The Black Country Geological Society

NEWSLETTER No. 58 - August, 1986:

Editorial:

August may be the off-season for national news, but not so for the BCGS. I have the very pleasant task of telling you all that John Easter has been awarded an honours degree in geology from Aston University. He has been a very determined and hard-working 'mature Student'.

I did ask him during his first term whether he would write a little about his new world, but he was far too modest. As you will see within, he is still modest, but now feels secure enough to write a little about it.

Congratulations, John, we're proud of you. And don't you dare miss the next meeting, so that we can all tell you.

Forthcoming Meetings:

7th Sept., Sunday - Field trip, Charnwood Forest.

22nd Sept., Monday - Informal meeting.

5th Oct., Sunday - Field trip, Forest of Dean.

Indoor Meetings are held at the Saracen's Head, Stone Street, Dudley: 7.30 p.m. for 8.00 p.m. start. Field Meetings commence from outside the Saracen's Head unless otherwise stated. Those who would like lifts for field meetings, please contact Graham Whorton (Dudley 213207).

The Society does not provide personal accident cover for members or visitors on field trips. You are strongly advised to take out your own personal insurance to the level which you feel appropriate. Schools and other bodies should arrange their own insurance as a matter of course.

Programme 1986:

7th September, Sunday. Field trip to to Charnwood Forest, led by Dr. T. Pharaoh of the British Geological Survey. Meet at Bradgate Park (SK542114) and park cars beside Coopston Reservoir - 10 a.m. Dr. Pharaoh is currently working on the concealed Precambrian geology of the Midlands.

22nd September, Monday. Informal meeting including fossil display and identification.

5th October, Sunday. Field trip to Staple Edge, Forest of Dean. Joint trip with the Shropshire Geological Society.

17th November, Monday. "Magmatic Processes and Mid-Ocean Ridges", talk by Dr. R. Bradshaw of Bristol University.

8th December, Monday. "New Zealand Geology and Scenery".Talk by Sheila Pitts, based on a five week tour of North and South Islands.

COTWALL END - Sunday Working Parties:-

24th and 31st August.
14th and 21st September.
10.30 a.m. Nature Reserve car park.

"What's it like at University?"

During infrequent attendances at BCGS meetings over the last three years, members have kindly asked me the above question, to which I could give only partial answers. Now after completing the course, it is possible to give an overall view and general impressions.
The first one concerns the change in lifestyle, which not only affects the student but other members of the family. This should not be underrated, and it is only possible with their active support. Secondly, before starting the course it is difficult to comprehend the wide range of subjects incorporated in the Geological Science degree. These range from natural philosophy through normal science subjects to practical engineering. Thirdly the course differs from other disciplines in the number of weekends and weeks taken as field trips during and additional to normal term time.
Finally, as a mature student the whole experience for me has been worthwhile and very rewarding, and I commend to you the staff and students of Aston University. I went seeking answers, found some, and also the ability to ask more complicated questions.

John Easter:

Congratulations, indeed, John. Please come back more often now, and keep telling us more about it!

Sheila

Soil and Geology - Part Two:

Relief can affect soil thickness and drainage. Erosion is more active on steeper slopes and soil is usually thinner, whereas it accumulates on flatter surfaces. However, drainage is often poorer where there is little slope. If the soil is permanently waterlogged, it is grey because the iron is in a reduced state, whereas if it is seasonally waterlogged, it is a mixture of grey and rusty colours. Young soils tend to be shallower than older ones and horizons have not had time to form. Horizons are often best developed in soil of moderate age. Man has modified the characteristics of many soils. Ploughing has obliterated some of the vertical changes within the upper 30cm. The nutrient status has been altered, waterlogged soil drained and soil erosion has exposed the subsoil in places,
Soil parent material provides the link between geology and soil. Its effects on the soil are long-lasting and difficult to modify. Parent material can vary tremendously from solid rock to peat and detritus. Hard rock and soluble material result in a thin soil. Rocks disintegrate differently, depending upon jointing

bedding, crystalline structure, etc. and together with the type of weathering can produce stony or fine soil. Limestones and sandstones are pervious and the soil is well-drained, whereas shales and many igneous rocks result in soils with impeded drainage. Soil colour is often inherited from the underlying rocks, for instance the soil is red on triassic materials, yellowish on Jurassic rocks and greyish on the Upper Coal Measures. Mineral composition, texture and nutrient availability are closely associated with parent material. Soil texture describes the size of mineral particles less than two mm. present in the soil. There are three broad categories, sand 2mm-0.05mm, silt 0.05-2μ, and clay less than 2μ. All three fractions are usually present but in different proportions. A sandy soil contains over 50% sand, a silty one over 45% silt, and a clay one over 35% clay.

The particle size fractions are closely linked to particular types of mineral, which relate to the parent material. Quartz is the commonest mineral in soil as it is in the earth's crust. It is fairly resistant to weathering and dominates the sand and silt size particles in the soil. It is chemically inert and provides no nutrients for plant growth. Feldspars weather slowly and some are found in the sand and silt fractions; but they eventually weather to clay minerals, predominantly kaolin and montmorillonite. The latter are very fine and comprise the clay fraction. The dark micas, e.g. biotite and phlogopite weather fairly rapidly, whilst muscovite weathers more slowly to clays such as vermiculite, chlorite and illite. Ferromagnesians weather rapidly to clays and iron and aluminium hydroxide. They are a very important source of soil nutrients. Clay minerals, which form the finest fractions of the soil, are secondary minerals resulting from chemical weathering. They are a very important constituent of soil. Their layered structure enables them to swell and take up water, and provides a large surface area which can absorb cations (nutrients) because of their electrical charge.

Rocks such as granite, which are rich in quartz, feldspars and muscovite weather slowly and produce sandy soil. Sandstones are very rich in quartz and the soil can contain as much as 90% sand-size material. Gabbros produce a rich dark loamy soil. The soil on shales and mudstones tends to be clay loam to clay in texture.

The combinations of these different sizes of material and their associated mineral composition give rise to certain characteristics in the soil. Sandy soil tends to be porous, well-drained, low in organic matter and nutrients, and poorly structured. It is easily worked, but needs large amounts of fertiliser to maintain its fertility. Clay soil can be poorly drained and heavy to work, but it is rich in nutrients. A loam combines the best characteristics of both extremes. It is well structured, reasonably well-drained, retains nutrients, organic matter and water, and is fairly easy to work.

Soil is a complex medium because it is continually changing, and is the result of many factors. This is, therefore, a very brief resume of a very large body of information.

Margaret Oliver:

Geology of Kenya. 24th Feb., 1986:

The talk was given by an old friend of the BCGS, Mr. W. G. Hardie, a former Senior Lecturer at the Department of Geology of the University of Birmingham. How pleasant it was to be taken to the warmth of Kenya, on a very cold evening during the 'cold February' which we shall remember for some years to come. Mr. Hardie's talk was based upon a Geologists' Association trip which he made with Mrs. Hardie and 44 others to Kenya in 1983. The trip was led by Dr. Mudie of Kingston Polytechnic. Mr. Hardie claimed to be just an onlooker, but this was far from true. He was a careful observer. Some 100 lecture slides, geological maps and diagrams were cleverly interspersed with informed instructions and comments. We were taken from the Precambrian to the present and learned about a 200 mile strip of the East African Rift Valley, partly north

and partly south of Nairobi. This strip is about 40 miles wide. The 17058 foot Mount Kenya and the Kenya Dome were mentioned. We learned of the early geologists who worked in Kenya, of fissures, volcanoes, lava, calderas, Lake Magadi, diatomite, columnar rhyolite, laterite, stone age culture and artifacts, flamingoes, dams for hydroelectric power, and the nocturnal habits of wildlife. The party met Africans who were highly educated and also those whose useful possessions were bows and arrows. Once again, Mr. Hardie demonstrated his success as a lecturer who had amassed a lot during his 11 day visit, Our appetites have been whetted and we are indeed grateful.

Douglas Warren:

Dudley Limestone Workings:
Progress Report:

The local authority has been told that in response to its bid for derelict land grant funds for dealing with the limestone problems in 1986/7, the Department of the Environment has indicated that subject to normal approval procedures, most of the bid will be met.
This represents a substantial increase in the levels of work over previous years in Dudley, and is a welcome sign that the objective of having substantially dealt with the limestone problem by the year 2000 may be achieved.
Design work for infilling the caverns adjacent to Birmingham Road has now been commenced, and among other schemes for the current financial year are drill hole investigations into the mines underlying the Sports Centre itself, further investigations in the area of the Guest Hospital and Black Country Museum which will lead to eventual treatment or other appropriate action. Provision is also made for drill hole investigations on Castle Hill, particularly in the area of Dudley Zoo and in the recently discovered plans of mines north of Castlemill and Kettles Hill.

Alan J. R. Evans:

From the Papers:

Cold Rocks:
The Daily Telegraph on June 20th had an article on the collapse of world tin prices, and the death of the Cornish tin industry. Mines such as Geevor have had generations of the same families in tin mining. People felt they cannot afford to move to another part of the country, but face up to 50% unemployment. They have traditionally emigrated to other hard rock mining areas such as South Africa, but they now fear the death of their communities.

From The Listener:

Hot rocks

Four of the five tin mines working in Cornwall are threatened with closure after the collapse of international tin-mining agreements. But there are distant hopes of a new industry for Cornwall—the provision of power from hot rocks. Since the 1970s, the School of Mining at Camborne in west Cornwall, one of the world's great centres of mining technology and teaching, has been exploring the possibility of tapping the free and inexhaustible heat of the rocks deep beneath the Earth's crust. In much of Devon as well as Cornwall, granite rocks which are naturally heated by their innate radioactivity come right to the surface and break out in wild granite outcrops on desolate moors.

At a disused granite quarry, the Rosemanowes, Dr Tony Batchelor's team has drilled three boreholes 2,000 metres down through solid granite and linked them up by cracking and splitting the rock between the bottoms of the boreholes. Cold water is pumped down one borehole, sideways through the cracks, which forms a natural radiator of warm rock and up the other two boreholes to emerge at the top, heated to 70 degrees Celsius.

The success of this long-running experiment has shown the feasibility of tapping Cornwall's hot rocks. But to boil water into the superheated system at 200 degrees Celsius needed to drive power-station turbines, the team needs to drill much deeper, to 6,000 metres—the rocks get hotter as they get deeper. Drilling through granite is tough and expensive. So the drillers want to choose a place where they will get the best value for their money—where their water will fetch up the maximum amount of heat. That may not be at Rosemanowes. Geologists from Camborne have been setting off small explosive

charges in shallow boreholes every 150 metres along two lines drawn right across Cornwall from the north to south coasts. Sensitive microphones will record the soundwaves which have travelled down into the earth and been reflected back to the surface again from interfaces between layers of rock below the ground.

The information from this survey will be combined with data obtained earlier, from measurements of the minute variations in the Earth's gravitational field in different parts of Cornwall, which are caused by varying masses of granite beneath the surface. This will provide detailed maps of the distribution of hot rocks beneath Cornwall. Then the geologists will know where to site their 6,000-metre boreholes. This assumes that the project continues to be funded, as it is at present, jointly by the UK Department of Energy and the EEC. Future funding can't be guaranteed, and investigations so far have cost £19 million. But, undoubtedly, the Chernobyl disaster will make those in high places look again at alternatives to coal and oil other than nuclear power.

Funding of the Camborne project has continued as support for some other alternative energy projects, such as tidal power, in the UK has dried up. If the teams get the go-ahead to drill to 6,000 metres, then that could be the turning-point for geothermal power in the UK, and for the Cornish project as a demonstration project for much of the world.

The granite spine of Cornwall and Devon could provide the heat for a line of power stations providing cheap locally available energy, independence from fossil fuels and none of the risks of nuclear power. Secondary industry springing up around the new power stations could provide employment to supplant some of the massive unemployment coming with the closure of tin mines. But that's all hypothetical for the moment. Much depends on the seismic survey—and not just for the UK: hot rocks able to supply heat lurk beneath perhaps four-fifths of the Earth's surface.

From the papers continued at the end of the newsletter.

Course for the Public:

GEOLOGY IN NORTHUMBRIA 18601

A five day field trip based in Northumbria

Wednesday-Sunday, 29 October-2 November, 1986

Fee: In the region of £100 which includes a non-refundable registration fee of £20 (see Information)

Director: Dr PAUL A. SELDEN

Northumberland and Durham have rightly been called counties for the connoisseur, and they present many features of interest for the geologist. The Great Whin Sill underlies much of the area, producing the spectacular waterfall of High Force in Teesdale, the bold escarpment along which Hadrian built his wall, and we shall see it again on the coast near Dustanburgh Castle and the pretty village of Craster. The Carboniferous rocks along the scenic Northumberland coast are of the 'Yoredale' type, with interbedded coal, limestone, sandstone and shales containing many interesting fossils (bivalves, brachiopods, worm trails and trilobites are all common). County Durham has the finest Permian reef complex in the county, again rich in fossils, and peculiar formations like the 'flexible dolomite' and 'daisy rock'. There is interest for the mineralogist too, in the North Pennine Orefield associated with the Wardale Granite; here beautiful specimens of purple fluorite, galena and other ore minerals can readily be found.

The fee includes travel by mini-bus from Manchester and bed and breakfast accommodation in twin-bedded rooms.

Mrs. Lynn Palethorpe, Extra-Mural Department, The University, Manchester, M13 9PL. Telephone 061-273 3333 ext 3076.

Enrolment Enquiries including availability of places: Enrolment Secretary (Residential), ext 3079.

The Ocean Drilling Programme produced its first newsletter in June, 1986, and expects to publish 3 times a year. There are currently 16 institutions forming the Joint Oceanographic Institutions for Deep Earth Sampling (JOIDES). The present programme includes drilling in the Tyrrherian Sea, Mid-Atlantic Ridge, Lesser Antilles Arc, Costa Rica Rift, Peru trench, Indian Ocean and Antarctica.

Geology of Skye:

New excursion guide by the Geological Society of Glasgow. 22 excursions, 316 pages, 44 maps, laminated cover, pocket size. £5 plus 65p postage. From:-

Sales Officer,
Geological Society of Glasfow, -
Department of Geology,
The University,
Glasgow G12 FQQ.

P.S. This is a most attractive and interesting book. Members are welcome to see mine. I also recommend Dr. Selden's Manchester field trips, having been on his Anglesey and Devon ones.

Sheila:

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