secured £750,000 of grant aid for community projects and delivered £2,980 000 as part of the Natural Rural Resource Tourism Initiative (NRRTI). Projects include development of woodland walks, recovery of neglected Nation Trust sites, project co-ordinator for “Gap of the North” archaeology guide (O’Brien Press 1500 copies), established 56km Ring of Gullion “way-marked way” which is part of the Ulster Way and is the longest in Northern Ireland. It is marketed by CAAN (Country Access and Activity Network) and has had 4000 visitors this year.

Marie: Have your plans met with any local or government resistance?

Anthony: Rarely, sometimes landowners may be resistant to the assertion of Rights of Way. Occasionally farmers may continue with their current farming practice at the expense of areas of unique habitat. I work with EHS, DARD, Northern Ireland Tourist Board, National Trust, RSPB, Ulster Wildlife Trust, Woodland Trust, Wildlife Federation of Northern Ireland and a number of farmer organisations.

“The Rural Armagh Sustainable Development Strategy”, “Natural Rural Resource Strategy for South Armagh” and “The Countryside Recreation Strategy”. They provide the framework for the next ten years. In short, the focus is on communities, education and improving awareness. For instance, I have been working with 10 primary schools over the last three years promoting geology, folklore, flora and fauna.

Marie: Have your plans met with any local or government resistance?

Anthony: Rarely, sometimes landowners may be resistant to the assertion of Rights of Way. Occasionally farmers may continue with their current farming practice at the expense of areas of unique habitat. I work with EHS, DARD, Northern Ireland Tourist Board, National Trust, RSPB, Ulster Wildlife Trust, Woodland Trust, Wildlife Federation of Northern Ireland and a number of farmer organisations.
Whatever development is planned ES2k hopes the planners will ensure this little bit of nature is conserved. It was once extensively dug from the area for the building trade. It is not the best exposure of these sandstones in Ireland but it is one of very few in an urban area of Belfast. It is a little bit of the sandstone from a distant era of desert conditions.

THE GIANT’S FOOT

Off the middle Falls Road there was once a broad stoney lane that led to the Whiterock Road housing estate. About 300 metres long it was known as the Giant’s Foot because it resembled a long curving instep.

That was in the 1960’s but the heel of the foot can still be seen and is threatened by development. The heel is an outcrop of Triassic Sherwood Sandstone (Photo) to be found at the top of Rockdale Street. It shows current-bedded red and yellow sandstone from a distant era of desert conditions.

It is not the best exposure of these sandstones in Ireland but it is one of very few in an urban area of Belfast. It is a little bit of the natural environment in the middle of dense housing. Schools should be using it to teach children about past climates and the fact sand was once extensively dug from the area for the building trade.

Whatever development is planned ES2k hopes the planners will ensure this little bit of nature is conserved.
Enviros was founded in 1995 and brought together a number of consultancies with a track record of performance in the environmental field, including Aspinwall, March and Quantisci. With over 350 people in eleven offices throughout the UK and Ireland and through partner organisations, we extend globally, with active projects on every continent.

Enviros Consulting Limited is an environmental consultancy and software business helping organisations in the public and private sector. We deliver long-term, sustainable value and with it progress on issues that cannot be ignored. Through passion, expertise, commitment and experience we help organisations improve financial performance, increase stakeholder support and create a better environment.

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ALL KINDS OF SCIENCE FOR ALL KINDS OF PEOPLE
It takes a lot these days to make the hairs on the back of my neck stand up but in Berlin last December they most certainly did, accompanied by goose pimples. There are only seven specimens in existence and, of course, the feather. The most famous is the one in the Natural History Museum in South Kensington because it was the first to be discovered, in 1861, at exactly the time of the Darwinian debate with the clamour for missing links. Was it a bird with some of the characteristics of a reptile or a reptile with feathers? Richard Owen opined the former, named it Archaeopteryx after the original feather, and left the rest to history.

But the science overshadowed a serious breach of scientific etiquette because the specimen was found in a German lithographic limestone quarry and while the German scientists and institutions were wrangling over the price, George Waterhouse, the Keeper of Geology in the British Museum, slid in and closed the deal. It couldn’t happen now but it was perfectly acceptable then and left a gallery of Teutonic red faces. It claimed by many to be the world’s most beautiful fossil. A small group of British curators turned up at the Humboldt Museum last December to test this opinion. We were warmly received and over three days were dazzled by the enormous wealth of the collections but there could only be one highlight. On the afternoon of the second day we were shown into the main vertebrate store and encouraged to gather around a table. The huge grey safe was then opened and with the utmost reverence a tray was removed and set on the table before us -- and there it was. Head back, feathers spread in the posture of death, a perfectly articulated time capsule from a lagoon floor of 150 million years ago. No glass between us, initially no words spoken, just an astonishingly beautiful scientific specimen at which we stood and worshipped. There are times when the power of an object, replete as this is with history, personalities, and the associations of scientific culture, is overpowering.

The Humboldt is battle scarred; bullet holes around all the windows and doors, the west wing still in ruins with trees growing through the roof but the dedication of the curators protected the Berlin Archaeopteryx from Soviet occupation and did their best through the austere years of East German administration to follow. I take my hat off to them and thank them for the rare privilege I and my friends were afforded. A happening I will never forget. Is it the most beautiful fossil? Well I can’t think of a better.

Philip Doughty.
Just occasionally someone does science a special service. Such is Charles, who has just stepped aside from editing and publishing the 10th Irish Scientist Year Book (2002). He showed vision by providing a forum in which Irish scientists could tell the world outside their speciality what they were doing. Sometimes workers in the same department did not know what their colleagues were doing, much less what was happening in other colleges! But, as he says, there are still scientists who don’t know the difference between publication and publicity. His view is that if you don’t publicize what you are doing you will be ignored. ES2k agrees. Be ignored, lose funding and maybe your job!

His yearbook grew to a 256 page glossy, well-designed magazine. He dragged many scientists into print but regrets there are still some that don’t get the message and believe the world owes them a living. He created a vehicle for the popular explanation of Irish science that, in the hands of the new editor Geraldine Van Esbeck, we hope will go from strength to strength.

Meanwhile ES2k salutes Charles Mollan for his contribution to spreading the message about the successes of Irish science and wish him well ‘doing other things’.

How does an Essex-born Bristol graduate of 1961 become one of Ireland’s leading geologists? He takes a Masters degree at NUI Galway, explores for diamonds in West Africa for a few years, manages a cooperative in Connemara - and then joins the Geological Survey in Dublin. 26 years later, as he puts it, he is being ‘put out’ rather than retiring. As GSI Senior Geologist in charge of mapping he still has things to do, but he has already made his mark on our understanding of the geology of Ireland, especially the northern parts and Donegal.

ES2k knows that Barry’s enthusiasm for his subject is remarkable. He is always at his best in the field. It is hard to drag him away from any rock exposure that is difficult to interpret. This enthusiasm has helped inspire many young researchers and students over the years. We have benefited from two articles in this magazine, one in the current issue. We hope for more. Currently he is travelling in Australia and Brazil whilst ‘winding down’ from the GSI. Barry has not left the scene! We look forward to hearing much more from him. Meanwhile we wish him and his family all good wishes for the future. (Editor)
50 YEARS ON AND STILL GOING STRONG

2004 marks the golden anniversary of the Belfast Geologists' Society. Established by the endeavours of the redoubtable Herbert ('Herbie') Black and now run by the equally enthusiastic Peter Millar.

If you have considered joining the society, this is surely the time. To celebrate the event there will be a series of lectures (see ‘What’s On’) starting in January and special field trips throughout next spring and summer. Before it all starts there is a talk by the author of a new book about the north of Ireland (get your copy signed), another about the cowboy country of Utah and in December a leading publicist for geology ‘collides’ with scientists in Holywood.

ES2k will follow this celebration year with interest. We show (above) Susan McDonnell, leader of the BGS Ring of Gullion trip. Susan was at Trinity College Dublin and it was good to greet members of the Geological Survey of Ireland and the flourishing Cork Geological Association on this outing. We picture (below) a BGS group on a visit to Inishowen, Co. Donegal earlier this year, led by Bernard Anderson.

WHAT’S ON?

The following events are organised by the Belfast Geologists’ Society (BGS), National Museums & Galleries of Northern Ireland (MAGNI) and Geological Survey of Northern Ireland (GSNI). All are free and are held at the Ulster Museum, Botanic Avenue, Belfast at 7.30pm. At BGS meetings refreshments are available half an hour before the talk.

**Wednesday 22 October**
BGS lecture: Lava landscapes - the formation of flood basalt provinces by Dr Paul Lyle (University of Ulster).

**Monday 27 October**
MAGNI Habitas ‘Fossils Tamed’ Lecture: How to become a fossil by Dr Mike Simms (Ulster Museum).

**Monday 3 November**
MAGNI Habitas ‘Fossils Tamed’ Lecture: Bringing Fossils back to life by Dr Mike Simms (Ulster Museum).

**Monday 10 November**
MAGNI Habitas ‘Fossils Tamed’ Lecture: Life’s Comings and Goings - evolution and extinction by Dr Mike Simms (Ulster Museum).

**Monday 17 November**
MAGNI Habitas ‘Fossils Tamed’ Lecture: The Message in the Mud - what the rocks can tell us by Dr Mike Simms (Ulster Museum).

**Wednesday 19 November**
BGS lecture: The rise and fall of Utah geology by Dr Mark Cooper (GSNI).

**Monday 24 November**
MAGNI Habitas ‘Fossils Tamed’ Lecture: Ireland’s Fossil Highlights by Dr Mike Simms (Ulster Museum).

**Monday 1 December**
MAGNI Habitas ‘Fossils Tamed’ Lecture: The Weird and the Wonderful by Dr Mike Simms (Ulster Museum).

**Wednesday 17 December**
BGS Lecture: When world’s collide - scientists in Hollywood by Dr Ted Nield (Geological Society of London).

**Monday 19 January 2004**
GSNI ‘Geology Works!’ Lecture: Geological Hazards at Home and Abroad by Professor Martin Culshaw (British Geological Survey).

**Wednesday 28 January**
BGS 50th Anniversary Lecture: Half a Century of progress in Irish Geology - Topic 1, see website for details.

**Monday 2 February**
GSNI ‘Geology Works!’ Lecture: Fossil Fuels - the burning question by Dr Nick Riley (British Geological Survey).

**Monday 16 February**
GSNI ‘Geology Works!’ Lecture: Environmental Geology from the Air by Dr Mick Lee (British Geological Survey).

**Wednesday 18 February**
BGS 50th Anniversary Lecture: Half a Century of progress in Irish Geology - Topic 2, see website for details.

**Monday 1 March**

**Monday 15 March**
GSNI ‘Geology Works!’ Lecture: The Last Ice Age - searching for the smoking gun by Professor Randy Parrish (British Geological Survey).

**Wednesday 17 March**
BGS 50th Anniversary Lecture: Half a Century of progress in Irish Geology - Topic 3, see website for details.

**Monday 29 March**
GSNI ‘Geology Works!’ Lecture: Groundwater and Climatic Change by Dr Denis Peach (British Geological Survey).

(ES2k is delighted at so many events but would like to see more outside Belfast. Are there any we haven’t heard about or do you belong to a society that would like a talk on a popular aspect of earth science? Let us know please)

Editor
MINNIS MONSTER

Have you heard of the spring in southern England that produces perfect fossils as an ‘extra’ to drinking water? Co Antrim has its own! It is just north of Larne, where 200 million-year-old Jurassic mud is being squeezed out beneath the Chalk. Percolating water is liquefying the mudstone and, much to the Road Service’s annoyance, in wet periods floods down the hillside (Photo). It used to regularly block the road but now a culvert has been built to take the flow beneath the road and onto the shore. Here it is washed by the sea and, eureka, perfect fossils appear. Ancient shells of cockles, mussels, ammonites and ‘monster remains’!

It is the monster bones that have excited interest (see photo below). Only part of quite a large sea animal has been found but more bits are coming out from the mud all the time. Mike Simms of the Ulster Museum (MAGNI) is collecting them together to try to assemble a whole skeleton. He relies on people who find the bones giving them to the museum - where, of course, their names will be recorded as the donors.

Why not go along that bit of shore and see what you can find (don’t attempt to go up the mudflow, it is dangerous). Even better, why not attend the talks Mike is giving in the Ulster Museum this autumn. They start on 27th October (see ‘What’s On’) and are entitled ‘FOSSILS TAMED!’ You need know nothing about geology to attend and understand these talks. They will let you into the secrets of past life, show you the finest museum specimens (as well as the Minnis Monster) and maybe trigger a new hobby.

Admission to the talks is free but do enrol because numbers may have to be limited - phone 028 9038 3131.

Information and illustrations from Mike Simms (MAGNI) with thanks.

IRISH GEOLOGICAL ASSOCIATION/GEOLOGICAL SURVEY OF IRELAND

DU NOYER PHOTOGRAPHIC COMPETITION 2003

Entries are invited for the Fifth Du Noyer Photographic Competition

George Victor Du Noyer, who served as a geologist with the Geological Survey of Ireland from 1847 to 1869, was a skilled field artist whose numerous sketches and pictures, with their combination of artistic skill and technical accuracy, were the “field photographs” of their day. This competition seeks to encourage the same blend of artistic and scientific skills through the modern medium of photography.

The photographs entered may be recently taken images but older, historical photographs, especially ones not in any archive and liable to be lost, would be welcomed and so conserved.

Entrants may submit photographs [prints, slides, digital images etc. are all acceptable] illustrating an aspect of field geology in Ireland in one or more of the following categories:

1. Open category
2. Photographs by a person under 18
3. Historical photographs [geological gatherings, persons etc. taken in past years]

Total prize money of €600 will be awarded over the three categories

All photographs entered must be clearly labelled with the following information:
Name, address, telephone number, fax, Email of entrant/photographer
Short title/description of geological/historical content of photographs
Place and Date when taken
Category being entered
[Please write on a label and stick it onto the back of each photograph]

The competition will be judged by a panel including representatives of the IGA, the GSI and external nominees; its decision will be final. Entries will be exhibited and prizes awarded at the GSI Awards ceremony in December. Entries will be returned after the competition.

Entries should be sent to: The General Office, Geological Survey of Ireland, Beggars Bush, Haddington Rd, Dublin 4 and the envelope marked “Du Noyer Competition”

The closing date for entries is Friday, 21st November, 2003

Letters to the Editor

I am looking for members of the Queen’s Honours Year 1976! Have just been contacted by Brian Turnage, the famous ‘Torange of Rhum’, so christened by Basher on our rather windswept Easter field course that year. With his long beard, tatty hair and infamous pipe, all he needed was a kilt to look like a real ‘local’. He called me after reading Issue 7 of the ES2k magazine.

So, if anyone knows of the whereabouts of Graham McClure, Robert Given, John Kelly, Andy Soye, Ken Davies or Sylvia McCleary, please contact me.

David Hood, 5 Fir Grove, Woking, Surrey GU21 7RD

I am looking for members of the Queen’s Honours Year 1976! Have just been contacted by Brian Turnage, the famous ‘Torange of Rhum’, so christened by Basher on our rather windswept Easter field course that year. With his long beard, tatty hair and infamous pipe, all he needed was a kilt to look like a real ‘local’. He called me after reading Issue 7 of the ES2k magazine.

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David Hood, 5 Fir Grove, Woking, Surrey GU21 7RD
Book launch of Classic Geology of Europe
– The north of Ireland by Paul Lyle

The Ulster Museum kindly provided the venue for the launch of Paul Lyle's new geological guide. Pictured are Peter Crowther (Keeper of Geology), Howard Platt (Environment and Heritage Service), Paul Lyle (author) and Roger Jones (Terra Publishing). The book was reviewed in the last issue of ES2k.

MAJOR LECTURE SERIES

“TOXIC TIME BOMB IN CO GALWAY”. “TIPPERARY VILLAGE LEFT WITH €6 MILLION BILL AS MINING LEGACY”. “ALL OF ULSTER SAYS NO TO ANTRIM LIGNITE MINE”.

Such were the headlines of a double page spread in one Irish Sunday newspaper recently.

“€110 BILLION OIL FIND OFF DONEGAL” screams another headline in July.

What is the truth of such headlines? Is this ‘spin’ purely to sell newspapers? How can the ‘person in the street’ be expected to know?

There is a chance for people to make their own judgement if they can get to the Ulster Museum this winter. Geological Surveys have experts who take an impartial stance and there is a series of talks about matters that effect our everyday life.

The series takes place after Christmas and was introduced by Dr David Falvey, Director of the British Geological Survey in the inaugural lecture on September 4th (He is pictured presenting the ES2k Northern Ireland Schools Prizes). The series, “GEOLOGY WORKS”, is advertised in “What’s On?” on page 18 of this issue.

Dr Falvey described the resources from the ground that are needed to support the current standards of living in Europe. For instance, each person in Britain ‘requires’ 3 tonnes of sand and gravel. Like all rock and minerals it has to come from somewhere and in the future we will need to quarry five times as much material to sustain the population. Going offshore or overseas might be the answer but that is transferring the problem to others. This is but one of the challenges for the geologists of the future. Others include what to do about flooding, earthquakes, radon, coast erosion, landslides, waste disposal and house subsidence.

Apart from being safe from natural disasters there are areas of Ireland that need the work and wealth quarrying or mining can bring. Provided it is correctly planned so the landscape and environment can be sustained for future generations should we object? Go to this free lecture series so you can be better informed.

Editor.

GSNI

Geological Survey of Northern Ireland

WORK EXPERIENCE

The Geological Survey of Northern Ireland is offering a week of work experience to four A level students interested in geology from 22nd March to 26th March, 2004.

The careers representative for the school should contact Dr. Patrick McKeever at GSNI in Belfast.

Join ES2k.

If you find the Newsletter interesting and would like to receive future issues - free - please tear off this section and return it to The Editor at ES2k, 24 Ballymacreely Road, Killinchy, Newtownards, Co.Down BT23 6RF. Email: tonybazley@csma-netlink.co.uk

ES2k is a voluntary initiative to raise the profile of Earth Science in the north of Ireland.

Name and Address (including Post Code): ...................................................................................................................................................................................

E-mail (if available and you would like us to use it): ...................................................................................................................................................................................