

Catastrophe in Parliament?

Ministers, MPs, Lords, industrialists and academics met recently to hear of the disasters that might devastate the world. Professor Bill McGuire (of University College London) and Professor Martin Culshaw (BGS) explained that floods, earthquakes, volcanic eruptions, and landslides are the main geological hazards.

Statistics show the rising death toll and the immense cost to individuals and governments worldwide. Poor planning and building standards in developing nations and lack of foresight costs millions.

After the presentations the Rt. Hon. Helen Liddell (Minister for Energy and Competiveness in Europe) remarked that 'whenever I hear of geology I know it must be bad news'. This is an opinion which the Group seeks to address. 'The antidote to fear is fact,' said Allan Rogers MP, Earth Science Group Chairman.

The presentations on the political and economic implications of natural disasters gave the facts. The consequences of natural disasters are twofold — the loss of life and the financial costs. Developing nations have had to deal with major loss of life over the past few years, and will face financial burdens in future. Recent earthquakes in Venezuela, and their effects, cost the country 10% of its GDP. In developed countries the cost to both lives and property could be greater. In Britain insurance losses have multiplied 28 times in recent years and natural disasters cost £300 million a year. Worldwide, the cost can be counted in billions.

The All-Party Group was invited to consider the questions: How can we make people more aware of natural hazards, how can we prepare for the inevitable, and how can we best deal with the consequences?

Climate change (global warming and sea level rises), super-volcanoes (volcanic winters), and impacts from space are the major catastrophes threatening the planet and the ultimate survival of mankind.

Government initiatives are helping. For example DETR's land stabilisation programme is investing £30 million in preventive action but more needs to be done.

There are three key stages in the prevention or mitigation of natural disasters:

- **Research** — the scientific understanding of natural processes and the consequences of human endeavour
- **Collection** — of data and the conversion of raw data into useful and accessible information
- **Communication** — making the facts available where and when needed.

'As a Group, we are committed to the encouragement of the first two,' says Allan Rogers, 'and actively contribute to the third. I hope that this is the first step in a long road towards a mutual understanding between politicians and earth scientists'.

Putting BGS in the picture

The BGS's photographic team have been awarded the prestigious British Institute of Professional Photographers (BIPP) accreditation in recognition of their professionalism. The BIPP accolade has corporate status and therefore reflects on the whole BGS organisation as well as on the committed and dedicated team who earned it. As the qualifying body for professional photographers and technicians, the BIPP awards world-recognised qualifications which seek to advance and maintain the highest possible creative standards. Representatives of the BIPP (all senior fellows of the institute) came to BGS headquarters at Keyworth, near

Nottingham, to assess Paul Tod, Caroline Adkin, Mark Goddard, Tim Cullen, and Tony Cooper on the quality of their work — Mark was assessed as a technician for the support work that he does. All five were awarded Licentiate accreditation, with the recommendation that Tim and Paul should present work next year to be judged for the next level of accreditation of Associate.

The BGS has employed photographers since the early 1890s and, as a result, has a skilled and well-equipped photographic department, with possibly the largest and best geo-photographic archive anywhere in the world. The BIPP is the UK's leading professional photographic body, founded in 1901, and is widely recognised and respected throughout the world. Their professional awards are not easily granted and therefore are highly respected in the photographic, publishing and other creative visual communication industries.

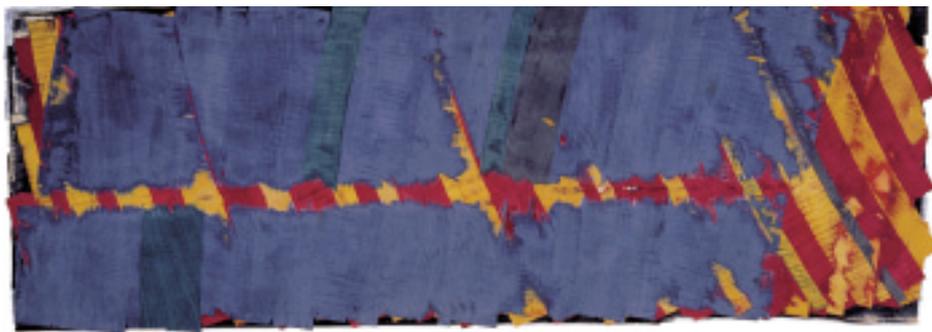
Continuing digitisation of data and improvements in web technology are allowing the work of generations of scientists and support services, such as the Photographic Unit, to become more accessible to many types of audience including children, enthusiasts and students. The BGS Photographic Archive is accessible at: www.british-geological-survey.co.uk

For further information contact Paul Tod on 0115 936 3360



The BGS photographic team: l to r Tim Cullen, Paul Tod, Caroline Adkin and Mark Goddard.

Keith Tidball © Chatwin: Martin



'Deep Earth 8' (detail) — part of a large panel constructed of layers of dyed wood veneer. The surface has been cut away to expose the inner layers. From the Chatwin:Martin exhibition 'Deep Earth' inspired geological processes such as volcanic activity and earthquakes.

Deep Earth, Chatwin:Martin

Over the past five years the artists Peter Chatwin and Pamela Martin (Chatwin: Martin) have focussed their work on the relationship between art and science, which reflects their lifelong interest in the natural world, in particular Earth Sciences. Recently this has led them to the seismological unit of the British Geological Survey to interview geologists and geophysicists about current scientific research.

The information gathered was incorporated into new work for Chatwin: Martin's exhibition 'Deep Earth', shown at the Yard Gallery, Wollaton Hall, Nottingham in June and July this year. It was presented in the form of a thirteen metre long wall-mounted installation and took as its starting point their interest in the fundamental shifting of the earth's crust, in particular the volcanic and earthquake activity they have experienced along the San Andreas fault in California.

The application of intensely saturated dye in conjunction of layers of wood veneer is used to construct the work. The surface is then cut away to expose inner layers — the inverse of painting — revealing hidden colours, random fractures and fragile edges such as would be found in geology, and which reinforce the dynamics of the subject matter. Occasionally some of the scientific notation, like the printouts from the seismograms that measure earthquake and volcanic energy lines, is built into their work, which all the while echoes the unpredictability of our lives with its constant shifts and changes.

The exhibition will be travelling to its next venue at 'gallerymateria' in Scottsdale, Arizona, USA., in April 2001.

The exhibition was supported by the British Geological Survey, East Midlands Arts, Nottingham City Museums and Art Galleries and Manchester Metropolitan University.

Getting to grips with science

The ground beneath our feet is fundamental to almost every aspect of our daily lives: the Earth underpins our home, work, recreation and travel. The Earth is host to the water we drink and grows the food we eat. Until now accessing information about the Earth upon which we live has been a task restricted to specialists, who know how to find geological facts from archives full of complex data. From 18th July, the sources of basic geological information have been accessible to all. Any user of the Internet will be able to access a free catalogue of all the information

held by the BGS. Access to this catalogue is free. The Geoscience Data Index (GDI) can be found at www.bgs.ac.uk/geoindex. It is a listing of 165 years of research and the work of generations of the country's leading earth scientists. The GDI allows the casual user to see where, and in what form, information exists describing the land surface and subsurface of Britain. It will also help the public find specialist BGS consultants who can explain its relevance.

Further information can be found on pages 30–31, or contact Jeremy Giles on 0115 936 3220

BGS Edinburgh Open Day

As its contribution to Doors Open Day, the BGS's Edinburgh office, Murchison House, was open to the public on Saturday 30th September from 10 a.m. to 5 p.m. Doors Open Day is coordinated by The Scottish Civic Trust and in Edinburgh is organised by the Cockburn Association.

The varied activities and scientific disciplines of the survey were on show, with scientists hosting displays and demonstrations. The 'Rock Doc' was in attendance to identify those problem rocks.

The Department of Trade and Industry Core Store also took part in the Doors Open Day. An hourly bus service operated between Murchison House and the DTI Core Store. The Core Store is the UK's National Repository for more than 300 km of rock taken from both onshore and offshore UK.



Children learn to pan for 'gold' during the BGS Open Day at Murchison House, Edinburgh.

Tom Bain, BGS © NERC

... Newslines ... Newslines ... Newslines ...



Tim Cullen, BGS © NERC

Meet the Ancestors TV crew filming in the NIGL laboratories.

Murder at Stonehenge

An Anglo-Saxon man was found in a shallow grave at Stonehenge and he had been beheaded. Who was he? Why was he buried there? And where did he come from? With the last question in mind the Channel Four programme *Secrets of the Dead* approached Archaeotrace, an archaeological consultancy, who commissioned the NERC Isotope Geoscience Laboratory (NIGL) at BGS Keyworth to undertake isotope analysis of the man's tooth enamel.

Tooth enamel is a resistant material that remains unaltered during burial and three elements found in teeth — strontium, lead, and oxygen — can provide information about an individual's life and environment. The data give a snapshot of the conditions during childhood, between, roughly, the ages of 2–10 years when secondary teeth are mineralised and erupt.

Strontium is ingested from food and water and it reflects the isotope composition of the land on which an individual lived. For example, someone brought up on the Chalk Downs would have a low strontium isotope ratio ($^{87}\text{Sr}/^{86}\text{Sr}$ value) compared to someone brought up on the Palaeozoic of central Wales.

The majority of oxygen in our bodies comes from the water we drink, so that

the isotope composition of the oxygen locked up in tooth enamel can be related to that of drinking water, and hence place of origin. In the UK the majority of oxygen isotope values (the $\delta^{18}\text{O}$ value) in groundwater fall between -5 and -8.5.

Lead is essentially a pollutant. In pre-metallurgical communities lead levels are below one part per million. However, lead concentrations rise with exposure to metalware, e.g. lead pipes, pewter, and in modern days, airborne lead. It is thought that lead levels may reflect cultural status in historical times, as it was higher status individuals who had access to metalware.

But back to Stonehenge. Tooth analysis showed that the beheaded man had an oxygen isotope composition consistent with an upbringing in the central north-south zone of Britain. When this was combined with his strontium isotope composition, which was

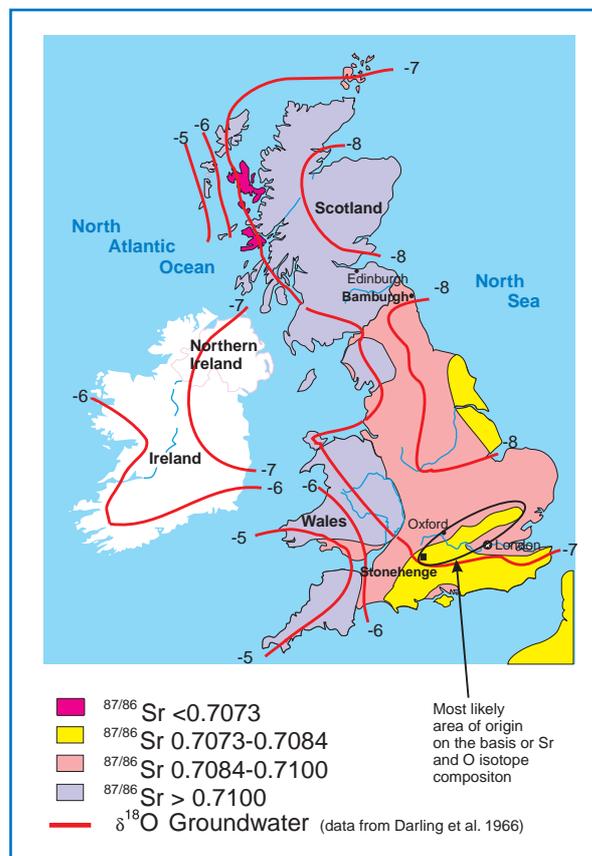
low, the area of upbringing was restricted to an area between Wiltshire and London and an area to the north of London. His lead levels were not very high and were typical of a UK ore source. Verdict — the man was a local.

Secrets of the Dead filmed at NIGL in June this year and the programme, which included interviews with Jane Evans (NIGL) and Bradford University Student, Janet Montgomery, was shown in July. The TV companies continue to show interest in this approach, and in September this year Julian Richards and the BBC's *Meet the Ancestors* team filmed for a programme they are doing on Bamburgh Castle in Northumberland which will be screened in January 2001.

For more information on the use of isotopes in archaeology contact Jane Evans on:

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NERC Isotope Geosciences Laboratory, BGS © NERC

Strontium and oxygen isotope compositions indicate that the beheaded man was local to Stonehenge.

Montserrat update

The BGS, under a contract to the Department for International Development, has recently taken responsibility for the overall management of the monitoring programme at the Montserrat Volcano Observatory (MVO).

The eruption of the Soufrière Hills volcano commenced in 1995 and has devastated large areas in the south of the island, necessitating evacuation of the population from the capital, Plymouth, and surrounding areas, and extensive redevelopment in the north. The objective of the MVO is to monitor the volcano, providing timely warnings of eruptions, and to gather volcanological data for hazard and risk assessment.

The eruption has been characterised by several major phases of activity, the first of which (1995–98) saw the growth of an andesite lava dome that infilled the summit crater and eventually overgrew its margins. This phase of dome growth was punctuated by periods of explosive activity, and was accompanied by dome collapse events that generated pyroclastic flows, some of which were of substantial size.

In March 1998 the summit dome ceased growing and over the following year and a half was partly destroyed by piecemeal

collapses accompanied by pyroclastic flows and explosive events. Surface magmatic activity resumed once again in November 1999 with the growth of a new dome, which in turn was almost completely destroyed by a collapse in March of this year. Subsequent lava extrusion has continued apace and has rebuilt a high, steep-sided dome, characterised by the extrusion of several large lava spines on its eastern summit. Semi-continuous spalling of lava off the unstable flanks of the dome produces rock falls and pyroclastic flows which, together with occasional explosions, eject ash into the atmosphere. Ash generated by these events is a problem for populated areas downwind, and for air traffic.



Fergus MacTaggart, BGS © NERC

The Scott Monument, Edinburgh.

Adopt a Monument scheme

Edinburgh is full of noteworthy monuments and sculptures, many of which are in the ownership and care of the City Council. Whilst the Council has a strong commitment to looking after them, they think there is room for the public to help in many ways. The BGS has responded to this initiative by adopting two significant monuments.

The Harrison Arch (1888), constructed in Dumfries-shire red sandstone, is only

a hundred metres from the front door of Murchison House and is at the foot of Blackford Hill. The arch commemorates the life and work of Sir George Harrison, Lord Provost of the City from 1882 to his death in 1885. Sir George was instrumental in acquiring and opening Blackford Hill to the public in 1884. The Hill, along with the adjacent Hermitage of Braid, is designated as an Area of Great Landscape Value and a Regionally Important Geological and Geomorphological Site.

The Scott Monument (1846) in East Princes Street Gardens celebrates the life and works of Sir Walter Scott. It is one of the most famous landmarks in Edinburgh and the tallest at 60 m high. It is open to the public with 287 steps up to the viewing gallery. It was built in grey sandstone from Binny Quarries in West Lothian. The stone was brought to the city in barges along the Union Canal — itself now being reconstructed. Ironically, the arch's architect George Meikle Kemp drowned in the canal in 1844 before the monument was completed.

Posters illustrating geological and other aspects of both monuments were on display at Murchison House during the recent Open Day. The City is planning a major exhibition about its monuments next year. The BGS hopes to be there helping to promote the monuments and our work with The Stone Liaison Group, which aims to help breathe life back into the natural stone industry in Scotland.



Gill Norton, BGS © NERC



David Ovadia, BGS © NERC

The effect of volcanic ash on Plymouth, the former capital of Montserrat. The war memorial on the sea front has been progressively buried by pyroclastic flows and mudflows since June 1997. The photographs were taken in November 1998 (l) and early September 2000 (r). The Soufrière Hills volcano can be seen in the background.