



**IQUA**

IRISH ASSOCIATION FOR QUATERNARY STUDIES

### IQUA NEWSLETTER

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Edited by Peter Wilson

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### INTRODUCTION

This is the longest Newsletter I've compiled since taking over the Editor's job and I hope all members will find something of interest within it. The longer the Newsletter becomes the longer it takes me to compile it, but I'm not complaining - it indicates a healthy Association with news to communicate.

Probably the two most important items contained within this issue are the details of the Annual Field Meeting to Clare Island and Inishbofin, which must be booked by Friday 20th May, and the usual reminder at this time of year that subscriptions are now due.

Those who missed the Discussion Meeting and AGM in Galway will find both abstracts and AGM report within. Also we have a report on the highly successful *Glacial Events* symposium held last November in Dublin.

Any member wishing to contribute to the next Newsletter should send their material to me before September 30th. May I take this opportunity of wishing all members a sunny summer for their field work!

Peter Wilson (University of Ulster).

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### IQUA ANNUAL SYMPOSIUM 1993 - GLACIAL EVENTS

The 1993 annual symposium addressed the theme of glacial events. Once again, IQUA was fortunate to avail of the excellent facilities in the Geological Survey of Ireland at Beggars Bush. The record number of people attending the symposium were rewarded with a full and comprehensive programme of papers. The meeting was opened by Peadar McArdle, Director of GSI. Pete Coxon, the symposium organiser, then set the scene for the

meeting by reviewing our current knowledge of Irish glacial events and placing them in a European context.

The keynote paper by Jane Hart (Southampton) addressed subglacial erosion, deposition and deformation associated with glaciers moving over deformable beds. Her detailed review and dynamic models eloquently illustrated the complexity of the mechanics of subglacial erosion and highlighted the gaps in our understanding that future research must address.

The extraordinary quality of Irish Late-glacial deposits was then demonstrated by Michael O'Connell's paper. His research team in Galway have worked on several sites (one with a 10 m Late-glacial deposit) which provide considerable detail on the rapid environmental changes that occurred during this period. A second paper on the Late-glacial by Robert Devoy and Anne Sinnott provided preliminary data from Co. Cork, a region hitherto devoid of detailed records. Samantha Hamilton's paper on testing lichenometric dating of rock glaciers in north Iceland clearly demonstrated the requisite of carefully planned and detailed field work when applying this technique.

The first paper after lunch was delivered by Lewis Owen (Royal Holloway, University of London). He illustrated some Himalayan glacial depositional systems with some stunning photography and gave the meeting an insight into contemporary glacial dynamics. This was followed by a pair of papers by Brian Whalley and Peter Wilson on Irish and British rock glaciers. Contrasting interpretations of some features stimulated lively debate after the session. Some excellent posters and an interactive computer demonstration of the role of GIS in groundwater protection by the TCD STRIDE GIS group were on display during the breaks. Catherine Coxon also presented a short paper to introduce the GIS project. She demonstrated the application of mapping Quaternary data to predict potential hazards of groundwater contamination.

Mary Smith provided a detailed account of the Quaternary geology of Clara and Raheenmore Bogs in which she demonstrated the application of a variety of geophysical data. Deglaciation in the Irish midlands was addressed by Cathy Delany. Her work around Lough Ree has revealed two sets of fluvioglacial landforms oriented perpendicular to each other. The final paper of the symposium delivered by Eric Farrell considered the engineering aspects of glacial deposits. It was encouraging to hear how much of the often considered academic research into our glacial deposits has a very real commercial application.

The success of the symposium is perhaps illustrated by the extended abstracts publication which runs to over thirty pages (Coxon, 1993). The



initial copy run of fifty was sold out before the symposium started. A second copy run has been made and copies are now available from the Hon. Treasurer (price £2.00). Pete Coxon must be congratulated for his excellent organisation of the symposium which was attended by over 70 people and provided such an excellent forum for interactive discussion on glacial events.

Reference: Coxon, P. (Ed.) 1993. *Glacial Events. IQUA Annual Symposium 1993*. IQUA, Dublin.

Fraser Mitchell (School of Botany, Trinity College, Dublin).

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## ABSTRACTS OF PAPERS - IQUA ANNUAL DISCUSSION MEETING 1994

### Application of geophysical techniques to shallow sub-surface investigations.

In the past ten years the application of geophysical techniques to imaging targets in the depth range one to thirty metres has seen rapid growth. This growth has been stimulated largely by the survey requirements of engineering geologists, environmentalists and archaeologists. The last mentioned often require large areas to be investigated in a non-invasive, cost effective manner in order to position excavations and drillholes.

This lecture will introduce some of the geophysical techniques which have been used in investigations in Ireland. The first technique discussed is resistivity profiling which was used to map the extent of a shell midden at Seaweed Point near Galway City. Here oyster shells contained in a drumlin provided a high resistivity target when compared with the lower resistivity of the drumlin. Resistivity profiling has also been used in a pre-excavation survey of a fulachta fia in a peat basin at Lecarrow on Clare Island, Co. Mayo. The objective here was to map the extent of the high resistivity burnt stones in the fulachta fia laterally from the edge of a drainage ditch in order to site trial trenches and pits. This survey demonstrates some of the difficulties in interpreting shallow geophysical anomalies which may result from both archaeological and geological sources.

A combination of resistivity profiling and depth sounding was used at other sites on Clare Island and the combined results from a habitation site and nearby fulachta fia will be presented. Here the resistivity technique effectively mapped the site and provided an indication of the sub-surface extent of these features. A second technique, magnetic susceptibility

mapping, was deployed over the fulachta fia. This technique measures the ability of a material to become magnetised, i.e. its magnetic susceptibility, and proved very effective in mapping the extent of the high susceptibility burnt stones of the fulachta fia.

Some of the results from a contribution to a conservation project at Raheenmore Bog, N.E. of Tullamore, Co. Offaly will be presented. Here electromagnetic and resistivity techniques were used to produce a series of depth sections which were to be used in the modelling of the hydrological regime of the bog. The initial work used the ElectroMagnetic-Very Low Frequency-Resistivity (EM-VLF-R) technique to rapidly survey the bog which measures some 2 km by 1.5 km. This produced a resistivity anomaly map which was then used to site a number of resistivity Vertical Electric Soundings (VES). These VES were then interpreted and used in conjunction with other geological data to construct geological depth sections through the bog.

The final technique to be discussed will be Ground Probing Radar (GPR) which has been successfully used at Rathcroghan near Tulsk, Co. Roscommon. This trial, or orientation, survey over a mound some 5 m high and some 90 m in basal diameter has revealed a number of features which have previously been unknown to archaeologists. The GPR depth section, when viewed in conjunction with a resistivity depth section, has provided many happy hours of head-scratching for those concerned with the project.

Kevin Barton, Applied Geophysics Unit, University College, Galway.

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### A vegetation history of Clara Bog.

A radiocarbon dated pollen diagram from Clara Bog, Co. Offaly provides a record of vegetation change in the catchment area for the entire Holocene (10,000 years). The succession of trees is typical of the Midlands but with high Pine values in the early Holocene. The record from the in situ vegetation shows an interesting period of ombrotrophic peat growth at about 8000 BP, which subsequently reverted to fen type vegetation. Agriculture in the catchment area appears to have had an impact later than normal at approximately 3800 BP. Archaeological evidence indicates the presence of man before this date although this is not evident in the pollen diagram. The decline in agriculture during the Iron age is very clearly demonstrated in the record. The recent vegetation history indicates very little arboreal pollen with grasses being dominant. A monolith sampled at closer intervals illustrates the recent vegetation history in finer detail. In this period the values for Coryloid pollen, which was the most numerous



pollen type for most of the Holocene, crashes dramatically indicating the removal of most of the remaining trees from the landscape.

Andrew Connolly, School of Botany, Trinity College, Dublin.

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Organic temperate stage sequences from the Lee Estuary area, Co. Cork.

The discovery of Gortian temperate stage deposits below extensive gravels during the construction of the Eamonn de Valéra bridge near Cork city centre in the early 1980s has promised to provide a long interglacial record for some years (see Scourse *et al.*, 1992). A recent drilling programme, funded by the EC, has been carried out by the authors as part of the SHELF project (The northwest European continental shelf over the last 250,000 years: palaeoclimate, palaeoceanography, tectonics and sea level change). This lecture will discuss some of the early findings of this part of the SHELF project in the Cork area.

Since January three boreholes have been completed obtaining continuous U4 samples of long organic sequences. The first, in the Customs House site (Scourse *et al.*, 1992), proved 17.5m of gravel overlying 18.5m of highly overconsolidated, variable (but predominantly silts, clays and peats) organic-rich (and in places shelly) sediments lying on gravel. This is the first continuous recovery of the sediment at this site and it should prove invaluable in our understanding of the Gortian temperate stage (Coxon, 1993). The other two sites, on the Douglas River and at Carrigtohill, have yielded ca. 18m and 20m, respectively of organic silts including peat horizons. The sediments at these latter sites are less consolidated and their geological context is, as yet, uncertain but they may provide even further information about the age of the Quaternary sediments lining the estuary. Sediments taken from adjacent boreholes in the Douglas River area have been found to contain pre-Holocene palynomorphs (including *Abies*) but the importance of the organic deposit here is as yet unknown. Peats from the base of the Carrigtohill borehole have been found to contain a *Betula-Pinus* assemblage which is not biostratigraphically correlatable to any particular temperate stage (including the Holocene).

The work to date suggests that the Customs House site will be the most important found in Ireland in terms of reconstructing the Irish Middle Pleistocene. This 18.5m-long continuous core is currently being subsampled by Laura Dowling and Ann Sinnott in Cork and samples will be analysed for (amongst other things) foraminifera, amino acid racemisation, diatoms, pollen and macrofossil plant remains in Aarhus, Bergen, Cork and Dublin.

Laura Dowling & Peter Coxon, Geography Department, Trinity College, Dublin.

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Joldelund: the environmental impact of iron production in the Roman Iron Age of Northern Germany. An interdisciplinary project

During afforestation of the inland dunes of Joldelund, northern Friesland, in the early 1950s, several slag pits associated with Iron Age furnaces were discovered. In the 1980s, geophysicists, on the basis of magnetic anomalies, mapped about 450 former furnaces in the study area. In 1990, an interdisciplinary team consisting of geographers, geophysicists, botanists, archaeologists and archaeometallurgists, started a new research programme. The aim was to reconstruct not only the process of iron production but to get more information about the economy of the community and the environmental effects of iron production. This project was sponsored by the Volkswagen Foundation as part of a program for archaeo-metallurgical research.

Geophysical and phosphate mapping was carried out to estimate the former settlement area. It was impractical to carry out archaeological excavations in the entire area, so a few sites were selected for detailed excavation. Fortunately, not only remnants of the furnaces, i.e. slag pits, were detected but also postholes of ancient farmhouses and evidence for smithies.

Reconstruction of the history of the inland dunes was one of the aims of the geomorphological and archaeobotanical investigations. In historical times such dunes, initiated by deforestation and over-exploitation, posed considerable economic problems for the farmers. A central question was whether, and to what degree, the consumption of timber for iron production was the source of these problems in historical times. A bog, covered by dunes, offered the opportunity for palynological investigations in the immediate vicinity of the former settlement. According to palynological and  $^{14}\text{C}$  analyses, peat accumulated from about 200 BC to AD 1200, so that a record of the period of interest was available. Radiographic and palynological investigations have demonstrated that small scale wind erosion took place in the vicinity of the bog. This might be connected with arable activity that is documented in the pollen record and also in the charred macroremains from the farmhouses postholes. Compared to medieval and modern erosion, the effect of the activities of the Roman Iron Age was quite small. Calculation of the whole energy consumption suggested that the amount of charcoal needed for iron production was not higher than the amount of wood needed for house building and fuel. Thus the



iron production in the lowland of northern Friesland did not result in an environmental disaster and in over-exploitation of the natural resources.

Walter Dorfler, Institut f. Ur- u. Frühgeschichte, Universität Kiel.  
(Present address: Department of Botany, University College, Galway).

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### Further contributions towards the archaeology of west Connemara and west Mayo.

On-going field research is continuing to highlight the importance of Connemara and S.W. Mayo in the context of prehistoric settlement history.

On Omey Island, the discovery of a pebble-hammer mace head points to possible presence of a Mesolithic culture in W. Connemara. Until now, evidence for Mesolithic activity has been confined to Galway city and the Corrib catchment in the vicinity of Oughterard.

Two megalithic tombs have been recently discovered in Fahy and Knockvalley Townlands on the Sky Road, west of Clifden. The tomb in Fahy Td. is the largest yet found in Connemara. In all, nine tombs, in two clusters – at the head and mouth of the bay – have now been recorded in and serve to further emphasise the importance of Streamstown Bay in the context of Neolithic settlement history.

Regarding the Bronze Age, fresh evidence for settlement is coming to light from three main areas:

1. Coastal midden sites at Doonloughan and Truska, south of Clifden, where a Bronze Age settlement site had been identified which yielded pottery of the food vessel type datable to c. 1600 BC.
2. The discovery of fulachta fia at L. Sheeauns, Kill, Knockvalley and Ballynahinch points to substantial late Bronze Age populations between 1400 and 900 BC. The L. Sheeauns site is particularly interesting in view its proximity to house remains in a pre-bog landscape. Evidence for ancient settlement at L. Sheeauns is now known from an area that extends over 4 km. The recent discovery of a beehive quern at L. Sheeauns (one of only two in Connemara) is also noteworthy.
3. From the hills overlooking Killadoon in S.W. Mayo a Bronze Age landscape with field systems, ritual enclosure, standing stone and cairns has recently been recorded.

Observations carried out at stone alignments, a megalithic type most likely of Bronze Age date, in Connemara (Derryinver and Gleninagh) and Murrisk (Killadangan), Co. Mayo have indicated that these show winter solstice alignment (on and about 21st December). The orientation coincides with the position of the setting sun on the horizon (between 14.30 and 16.00 hr).

Other evidence of settlement that has been recently recorded includes:

A small complex of upland hut sites in Lotaí on the western face of Derryclare Mountain in the Twelve Bens.

In Truska Td., south of Clifden, a complex of five and possibly six island cashels in close proximity have been noted. This suggests a marsh village or hamlet. There is little dating evidence available but comparable Scottish examples are considered to date to the Iron Age (6th to 3rd century BC).

Michael Gibbons, Dúchas, Island House, Clifden.

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Analysis of rates of change. A useful palynological technique or obtuse palaeoflower arranging?

The rates of change of pollen data are determined by calculating dissimilarity coefficients between adjacent pollen samples that are equally spaced in time. This approach gives a broad overview of the pollen data from which periods of stability and flux can be identified. The rates of palynological change from a selection of Irish sites will be compared. Data from North America and Ireland will be considered in a critical assessment of the value of this analytical technique.

Fraser J.G. Mitchell, School of Botany, Trinity College, Dublin.

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From Killumney to the sea: tracing the front of the last Cork-Kerry ice sheet.

Maps showing the maximum extent of the last Cork-Kerry ice sheet show the edge of it passing from Killumney in the Bride Valley, through or near Bandon, and reaching the sea-coast well to the west of Clonakilty. I can now offer evidence that it lies much further east than this on its way to the coast.

Two years ago I demonstrated the existence of a large moraine near Upton in the Owenabwee valley which has reversed the direction of drainage in



that valley. This moraine lies some 10 km due south of the Killumney moraine. A chain of morainic features can be traced southwards from this, reaching the sea along the eastern side of the Seven Heads. A morainic ridge, now eroded away, is deduced to have crossed Courtmacsherry Bay, impounding a lake for a time as the ice withdrew. Deltaic deposits at the western end of the presumed lake support this.

A line joining these features and continuing to meet the Killumney moraine is proposed as the furthest line reached by the last Cork-Kerry ice sheet. Morainic features, hummocky ground, undrained hollows, and drift-choked valleys abound west of this line, but have not been seen east of it. Outwash originating at this line is found to the east of it. A small ice-planed rock surface is preserved on the north shore of Courtmacsherry Bay, some 500 m east of the line. It displays striations running at 138 degrees, making an angle of about 40 degrees with the line, and thus indicating that the last ice sheet never reached this point.

Amhlaoibh Ó h-Aonghusa, 11 Wainsfort Road, Dublin.

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#### A Lateglacial and Holocene vegetation record from the Sierra de Urbion, northern Spain.

Laguna Negra is a cirque lake in the Sierra de Urbion, northern Spain. A 10 m long pollen sequence from the lake records Lateglacial and Holocene vegetation change in the region. The basal pollen spectra are dominated by *Pinus*, Gramineae, *Artemisia* and Chenopodiaceae, pollen assemblages typical of the steppe-like conditions which prevailed before the onset of the Holocene in south-west Europe. The beginning of the Holocene is marked by the expansion of *Betula*, *Quercus* (deciduous) and *Rumex*. After c. 8500 BP the vegetation became more diverse with the expansion of *Corylus*, *Ulmus* and *Fraxinus* together with regular occurrences in the record of sclerophyll taxa. There was a general decrease in diversity following the decline of *Ulmus* (c. 5000 BP) and *Fagus* expanded at c. 2900 BP. Anthropogenic activity becomes apparent at c. 5700 BP and anthropogenic influence upon the vegetation intensified during the early Roman period (c. 2000 BP).

Sebastian von Engelbrechten, School of Botany, Trinity College, Dublin.

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#### ANNUAL GENERAL MEETING 1994

The AGM was held in University College Galway on Saturday 12th March. The annual discussion meeting which was organised by Michael O'Connell

preceded the AGM. The abstracts included in this Newsletter demonstrate the wide range of Quaternary research currently engaging IQUA members.

The AGM was chaired by Fraser Mitchell. The Hon. Secretary, Michael O'Connell, read the minutes of the last AGM and in reflecting on the previous year reminded the meeting of the sad death of Bill Carter in July. The meeting held a minute's silence in his memory. The Treasurer's report highlighted an unusually healthy bank balance for the end of the year. This was mainly due to the successful campaign run to collect overdue membership subscriptions. The Auditor, Ronnie Crighton, suggested that some of this balance could be used to re-instate post-graduate travel grants. Fears were also expressed that future increased running costs of IQUA (e.g. postage, telephone, and room hire) due to the greater accountability being imposed by the Universities may substantially reduce this surplus. The Committee will consider this matter in the coming year.

The Autumn Field Excursion 1994 will be to Clare Island and Inishbofin. The organiser, Pete Coxon, reported that a ferry had been chartered for the weekend and hotel and hostel accommodation would be available on Clare Island. Numbers would be limited by the ferry capacity (c. 40) and the dates will be 17/18th September. The excursion will be two weeks earlier than normal to avail of the hotel on Clare Island which closes in October. Advance bookings by participants would have to be made to ensure the success of the trip. Corca Dhuibhne and N. Donegal were both suggested as possible locations for the 1995 Field Excursion.

The theme of *Sea Level Changes and Coastal Systems* was suggested for the 1994 November Symposium. Cathy Delaney agreed take on the organisation of the symposium.

Nominations to serve on the Committee for 1994-95 as put forward by the out-going Committee were unanimously accepted. These are as follows:

**Chairperson:** Dr F.J.G. Mitchell, School of Botany, Trinity College, Dublin 2.

**Hon. Secretary:** Mr K. Barton, Department of Geophysics, University College, Galway.

**Hon. Treasurer:** Mrs B. Miller, Department of Geography, University College, Dublin.

**Newsletter Editor:** Dr P. Wilson, Department of Environmental Studies, University of Ulster at Coleraine, Cromore Road, Coleraine BT52 1SA.



**Ordinary Members:** Dr J. Collins (UCD), Dr C. Delaney (UCC), Dr K. Molloy (UCG), Dr J. Sweeney (Maynooth).

Finally, the Chairperson expressed gratitude, on behalf of IQUA, to those leaving the committee (V. Hall, M. O'Connell and A. Sinnott). Michael O'Connell's contribution as Hon. Secretary over the past four years was especially appreciated.

Fraser Mitchell (School of Botany, Trinity College, Dublin).

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## FORTHCOMING MEETINGS

### IQUA Annual Field Meeting 1994 - Clare Island and Inishbofin, 16th-18th September.

Organisers: Pete Coxon (Geography, TCD) and Michael O'Connell (Botany, UCG).

The venue for this year's field meeting is to be two islands with rich archaeological, palaeoenvironmental and geological heritages off the west coast of Ireland. The programme will include a wide variety of sites of interest to our membership including a demonstration of geophysical surveying, visiting newly discovered archaeological sites and looking at, and sampling, bog and lake sites with detailed palaeoenvironmental records. We will also be looking at the general Quaternary geology of the islands.

So far a number of persons (in addition to the organisers) have agreed to show IQUA various sites on the islands including Kevin Barton (Geophysics, UCG), Gerry Doyle (Botany, TCD), Michael Gibbons (Archaeologist, Clifden) and Paul Gosling (Archaeology, UCG). Anyone who has worked on the islands and who has any material of interest they would be prepared to show should contact Pete Coxon at TCD as soon as possible.

The provisional itinerary is as follows: Meet at Roonagh Quay on Friday afternoon (16th September) and take ferry to Clare Island. Stay on the island using the hotel, the hotel's hostel (self-catering) and local B&Bs to give three-tier costing for participants. Look around Clare Island on Saturday taking in pollen sites, court cairns, fulacht fiadha and a walk to the lighthouse with its magnificent views. Stay overnight on Clare Island. Leave on Sunday morning taking the ferry to Inishbofin. The ferry will depart at 8 a.m. and will take 1-1.5 hours depending on sea conditions. This should allow from 10 a.m. to 5 p.m. on Inishbofin which again has a number of pollen sites and a rich archaeological heritage.

In order that arrangements can be confirmed, please return the booking form enclosed with this Newsletter to:

Dr. P. Coxon, Department of Geography, Trinity College, Dublin 2 - Before Friday 20th May. If you require further information, Pete can be contacted on 01 7021213 (Office) or 088 574496 (Mobile) or 01 6713397 (Fax).

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### RECENT PUBLICATIONS ON QUATERNARY RESEARCH IN IRELAND

COXON, P. 1993. Irish Quaternary biogeography, climate and the interglacial record. In: M.J. Costello & K.S. Kelly (Eds.), *Biogeography of Ireland: past, present and future*. Occasional Publication, Irish Biogeographical Society No. 2, 5-23.

COXON, P. 1993. Irish Pleistocene biostratigraphy. *Irish Journal of Earth Sciences* 12, 83-105.

COXON, P. (Ed.). 1993. *Glacial Events: IQUA Annual Symposium 1993*. IQUA, Dublin.

COXON, P., HANNON, G. & FOSS, P. 1994. Climatic deterioration and the end of the Gortian Interglacial in sediments from Derrynadivva and Burren Townland, near Castlebar, County Mayo, Ireland. *Journal of Quaternary Science* 9, 33-46.

HALL, V.A. (Ed.). 1993. *A field guide to some aspects of the Quaternary history of south Fermanagh*. Field Guide No. 16, IQUA,

HALL, V.A., PILCHER, J.R. & BOWLER, M. 1993. Pre-elm decline cereal-size pollen: evaluating its recruitment to fossil deposits using modern pollen rain studies. *Environment and Biology: Proceedings of the Royal Irish Academy* 93B, 1-4.

HALL, V.A., PILCHER, J.R. & McCORMAC, F.G. 1994. Icelandic volcanic ash and the mid-Holocene Scots pine (*Pinus sylvestris*) decline in the north of Ireland: no correlation. *The Holocene* 4, 79-83.

McCABE, A.M., CARTER, R.W.G. & HAYNES, J.R. 1994. A shallow marine emergent sequence from the northwestern sector of the last British ice sheet, Portballintrae, Northern Ireland. *Marine Geology* 117, 19-34.



MITCHELL, F.J.G. 1993. The biogeographical implications of the distribution and history of the strawberry tree, *Arbutus unedo* in Ireland. In: M.J. Costello & K.S. Kelly (eds.), *Biogeography of Ireland: past, present and future*. Occasional Publication, Irish Biogeographical Society No. 2, 35-44.

MITCHELL, F.J.G. & CONBOY, P. 1993. Early blanket bog development in the Wicklow Mountains. *Irish Naturalists' Journal* 24, 229.

MITCHELL, G.F. & WATTS, W.A. 1993. Notes on an interglacial deposit in Ballykeerogmore Townland and an interstadial deposit in Battletown Townland, both in County Wexford. *Irish Journal of Earth Sciences* 12, 107-117.

SHAW, J. & CARTER, R.W.G. 1994. Coastal peats from northwest Ireland: implications for late-Holocene relative sea-level change and shoreline evolution. *Boreas* 23, 74-91.

WILSON, P. & HEGARTY, C. 1993. Morphology and causes of recent peat slides on Skerry Hill, Co. Antrim, Northern Ireland. *Earth Surface Processes and Landforms* 18, 593-601.

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### SUBSCRIPTIONS 1994

Subscriptions for 1994 are now due and should be sent to the Hon. Treasurer, Mrs. B. Miller, Department of Geography, University College, Belfield, Dublin 4. The membership fee remains at IR£5, and IR£3 for students and the unwaged.

The address label on the envelope in which this Newsletter arrived gives the last year in which your membership fee was paid. To continue receiving IQUA information your subscription must be paid for the current year.

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