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Editor: Karen Molloy



Introduction

This lengthy issue of the Newsletter highlights the numerous activities of the Association and its members. Within these pages accounts are given of the most successful and well attended Annual Symposium held last November. Abstracts of papers and posters presented at the Annual Discussion Meeting are given as are details of the Annual General Meeting. The next IQUA event will be the Annual Field Meeting which this year is to be centred in the area of the Lower Bann and will be organised by Valerie Hall, Jasper Knight and Michael Philcox.

As ever members are encouraged to continue to support the Newsletter. Contributions for the Autumn edition should reach me by September 30th.

IQUA Annual Symposium 1998:

Frank Mitchell Symposium

The IQUA Annual Symposium on 20th November 1998 was an extra special event as it was in memory of Professor Frank Mitchell. The

range and subjects covered reflects Frank's eclectic vision of the geology, geography, archaeology and history of Ireland. Thanks to a team of excellent speakers, all of whom had close links with Frank and his work, we were treated to an exploration of studies pertaining to the Irish landscape and a flavour of the man himself. The symposium was very well attended and we sat in the comfortable surroundings of the Geological survey of Ireland overlooked by a magnificent and kindly portrait of Frank Mitchell.

Many people contributed to making the day such a success and I extend a heart-felt thank you to them all. The smooth running of the day was due to the admirable organisation of **Michael Philcox** (himself taught geology by Frank Mitchell). **Tom Cooney**, who has been working on Frank Mitchell's archival material, produced a wonderful poster display with a fine selection of items and photographs to give us great insights into Frank's life and special way of doing things. Tom also produced the extensive bibliography of Frank's many publications from

the 1930s-1990s (see symposium abstracts compiled by Karen Molloy).

Pete Coxon worked closely with Frank Mitchell on many varied projects and remembered Frank's influence as the external examiner for his PhD. Pete recalled times when Frank would leave him cryptic instructions in the department at Trinity which invariably led to adventures of some sort exploring the Irish landscape. We were treated to a show of old photographs of Frank, taken from original plates. These included photos taken on Valencia which was a very special place for Frank. Pete explored the theme of the recognition of Tertiary elements to be found in the Irish landscape, a subject in which Frank was especially enthusiastic.

Jasper Knight spoke about work based and following on from Frank Mitchell's. This regarded late Pleistocene environmental change in glacial systems especially the two-phase oscillation of ice movement across Clew Bay. Mitchell and Synge provided the original ground data from this project. The glacial models have been taken forward as Jasper and his colleges have produced new data. This data indicates that, far from a steady retreat of the ice revealing the underlying landforms, a more complex series of events occurred.

Michael O'Connell told us that Frank Mitchell was the external examiner when he was gaining tenure at the University of Galway. Michael referred to the seminal paper written sixty years ago by Jessen and Farrington in which Frank assisted and contributed. This described the classic tripartite Late-glacial stratigraphy for the first time in Ireland and Britain. Frank also proposed the Irish type localities for the

Late-glacial interstadial, Woodgrange and the Younger Dryas stadial, Nahangan. Ireland has good deposits of Late-glacial sediment and thus this period is well studied in Ireland. We were treated to a jazzy pollen diagram obtained from 2,000 years of laminated sediment from Tory Hill which spanned the time between the ice melt and the beginning of the Bølling. Michael pointed out that Frank's influence was to broaden horizons looking at Late-glacial deposits from elsewhere in Europe and the Greenland ice-core records.

Bill Watts gave us a personal account of his time as a student under Frank Mitchell and through his career at Trinity College. Frank was Provost at Trinity for ten years and a new chair was created for him as Professor of Quaternary Studies, a post Bill Watts now holds. We were told of a very important period in Frank's career in 1949 when he met Iverson at the time when the idea of revealing 'Landnam' in pollen diagrams was being developed. Frank explored the idea of the Elm Decline suggesting the influence of disease and climate when others were thinking only of human influence. Bill showed us early pollen diagrams in the 'chair-leg' style in which Franks notes the periods, 'Pagan', 'Christian' and 'Afforestation' back in the time when no technical dating was available. The development of the landscape and human impact were of very great interest to Frank and he provided a huge data base of pollen diagrams along with speculation and insights, some of which still remain to be explored. Bill ended his recollections of Frank by describing him as 'full of energy and a great supporter of graduate students'.

Gabriel Cooney also recalled that Frank Mitchell was the external examiner for his PhD and of Frank's great enthusiasm for the Stone Axe Project. More than 20,000 prehistoric stone axes have been recovered from Ireland. Lambay was a centre of axe production and Lambay Phophyry was the raw material used. Gabriel pointed out that pollen diagrams are a simplistic, general representation of the landscape and asked the question, how do we link this to reality? Lambay Island shows a different picture from Ireland in general illustrating that conditions on a local scale are variable. Lambay shows evidence of intense human activity interspersed by quiet spells. Gabriel described to us a pit excavated on this project in which rocks had been deliberately redeposited between 3600-3200 BC. At the base of this pit, pottery and a handful of cremated bone were carefully placed, perhaps as a 'repayment' to the earth for materials removed for axe production.

Peter Woodman discussed the paper put forward by Frank Mitchell in 1970 recognising that the Mesolithic period was not well understood in Ireland and suggesting the idea of a, 'minimal Mesolithic' in Ireland. Late Mesolithic technology in Ireland was certainly very different from the rest of Europe, with characteristic tools being found in the Bann area. In 1983 Peter suggested that evidence for the Mesolithic could be found not just in the north-east but all over Ireland. This was supported by finds of tools, including those of non-traditional type. Often different materials such as rhyolite and siltstone were used rather than flint. Peter also noted that stone axes were more common in the Mesolithic period in Ireland

than in the Neolithic period. The traditional idea of Mesolithic communities was of a seasonal movement around river and coastal sites. Peter suggests that, due to this new evidence, it is time to abandon this model for one of regional diversity.

Michael Ryan co-author of 'Reading the Irish Landscape' with Frank Mitchell recalled how he took Frank to Skerries and thus his work agenda was set for the future! Frank recognised an Iron Age 'lull' in pollen diagrams followed by a very intensive return to agriculture. Early Medieval (450-1200AD) raths of earth or stone are the most numerous monument Ireland, about 48,000 being recognised. Ireland was very densely populated at this time and it is believed that new agricultural practices were taking place. However, Michael suggests caution in this assumption. The 5th and 6th century were a time of dairying and the coulter plough was not used until at least the 10th century. Assuming reasons for major social change from pollen diagrams is, therefore, a risky idea. However, the Early Medieval period was a time of great social change in Ireland. It seems it was a time of population influx, perhaps with trading contacts with Rome. So, Michael suggests, we are back to the drawing board trying to discover what type of changes in society and ideology were taking place at this time, exactly the type of situation Frank would find a challenge!

Alan Hayden along with Clare Walsh worked with Frank Mitchell on Valencia Island from 1993 until the time of his death in 1997. Valencia had a special place in Frank's heart and we were treated to some marvellous slides of Frank in a place he loved. Alan had been doing

archaeological excavations on a nearby island when Frank asked if he would be his 'trowels and shovels' to help answer some questions posed by Frank's research on Valencia Island and so the adventures began! Alan told us of an occasion when Frank spotted a Hen Harrier and a car chase ensued! Alan is working with the O.P.W. on the National Monuments survey and he and Frank excavated a series of enigmatic buildings including *fulachta fiadh* on Valencia Island. Frank recognised evidence of areas of Medieval ridge-and-furrow which had not been noticed before indicating that the soils were originally very fertile. Excavations showed that the population was very high in early medieval times with the remains of more than thirty houses being recorded on one headland alone. The landscape of Valencia Island is unique and one which Frank liked to describe as a 'Tattered agricultural palimpsest'.

Breeda Tuite met Frank Mitchell socially when he was living at Townley Hall in Co. Meath. She became involved with excavations on Ardee Bog with Frank. Breeda had been taking children to see the environment there and was bowled over by the idea of pine stumps 5,500 years old. She reminded us of Frank's ability to access the imagination of people outside universities and reach general readers with his insight and clarity. Breeda painted a personal and affectionate picture of Frank at 83 years out on Ardee Bog in his gear of jeans, bomber-jacket, 'Reeboks' and baseball cap or dashing around the countryside doing 'C.W.G.', that is 'car window geology' and suggested that a fitting memorial to Frank would be a periodical publication entitled, 'Irish Landscape' which could contain the accumulated

knowledge of this wide and fascinating topic to which Frank contributed and inspired so much study.

Breeda's talk brought the proceedings to a perfect end.

Personally, I visited Frank when I lived in Co. Meath. I never realised going for tea could be such an inspiring experience! For me the symposium was a fitting tribute to a wonderful person.

Rosemary Stewart (formerly Department of Geography, TCD; currently Kent, UK)

IQUA Spring Meeting 1998 – Abstracts of Papers and Posters

Images of Archaeological landscapes; Geophysical studies at Mayo Abbey, Co. Mayo

John Madden, Applied Geophysics Unit, National University of Ireland, Galway

The archaeological landscape is a fragile, disappearing and frequently little understood resource; conventional methods of field research tend to be both time-consuming and labour-intensive and produce a patchy and inconsistent record that reflects varying site visibility rather than poor research. Nevertheless, the Sites and Monuments Records (SMRs) of Ireland at least, which has grown due to random discovery rather than intensive landscape research, tends not to contain sufficient pertinent detail to allow reliable assessment of landscapes from the record. If realistic assessment of landscapes is to be undertaken, the methods of site identification

and discovery need to be re-assessed and developed. The work presented deals with an assessment and analysis of new and established non-invasive prospecting methods (methods of site identification and discovery) when used in the surveying of archaeological sites previously unsurveyed in an Irish context. The most effective way to try and do this is to produce geophysical images from surveying that may relate to the underlying archaeology and to assess the general quality of these images. This is done by processing the data and dissecting the results of the surveys; carried out over archaeological sites/monuments in the Mayo Abbey area, Co. Mayo.

Four archaeological sites/monuments were surveyed for the purposes of the assessment and analysis. They were an Early Christian Monastic Enclosure, a Rath and Souterrain, a "Stone Circle" and an Anglo-Norman Moated site. Some results from the Monastic Enclosure, Rath and Souterrain are presented here. From these results, an assessment can be made of the value and usefulness of the techniques.

Holey rocks and boulders in sockets: A record of Holocene lake water chemistry from the west of Ireland

Mike Simms, Department of Geology, Ulster Museum, Botanic Gardens, Belfast BT9 5AB

Upwardly-tapering vertical tubes (röhrekarren) pierce the underside of limestone blocks and overhangs in profusion around the shores of seasonally-fluctuating Irish lakes, even where the lake waters are permanently carbonate-saturated. They testify to rapid

dissolution of the limestone and form by condensation corrosion in the epiphreatic zone. Röhrekarren morphometry is lake-specific and linked to long-term water chemistry. Röhrekarren in persistently carbonate-saturated lakes are narrow while those in lakes which are periodically undersaturated have a broader taper due, in part, to direct dissolution by lake water. Condensation corrosion rates always greatly exceed rates of direct dissolution by lake water. Relict populations of 'giant röhrekarren' and 'nested röhrekarren' (small röhrekarren developed in the apex of a larger one) around the Mask-Corrib lake system indicate an abrupt change in lake-water chemistry earlier in the Holocene. A suite of other lacustrine dissolution features, such as lake-margin notches and 'mushroom stones', provide further evidence of long-term lake-water chemistry. Röhrekarren are not the only bizarre karst features associated with these lakes. At some sites around Lough Mask but above maximum current flood levels, erratic boulders fit snugly into corresponding 'sockets', up to 14 cm deep, in the limestone pavement. These sockets developed on areas of limestone pavement seasonally inundated by undersaturated flood waters. During brief falls in flood level the boulders acted as 'sun-shades', slowing the evaporation of standing water beneath them sufficiently to prevent significant reprecipitation of dissolved carbonate before the, now saturated, water was flushed out by the next flood of undersaturated water. These 'boulders in sockets' testify to much greater aggressivity of lake waters earlier in the Holocene and contrast strikingly with the 'boulders on pedestals' which are so

characteristic of glaciokarst pavements in Ireland and northern England.

Tacumshin Lake: some of its history

Amhlaoibh Ó h-Aonghusa, 11 Wainsfort Road, Dublin 6W

Tacumshin 'Lake' is really a bay on the south Wexford coast now closed by a sand and gravel bar 4.5 km long. The area enclosed is c. 4 km², and its catchment is about 35 km². Thick deposits of drift cover the landscape, and the shore is steadily receding in the vicinity of the lake.

At present the bar is closed and the lake is drained by sluices installed in 1975, thus alleviating the severe flooding of adjacent lands. According to local tradition, the lake was open to the sea in recent centuries and was navigable by small ships carrying coal and other goods. Evidence from old maps and from cliffs cut in drift inside the bar will be shown to support this.

By 1840, the bar had extended all the way across the bay but it had a gap in the middle. This gap sometimes closed causing flooding and sometimes opened again, or was opened artificially. The gap always migrated westward, ultimately causing erosion in the drift at the western side. There is evidence of possibly two such events which occurred before 1840, and which indicate that the bar lay further seaward at the time.

There have been a number of attempts to drain the lake before the 1975 operation, but with limited success.

The bed of the lake has been filled up to about

mean tide level by sand which must have been brought in by the tidal influx through the gap, this process continuing up to 1975.

The evidence from old maps suggest that the bar may have begun to form less than 1000 years ago. If this is a fair conclusion, it calls for an explanation.

Directions of ice flow during the last glaciation in counties Meath, Westmeath and Cavan

Robbie Meehan, Teagasc, Kinsealy Research Centre, Malahide Road, Dublin 17

The talk summarises ice flow directional indicators in northwest County Meath and adjacent parts of Westmeath and Cavan, as mapped recently for a thesis examining the sedimentology of Quaternary glacial and postglacial deposits in that part of Ireland. Within the thesis the sediments in the area were described, identified and categorised into five main types of deposit: till; glaciofluvial; glaciolacustrine; alluvial; and peat. Bedrock within 1m of the surface was also mapped. Each category was further subdivided based on dominant petrographic components and texture. Glaciofluvial deposits were categorised in terms of genetic type. This, combined with morphological data, allowed an evaluation of the spatial pattern of differing deposit types and a basis on which to infer detailed genetic history and related ice flow and retreat dynamics.

As a result it was seen that the sediment-landform assemblages provide a record of glaciation and a detailed record of deglaciation. The glacial sediments are

dominated by drumlinised lodgement tills and the deglacial sediments are composed of glaciofluvial sandar, subaerial and subaqueous fans, deltas, eskers and moraines comprised of meltout and flow tills. These seem to reflect a continuous retreat of ice across the area with associated ponding and development of broad glaciofluvial systems.

Drumlins, striae, roche moutonnees, and other streamlined features, as well as till fabrics and subglacially deposited esker ridges, suggest a general flow during glacial maximum of northwest to southeast. Analysis of the configuration of ice marginal moraines deposited during glacial retreat, as well as till fabric analysis of deglacial sediments, suggest a more complicated retreat of ice, with margins oriented southwest-northeast prevailing in the south and east of the study area. Further to the west and southwest there seems to be an element of retreat towards the west, with a north-south trending ice margin. This is suggested as providing evidence for a decoupling of the ice into separate lobes in that area. The presence of interlobate delta sediments and anomalous orientation of esker-like ridges aids in this interpretation.

The geomorphology of the Macgillicuddy's Reeks: glacial, periglacial and fluvial landform evolution

Stephan Harrison¹, Tim Mighall¹, Ed Anderson², and David Passmore³,

¹Department of Geography, Coventry University, ²Department of Geography, Middlesex University, ³Department of

Geography, Newcastle University

Recent research in the Macgillicuddy's Reeks has highlighted the legacy of Lateglacial glacial, paraglacial and periglacial processes on the landscape and the role of fluvial action in modifying the landforms.

Geomorphological mapping in the area has revealed evidence for a phase of local glaciation following the retreat of the Glenavy Stadial glacial ice. On the basis of contrasting geomorphic evidence inside and outside the limits of local glaciation it is considered that this phase was triggered by Younger Dryas cooling. This evidence takes two forms: (1) periglacial features are absent or poorly developed within the glacial limits, but are well developed outside and, here, include protalus rock glaciers. (2) Schmidt hammer rebound values (R-values) demonstrate that the surface strength of glacially moulded *in situ* rock within the glacial limits is higher than equivalent bedrock exposures outside, which indicates that R-value contrasts can only be attributed to temporal weathering differences.

This paper presents some of the results of this work, describing aspects of Lateglacial and Holocene landform evolution, and attempts to determine the extent to which fluvial and slope processes have modified the glacial and periglacial landscape.

Investigations towards reconstruction of environment change at An Loch Mór, Inis Oírr, Aran Islands: initial results and implications for Holocene vegetation and climate change at the Atlantic seaboard

**Michael O'Connell and Karen Molloy,
Palaeoenvironmental Research Unit,
Department of Botany, National University
of Ireland, Galway**

Preliminary results of multidisciplinary investigations of a partially laminated, long lake core from An Loch Mór, Inis Oírr, Aran Islands, will be considered. These investigations are being carried out in the context of an EU-funded project entitled: *TIMECHS: Timing and mechanisms of Holocene climate change in NW Europe, based on stable isotope, pollen and macrofossil evidence from a lacustrine environment*.

An overview will be presented of first results from (1) sedimentological investigations by T. Saarinen (Geological Survey of Finland), (2) ostracod analyses by J.A. Holmes and R. Jones (Kingston University, UK), (3) diatom analysis by C. Dalton, University College London), and (4) stable isotope analyses by M. Leuenberger and U. Eicher (University of Bern). The implications of these results for reconstruction of environmental change, including lake-level and sea-level changes, and aspects of climate change in western Ireland during the Holocene will be briefly considered.

Pollen analytical results, supplemented by limited macrofossil data (K. Molloy), enable reconstruction of the various changes in vegetation cover and composition in the vicinity of An Loch Mór during the course of the Holocene. It will be shown that the present virtually treeless aspect of Inis Oírr is of relatively recent origin. The pollen data also provide good indications as to the changing role of human activity on the local environment as

well as insights into aspects of past climate change.

Did mineral deficiency cause the mid-Holocene *Pinus* decline? Pollen and geochemical data from Cadogan's Bog, Ratooragh, Co. Cork

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Pollen records across Ireland and northern Scotland show a dramatic collapse in *Pinus* pollen percentages at approximately 4000 years BP. This phenomenon has attracted much palaeoecological interest and several hypotheses have been forwarded to account for this synchronous and often quite rapid loss of pine populations from mid-Holocene woodland. These hypotheses include prehistoric human activity, climate change, in particular a substantial increase in precipitation, and the effects of Icelandic volcanic activity. One unexplored hypothesis is that mineral deficiency could adversely affect pine growth and regeneration on mire surfaces.

The discovery of pine macrofossil fragments within a blanket peat located at Cadogan's Bog, Ratooragh provided an opportunity to investigate the history of *Pinus sylvestris* in an area devoid of published palaeoecological studies. Pollen, charcoal and geochemical data are presented from a radiocarbon-dated monolith extracted from Cadogan's Bog. The results suggest that peat accumulation

commenced at the site around 5900 years BP when pine was the dominant tree taxa. *Pinus* pollen percentages diminish in two stages, with the second fall taking place around 4,000 years BP. Corresponding with the fall in *Pinus* pollen, there is a noticeable increase in wet-loving mire taxa and a drop in values of phosphorus, potassium, sodium, calcium and zinc. The depletion of chemicals, possibly the result of hydrological changes in the mire, may have played some role in causing the loss of pine from the mire surface and prevented seedlings from re-establishing themselves.

A re-examination of early Holocene tree migration into Ireland

Fraser J.G. Mitchell, Botany Department, Trinity College Dublin

Palynological research over the last ten years has significantly increased the number and geographical spread of radiocarbon dated pollen diagrams in Ireland. Pollen diagrams that cover the early Holocene provide data on the arrival times of the principal tree taxa. A database of these arrival times from 32 sites in Ireland has been used to plot isochrone maps of the migration of some of early tree colonists into Ireland. The maps also provide information on migration direction and migration rate. Earlier models of tree migration and hypothetical land bridges will be reviewed in the light of this new data synthesis.

Poster presentations

Geomorphic response of upland slope and

fluvial systems to Holocene Environmental change: Brandon Mountain Massif, southwest Ireland

Phil Allen, Department of Geography, Coventry University

Recent research has provided evidence for periods of widespread geomorphic activity within the Holocene across the British Isles. This geomorphic activity is thought to have been initiated either by climate change and/or human activity. In order to investigate the role of climate change and human activity in instigating geomorphic activity, a multi-proxy approach combining geomorphological and palaeoecological techniques has been undertaken across the Brandon Mountain massif, Dingle Peninsula, Co. Kerry.

Preliminary investigations have focussed on whether climate change or human activity have influenced the formation of alluvial fans. Geomorphological maps and the results from pollen and microscopic charcoal analysis of exposed peat deposits intercalated with inorganic sediments in the distal portions of an alluvial fan are presented in this poster.

Middle Pleistocene Vegetational and Climatic History of the Medoc Region, SW France

Charlotte O'Brien, Department of Geography, Coventry University

Eroded cliffs along 30 km of coastline of the Medoc Region, SW France, include temperate sediments which appear to date from at least two pre-Holocene stages. The sequence includes clay and organic layers which are thought to

have developed in coastal lagoons which formed during periods of elevated sea level.

Detailed pollen and plant macrofossil analysis is being carried out in order to reconstruct the vegetational successions recorded in the sediments, which will provide evidence for environmental changes over the time period.

Preliminary work has shown the sediments to be extremely fossiliferous. In particular, initial pollen analysis has revealed a diverse and well-preserved assemblage dominated by coastal and wetland taxa eg. *Abies*, members of the Ericaceae and Apiaceae, *Alnus* and *Salix*. Particularly noteworthy is the abundance in the lower organics and clays of macrofossil remains of the aquatic fern, *Azolla filiculoides* Lam., which suggests that a pre-Eemian interglacial is represented. Further analysis will provide biostratigraphic evidence to ascertain which climatic periods are being represented in these sections.

Annual General Meeting 1999

Date: 13th March

Venue: Trinity College Dublin

The meeting opened at 1600h, was attended by 11 members and chaired by Michael Philcox (Chairperson) who signed the minutes of the 1998 AGM as being an accurate record of that meeting.

As IQUA has been functioning without a Secretary for most of the year (the Secretary's duties have been largely carried out by the Chairperson). The traditional Secretary's Report

was therefore replaced by the Chairperson's report on this occasion. This outlined the main activities of IQUA over the year and reported on the well attended (over 50 members) two day field excursion to South Central Mayo organised on behalf of IQUA by Kevin Barton and Karen Molloy. The Annual Symposium which was attended by over 58 people was also reported on (details are given in this Newsletter). The annual joint IQUA/IGA lecture, this year organised by the IGA, has due to extraneous circumstances been postponed till later in the year.

The Treasurer's report indicated that IQUA's financial position was good although some outstanding bills from 1998 still needed to be paid. Ronnie Creighton (Hon. Auditor) was thanked for his help in auditing the accounts.

The Newsletter Editor reported the publication of two Newsletters during the year and hoped that members would continue to support the Newsletter.

The Chairperson provided an outline of the proposed Autumn Excursion to the Lower Bann Valley and the 1999 Annual Symposium was also discussed (see below).

The possibility of a joint IQUA/QRA fieldtrip to Kerry/West Cork next year proposed by a group from Coventry University was discussed. The possibility of increased publicity for IQUA was to be investigated. The proposal that IQUA should sponsor the Institute of Geologists of Ireland was not adopted on the basis that it appears to be irrelevant for most IQUA members.

It was decided to increase the number of Ordinary Committee Members from 4 to 6 in

order to provide IQUA with additional people with Committee experience from whom to draw officers in the future.

The nominations for the 1999 Committee are set out below:

Chairperson:	Michael Philcox
Secretary:
Treasurer:	Robbie Meehan
Newsletter Editor:	Karen Molloy
Ordinary Members:	Andrew Connolly, Janice Fuller, Valerie Hall, Susan Hegarty, Aoibheann Kilfeather and Mike Simms

These nominations were accepted unanimously. The Chairperson thanked outgoing Committee Members for their work on behalf of IQUA. The meeting closed at 1700h.

Karen Molloy (Palaeoenvironmental Research Unit, Department of Botany, NUI, Galway)

Abstracts of Recently Completed Ph.D. Theses in Quaternary Science

Meehan, R.T. 1998. *The Quaternary Geology and Last Glaciation and Deglaciation of Northwest Meath and Adjacent Parts of Westmeath and Cavan*. Unpublished PhD Thesis, University College Dublin, 504 pages plus appendices.

This thesis examines the sedimentology of Quaternary glacial and postglacial deposits in northwest County Meath and adjacent parts of Westmeath and Cavan, Ireland. The sediments in the area were described, identified and categorised into five main types of deposit: till; glaciofluvial; glaciolacustrine; alluvial and peat. Bedrock within

1m of the surface was also mapped. Each category was further subdivided based on dominant petrographic components and texture. Glaciofluvial deposits were categorised in terms of genetic type. This, combined with morphological data, allowed an evaluation of the spatial pattern of differing deposit types and a basis on which to infer detailed genetic history and related ice flow and retreat dynamics.

The detailed study focussed on the sedimentology of key features across the study area, generally in gravel pits but often also in trenches which were dug during the project. The sedimentary facies at 37 sites were logged, sampled and analysed in order to infer the depositional history of each of the features. Fabrics were taken and analysed in some detail to provide information on depositional flows. Erratics within the sediments were also identified and examined, from which glacial flow directions were inferred.

As a result it was seen that the sediment-landform assemblages provide a record of glaciation and a detailed record of deglaciation. The glacial sediments are dominated by drumlinised lodgement tills and the deglacial sediments are composed of glaciofluvial sandar, subaerial and subaqueous fans, deltas, eskers and moraines comprised of meltout and flow tills. These seem to reflect a continuous retreat of ice across the area with associated ponding and development of broad glaciofluvial systems. No evidence for a regional readvance of ice associated with drumlinisation was found. Furthermore, there is no evidence for a large-scale lake flooding Central Meath during the deglacial period.

This analysis of the depositional environments allowed an interpretation of deglacial environments during ice retreat. The evidence suggests one northeast-southwest oriented ice margin during retreat in the southeast and east of the area, but may have been associated with the separation of a number of ice lobes further west. Interlobate delta sediments

and anomalous orientation of esker-like ridges leads to this interpretation. It is likely that the ice margins were of ice lobes that were linked as a single ice mass during glacial maximum.

Heery, A. 1998 *The Vegetation History of the Irish Midlands: Palaeoecological Reconstructions of Two Lake Sites Adjacent to Eskers*. Unpublished PhD Thesis, University of Dublin (Trinity College).

In this thesis, the results of a first attempt at regional syntheses of palaeoecological data relating to the late-glacial and post-glacial from central Ireland will be presented. New palaeoecological evidence from two lake sites adjacent to eskers in Counties Offaly and Westmeath will be considered. Up until now there have been few studies set in central Ireland, none of which have been radiocarbon-dated, therefore, reliance on these diagrams to infer the vegetational history of the Midlands is far from ideal. This project is part of a wider undertaking at Trinity College Dublin to reconstruct the late-and post-glacial history of the Midlands.

The pollen sequence from one of the sites includes the only record of the full late-glacial from central Ireland. Interpretation of this pollen record has added to the evidence for a more elaborate array of environmental change in the late-glacial Interstadial with the possible existence of *Betula* woodland in the Midlands during the late-glacial as indicated at only three other sites in Ireland. There is also palynological evidence for a pre-Younger Dryas cold event at approximately 11,400BP correlated with the Killarney oscillation of Levesque *et al* (1993) and the Gerzensee oscillation of Lotter *et al* (1992).

There is also evidence for another minor oscillation in climate during the early Holocene (at approximately 9,450BP) as recorded at numerous sites from areas around the North Atlantic. Again palynological evidence for this possible brief change

in climate is recorded at very few sites in Ireland.

It is suggested that the multiple declines in *Ulmus*, which most likely grew in dense stands on the eskers and surrounding fertile soils, are closely associated with anthropogenic activity and are the consequence of human exploitation. However, the possible interaction between pathogenic attack and human impact is not dismissed.

The earliest evidence for low level arable agriculture in the Midlands is recorded from Cornaher Lough at approximately 5,400BP, prior to the 'elm decline'. There is evidence from both sites for increasing pressure on particularly the esker woodlands from about 3,400BP with more widespread clearances and evidence for anthropogenic activity. The earliest evidence in Ireland for *Cannabis* cultivation and retting is recorded from Cornaher Lough at approximately 2,000BP.

Mid-Holocene sediment from one of the sites exhibits unusual iron-rich laminated sediment. These post-glacial laminations, which are rare in Ireland, have the potential to provide an accurate chronological timescale for the palaeoecological data. Preliminary pollen analysis suggests that the laminations are for the most part annual: the pale carbonate laminae representing summer deposition and the darker iron-rich layers representing autumn through to late spring.

Forthcoming Events

IQUA Field Meeting 1999: Lower Bann

Organisers: Valerie Hall, Jasper Knight and Michael Philcox

This years excursion will be to the area of the Lower Bann in Northern Ireland, and will include the diatomite deposit and a lab display of

sidescan radar and seismic data of seafloor topography and shipwrecks, as well as a range of glacial and Holocene deposits and archaeological sites. The date has not been fixed but will be in the first half of October.

Annual Symposium 1999

This will be held in November in Dublin and will be on the theme of the 'Pleistocene outside Western Europe'. It is intended to provide a more global view of conditions outside our own icesheets.

Details of both these events will be circulated to members once finalised.

Ballybetagh Bog

It may have come to the attention of some members that damage to this site has occurred. For information of members, I briefly summarise the situation as of April 22nd 1999, but can provide more information if anyone requests it.

Ballybetagh Bog is an internationally important Late-glacial stratigraphical site with unusually thick lake and other sediments preserving a rich fossil macrofossil and palynological flora, in three small sections of bog on a valley floor near Kiltiernan in south Co. Dublin. It is also renowned as one of the most important sites for *Megaceros giganteus*, the Irish Elk or Giant Irish Deer. A drainage channel cut in 1847 and many other excavations have recorded over 100 skulls, all male. These have been studied to conclude that a die-off of overwintering populations of segregated males produced the

accumulations of remains at the one site.

In March, the landowner of this site started drainage works and has extensively altered it, with the attendant probability that the sediments will dry out and the scientific interest be lost. The site is a proposed NHA (National Heritage Area), and in part a recorded monument. Contact has since been made by the National Monuments Service of Dúchas and the local Wildlife Rangers with the landowner. Site assessment and discussions with the landowner have been going on in order to decide how best to minimise the damage and protect the remaining scientific interest. What this case clearly demonstrates is the present inadequacy of the law to fully protect sites of great scientific importance.

If any resolution is made the information will be supplied for the next newsletter, but in the meantime, should you want to know any more about the situation phone Matthew Parkes (01-6041493) in the Geological Survey of Ireland, Beggars Bush, Haddington Road, Dublin 4 (parkesma@tec.irlgov.ie) or phone Sean Casey, Regional Manager, Wicklow Mountains National Park, Glendalough, Co. Wicklow. (0404-45338).

Matthew Parkes, GSI

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