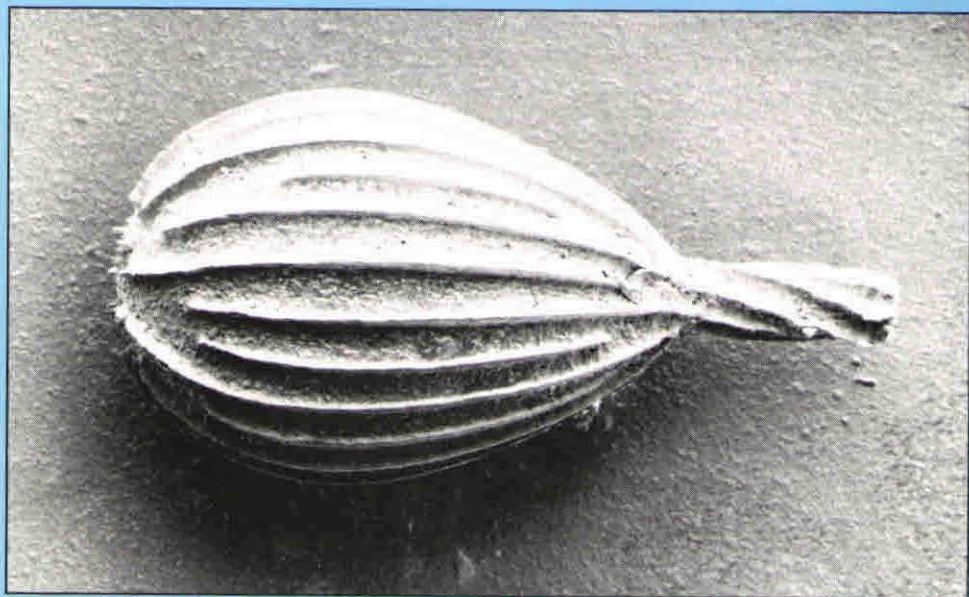


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QUATERNARY NEWSLETTER

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Quaternary Newsletter is issued in February, June and November. Contributions comprising articles, reviews, notices of forthcoming meetings, news of personal and joint research projects, etc. are invited. They should be sent to the Quaternary Research Association Newsletter Editor. Closing dates for submission of copy for the relevant numbers are 1 January, 1 May and 1 October.

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COVER PHOTOGRAPH:

Scanning electron micrograph of the benthic hyaline foramiferid *Lagena sulcata* (Walker & Jacob) var. *torquitoris* Haynes. Side view of specimen (500 microns in major axis) from Laugharne, Taf Estuary, South Wales. Monograph courtesy of Dr W.E.N. Austin (thesis abstract included in this issue of the Newsletter).

EDITORIAL

In taking over from Brian Taylor I should like to thank him for making the transition of editorial responsibility as smooth as possible, and I would also like to acknowledge his efforts in editing the Newsletter at a time of considerable flux, both within the QRA and in the scientific community as a whole. Brian has steered the Newsletter through a difficult period during which the mainstream journal of the Association, the *Journal of Quaternary Science*, has become established. To some extent this has involved a redefining of the role of the Newsletter, and Brian deserves credit in effecting this transition.

As for the future I hope the Newsletter will continue to develop its traditional strengths, whilst at the same time strive to rise to the challenges which face the Quaternary community. One of these strengths is the recognition that all Quaternary reconstructions ultimately depend on data generated in the field, and the Newsletter has always been ready to include reports of sites which might at first seem to be of only parochial interest, but which later assume an international significance. Another strength has been a willingness to include material from all quarters of the membership, whatever their affiliations or expertise. These are, of course, the strengths of the QRA as a whole. I therefore hope to encourage the continued submission of local site reports and accounts of temporary exposures, in addition to more controversial articles which more august journals might be too timid to contemplate!

The time is now ripe, however, for the QRA to take on a wider role within the scientific community, and in society as a whole, and I hope that over the next few years the Newsletter will play its part in embracing these new developments. Questions are now being asked about the evolution of our environment for which Quaternarists have been providing answers for some time. In order to widen the impact of Quaternary research the QRA needs to raise its public profile, whilst at the same time strengthen developing links with cognate disciplines and with Quaternary scientists abroad. I therefore hope to develop, over the course of the next few issues, a network of *rapporteurs* from related disciplines (civil engineering, meteorology, oceanography, soil science etc.), and from abroad, to provide articles for the Newsletter on developments of Quaternary relevance in other disciplines and on Quaternary activity in other countries; this latter development partly reflects the growing international membership of the QRA.

I hope the QRA membership will support the Committee by endorsing these new functions for the Newsletter, principally by supplying me with a steady flow of copy!

James Scourse

REPORTS

YOUNG RESEARCH WORKERS AWARDS 1991

Four grants were made under the Young Research Workers Awards Scheme in 1991 to Ruth Charles, John Hunt, David Roberts and Clare Watson. The reports received from them are published below. The awards are normally announced in the October Newsletter with a closing date for applications in March of the following year. The current convenor of the Awards Committee is Dr G.S.P. Thomas, University of Liverpool.

The Lateglacial Archaeology of Belgium Report of a Research Visit to Belgium 1991

Ruth Charles

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The time spent in Belgium during last summer was equally divided between research in the Department of Anthropology and Prehistory in the Royal Institute of Natural Sciences in Brussels and the Department of Palaeontology at the University of Liège. The data recorded during this visit will form a substantial part of the basis of my D.Phil. dissertation which examines evidence for the human exploitation of animal resources during the Lateglacial period in North Western Europe.

Whilst in Liège I studied the faunal collections from the 1969-70 excavations at the Grotte de Remouchamps; the Destinez and Moreels, and Thisse collections from the Grotte de Verlaine; as well as part of the collections from the 1974-76 excavations at the Grotte de Coléoptère by courtesy of Dr. Jean-Marie Cordy. The primary focus of my work was the identification and documentation of butchery evidence on the faunal remains from these sites; this type of evidence allows the differentiation between animal bones deposited as food residues by humans and those left by other predators.

During the visit, a number of specimens were selected for radiocarbon analysis. A submission to the Oxford University Research Laboratory for Archaeology

and the History of Art for six radiocarbon dates on animal bone specimens modified by humans has been successful, and the results are awaited.

Preliminary results include evidence for the exploitation of reindeer during the Ahrensburgian occupation of the Grotte de Remouchamps (c. 10,000 B.P.). There is also evidence for human exploitation of both bear and horse from the Grotte du Coléoptère, and horse again from the Grotte de Verlainne during the Magdalenian occupation of these sites (c. 12-13,000 B.P.).

During my stay in the Institute of Brussels, I was able to study the palaeontological collection made by Edouard Dupont in 1865 from the Trou de Chaleux, which lies by the banks of the river Lesse, near the town of Dinant. This was one of the first cave sites to be excavated in Belgium, and still represents one of the finest archaeological and palaeontological collections from the country. The archaeological evidence suggests a Magdalenian occupation, of unknown duration, during the Bølling Interstadial (c. 12-13,000 B.P.). Over 1000 faunal specimens are available from Chaleux, the primary species being horse (*Equus ferus*). A high proportion of the faunal remains from this site show unequivocal evidence of butchery; in summary there is strong evidence for the regular exploitation of horses for their skins, meat, bone and bone marrow, as well as keratin (from the hooves, which may have been used in glue manufacture) by the Lateglacial hunters. In addition, I examined the remains of reindeer, aurochs, roe deer, wild boar, and confirmed the tentative identification of saiga antelope (*Saiga tatarica*) within the collection.

Amongst the avian remains within the collection, I noted a previously unrecorded engraving on a tibia, which has yet to be identified to species. This specimen was attributed to the "1er Niveau ossifère" by Dupont, and as such can be correlated with the late Magdalenian occupation of the site. It is planned to publish this specimen in greater detail when the current re-evaluation of the fauna is complete.

An archive search for Dupont's site notes and photographs was initiated. Unfortunately it appears that these may have been destroyed during the German occupation of Belgium in the last war. I have also begun archive searches for material relating to Dupont in Britain.

In addition, I was able to travel to Antwerp, Liège, Dinant, Namur, Brugge and Ostend in each case to visit other researchers and local museums, and to actual sites at Chaleux and Furfooz to examine the cave walls for any residual stratigraphy and take photographs. The money awarded by the QRA was used in part to cover travel within Belgium and part towards the cost of accommodation.

My hosts in both Liège and Brussels were most considerate and helpful, allowing access to their libraries and research archives. I am indebted to Drs. Dewez and Cordy who made my visit to Liège a pleasure by their generous actions. Likewise, in Brussels, I was welcomed by the staff of the Institute, who helped to make the visit thoroughly enjoyable, and thanks are due especially to Luc Cornant and Paul-Louis Van Berg who arranged for extensive photocopying and who also extended the hospitality of their homes.

Icelandic Tephra, Ancient and Modern

John Hunt

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The Icelandic volcano Hekla erupted unexpectedly on 17 January 1991. This was the 17th eruption of Hekla in Historical time (< 900 AD) and follows its shortest period of quiescence (9 years, 30 weeks) yet recorded. The initial eruption column reached a height of 11.5km, and tephra was deposited to the NE of the mountain, reaching the northern coast some 300km away. (Larsen *et al.*, 1992; Gudmundsson *et al.*, 1992). The tephra (H1991) fell on to extensive snow-fields and was buried by further snow during and immediately after the eruption. In effect a snow-tephra-snow sandwich was formed. This offered the unique opportunity of sampling the tephra within lake catchments, provided that the field work could be undertaken prior to the spring thaw, with its consequent problems of tephra redistribution by fluvial, aeolian and slope-wash processes.

A field project was rapidly initiated to investigate the mass loading (a layer-thickness equivalent) of the tephra in selected catchments within the ash-fall sector. The rationale for this opportunistic study was to investigate the catchment parameters that controlled the re-mobilisation of the tephra and its subsequent transport into the lakes themselves. It was hoped that such a study would serve as an analogue for the lacustrine deposits of the early Holocene Saksunarvatn Tephra on the Faroe Islands (Mangerud *et al.*, 1986). Field work relating to the Saksunarvatn and other Late Glacial and early Holocene tephra on Iceland and the Faroe Islands, was already planned when the Hekla eruption occurred.

The first field visit was in March/April 1991. An unusually mild February/March resulted in early severe thawing of the snow, with its complete disappearance below an altitude of 400m. The consequences of early thaw were seen in the highly complex disposition of the tephra revealed in the excavated snow-pits. This complexity meant that the Saksunarvatn analogue study could not be pursued: the mass loading data could not be averaged over the catchment and could not be related to subsequent redeposited thicknesses of tephra within the lake sediments.

These results, although initially disappointing, seem likely on reflection to be normal in windy areas where tephra is buried within snow. Depositional complexity occurs as a result of spasmodic thawing and occasional exposure of tephra, with subsequent drifting and reburial. This has implications for thin pre-Landnam tephtras in Iceland and for distal Holocene tephtras elsewhere. Spatial variability in loading within the snow can be transferred to the ground upon the final thaw. Provided that this occurs in a vegetated area with accumulating soil profiles, this tephra signal will be incorporated in the sediment record. Support for this suggestion comes in the form of local irregularities within Holocene tephtras from Snæfellsjökull (Johannesson *et al.*, 1981), which could only be explained by processes similar to those seen acting on H1991.

Work on H1991 in the second field visit in summer 1991 was focused on the proximal deposits and their relation to ablation mechanisms on late lying snow. Investigations were also carried out on older tephtras in relict lake, mire and deltaic deposits. The Saksunarvatn Tephra was identified for the first time in Eastern Iceland and forms part of an on-going study with an equivalent layer found as far south as Germany. Follow-up work was also conducted in the Faroe Islands, where the Saksunarvatn Tephra was found in layers 16cm thick within very small basins.

Results from this work have been presented in Munich, at the 2nd Icelandic Environmental Change Conference (December 1991), and in Reykjavik at the 20th Nordic Geologists Winter Meeting (January 1992). In addition to the QRA Young Research Workers Award, the field work was also supported by the Frodskaparsetur Foroya - Faroe Islands and the University of Edinburgh Weir Fund for Field Studies. To all of these I am especially grateful and to NERC for receipt of a studentship. I am also indebted to my supervisors Dr Nigel Fannin, Dr Pete Hill and Dr Roy Thompson, for their continued help and encouragement.

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Characterisation of Microscale Features of Glacial Sediments

David Roberts

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The aim of research currently being undertaken at Southampton University is to find criteria to distinguish glaciotectionic from glaciomarine sediments. The need to do this has arisen from recent controversies surrounding the depositional origins of a number of glacial sedimentary sequences, particularly those around the Irish Sea basin (Eyles and McCabe, 1990; Thomas and Dackcombe, 1985) and the north Norfolk coast (Hart and Boulton, 1991; Eyles *et al.*, 1989). As macroscale sedimentological criteria tend to be equivocal, an important part of the research involves the utilisation of micromorphological techniques (using Scanning Electron [SEM] and Optical microscopes) in order to characterise the unique microscale features found within each type of sediment.

Since the origin of many Quaternary deposits tends to be complex, research has initially involved collection and examination of contemporary glacial sediments in order to characterise modern glacial sedimentary features. This will facilitate the interpretation of the Quaternary deposits under scrutiny in the project. As part of this strategy, the 1991 Southampton University expedition to Iceland provided an excellent opportunity to sample a wide range of contemporary terrestrial glacial sediments.

In order to obtain undisturbed samples for micromorphological work and transport them intact it is vital that the sediments be properly packed and protected in Kubiena sediment sampling boxes. These aluminium boxes are of a simple three piece construction, allowing impregnation of the sediment in the box, hence avoiding any further disturbance of the sample once removed from the field. Once collected, the samples are either impregnated with resin for thin sectioning and optical microscope work, or are prepared along orientated natural faces for examination under the SEM.

Results thus far have proved very promising and a number of criteria to distinguish the sediments, particularly stratified and laminated deposits, are being formulated. Glaciotectonic laminations are generally unsorted and ungraded, and have a tendency to be highly anisotropic due to related shear stresses imposed upon them through ice overburden. In contrast, sedimentary laminations formed subaqueously can exhibit grading, sorting, erosional and depositional contacts and distinct sedimentary structures such as cross lamination and load casts. The development of microfabric analysis currently underway should further help to substantiate the early results of the research and allow accurate evaluation of the (an)isotropic nature of the sediments.

In summary, it is hoped that when micromorphological characteristics are used in conjunction with corresponding field data on macrofabrics, structures and lithofacies associations, it will be possible to differentiate glaciomarine and glaciotectonic sediments and so reveal the true depositional origins of many controversial Quaternary sedimentary sequences.

I would like to thank the QRA for the award and the NERC for continued funding. I would also like to thank Dr J. Hart and the other members of the 1991 Southampton University Expedition to Iceland and the Icelandic Council of Science for research permit 91023. Many thanks also to Dr L. Owen, the Royal Holloway Electron Microscopy Unit and Mr B. Jones for their assistance with the micromorphological research.

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The Lateglacial and Holocene Vegetational History of the Northern Apennines, Italy: Report of a visit to Firenze, Italy

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The research focus is in the east of the Northern Apennines in Italy. There is no detailed information on the vegetational and environmental history of this area during the Lateglacial and Holocene, and a detailed pollen stratigraphy, supported by radiocarbon dating to give a chronostratigraphic framework, is required to allow the reconstruction of vegetational change.

One of the primary objectives of the project was to undertake a thorough survey of the region to identify potential sites with sedimentary records useful for the research. Detailed maps and air photographs were required to plan this work, and the aim of the visit to Firenze was to obtain these resources.

In Firenze, visits were made to the Tuscany Regional Offices and the Istituto Geografico Militare (IGM). The Tuscany Regional Offices were able to provide orthophotographs of the Tuscan Apennines which give a very useful overview of the area. At the IGM, air photographs of most of Italy are available, and several different scales of photographs have been collected for some areas. Two runs of photographs showing areas with numerous lakes were selected for purchase. IGM 1:25,000 topographic maps for the area of fieldwork were also obtained.

These resources, combined with locally available larger scale and more general small scale maps, were used to plan extensive reconnaissance work in the area. Fifty-two potential sites were visited during fieldwork in December 1990, August and September 1991. Due to the success of this reconnaissance work several interesting sites have been identified and those with the most suitable sedimentary sequences have been selected for coring.

Pollen and other analyses have been started on cores from four sites, and preliminary investigations suggest that at least one of the sites has a long and detailed Holocene record. At another site, grey/blue silty sediments and peat have been sampled, which may represent an important stadial/interstadial transition.

I would like to thank Mr B.E. Bradstock, Mr N.P. Branch, Dr and Mrs D. Bridgland and Mr S-J Li for assistance in the field. I am also very grateful to Mr R. Maggi and Mr L. Mordini for their help in Italy and Dr J.J. Lowe, Dr J-L de Beaulieu and Prof J. Rose for their advice and encouragement during this work. The work was supported by funding from the University of London Central Research Fund and a NERC framework award, and the additional support from the QRA Young Research Workers Award for the reconnaissance visit is gratefully acknowledged.

III Postgraduate Palaeoecology Conference
Department of Geography
University of Newcastle Upon Tyne
28th-29th April 1992

Despite many difficulties in tracking down this shy and elusive species, over twenty postgrads in palaeoecology found their way to Newcastle for the third and largest conference so far. Released from the maternal care of their supervisors, the fledgling palaeoecologists could stretch their wings without fear of plucking or roasting. The resulting cross-fertilisation of ideas and experiences was of great value, and I am sure will contribute to the strength and survival of both postgrads and palaeoecology. It was noted however that the Keele delegation preferred the safer strategy of self-pollination.

Many thanks must be extended to Prof. Malcolm Newson for use of the department and minibus, as well as to Rob Stoneman and Lisa Dumayne for hosting the RAC Northumberland Rally.

Next years conference will be at Sheffield, courtesy of Helen Smith and Peter Marshall at the Dept. of Archaeology & Prehistory, University of Sheffield, S10 2TN. If you are a postgrad with an interest in palaeoecology or related field, then please send Helen and Pete your name, address and research topic, so that they can contact you later with more details. Remember! there is no register of this kind of postgraduate research in Britain (why not??): you probably don't exist unless you tell someone!.

Abstracts

Helen Bennion (UCL)

Reconstructing eutrophication histories of ponds in SE England

Diatom assemblages from the surface sediments of 31 artificial waterbodies in SE England are related to contemporary water chemistry parameters; the nutrient gradient best explains the variance in the diatom data. Weighted averaging regression and calibration techniques are successfully used to generate a diatom-based Total Annual Phosphorous "transfer function". This is then applied to two sediment cores in order to reconstruct the eutrophication histories of two selected sites.

Margarita Caballero (Hull University)
Quaternary palaeolimnology of Chalco Lake, Central Mexico

Chalco Lake lies at the south of the Basin of Mexico, where Mexico City is located. The Basin has a main altitude of 2240m above sea level and ranges in precipitation from 600mm a year at the north to 1500mm a year at the south. Diatom, pollen and magnetic susceptibility analysis are being done in the sediments from this site. Diatoms can be grouped in four assemblages reflecting different climatic conditions, that establish five zones: Zone 5; 18,000 to approx 15,000 BP, where freshwater diatoms and acidic bog ones alternate with alkaline assemblages suggesting a generally cool-dry climate. Zone 4; 15,000 to approx 14,000 BP, where alkaline diatoms lower gradually and freshwater ones increase, suggesting an increase in humidity. Zone 3; 14,000-12,000 BP, where freshwater diatoms dominate, suggesting the wettest period in the record. Zone 2; 12,000-9,000 BP, where saline-alkaline diatoms are dominant suggesting an evaporative stress period and very shallow lake levels. Zone 1; 9,000-Present(?), where freshwater diatoms are present again, suggesting a less dry period than before. However this zone could have been affected by agricultural activities in the area.

Basil Davis (Newcastle University)
Holocene environmental change in north-east Spain: the salt lake record

The middle Ebro valley, north-east Spain, contains a series of endorheic basins containing both perennial and ephemeral salt lakes. These lakes have been cored and pollen, macrofossil, charcoal and geochemical analysis have been undertaken. The hydrological changes within these lakes are clearly displayed by both macrofossil and aquatic pollen evidence. This can be compared with the land pollen and charcoal record to examine the man / vegetation / climate / hydrology relationship. The importance of this approach is illustrated in the Laguna Salada. This is the only permanent hypersaline (meromictic) lake in Europe; however these conditions have only occurred relatively recently (18th Century?) with the intensification of agriculture. Prior to this point, the lake regularly dried out. The onset of this playa period, however, followed an even drier phase which lasted until the burning of the original pine forest. It is suggested that the deforestation resulted in a local rise in groundwater.

Lisa Dumayne (Southampton University)

Invasion or native? - vegetation clearance in northern Britain

Pollen analysis of nine large mire sites in northern Britain has been undertaken to determine the nature of human impact on the vegetation of the area, particularly that of the Roman invasion and occupation. The results, supported by radiocarbon dates suggest that in most areas the first major clearance occurred during the Iron Age, with a second major clearance during the Roman period. Only at Fozy Moss, Northumbria, has the first major vegetation clearance been dated to the Roman period. In general, the size and intensity of clearance during the Roman period is related to distance from Roman archaeological structures, such as the frontier walls and forts.

Malcolm Grant (Keele University)

Dendrochronological and palynological analysis of contemporary and ancient populations of *Pinus sylvestris* at Whixall Moss, Shropshire

Dendrochronological/hydrological and fine resolution palynological techniques are to be used to study the response (in growth and pollen production) of a population of mire rooted pines to a recent elevation of water table. Results will be used as an analogy to test for climate / hydrologically generated decline of pine on Whixall in prehistory.

Deborah Long (Keele University)

Prehistoric agricultural activity and its effect on the vegetational sequence of the gritstone uplands in the Peak District

Through the use of palaeoecological techniques, such as pollen and spore analysis, prehistoric agricultural activity will be identified in a local context and the effect of this activity on the prehistoric environment established.

Sarah McVicker

Mapping past vegetation in the Mourne, County Down, using palynological and tephrochronological techniques

Tephra, volcanic dust which is injected into the upper atmosphere during major volcanic eruptions, can be carried substantial distances and deposited over wide areas as unambiguous isochrones, planes of equal age. Such layers have

been isolated in blanket peats, from the Mourne Mountains, Co. Down. These layers are currently being used as dating tools in preference to radiocarbon dating, which often cannot specify a date closer than the nearest half-millennium. Mapping of vegetation on either side of the tephra enables precise correlation of temporally similar yet spatially distinct flora. Using this technique I hope to be able to contribute to the understanding of the importance of factors affecting vegetation patterns.

Anson Mackay

Peat erosion, *Sphagnum* and pollution

The nature of summit and gully peat erosion in the Forest of Bowland, Lancashire, is discussed in relation to the history of *Sphagnum* during the last millennium. It is suggested that neither climate change or atmospheric pollution were determining factors in the decline of *Sphagnum* spp. but that the decline has been caused by erosion, stemming from both biotic and natural processes.

Peter Marshall (Sheffield University)

The environmental impact of prehistoric mining activities

Analysis of peat deposits from the Mitterberg, Austria, using pollen and geochemical techniques will help to elucidate the impact of Bronze Age copper mining (5000 BP) on the environment. The identification of clearance phases may help to answer archaeological questions as to the extent and time over which mining activity took place.

Jane Reed (UCL)

The study of past climate change: the potential of diatoms in Spanish salt lakes

Started in October 1991, the project is aimed at assessing the potential of diatom research to study past climatic change in Spain. Following work in North American salt lakes it is hoped to develop a transfer function along a salinity gradient within Spanish lakes and apply this to fossil diatom assemblages in order to reconstruct past salinity fluctuations and hence changes in precipitation:evaporation ratios. Preliminary screening of short cores suggests preservation at depth is very poor. Further coring will establish whether or not diatoms are preserved in earlier Holocene sequences.

Neil Rhodes (Newcastle University)

Charcoal analysis - *Calluna* loss and peat erosion

Microscopic charcoal analysis of mor humus and lake sediments. The aims of this study are to determine dates of last burning and individual muirburns and to elucidate charcoal particle transport and deposition within the heathland ecosystem. In addition, for a number of upland lochs in the UK, to assess whether catchment burning may be responsible for the initiation of peat erosion and *Calluna* loss.

Rob Stoneman (Southampton University)

Climatic signals in raised peat

The decline of *Sphagnum imbricatum* on British raised mires have long been commented on. Semi-quantitative macrofossil profiles were compared to curves of reconstructed surface wetness, charcoal profiles and % arboreal pollen and of theories concerning the decline of *Sphagnum imbricatum* were discussed.

Michael Walsh (University of St. Andrews)

The Lateglacial environment of Fife

A Lateglacial section near Logie, in the Ochil Hills of northern Fife was excavated and sampled in bulk. Large plastic tubes were pushed into Lateglacial lake muds and dug out to recover a sequence of clay and marl. The sediments, after being prepared for Coleopteran and pollen analysis yielded a faunal assemblage of 85 taxa and a pollen record stretching from the Lateglacial Interstadial to the Flandrian Interglacial. The thermal climate of the warmest month during the Lateglacial, as indicated by the Coleoptera, was 12/13°C during the Interstadial which fell to below 8°C with the onset of the Loch Lomond Stadial. The vegetation history was open grassland giving way to a *Juniper/Empetrum* heath during the Lateglacial Interstadial. The Loch Lomond Stadial vegetation was that of a disturbed tundra environment. The onset of the Flandrian was marked by the rise of birch woodland. Comparison of the two methods shows basic agreement; however, there are vegetation changes during the Lateglacial Interstadial that cannot be explained by thermal climate changes. Other environmental factors, such as soil maturation, are more probable causes.

Basil Davis,

Department of Geography

University of Newcastle-upon-Tyne

REVIEW

SNOWDON'S PLANTS SINCE THE GLACIERS: A VEGETATIONAL HISTORY

By H.S. Pardoe and B.A. Thomas

Published by the National Museum of Wales, May 1992

32 pp, 16 colour plates, 23 monochrome illustrations, 12 line drawings

ISBN 0 7200 0365 2 Price £3.25 (£3.70 by post)

A Welsh language version is available.

This booklet introduces the vegetational history of Snowdon and guides the reader through the evidence used to reconstruct the Postglacial environment. The 32 pages include a brief introduction to Quaternary climate changes and the glaciation of Snowdonia. A succinct account of pollen analysis follows with a pollen diagram from Llyn Llydaw (after Ince, 1983) summarising the vegetational succession of Snowdon. The ecological requirements of plant species and their zonation on a mountainside are also considered.

The book then looks in detail at Snowdon's postglacial plant communities. Pioneering arctic-alpine communities and their special adaptations for adverse conditions are discussed, followed by a description of the subsequent grasslands and the establishment of deciduous woodland. Limiting factors on taxa migration and distribution are then considered.

The impact of man and climate change on the environment is the final theme. The elm decline, early agriculture, the grazing of upland areas and blanket peat initiation are all introduced, followed by a description of continuing deforestation, increased farming and mining. The booklet is concluded with a brief section on 'Exploitation, Tourism and Conservation' with emphasis on modern development and the problem of peat erosion in what is now a National Nature Reserve.

The book is easy to read as the well illustrated text is divided into manageable sections, and there were few typographical errors. It is unclear as to whom the booklet is specifically aimed at; if it is for the general public, then with a few exceptions, the topics covered are well written with scientific concepts conveyed

in an interesting and informative manner. There are just a few occasions when further explanation may be required; terms such as BP., pollen assemblage, total land pollen and plant succession may be unfamiliar to the casual reader.

The illustrations aid a better understanding of the text although some would have benefitted from further explanation (eg. 'The present day natural limits of woodland' p22) or from extra annotation to link the diagram more closely to the passage (eg. 'Llyn Llydaw pollen diagram', p12). An overall location map would have been helpful to show the exact position of Snowdon and the relative locations of sites such as Cors Tregaron, the Brecon Beacons and Cader Idris.

The black and white photographs are often disappointing, especially those illustrating grass species, a peat profile and different types of woodland. In contrast the colour photographs are excellent, but the most impressive pictures are the delightful paintings (by Dale Evans) which reconstruct the Postglacial vegetation of Snowdonia. These include many varieties of plant species but unfortunately there are no keys and so the species, so beautifully painted, remain unidentified.

In conclusion, this booklet serves its purpose well and is a simple but informative introduction to both palaeoecology and Snowdon's vegetational history. The list of references and further reading are useful and ensures that those who are interested are able to pursue the topic further. The booklet is produced to a high standard and at £3.25 represents good value for money.

R. Watkins,
University of Paisley

ABSTRACTS

STRATIGRAPHY AND PALAEOBOTANY OF MIDDLE PLEISTOCENE INTERGLACIAL DEPOSITS IN THE NORTH SEA

Murtaza H. Ansari (Doctor of Philosophy)

School of Ocean Sciences, University College of North Wales

ABSTRACT

This study presents a detailed palynological investigation of Middle Pleistocene interglacial sediments from the North Sea. A borehole and three vibrocores from the Inner Silver Pit area of the southern North Sea, and a borehole from the Devil's Hole area of the central North Sea, have been investigated. The palynological investigation has been supplemented by micropalaeontological and sedimentological analyses, and also by seismic data.

The sequence recovered in BGS borehole 81/52A from the Inner Silver Pit presents a depositional record from the mid-Anglian to the Wolstonian cold stage.

Glacigenic sediments overlying Cretaceous Chalk correlate with the Lowestoft Till (Anglian).

The depositional history of the Hoxnian interglacial cycle indicates that during the pre-temperate substage extensive erosional activity occurred in coastal areas causing a large proportion of reworked pollen and a very low amount of contemporaneous pollen to be deposited. The sequence preserves a good vegetational record of the early-temperate (HoII), late-temperate (HoIII) and post-temperate (HoIV) substages. The pollen assemblages representing HoIII and HoIV are very similar to the pollen assemblages of these substages from Marks Tey, Essex. The pollen assemblage representing HoII is different from Marks Tey in having a high proportion of *Picea*; as such it shows similarity with the pollen assemblages found at Nechells, Birmingham.

The sequence of the sands and gravels can be correlated with the Wolstonian sands and gravels at Tottenhill in the Nar Valley, North Norfolk and with Saalian sediments in the Dutch sector of the North Sea.

Three BGS vibrocores, 53/00/962, /1103 and /1104, from the Inner Silver Pit area provide additional data and represent various parts of the Hoxnian interglacial stage.

Pollen data from BGS borehole 81/34 from the Devil's Hole area suggests that the sequence representing the Ling Bank Formation does not represent a single interglacial stage but rather two interglacial stages (separated by a cold stage) within the Cromerian Complex.

LATE QUATERNARY BENTHONIC FORAMINIFERAL STRATIGRAPHY OF THE WESTERN U.K. CONTINENTAL SHELF

William E.N. Austin (Doctor of Philosophy)
School of Ocean Sciences, University College of North Wales

ABSTRACT

Late Quaternary deposits have been investigated from three main study areas from western Britain in an attempt to define lithological and biostratigraphic changes. Detailed analyses of included benthic foraminiferal assemblages are presented and a systematic section included which describes and illustrates over 200 distinct forms. Chronostratigraphic control is provided by radiocarbon dating, amino acid geochronology and tephrochronology.

The three study areas yield distinctive records of the depositional environments characterizing the climatic events of the Late Quaternary. From the Hebridean Shelf, BGS vibrocores have been analysed within the context of a previously established seismostratigraphic sequence. Foraminiferal faunas allow the reconstruction of a regional climatostratigraphic sequence for the Lateglacial period (ca. 14,000 to 10,000 BP) and this sequence is correlated, through nine radiocarbon (AMS) dates, to the established climatostratigraphy of the Lateglacial period from NW Europe. Reconstructions of notional water depths during this period allow glacio-isostatic components from the shelf to be estimated and these confirm a generally accepted pattern of changing relative sea-level, from initial regression following deglaciation and subsequent transgression as the eustatic component over-takes the isostatic component. Rising sea-levels are most notable after about 10,000 BP. Preliminary results are published by Peacock *et al.* (1992).

A cliff section at Aberdaron on the western Llyn Peninsula provides an insight into the controversy surrounding the question of depositional origin of the "Irish Sea Drift" sequences bordering the Irish Sea. Diamicts and sorted layers from the section contain mixed boreo-arctic, temperate and pre-Quaternary species, and allochthonous / autochthonous elements are identified. While lithological changes within the section are marked, the foraminiferal assemblages maintain relatively constant faunal ratios. None of the foraminifera are considered to be *in situ*, but instead entrained by the Irish Sea glacier during its passage along the Basin and deposited at the site by basal melt-out processes.

The third study area, the southwestern Celtic Sea, records geomorphological evidence of previously extensive glaciation in the region. Microfaunas, both foraminifera and Ostracoda, are analysed and record a transition from grounded ice lodgement facies to quiet, glacial marine facies at about 49°30' N. Amino acid analysis confirms the geomorphological evidence for glacial marine accumulation during the Late Devensian (see Scourse *et al.*, 1990).

References

- Scourse, J.D., Austin, W.E.N., Bateman, R.M., Catt, J.A., Evans, C.D.R., Robinson, J.E. and Young, J.R. (1990). Sedimentology and micro-palaeontology of glacial marine sediments from the Central and South Western Celtic Sea. In Dowdeswell, J.A. and Scourse, J.D. (eds.) *Glacial marine Environments: Processes and Sediments*. Geological Society Special Publication No. 53, 329-347.
- Peacock, J.D., Austin, W.E.N., Selby, I., Harland, R., Wilkinson, I.P. and Graham, D.K. 1992. Late Devensian and Holocene palaeoenvironmental changes on the Scottish continental shelf to the west of the Outer Hebrides. *Journal of Quaternary Science*, 7, 145-161.

DEGLACIATION OF THE DEE VALLEY, NE SCOTLAND

Iain M. Brown (Doctor of Philosophy)
Department of Geography, University of Aberdeen

ABSTRACT

The aim of this study was to analyse the pattern of deglaciation in the Dee valley and, in particular, to deduce whether this occurred by active frontal retreat or by areal stagnation and downwasting. This has important implications for palaeo-environmental reconstructions of the Lateglacial period.

The main techniques used were morphological mapping and construction of sediment-landform assemblages, facilitated by borehole records of the British Geological Survey. Several sections were available which have not previously been logged.

The area of study was sub-divided into three main sectors: Lower Deeside, Feughside and Upper Deeside. In each case, conclusive evidence was obtained that the last (Devensian) ice-sheet decayed predominantly by active retreat but with a stagnant margin. Linear assemblages of ice-marginal topography frequently indicate alobate ice-front based in the main Dee valley. The closely-spaced alignment of ridges in these assemblages suggests that they represent stillstands which interrupted retreat of the ice front.

The presence of ice in the main Dee valley during deglaciation meant that drainage of tributary valleys was blocked. This resulted in formation of glacial lakes as indicated by glaciolacustrine sediments, deltas and overflow channels.

Topography was a major control on the pattern of deglaciation, notably in areas of compressive ice flow where supraglacial sedimentation resulted in hummocky, ice-marginal deposits. These have previously been mis-interpreted as evidence for glacial readvances initiated by climatic change.

The sedimentary successions in ice-marginal ridges strongly resemble those recorded from present-day sub-polar glaciers (eg. Svalbard). This implies that deglaciation in NE Scotland occurred whilst the climate was still cold which is consistent with evidence from the coastal zone indicating that deglaciation was in progress by 15 ka BP. Much of the ice-sheet over NE Scotland therefore disappeared before the global climatic amelioration that occurred at 13.5-13 ka BP.

POSTGLACIAL VEGETATION DYNAMICS IN LOWLAND NORTH WALES

Ruth Watkins (Doctor of Philosophy)

School of Ocean Sciences, University College of North Wales

ABSTRACT

This study elucidates the Postglacial vegetational history of lowland lake sites in Gwynedd using detailed palynological work integrated with radiocarbon dating, loss-on-ignition, chemical, charcoal, and X-ray diffraction analyses.

An early Postglacial phase of *Juniperus-Betula* scrub was succeeded by open *Betula-Corylus* woodland at Llyn Cororion, a kettlehole site on the Arfon Platform (SH597688). *Quercus* and *Ulmus* were established by 8600 BP and *Pinus* dominated locally at 8425 BP. A subsequent water level rise and fire disturbance encouraged the spread of *Alnus*. *Tilia* was established by 5650 BP. Progressive deforestation began in the Late Bronze Age with increased fire use and spread of grassland; cereals are first recorded by 2900 BP. There is evidence that Llyn Cororion was used for *Cannabis* retting during Mediaeval times.

Postglacial vegetation at Llyn Hendref (SH398765), an exposed lake basin on Anglesey, was dominated by *Corylus* and *Alnus*; mixed, open oak woodland occurred away from the lake basin but *Tilia* and *Pinus* were never abundant. In the late Postglacial there was increased fire disturbance resulting in effective soil erosion and acceleration of mire development. Mire encroachment increased around 8700 BP resulting in lake shallowing and increased sediment erosion and redistribution.

Site comparison with published work (Melynlllyn and Nant Ffrancon) shows that there were variations in vegetational development within North Wales. Radiocarbon dating shows that similar vegetational events were time transgressive determined by migration rates, soil conditions, competition, hydrology and altitude.

NOTICES

QRA members may be interested in the following notices which appeared in the July edition of IKSU FOCUS, a newsletter produced by the Royal Society on "The UK and the International Council of Scientific Unions". This Council includes organizations such as INQUA and IGCP.

1. IGCP (INTERNATIONAL GEOLOGICAL CORRELATION PROGRAMME)

The UK has been actively involved in the IGCP over the last year. The Royal Society published its Report on *United Kingdom Contribution to the International Geological Correlation Programme 1991* last December.

In June 1992, the Royal Society's Earth Resources Committee agreed that the UK should participate formally in two of the new projects adopted by the IGCP Board in February 1992, and seek advice on participation in an additional six projects. By virtue of IGCP projects that terminated in 1991, and the new projects adopted in 1992 the number of current projects in which the UK is participating formally is 32.

Scrutiny of the national correspondents' reports demonstrates that the basic philosophy of the IGCP Board, namely to support timely project proposals for a limited period thereby fostering international cooperation, continues to work well, given the number of officially terminated projects where many of the participants are continuing to study the problems addressed by IGCP projects often in cooperation with newly-acquired collaborators overseas.

Sir Malcolm Brown has been elected chairman of the IGCP Board from 1 January 1993.

An article in the International Geological Correlation Programme appeared in Volume 2 no. 1 of *Geoscientist* (February/March 1992 issue). Grants to enable UK scientists to participate in the programme are available from the Society; please contact Miss Ruth A. Cooper for details.

2. SCOR (SCIENTIFIC COMMITTEE ON OCEANIC RESEARCH)

Under the auspices of the Interdisciplinary Committee for Environmental Research the Royal Society has now established an *ad hoc* Working Group for SCOR. The membership of this Working Group is Dr M. Whitfield (Chairman), Dr M.V. Angel, Professor J.R. Cann, Dr D.J. Garrod, Professor N.J. Shackleton, Dr C.P. Summerhayes and Dr J.D. Woods. Professor S.A. Thorpe is an *ex officio* member as the Chairman of the parent Committee.

Terms of reference of the *ad hoc* Working Group for SCOR:

- (i) to have responsibility for consideration and coordination in the UK of contributions to the marine science programme of the ICSU family of organizations, especially the Scientific Committee on Oceanic Research (SCOR);
- (ii) to stimulate participation by the UK scientific community in such programmes and to elicit from it proposals of topics for inclusion in them;
- (iii) to report to the Environmental Research Committee.

The Working Group intends to take an active role in strengthening the links between SCOR and the UK research community. It is particularly anxious to establish good lines of communication.

The official UK delegates to SCOR are Professor H. Charnock, F.R.S., Dr. C.P. Summerhayes and Dr. M. Whitfield. They are the primary contacts for information.

The first meeting of the *ad hoc* Group was held in April; a second meeting will be held on 4 August to provide a briefing for the delegates who will be attending the 21st General Meeting of SCOR in Goteborg Sweden during the week 14 September 1992. The group would like input from interested members of the UK community, particularly with regard to

- (a) proposals for new working groups within SCOR;
- (b) involvement of UK research scientists in the JGOFS Programme; and
- (c) the interest that UK scientists might have in the global Ocean Eco System Dynamics Research Programme (GLOBEC).

For further information on any of these issues please contact Dr M. Whitfield at the Plymouth Marine Laboratory (Tel: 0752-222772)

The SCOR Secretariat has relocated to Maryland. The SCOR Executive Director, Ms Elizabeth Gross, can be contacted at: Department of Earth and Planetary Sciences, John Hopkins University, Baltimore, MD21218, USA (Tel: 410 516 4070): Tlx: 7401472 SCOR UC; Fax: 410 561 7933).

3. INQUA (INTERNATIONAL QUATERNARY ASSOCIATION)

The Secretary General is now Professor E. Derbyshire,
Department of Geography,
The University, Leicester LE1 7RH

INQUA SEQS - Subcommittee on European Quaternary Stratigraphy

QUATERNARY STRATIGRAPHY IN VOLCANIC AREAS
--

A meeting to discuss aspects of the litho-, bio-, and chronostratigraphy, methodology (geochemical, biostratigraphic - pollen, vertebrates and invertebrates - and isotopic studies), and the role of long sequences in volcanic areas, will take place at the University "La Sapienza", Conference Hall, Roma, between 20-21 September 1993.

This meeting is being held under the auspices of the INQUA Subcommittee on European Quaternary Stratigraphy and the CNR.

The organisers are Dr G. Cavarretta and Dr C. Turner.

The meeting will begin on the evening of Monday 20th September, with two days of formal lectures (21-22 Sept.). This will be followed by a field excursion to the Alban Hills and Vulsini Mt. complexes (23-24 Sept.). An additional field excursion to the Pontine Islands is also planned (25-26 Sept.)

The topics of the meeting are:

- **ADVANCED METHODS IN STRATIGRAPHY & GEOCHRONOLOGY**
- **BIOSTRATIGRAPHY**
- **TEPHROCHRONOLOGY**
- **MAGNETOSTRATIGRAPHY**
- **EXAMPLES OF APPLICATIONS and INTEGRATION**
- **GEOMORPHOLOGICAL EVOLUTION**
- **ROLE OF LONG SEQUENCES**

Cost

The provisional registration fee for the meeting, which includes coffee and buffet lunches will be about 170.000 It. Liras. The cost of the two-days field excursion to the volcanic complexes will be approximately 200,000 It. Liras.

Further details from:

SEQS '93

CNR - CSGIC - CSGASR

Dep. Scienze della Terra Università "La Sapienza"

P.le A. Moro, 5 00185 ROMA, ITALY

Fax. ** 39-6-4468632

E-Mail CSGIC @ ITCASPUR

PALAEOCLIMATE 93

An Open Meeting to present and discuss the results of research undertaken as part of the NERC Palaeoclimate Special Topic, (and the first results of research supported by the TIGER programme), will be held at Van Mildert College, University of Durham from the evening of Wednesday, 22 September to Saturday, 25th September 1993.

The meeting will be hosted by the Environmental Research Centre (Chairman, Dr. Michael J. Tooley), of the University of Durham.

It is intended that a programme and application form for intending attendees will be issued in the next (February 1993) Circular. In the meantime potential participants would probably like to know:

A. The first day will be largely devoted to lecture reviews of results in different research areas, the second day will involve discussion groups on different research topics, (including planning for future research), and the third day will comprise a locally arranged field excursion.

B. The full residential cost, from dinner 22 September to (packed) lunch for 25 September (morning coffees and afternoon teas included) is expected to be £114; the non-residential cost, including morning coffees and afternoon teas, and all meals except breakfast, £49. In addition there will be a non-refundable registration fee for all of £6.

Brian Funnell (Chairman, NERC Palaeoclimate Special Topic Steering Group).

CORRECTIONS

CORRECTION TO:

"TERRACES OF THE RIVER AVON AT TWYNING, GLOUCESTERSHIRE: THEIR STRATIGRAPHY, CLIMATE AND BIOTA"

by P.F. Whitehead

***Quaternary Newsletter* 67, 3-29 (1992)**

An unfortunate printing error has occurred in the above paper. Midway down page 13 the text should read:

"Samples 1 (1300 gm, 12.10.1974) and 2 (1200 gm, 12.10.1974) were horizontally distant by 17.25 m and are here amalgamated. Sample 5 (900 gm, 12.10.1974) was 109.25 m distant from sample 1, and since their stratal relationships were uncertain, they are here separated."

P.R. Whithead
Moor Leys
Little Comberton
Pershore
Worcestershire WR10 3EH

CORRECTION TO:

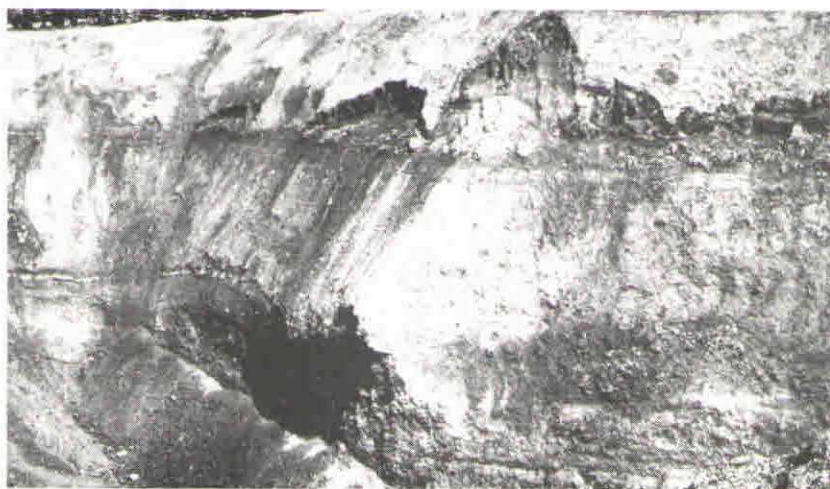
**"GLACIAL DEPOSITS OF LINCOLNSHIRE
AND ADJOINING AREAS"**

**By A. Straw in Ehlers, J., Gibbard, P.L. & Rose, J. (Eds.)
Glacial Deposits in Great Britain and Ireland (1991), Balkema**

An unfortunate printing mistake has occurred in that otherwise excellent publication *Glacial Deposits in Great Britain and Ireland* edited by J. Ehlers, P.L. Gibbard and J. Rose and published by A.A. Balkema in 1991.

Figure 139 on p.218 in the paper on 'Glacial deposits of Lincolnshire and adjoining areas' displays the correct caption but the wrong photograph. In the Welton-le-Wold quarry the printed photograph shows Calcethorpe Till over Welton Till (at TF 280883) in a section some 500m west of the intended illustration.

The correct photograph for the printed caption is reproduced below:



Prof. A. Straw
Department of Geography, University of Exeter

NOTES

QUATERNARY RESEARCH ASSOCIATION

The Quaternary Research Association is an organisation comprising archaeologists, botanists, civil engineers, geographers, geologists, soil scientists, zoologists and others interested in research into the problems of the Quaternary. Most members reside in Great Britain, but membership also extends to most European countries, North America, Africa and Australasia. Current membership stands at ca. 1000. Membership is open to all interested in the objectives of the Association. The annual subscription for ordinary members is £10.00 and is due on January 1st for each calendar year. Reduced rates apply for students and unwaged members.

The main meetings of the Association are the Annual Field Meeting, usually lasting 3 or 4 days, held in April, and a 1 or 2 day Discussion Meeting held at the beginning of January. Additionally, Short Field Meetings may be held in May or September and occasionally these visit overseas locations. Short Study Courses on the techniques used in Quaternary work are also occasionally held. The publications of the Association are the *Quaternary Newsletter* issued with the Association's *Circular* in February, June and October; the *Journal of Quaternary Science* published in association with Wiley, and with four issues a year, the monograph series *Quaternary Proceedings*; the Field Guides and the Technical Guide series.

The Association is run by an Executive Committee elected at an Annual General Meeting held during the April Field Meeting. The current officers of the Association are:

President: *Professor G.S. Boulton FRS:* Grant Institute of Geology, University of Edinburgh, West Mains Road, Edinburgh EH9 3JW

Vice-President: *Professor W.A. Watts:* Provost's House, Trinity College, Dublin 2, Ireland.

Secretary: *Dr. M.J.C. Walker:* Department of Geography, St. David's University College, University of Wales, Lampeter, Dyfed SA48 7ED, Wales.

Assistant Secretary (Publications):

Dr. D.R. Bridgland: 41, Geneva Road, Darlington, Co. Durham DL1 4NE

Treasurer: *Dr. J.E. Gordon:* Scottish Natural Heritage, 2, Anderson Place, Edinburgh EH6 5NP

Editor, Quaternary Newsletter:

Dr. J.D. Scourse: School of Ocean Sciences, University College of North Wales, Menai Bridge, Gwynedd LL59 5EY

Editor, Journal of Quaternary Science:

Dr. P.L. Gibbard: Subdepartment of Quaternary Research, Botany School, Downing Street, Cambridge CB2 2TF

Publicity Officer: *Mrs H. Davies:* Pharm House, Neston Road, Willaston, South Wirral, Merseyside L64 2TF.

All questions regarding membership are dealt with by the Secretary, the Association's publications are sold by the Assistant Secretary (Publications) and all subscription matters are dealt with by the Treasurer.



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