

A Registered Charity
No. 220014

Circular 514



YORKSHIRE GEOLOGICAL SOCIETY

President: Professor Pete Rawson

EVOLUTION OF EARLY VERTEBRATES



*Moya Meredith Smith in a
Dunkleosteus skull,
Cleveland, Ohio*

SPEAKERS: IVAN SANSOM, MARK PURNELL,
PAUL SMITH and MOYA SMITH

14.00 to 16.30 SATURDAY 24TH JANUARY 2004

RUPERT BECKETT LECTURE THEATRE, LEEDS UNIVERSITY

*Paper Sponsored by
PAPER CO LEEDS*

www.yorksgsolsoc.org.uk

NON MEMBERS WELCOME

YGS 2004

EVOLUTION OF EARLY VERTEBRATES

- 14.00 - 14.05 **Introduction and Society Announcements**
Professor Pete Rawson UCL, London
- 14.05 - 14.30 **Fishing in the Ordovician**
Ivan Sanson (University of Birmingham)
- 14.30 - 14.55 **Early vertebrates in space and time**
Paul Smith (University of Birmingham)
- 14.55 - 15.30 **Tea and Coffee**
- 15.30 - 15.55 **“At the cutting edge: a bite deep into fish at the origin of vertebrate teeth”**
Moya Meredith Smith (King’s College London)
- 15.55 - 16.15 **Conodont Dentition**
Mark Purnell (University of Leicester)
- 16.20 - 16.30 **Closing Remarks**

SUBSCRIPTION RENEWALS REMINDER

Subscriptions are due on January 1st and remain as last year i.e.

ORDINARY	£30.00	ASSOCIATES	£10.00
OVER 65	£20.00	STUDENTS	£12.00

If our current records show that we expect you to renew by cheque, then CH will appear on the top line of the address label of this Circular. Please send a cheque for the relevant amount (made payable to YGS) to Mrs S. Rogers, 4 Middledyke Lane, Cottingham HU16 4NH.

If you pay by direct debit you need take no further action. If you pay by standing order PLEASE check with your bank that it is for the correct amount.

The Society would like to thank the Paper Co Leeds for sponsoring the paper for this publication and therefore allowing it to be produced in colour at no extra cost to the YGS.

FISHING IN THE ORDOVICIAN

Ivan J. Sansom

Lapworth Museum of Geology, School of Geography, Earth and Environmental Sciences,
University of Birmingham B15 2TT.

Until 20 years ago, Ordovician fish were characterized as a minor component of both Ordovician seas and vertebrate diversity. However, with the rapid increase in our knowledge of fish from this interval and the concomitant taxonomic expansion, the Ordovician is now recognized as a time of a major evolutionary radiation within the fish. With the application of a wide variety of investigative methods, the extent of this radiation event is now becoming clear, with a diverse assemblage of heavily armoured jawless (agnathan) fishes making their first appearance as well as the first signs of the jawed (gnathostomata) fish.

Ecologically, fish in the Ordovician remain restricted to distinct environmental settings - the majority of Ordovician fish localities are indicative of shallow marine, low latitude environments but with significant components of the typical Palaeozoic invertebrate 'shelly fauna' absent - and this can be used as a prospecting tool for the discovery of further fish-bearing localities. In addition, facies analyses indicates that a hitherto unexpected degree of ecological segregation had developed at an early stage in the evolution of fishes.

EARLY VERTEBRATES IN SPACE AND TIME

Dr Paul Smith

Lapworth Museum of Geology, University of Birmingham,
Edgbaston, Birmingham, B15 2TT

The understanding of Early Palaeozoic vertebrate faunas has improved dramatically over the last dozen years. A review of pre-Silurian vertebrates carried out as recently as 1991 concluded that only six species could confidently be included in the clade. Since then, a number of key discoveries have been made, mainly through new lagerstätten and the application of micropalaeontological methodologies - together, they have increased the known diversity of Cambro-Ordovician vertebrates by two orders of magnitude. This new dataset has enabled the production of stable, well-resolved evolutionary trees for the major groups of primitive vertebrates, based on large numbers of morphological characters. One consequence of these advances has been the overturning of a view of early vertebrate evolution that has persisted for well over 150 years, from a view that would have been familiar to Murchison or Darwin to a modern, cladistic framework.

For the first time, vertebrate palaeobiologists therefore have a robust, and improving, dataset with which to examine larger scale trends in the evolutionary history of the group. One aspect of this relates to the timing of the origin of the group, where ‘molecular clock’ estimates are seemingly at significant variance with the fossil record. The new data show that these differences may not be as significant as previously thought. The data also enable the analysis of early vertebrates in space as well as time, permitting the elucidation of large-scale ecological and biogeographical patterns and processes, and the role of tectonic events in shaping these patterns.

“AT THE CUTTING EDGE: A BITE DEEP INTO FISH AT THE ORIGIN OF VERTEBRATE TEETH”

Moya Meredith Smith,

Dental Institute KCL, London, UK (moya.smith@kcl.ac.uk).

At the base of the jawed vertebrate clade, the armoured Placoderm fish lack teeth that can be directly compared with other fish (the Gnathostomata). Crown-group gnathostome teeth are part of an ordered dentition, patterned by a dental lamina (a specific tooth making structure), function together with articulated upper and lower jaws and are made of typical dentine. Although basal placoderm taxa, all with articulated jaws, adopted various strategies for feeding, none have teeth in a patterned dentition with typical dentine.

We propose that, as in many other gnathostomes with statodont, non-replacing dentitions, regulated tooth addition can be recognised in placoderms but only within the group Arthrodira, a group including large, fearsome predators. In these fossils new teeth are at the ends of rows, outside, but in line with, the worn biting edges of the dentition. The pattern of rows is unique and distinctive for placoderms. The teeth are made of regular dentine comparable to that of other crown-group gnathostomes. Dentine grows from within a pulp cavity and differs from the semidentine previously described for placoderm gnathal tissues, a type present in the external dermal tubercles. Therefore, the origin of a dentition in placoderms, one patterned by a dental lamina, occurs late in phylogeny and is convergently derived from other jawed vertebrates.

CONODONT DENTITION

Mark Purnell
University of Leicester

No abstract available.

PRESIDENT'S WORD

Welcome to our first circular of the New Year. We have received several comments, mainly positive, about the first of our colour circulars. But several of you pointed out how difficult it was to read page 5 against the rather strong background, and we will do our best to avoid such problems in the future. We would welcome further views on both appearance and content.

The Council for 2004 was elected at our AGM in York on 6th December, including two new members and one, Professor Patrick Boylan, who had been co-opted during the year as our new Web Editor. We welcome as the new members Dr John Knight and Mr Stuart Ogilvie. John Knight graduated from the University of Aston-in-Birmingham with Combined Honours in Geology and Botany and completed his Ph.D. at Sheffield (1975), working on the palaeobotany and stratigraphy of Stephanian coalfields of Northern Spain. He then worked in the coal industry before joining an international mining consultancy. He has managed mineral resource projects in Asia, Africa, Europe and Latin America, and currently heads Harworth Mining Consultancy; his present principal commitment is secondment as Environmental Permitting Manager for a major new gold-mining project in Romania. Stuart Ogilvie graduated in geology from the University of Hull and then moved into the museums sector. He is currently Assistant Curator of Natural Sciences at the Yorkshire Museum in York, working with both the geology and biology collections.

After the AGM over 50 members and guests attended the Annual Dinner at Kings Manor – a fitting end to a rewarding year for our Society. Now we look forward to a varied programme for 2004 and the production of a forward plan to help develop our Society over the next few years.

NEW MEMBERS

We would like to welcome the following new members:

Mr T M Duffield, Sheffield

Mr Ian Antony Kane, Derby

Ms Clare Mohally, York

CALL FOR PAPERS : NEW POSTGRADUATE RESEARCH

The Society's general meeting on 21st February 2004, to be held at the University of Durham, is to be a forum for Earth Science postgraduate students to present the findings of their research. Talks on any subject are welcome and they do not have to represent the "finished article", the Society is keen to hear of the latest developments in research being undertaken in the region. If you would like to give a talk then please contact the Programme Secretary.

MEETINGS OF CORRESPONDING SOCIETIES

Contact society representatives for the latest information.

CRAVEN & PENDLE GEOLOGICAL SOCIETY

Yvonne James. Tel: 01282 813 772 or www.cpgs.org.uk

Triassic Salt of Cheshire and a 'pinch' of Miocene Friday 23rd January
Speaker: Paul Kabrna, C.Geol.

Ice Cold in Adel: Friday 20th January
Urban and suburban glaciology in and around Leeds.
Speaker: Jon Barber, BSc. (Hons), University of Leeds

CUMBERLAND GEOLOGICAL SOCIETY

Nigel Courtman. Tel: 01229 861 478 or www.cumberland-geol-soc.org.uk

PRESIDENTIAL ADDRESS, The Geology of the Canary Islands 14th January
Speaker: Dr Alan Smith. The Friends Meeting House, Kirkgate, Cockermouth.

West Cumbrian rocks and vernacular architecture 25th February
Speaker: David Grech. The Friends Meeting House, Kirkgate, Cockermouth.

EAST MIDLANDS GEOLOGICAL SOCIETY

John Wolf e-mail sec@cmgs.org.uk or www.emgs.org.uk

President's Evening celebrating 40 years of the EMGS Saturday 7th February
Start: 6.30pm

Earthquakes in the English Midlands Saturday 13th March
Speaker: Dr Brian Baptie, British Geological Survey, Edingburgh.
Start: 6.30pm

HUDDERSFIELD GEOLOGY GROUP

Julie Earnshaw (Secretary). Telephone: 01484 311 662 or e-mail: earniehome@ntlworld.com

Working for the Geological Survey in the Yorkshire Dales Monday 12th January
Speaker: Albert Wilson. Greenhead College, Room F9. Start 7.15pm.

HUDDERSFIELD GEOLOGY GROUP continued.**Building stones of the Trafford Centre**

Sunday 18th January

Speaker: Alison Quarterman. Start: 10.00am - 1.00pm

For meeting details nearer the time, phone Alison on 01484 608004.

HULL GEOLOGICAL SOCIETY

Mike Horne. Tel: 01482 346 784 (after 7.30 pm)

or e-mail: m.horne@hull.ac.uk or www.go.to/hullgeolsoc

Members' Evening

Thursday 22nd January

Early Cretaceous Events: from Eastern England to Argentina

Thursday 12th February

Speaker: Professor Peter Rawson, University College London

LANCASHIRE GROUP OF THE GEOLOGISTS' ASSOCIATION

Norman Catlow. Tel: 01772 727 577 or e-mail: norman@catlow4736.freemove.co.uk

LEEDS GEOLOGICAL ASSOCIATION

Anthea Brigstocke (General Secretary). Telephone: 01904 626 013.

E-mail: a brigstocke@hotmail.com or www.leedsgeolassoc.freemove.co.uk

Deep Research: Experimental Modelling of Sediment Dynamics

30th January

Speaker: Dr Stuart McLelland, Department of Geography,
University of Hull**Presentations by Students in the School of Earth Sciences**

20th February

3rd/4th Year Students, School of Earth Sciences, University of Leeds

LEICESTER LITERARY & PHILOSOPHICAL SOCIETY

Chairman: Andrew Swift. Tel: 0116 252 3646. as48Ele.ac.uk

From climate change to time scales: example from the Jurassic in England

Wednesday 14th January

Speaker: Dr Graham Weedon, Department of Environment, Geography and Geology,
University of Luton**Geology above ground in Northamptonshire**

Wednesday 28th January

Speaker: Dr Diana Sutherland, Mears Ashby, Northampton

MANCHESTER GEOLOGICAL ASSOCIATION

Jane Michael. Tel: 0161 366 0595, e-mail: jammyjane@aol.com or www.mangeolassoc.org.uk

Afternoon Seminar - Martian Geology

Saturday 17th January

Speaker: Dr Jamie Gilmour, University of Manchester, and others.

Annual General Meeting & Presidential Address. Start: 7.00pm

Wednesday 11th February

High-Grade Metamorphism and Granite Genesis in the Crust

Speaker: Dr Giles Droop, University of Manchester

NORTH EASTERN GEOLOGICAL SOCIETY

Frank Trowbridge. Tel: 01642 582 786, e-mail: frank.trowbridge@care4free.net

or www.northeast-geolsoc.50megs.com

Heavy oil, the base of the deep crustal biosphere and life on Mars

16th January

Speaker: Professor Steve Larter

The Lower & Middle Palaeolithic as seen by a Quaternary Geologist

20th February

Speaker: Dr David Bridgland

WESTMORLAND GEOLOGICAL SOCIETY

Mrs P. M. Wilson. Tel: 01539 533 198 or www.wgso.fsnet.co.uk

The amateur in Lake District geology

21st January

Speaker: Dr Alan Smith, WGS & CGS

AGM & Presidential Address: start 7.45pm

18th February

Speaker: Dr Stuart K. Monro

YORKSHIRE REGIONAL GROUP OF THE GEOLOGICAL SOCIETY

Isla Smail. Tel: 0113 242 8498, e-mail: isla.smail@arup.com

Surface Instability due to Coal Mining

25th February

SUBMISSION OF PAPERS

Manuscripts for publication in the Proceedings should be submitted to *The Editors, Proceedings of the Yorkshire Geological Society, Geological Society Publishing House, Unit 7, Brassmill Lane Enterprise Centre, Brassmill Lane, BATH, BA1 3JN*. Typescripts should be prepared using the updated instructions for authors given on the inside back cover of the latest issue (Volume 54 Part 4, November 2003).

Publication of manuscripts may be expected in the next, or next but one part, following acceptance. As a result of the change in publishing arrangements the proceedings will be abstracted and/or indexed in, *GeoArchive, GeoRef, Geobase, Geological Abstracts and Mineralogical Abstracts, Research Alert and Science Citation Index Expanded (SCIE)*.

COPY FOR CIRCULAR

Copy deadline for Circular 515 is the 4th January. The next indoor meeting will be held on the 21st February 2004 at University of Durham. Current Postgraduate Research.

GENERAL SECRETARY

Trevor Morse, Ph.D. 19 Thorngate, Barnard Castle, DL12 8QB

Tel: (01833) 638893 e-mail: tjm4@tutor.open.ac.uk

PROGRAMME SECRETARY

Paul Wignall, Ph.D., Department of Earth Sciences, University of Leeds, Leeds, LS2 9JT.

Work Tel: (0113) 233 5247, Fax: (0113) 233 5259

e-mail: wignall@earth.leeds.ac.uk

CIRCULAR EDITOR

Keith Park, BSc. (Hons), 24 Ings Lane, Guiseley, West Yorkshire LS20 8DA

Telephone: (Work) 0113 278 4286 (Home) 01943 878787

e-mail: (Home) k-park@bigfoot.com (Work) keith@tcpleeds.com