

Abstracts of other papers read at the Annual Conference, January 1990

Palynology in south-west England: the post-Variscan – pre-Jurassic succession. *G. Warrington, British Geological Survey, Keyworth, Nottingham NG12 5GG.*

Palynomorph assemblages from the largely red-bed post-Variscan - pre-Jurassic succession in south-west England form three stratigraphic groupings:

- a. Late Permian (Kazanian to Tatarian): sparse; in the earliest widespread post-orogenic sediments.
- b. Late Triassic (Carnian): widespread; in the Mercia Mudstone Group around the horizon of the North Curry Sandstone Member and its correlatives.
- c. Late Triassic (late Norian? and Rhaetian): widespread; in the youngest Mercia Mudstone Group deposits, including the Blue Anchor Formation, and in the succeeding Penarth Group and basal (pre-Jurassic) beds of the Lias.

Contrasting terrestrial microfloras in these assemblages reflect vegetational and geographic changes in the region over a period of some 50Ma. In Rhaetian assemblages, the presence of marine organicwalled microplankton, including the earliest dinoflagellate cysts recorded from Britain, reflects biogeographic changes affecting the late Triassic phytoplankton populations, and a transgression that terminated red-bed deposition over much of Britain.

Lower Jurassic sequence and seismic stratigraphy. *A. Whittaker, British Geological Survey, Keyworth, Nottingham NG12 5GG.*

Thin bed stratigraphy and much larger-scale sequence stratigraphy can be determined using geophysical borehole log data and seismic reflection data. Well documented Lower Jurassic rock successions, including the proposed world stratotype for the base of the Jurassic System, are exposed and also available in borehole section in southern and SW Britain. Geophysical data are not of sufficient quality and quantity to assess whether the application of sequence stratigraphical methods and concepts of cyclicity might augment understanding of Mesozoic stratigraphy. They might also be useful in the location of the most appropriate stratigraphical level for the base of the Jurassic System and be of help in the stabilisation of Jurassic stratigraphical nomenclature.

The Devonian of north Devon - a palynologist's (or "conodontologist's") dream or nightmare? *R. Knight, Department of Geology, University of Southampton, SO9 5NH.*

Part of the marine and nonmarine Devonian sediments of north Devon are widely considered impoverished of fossils. A detailed micropalaeontological study has revealed the marine sediments to contain varied and locally prolific palynomorphs. The assemblages are dominated by miospores with occasional (and rare) acritarchs, chitinozoa and scolecodonts. Low diversity icriodid-dominated conodont faunas have been recovered from a limited number of sites within the Lynton Formation and Ilfracombe Slates.

Relying principally upon the palynology, the micropalaeontology documented from the Lynton and Hollowbrook Formations suggests a late Emsian/early Eifelian age. The central portion of the Hangman Sandstone Group has proved barren. Towards the top of this Group the overall character of the miospore assemblages compares favourably with documented late Eifelian/earliest Givetian palyniferous sediments. Within the Lower Ilfracombe Slates the inception of *Geminospira lemurata* coupled with the recovery of conodont elements referable to the *Polygnathus varcus* plexus infers a Givetian age. Late Givetian/early Frasnian miospores were isolated from the Upper Ilfracombe Slates. The overlying Morte Slates contain sparse palynomorphs of somewhat problematical age. The Upper Morte Slates may be ?earliest Famennian.

Crosscourse mineralisation and basin development in SW England. *R.C. Scrivener, British Geological Survey, 30 Pennsylvania Road, Exeter EX4 6BX. D.P.F. Darbyshire and T.J. Shepherd British Geological Survey, 64-78 Grays Inn Road, London WC1X 8NG.*

Investigation of fluid inclusion chemistry from a wide range of veins in SW England has led to the identification of a distinct group of late-stage deposits associated with high Ca:Na ratios, high salinities and low temperatures of homogenisation. Such fluids are very widespread and have been reported from a number of mineral assemblages; they are considered to have originated from basinal brines. Rb-Sr studies on fluids from a typical N-S vein system have indicated an early Triassic age for lead-zinc-silver mineralisation in the Tamar Valley. This result is discussed in terms of the known chronology of the Perno-Triassic and of the development of the NRS basin in SW England.

Clay mineral diagenesis in the Westbury Formation (Upper Triassic) of south-west England. *J.H.S. Macquaker, Department of Geology, University of Sheffield, S1 3JD.*

The sedimentation and subsequent diagenetic history of the organicrich muds in the Westbury Formation of SW England are controlled by the differing burial history of the two main depositional basins - the Worcester Graben and the Bristol Channel Trough. Generally the main detrital input into these basins is similar, being dominated by a coarse mineral assemblage comprising:- quartz, K-feldspar, biogenic carbonate and phosphate, and a phyllosilicate assemblage of illite, illite/smectite (I/S), glauconite and kaolinite. The maximum burial depths, however, of the two basins are different, with the Bristol Channel Trough having been buried slightly deeper than the Worcester Graben, although neither has reached the "oil generation window". Using XRD, BSEM and ATEM data the effects of burial on the detrital clay mineral assemblage in the two basins are discussed, and the main diagenetic processes acting on the Westbury Formation phyllosilicates prior to the transformation of I/S to illite are reviewed.

Field investigations on Quaternary slope materials in south-west England. *M. Gallop, University of Wales, Cardiff.*

Geotechnical investigation of periglacial sediments (Head) derived from four major lithological groups in south-west England (schist, slate, sandstone and granite) classified all sediments as diamictons dominated by a fine sand/silt matrix. The diamictons often display a crude stratification together with thin (0.5m), laterally extensive silt/ clay lenses. All sediments were classified as frost susceptible. Index properties are low, reflecting low clay contents in the sediment matrix, but distinct variations do occur between heads derived from differing lithological groups. Variations in index properties appear to be predominantly controlled by clay and silt content. Highest liquid and plastic limits occur in heads over schistose bedrock. Highest plasticity indices are found in heads over slate and sandstone bedrock. Those heads developed over sandstone have both the lowest liquid and plastic limits sampled. All granitic heads sampled were non-plastic.

Undisturbed shear-box samples gave ϕ' values ranging from 52° to 37°. Highest ϕ' values came from heads developed over sandstone ($\phi'=52^\circ$) and granite bedrocks ($\phi'=50^\circ$). Mean values of ϕ' then decline to 39° over schists and 37° over slates. For all samples, values of ϕ' were no more than one degree lower than ϕ' . All samples displayed zero cohesion and none were overconsolidated. Clasts within the diamictons displayed a well developed low angle fabric, parallel or sub-parallel to the direction of maximum hillslope. Mean clast dip was 14° and modal class 10°/12°, these values are considerably less than the dip of the hillslope from which they were sampled.

Pleistocene structures and environments at Redruth, Cornwall. *H.C.L. James, University of Reading, Bulmershe Court, Earley, Reading RG6 1HY.*

A 200m east-west section cut into local "Killas" bedrock south of Redruth is described. A number of sedimentary units are identified in the 4m deep terraced section. Discussion of the sedimentological characteristics of the units reveal complexities of source and origin at this location. Preliminary results of analysis of pollen obtained from a silty clay unit are considered. Post-depositional structures and their environmental implications are examined. Finally, there is a brief consideration of the possible chronology of the site.

The Somerset Environmental Records Centre. *H.C. Prudden, 2 Yeovil Road, Montacute, Somerset.*

Conservation of both geological sites and data is important for all geologists. Three important developments are presented:

-Somerset Environmental Records Centre at Hestercombe House near Taunton now has record sheets of important sites throughout most of the County. The Centre is also compiling a list of geologists with research interests in the County.

-A start has been made in selecting Regionally Important Geological Sites (RIGS) in Somerset. This is an idea promoted by NCC to recognise sites which are locally important but do not qualify for SSSI status.

-The National Geosciences Data Centre have produced a 'temporary section recording form'. Hopefully, this will encourage the recording and dissemination of much information which is now lost or buried in private files.

Interpretation of aerial views of the Taw-Torridge Estuary. *D.J.C. Laming, Treehayes, Crabb Lane, Alphington, Exeter EX2 9JD.*

No abstract submitted.

A synthesis of Sheets 355/356 including the Start Metamorphic Complex, South Devon. *M. Cole, Hillcrest, 3 Springfield Drive, Kingsbridge, Devon TQ7 1HG.*

The Start Metamorphic Complex comprises a suite of mica, composite and green schists separated from the Lower Devonian, Meadfoot and Dartmouth Slates by a fault. The Variscan Orogeny responsible for the deeper level of burial and higher temperatures causing the schists to form, means that estimates of age and assessment of way up have been, so far, inconclusive. This presentation provides a photographic summary of the highlights.

A stratigraphical revision of the Trevone Basin, north Cornwall and its structural implications. *O. Smith, Department of Geology, University of Exeter, EX4 4QE.*

Geological mapping at 1:10,000 of the St. Minver Syncline for the Trevoze Head - Camelford Sheet (335 & 336) has clearly defined the structure as a shallow dipping, south facing, tight F1 fold. It trends WNW for 18km, with a wavelength >5km, complete with closure to the ESE. A continuous, conformable sequence of Middle to Upper Devonian basinal sedimentary rocks and associated volcanics can be traced from the northern margin, around the closure and along the southern margin. The cross-section of this structure is exposed along the Camel Estuary, from which Gauss and House (1972) described the northern and southern limbs in terms of two successions, Pentire and Trevone respectively. These may now be ascribed to one, the Trevone succession, with lateral lithological variations reflecting facies changes within the Trevone Basin. The Padstow Confrontation, where a change in F1 facing direction occurs across a tectonic boundary at Trebetherick on the southern limb, thus becomes intrabasinal in status.

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A new *Aulopora* from the Devonian of south-west England and its significance. *C.T. Scrutton, Department of Geology, The University, Newcastle upon Tyne NE1 7RU (present address: Department of Geological Sciences, South Road, Durham DH1 3LE).*

A new species of the simple tabulate coral genus *Aulopora*, from the Chercombe Bridge Limestone (Eifelian) of the Lemon Valley near Newton Abbot, South Devon, is free living. Its presence was detected in serial sections and its three-dimensional form reconstructed by computer. Members of this genus not occurring as weathered out encrusting material are probably much more common than recorded but usually escape detection. Characteristic features are only more apparent in sections cut in the plane of bedding, whilst most working sections are cut perpendicular to bedding.

The protocorallite of this new species shows the development of a macrospine in the plane of bilateral symmetry. Such a structure has not previously been described in a tabulate coral, but suggests comparison with the first formed counter-cardinal septal plate of rugose corals. In addition, the serial sections yield new information on the mode of origin of new corallites in the aulopodid colony.

The pattern of offsetting compares closely with that seen in the genus *Eofletcheria* rather than with the mode typical of most tabulate corals. This supports an earlier deduction that *Aulopora* evolved from *Eofletcheria* in the Middle Ordovician, rather than the Russian view of *Aulopora* as ancestral to all tabulate corals (Scrutton 1984, 1990).

Scrutton, C.T. 1984. Origin and early evolution of tabulate corals. *Palaeontographica americana*, 54, 110-118.

Scrutton, C.T. 1990. Ontogeny and astogeny in *Aulopora* and its significance, illustrated by a new non-encrusting species from the Devonian of southwest England. *Lethaia*, 23, 61-75.

A late Gedinnian - early Siegenian palynomorph assemblage from the Dartmouth Beds of north Cornwall. *P.G. Davis, Department of Geology, University of Exeter, North Park Road, Exeter EX4 4QE.*

Using new scanning electron microscope (SEM) based palynological techniques (Dean 1989a, b) the age of the pteraspis fish-bearing strata of the Dartmouth Beds in Watergate Bay, near Newquay, north Cornwall were examined. The low grade metamorphic, fish-bearing slates yielded a palynomorph assemblage of an uppermost Gedinnian to lowermost Siegenian age. This stimulates the need to replace the poor biostratigraphy of the Dartmouth Beds (based at present on fragmentary, deformed pteraspis fish remains) with a high resolution biostratigraphy such as SEM based palynology.

Dean, A. 1989a. Palynomorphs from deformed low-grade metamorphic rocks: an S.E.M. based technique. *Journal of the Geological Society, London*, 146, 597-599.

Dean, A. 1989b. A new assemblage of palynomorphs from the low grade Upper Devonian metamorphic rocks of east Cornwall. *Proceedings of the Ussher Society*, 7, 180-182.