

Bulletin

Number 88

January 2009



Diary Dates:

Please note that all lectures are held starting at 7 30 pm in the School of Earth Sciences and Geography, William Smith Building at Keele University unless otherwise stated.

Thursday 8th Jan 2009 - *The 2004 Boxing Day Earthquake and Tsunami*

Speaker: Dr Ian Stimpson (Vice Chairman NSGGA)

The Indonesian Boxing Day 2004 tsunami killed more than 225,000 people in eleven countries, and inundated coastal communities with waves up to 30 metres high. This talk examines the causes of tsunamis and the Indonesian earthquake and tsunami in particular, and questions whether this massive loss of life could have been prevented.

The committee invites you to join them for a meal at the COMUS restaurant to entertain the speaker before this lecture. Please make your own booking with the restaurant mentioning that you wish to join the NSGGA party. The cost is £8 95 for a two course meal (starter and main course with vegetarian option or main and dessert) not including wine or coffee. The COMUS restaurant telephone number is 01782 734121. If you wish to dine meet in the restaurant at 6 00 pm.

Thursday 5th February 2009 *Silurian soft-bodied sensations: a unique window on the evolution of life.*

Speaker: Professor David Siveter, University of Leicester.

Our understanding of the history of life on Earth relies heavily on the fossil record and especially on rare cases of so-called 'exceptional preservation where soft parts of animals and entire soft bodied animals are preserved. Such exceptionally preserved fossils provide an unparalleled view of animal palaeobiology and biodiversity and are crucial to unravelling the evolution of life. The lecture will focus on illustrating recently discovered exceptionally preserved fossils from 425 million year old Silurian rocks of Herefordshire in the Welsh Borderland. This is a fossil biota of global importance, containing representatives of many major groups of animals. They are being studied by various methods, including reconstruction in 3-D using computer techniques to create 'virtual fossils'. These fossils are crucial in helping to fill a gap in our knowledge of the history of life and to resolve controversies about the relationships of animals still alive today.

This will be preceded by a sit down buffet. To book a place please complete the flyer www.esci.keele.ac.uk/nsgga/forms/buffett050209.html and send to Carol Fereday together with the appropriate cheque by 30th January 2009.

Thursday 5th March 2009 AGM and Chairman's Address

Speaker: Elizabeth Hallam "Shark Bay to Wave Rock".

Some of the interesting landforms of Western Australia

Last year Elizabeth spoke about the mining industry in Western Australia, in this year's address she will describe some of the spectacular geological exposures of WA, including rock cauliflowers, some curious pinnacles and a giant granite wave.

NSGGA Field Program for spring 2009

The Group has Public Liability Insurance through a GA insurance policy which also carries limited personal accident cover for members attending meetings or field trips. Non-members attending Group field trips are advised to take out their own personal accident insurance to the level they feel appropriate.

Note: a field fee of £2.00 per head is made (for members and non members).

Wednesday 22nd April: *Downstairs (and Upstairs) at the Potteries Museum, Hanley.*

Leader Don Steward.

Meet in foyer at 2.00 PM. Due to restricted space in the geology store, limited to 10 places only; please book in with the Field Sec.

An opportunity to study some of the John Wood collection of fossils from the Carboniferous Coal Measures and the Sarjeant North Midland Mineral Collection, plus local memoirs and maps. Upstairs, the building stones of the museum plus its various exhibits. Suggested Car Park – Hinde Street (Park and Ride).

Friday 8th May - Sunday 10th May: *The Jurassic Coast.*

Leader: Alan Holiday.

Based at The Heights, Isle of Portland Hotel, to book a place please complete the flyer www.esci.keele.ac.uk/nsgga/forms/field080509.html.

Saturday 27th June: *Brymbo Fossil Forest, nr Wrexham (jointly with the BCGS).*

Leader: Dr Jacqui Malpas

Meet at Brymbo at 10.30AM (SJ 296535), for directions contact Field Sec. Afternoon, Minera Lead Mine, Visitor Centre and Country Park (about three miles away), self guided.

For further information contact NSGGA Field Secretary Gerald Ford , Tel. 01630-673409 or e-mail: g.ford@ukonline.co.uk

New Members

Since the last Bulletin the following new members have joined. We welcome them and look forward to seeing them at our meetings.

Sharon Crossley, Richard Marriott, Diane Lawrence, Geoff Wood and Claire Howell.

Gardening at Park Hall Country Park

Everyone is welcome to come along to a supervised geological management work-party on Sunday 1st March at the geological National Nature Reserve at Park Hall. The event will start at 10am and there is normally a break for lunch at 12 noon. Meet at the Park Hall Country Park visitor centre off Hulme Road NGR: SJ930448, telephone 01782 331889 The plan is to clear shrubs from on and near to the Triassic conglomerate exposures in the quarries to improve access and appearance. This work-party will go ahead even if no volunteers turn up, so don't feel any obligation to come along - but any help will be gratefully received. If you require any further information please contact Paul Shires, Countryside Officer on 01782 331889

SAD NEWS

Ian Cass, an NSGGA member since 2001 has sadly passed away, below is an obituary notice received from his widow Rowena.

Goodbye to Ian.

17.11.1939 – 28.11.2008

On a beautiful, sunny, still day in the Sierra de Gador, south east Spain, Ian passed away. He was leading seven friends and I through woodland at the start of a stunning mountain walk high above the Mediterranean, when he collapsed. In spite of CPR and the help of the rescue services he was pronounced dead at the scene. His passing was instant, pain-free and peaceful. Following local tradition, he was cremated the following day in the presence of our son, James, our daughter, Melanie and myself, surrounded by sailing friends from Almerimar where we are staying aboard our boat, Pegasus of Arne. Ian's ashes will return to Stafford, UK, next week and a celebration of Ian's life will be held in January 2009.

Rowena Cass

Restoration of the Bateman Geological Gallery at Biddulph Grange

NSGGA has been actively involved in researching the Geological Gallery with a view to helping the National Trust with its restoration. For the foreseeable future this has been put on hold due to lack of funding. However, the work will not be wasted as it is now on file and can be picked up again as and when funding becomes available.

Geological Howlers on the Internet

If you want something to amuse you on the cold winter days why not visit the Keele website:

www.esci.keele.ac.uk/resources/howlers.htm with contributions from many NSGGA Keele members.

"The supper continent of Pangaea".

"(Q) name two features of "black smokers" A) Lung disease and breathing difficulties"

Another site worth visiting is <http://userpage.fu-berlin.de/~rohstoff/Fun/Howlers.html>

"Volcanoes are often found at the top of hills".

"Rudaceous rocks are uncultured rocks made up of rude, disagreeable material"

Newcastle Countryside Project and the Darwin bi-centenary

To celebrate the 200th birthday of Charles Darwin next year the village of Maer will hold a series of walks and events in the neighbourhood, an opportunity for anyone to learn more about the wildlife, landscape and social history of Maer.

The Newcastle Countryside Project has agreed to organise an activity for families with young children, which might be very appropriate since Darwin is partly remembered for his devotion to family and for his studies of garden and domestic animals such as pigeons and earthworms, all very accessible to young children.

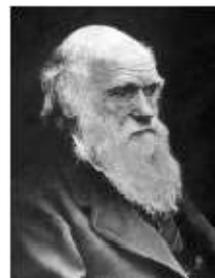
Darwin knew Maer Hall from an early age as it was owned by his uncle, John Wedgwood, brother of Josiah. Darwin later married his cousin Emma, at Maer church in 1839. Maer Hills was part of the family estate at that time. It was one of Darwin's favourite walks, still known as the Darwin path.

In 'Origin of Species' he describes the effects of planting pines and fencing out cattle from the heath, a process which today has changed the whole of the hills to woodland.

Ian Stimpson will be running geological walks on the Darwin theme, details will be circulated as soon as more information is available. This article was taken from the latest NCP newsletter to view it on line visit:

www.staffordshire.gov.uk/environment/e-land/countryside/projectspartners

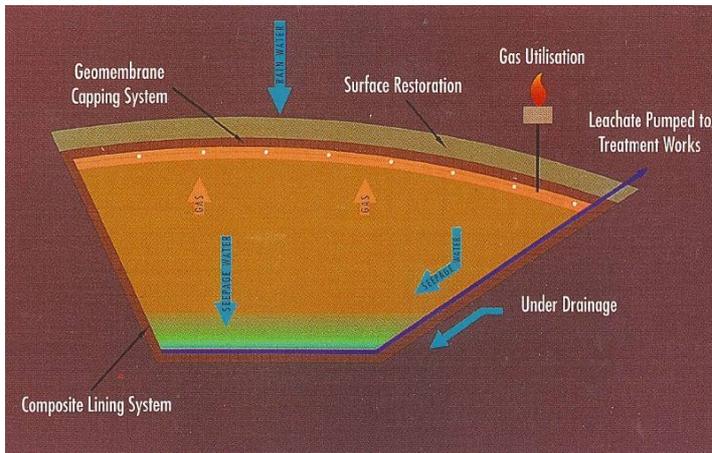
To receive a copy by e-mail send your request and details to steve.morris@staffordshire.gov.uk



Landfill Engineering, Protecting the Environment by Christine Blackmore

Christine is Senior Environmental Geologist and is Construction Quality Assurance Manager for Wardell Armstrong LLP. She has had a varied career including 10 years as a Communications Officer (Petty Officer Wren) in the Women's Royal Naval Service, a Freelance Researcher; she also worked at the Her Majesty's Young Offender's Institution (HMYOI) at Brinsford, Wolverhampton. Whilst working at HMYOI Brinsford she studied at Staffordshire University and was awarded BSc (Hons) in Applied Geology in 2002. She followed this by doing an MSc by distance learning and was awarded an MSc in Environmental Geology and Environmental Management in 2006. Since 2002 she has worked for Wardell Armstrong LLP. That's enough about her, now her talk!

Christine started by explaining the historical approach to landfilling and gave illustrations of the hazards associated with these methods, e.g. leachate pollution of watercourses and unmanaged landfill gas. Today's landfills are engineered to a high specification in order to protect the environment and can cost in the region of, £1 to 1.5m per cell build, each landfill will have several containment cells. The engineering of a cell involves, the bulk excavation, preparation of sub-strata e.g. Under cell drainage, treatment of mine workings etc, even local wildlife can cause problems such as sand martins nesting in the side slope of cells and bats nesting in old mine workings, all of which were found alternative nesting sites, by creating new habitats in different areas of the site.



Cross section (left) of a typical landfill cell, illustrating the different features of a modern landfill site.

The next procedure is to install a mineral liner for the basal area and sides slopes of the cell. Mineral liners generally comprise colliery shale or boulder clay or Oxford clay, and should achieve a criteria of >90% compaction with < 5% air voids and have a maximum permeability of 1×10^{-9} m/s.

Above this in many cases a 2 mm thick Heavy Duty Polythene (HDPE) geomembrane with fusion welded seams is installed, all seams are air pressure tested to ensure that they are watertight, above this a geotextile is placed which protects the HDPE liner from physical damage. To complete the cell a Leachate drainage collection system is installed, this comprises either a drainage stone or shredded tyres, both having an HDPE pipe work system. Geophysical testing is undertaken to ensure that the liners are free from leaks and repairs are carried out where necessary. Finally, when all construction works and testing is complete a report is submitted to the Environment Agency for approval, only on their approval will waste be permitted to be placed in the cell.

After the infilling of waste is complete the cell will be capped and restored, the cap usually comprises either a mineral liner or 1mm HDPE, installed and tested to the same degree as for a cell build, with reports being submitted for the EA for approval.

Christine also showed slides of a project she is managing in the Sahara Desert for a Copper mine in Ajoukt, Mauritania, with a secondary mineral of Gold. The project comprises the construction of 3 Carbon-in-Leach (CIL) dams, using geosynthetics liners and a New Floatation dam using a mineral liner.



(Left) An aerial view of the completed landfill site of Pwllfawtakin in South Wales. (Below) Christine giving her talk.



Mike Fereday

2008 - UN International Year Of Planet Earth

by Professor Aubrey Manning, Emeritus Professor of Natural History, University of Edinburgh on 6th November 2008

THE 6th PROFESSOR WOLVERSON COPE ANNUAL LECTURE



Prof Aubrey Manning, Emeritus Professor of Natural History Edinburgh University (right) pictured with one of his former students - Prof Gilbert Kelling Emeritus Professor of Geology Keele University (left) - on the occasion of Prof Manning's talk "2008 UN International Year of Planet Earth"

A few years ago the North Staffs. Group of the Geologists' Association instituted an Annual Lecture to commemorate Wolverson Cope, founding Professor of Geology at Keele University and a life-long supporter of the G.A. and its local Group. The aim was to enable the local community to hear distinguished earth scientists speak on topical subjects.

The selection of each Wolverson Cope Lecturer evokes considerable anticipation within the Group but the choice of the speaker for 2008 was of particular importance. First, this year marks the 150th anniversary of the inception of the Geologists' Association, our national body; 2008 also marks 60 years since the North Staffordshire Group formally came into existence.

In this context the choice of Professor Aubrey Manning as the Wolverson Cope Lecturer for 2008 was especially apt, not least to this writer, as Wolverson Cope's successor in the Keele Chair of Geology and an (unofficial) member of the first Zoology class taught by the then Dr. Manning at Edinburgh University! Aubrey Manning is well known as a broadcaster and television personality, famous as presenter of popular series such as 'Earth Story', 'Landscape Mysteries', etc. As such he is possibly the most recognisable public face of geology in this country and abroad. However, despite his distinguished career in the life sciences and his international standing as an authority on animal behaviour, Professor Manning constantly asserts his amateur status in the geological sciences. Paradoxically, his non-professional standpoint actually enhances his authority as public communicator – and also places him firmly in the ranks of those for whom the Geologists' Association was created.

The communication skills, experience and wide-ranging insights that characterise Professor Manning's broadcasts were consummately displayed in the Cope Lecture he delivered to an enthusiastic capacity audience at Keele on 6th November. From the rather dry title of "2008 – UN International Year of Planet Earth", Prof. Manning conjured up from the geological and biological records a fascinating account of the interaction and mutual dependence of organisms with our home planet, culminating in the emergence of Man, as arguably the first (and perhaps last?) organism capable of bringing about mass extinction. Prof. Manning is closely involved with the IYPE, sponsored by UNESCO, supported by some 25 major geoscientific bodies and endorsed by nearly 100 countries across the globe. In a fascinating talk, laced with humour and personal insights, he emphasized the important aim of this ambitious project, to increase public and political awareness of the Earth Sciences, as vital to achieving sustainable development and he outlined the ten research themes (from Groundwater to Deep Earth) identified for international support within the project. Professor Manning ended with a plea for all of us interested in the earth sciences to become more involved (scientifically *and* emotionally) in the current struggle for survival of our species on this planet. As he expressed it, "... we have nowhere else to go!"

Gilbert Kelling

Footnote: The venue for this lecture also was highly appropriate, named after Prof. Alan Gemmill, founding Professor of Botany at Keele and familiar to those of a certain age as a famous broadcaster and long-serving member of the venerable radio programme "Gardeners' Question Time".

Ecton Hill Field Study Association (EHFSA) Resumes Courses

NSGGA is a member of EHFSA and has supported the Association for many years. Below is a report from their Chairman Bob Thompson.

EHFSA has for many years run tutored one-day courses to support A level science courses in Chemistry and Geology. These courses can be adapted for reliable groups of KS4 students, and are particularly suitable for stretching gifted and talented students.

Undergraduate geology groups are also welcome and benefit from an opportunity to be inside a mine, consider an unusual mineralisation and study the structural geology in 3-dimensions – an experience that is increasingly difficult to provide in the few mines now working in Britain.

Adult groups from various organisations can enjoy an underground visit, hear the fascinating story of Ecton, learn about these historic mines, and how science was developed and applied to the winning of an important metal – copper.

We are supported by the Ecton Mine Educational Trust, which is, in turn, supported by Anglo American plc, Rio Tinto plc, the Institute of Materials, Minerals and Mining, MinSouth and the Royal Society of Chemistry.

After a six year break from 2001 until 2007 courses were redesigned and trialled during 2007 before being offered to schools this year. Sixth form groups from thirteen schools have undertaken our one day courses this year with approximately 250 participating students. There were 6 geology courses and the remainder were chemistry days. The feedback we received from the schools was favourable in every case and we already have commitments for bookings again next year.

The facilities at Ecton have been used for 3 days as part of the Science PGCE course at Keele University and a group of approximately 20 undergraduates from the Keele Geology Department have also participated in a 1 day geology/chemistry EHFSA course.

In addition we have run visits for various adult geology groups and the North Staffs branch of the RSC.

There have been a number of major developments this year. The Ecton Mine Educational Trust has completed the first phase of the planned structural changes to the education centre and this has opened up a second teaching area, greatly improving the facilities and our ability to cope with severe weather conditions.

With the help of Don Walton, one of our committee members, we have continued to develop our website which is proving to be a great success. As well as accessing general information, schools are able to view and download the course materials and book their course online at www.ectonhillfsa.org.uk

One of our members, David Webb, has spent a day with us and has produced a DVD of the student activities that captures the magic of Ecton and the atmosphere of the sixth form courses. The intention is to add these clips to our website so that schools can see the activities for themselves and hopefully this will stimulate interest in EHFSA and the course we offer.

The progress that we have made this year has depended almost entirely upon the efforts of our volunteers. The tutors who give freely of their expertise and time, the committee members and other EHFSA members who have spent many days redecorating the centre and those who have donated and searched for inexpensive sources of fleeces and walking boots. Without a doubt our most unusual source of funds are the 'knitted guts' that Carol Fereday knits, which are then sold to the Biology PGCE students at Keele as a visual aid that they use in their teaching of digestion! Profits go the EHFSA

It has been a team effort and thanks are due to all involved.

We are excited that interest in Ecton is growing and we anticipate the number of schools wishing to come to Ecton will increase next year and, as a consequence, we would welcome interest from anyone who would like to support us. This may be as a member (annual subscription £5) or as a prospective tutor, in which case there would be mine training and an opportunity to shadow established tutors.

Bob Thompson, Chairman EHFSA

Members in the News

Ted Watkin

Ted has been a member of NSGGA for 60 years. What more can I say but congratulations and thank you for the talk that you gave at the Christmas Social?

John and Margaret Parton

John and Margaret are proud grandparents; Christopher John was born on 13th November 2009. John said in an e-mail that the baby was 8st 2lbs. We think that he meant 8lbs 2oz. All are doing well including John and Margaret.

Vicky Tunstall

Many congratulations to Vicky Tunstall who was recently awarded her MA in Heritage Management with merit.

Nick Hulley

Having recently been appointed as an ESEU Primary Facilitator and Ambassador, I thought it would be interesting for readers to hear about my new role. From January 2009, the Earth Science Education Unit (ESEU) based at Keele University will be able to offer, 90-minute Key Stage 2 Earth Science INSET workshops to groups of primary teachers and trainee primary teachers across the country at minimal cost. The workshops aim to improve the teaching of Earth Science topics, emphasise the importance and relevance of the subject and provide primary teachers with a wide range of practical and thinking activities (which cover aspects of both the Science and Geography Programmes of Study and Schemes of Work for the Years 3-6.)

So to this end, with five other candidates who had been appointed following interviews held in early October this year, we were invited to attend Keele University in November 2008, for a training event run by Professor Chris King and his fantastic team. The lengthy day covered all aspects of delivery into schools; with a healthy input on not actually teaching teachers to teach but to rather enthuse and empower these teachers in their particular delivery within the sphere of Earth Science. We as Primary Facilitators are determined to enable the successful building blocks to be laid at the feet of our Earth Scientists of tomorrow.

Therefore the participants of our workshops will:

- increase their understanding of Earth science topics at KS1 and KS2 and their application outside of the classroom;
- develop effective use of practical, hands-on activities relevant to the teaching of Earth science;
- apply methods that can be used to investigate and understand major rock groups and also to explain the landscapes of the world.

The three workshops we offer are entitled; **How the Earth Works in Your Classroom (Earth Science for Years 5/6)**, **The Rock and Soil Circus Comes to Town (Earth Science for Years 3/4)** and **Spot that Rock: sorting rocks the scientific way (Earth Science for Years 3/4)**. If you wish to know more and to find out about the work that we do (secondary workshops also available), including free resources for schools, then can I signpost you to the following: www.earthscienceeducation.com or contact ESEU at eseu@keele.ac.uk

May I take this opportunity to ask you all to spread the word amongst friends and colleagues in order to make this wonderful endeavour work more effectively?

Nick Hulley N.S.G.G.A. Committee.

Below is a copy of the first minutes held on 13th March 1952, prior to that date no official record of committee meetings was kept.

Committee Meeting 6.45 pm. 13th March 1952 (1)

Present: In the chair: Dr F.W. Cope
and Messrs Parrack, Thomas, Adams, Gleaves and Secretary.

Minutes

- 1 It was decided to organise regular minutes for the future, and to make provision for reference to records of meetings previous to this one.
- 2 The resignation of the Treasurer
Miss O'Malley's resignation was accepted with regret, and the thanks of the Committee were extended to her for her work.
- 3 The Treasurership
Mr J.T. Gleaves offered to combine the Treasurership with his office of Field Secretary, and his generous gesture was passed on to the Annual General Meeting for its approval.
- 4 Recommendation of Officers to the A.G.M. for 1952-53
It was decided that the Committee's recommendations to the A.G.M., for its consideration, should be:-
Chairman: Dr F.W. Cope
Vice Chairman and Chairman-elect: Mr J.C. Parrack
Secretary: Mr T.S. Purcell
Treasurer: Mr J.T. Gleaves
F.M. Secretary: Mr J.T. Gleaves
Auditors: { Miss M.W. O'Malley
 { Mr Jones

Committee
Messrs Adams
Barras
Hinchin
Keeling
Myers
Ogden
Thomas
Wattison

(1)

East Midlands Geological Society Diary Dates 2009

Indoor meetings take place in lecture theatre B3 of the Biology building at the University of Nottingham.

Saturday 10th January 2009 6 30 pm "The Secret of Sherwood Forest, the part that oil wells in the Dukes Wood area played in World War 11" Speaker Kevin Topham

Saturday 21st February 2009 6 00 pm followed by annual dinner

"When Antarctica was green: fossil plants reveal Antarctica's climate history" Speaker Prof Jane Francis

Saturday 21st February 2009 6 00 pm AGM followed by members' evening "Volcanoes, Volcanoes, Volcanoes. Various speakers.

Secretary: Mrs Janet Slatter, 100 Main Street, Long Whatton, Loughborough, Leicestershire LE12 5DG
e-mail: j.slatter@zoom.co.uk. tel. no. 01509 843297

Black Country Geological Society Diary Dates 2009

Lecture meetings are held at Dudley Museum, St James's Road, Dudley. Phone (01384 815575)
7.30 for 8 o' clock start unless stated otherwise.

Monday 26th January 2009 (Indoor meeting)

North Sea Oil. Speaker: Les Riley (BCGS Committee Member)

"Bugs and Black Gold; Palaeontology and its role in hydrocarbon exploration and production - examples and applications from the North Sea and Offshore Eastern Canada."

Monday 23rd February 2009 (Indoor meeting)

Natural and Man-Made Earthquakes in the U.K. Speaker: Professor Peter Styles. (University of Keele).

For further details contact BCGS Hon. Secretary: Sarah Worton, 158 Oakham Road, Oldbury B69 1QQ
Tel 01384 235946 or email: sarah.worton@atkinglobal.com

Manchester GA Diary Dates 2009

Indoor meetings will be held in the Samuel Alexander Building (ARTS) University of Manchester (car park £3)

Saturday 17th January 2009 – "The Cretaceous World" - 1.00 pm

Speakers: Dr. Peter Skelton, Professor Bob Spicer, Professor Simon Kelley, Dr. Iain Gilmour,
Open University

Wednesday 18th February 2009- AGM & Presidential Address 7.00 pm

"Mam Tor: a Landslide still on the Move"

Speaker: Dr. Christine Arkwright, University of Manchester

Wednesday 18th March 2009 Evening Lecture 6.30 pm

"Magnetic Lakes and Trees: What Environmental Magnetism can tell us"

Speaker: Professor Barbara Maher, University of Lancaster

Joint Meeting with Geographical Association

Field trips: Contact Jane Michael 0161 366 0595 or e-mail outdoors@mangeolassoc.org.uk

More details from website www.mangeolsocassoc.org.uk

Liverpool Geological Society Diary Dates 2009

Meetings are held at Liverpool John Moores University, Byrom Street, Liverpool

Tuesday 20th January 2009 Speaker **Professor Phil Manning** Distinguished Visitor's Address – 'Stardust and Dinosaurs'.

Tuesday 10th February 2009 Speaker **Vaughan Williams** on 'Gold Exploration in Ireland'.

Tuesday 24th February 2009 Speaker **Mark Jenkins** on 'Drilling for Oil'.

Friday 6th March 2009 to Sunday 15th March National Science Week Events.

Tuesday 24th March 2009 Distinguished Member's Address by **Professor Silvia Gonzales**

Hon. Secretary: Joe Crossley email Address: lgsjoecrossley@hotmail.com

NSGGA - Next Committee Meeting

- **Thursday 15th January 2009, at 7.00pm** in the School of Earth Sciences and Geography, Keele University

Staffordshire RIGS Group

For details about the Group and meetings, contact:

SRIGS Secretary: Sue Lawley

c/o Staffordshire Wildlife Trust, The Wolseley Centre, Wolseley Bridge, Stafford ST17 0WT

☎ 01889 880100 email: slawley@staffswt.cix.co.uk

Contacts List: NSGGA Committee 2008-09

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Vice-chairman: Dr Ian Stimpson

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e-mail; i.g.stimpson@esci.keele.ac.uk

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email: candm.fereday@btinternet.com

Executive Committee (honorary):

Dr. Colin Exley; Terry Jones; David Thompson; Ted Watkin.

Honorary Life Member: Ann Myatt

Executive Committee (elected):

Dr Lloyd Boardman; Dr Peter Floyd; David Osborn; Janet Osborn; Don Steward;

John Reynolds.

Executive Committee (co-opted):

Dean Rigby (Keele Geol. Soc), Nick Hulley

Why not visit the NSGGA web pages: www.esci.keele.ac.uk/nsgga