IQUA

Cumann Ré Cheathartha na h-Éireann

Irish Quaternary Association

April 2003 NS 30

ISSN 0790-4096

Editor: Janice Fuller

Introduction

This edition of the Newsletter, my last as editor, contains abstracts from the recent Spring Meeting, minutes from the AGM, a report on the Annual Symposium in November, as well as, the usual items.

I would like to thank all the contributors to this edition of the Newsletter and all those who have contributed over the past few years while I have been editor.

Best wishes to the new ed., Dr Catherine Dalton, who is based in Mary Immaculate College, Limerick. Contributions for the next Newsletter should be sent to Catherine by mid-October 2003 (catherine.dalton@mic.ul.ie).

Upcoming Events

The **IQUA Autumn Field Meeting** in 2003 will be to the Sperrin Mountains and will be lead by Steve McCarron. More details will be circulated to the membership in the near future.

Abstracts of the IQUA Spring Meeting 2003

The Irish Palaeoecological Data Synthesis and Analysis Project

Rob Marchant and Fraser Mitchell
Department of Botany, Trinity College Dublin

The Irish Palaeoecological Data Synthesis and Analysis Project (IPAL), funded by a European Union grant under the Marie-Curie Postdoctoral Fellowship scheme, is being developed within the Department of Botany, Trinity College, Dublin. The two-year project can be divided into two phases. Primarily, the project will construct a database of pollen-based results from Ireland carried out since the pioneering work of Jessen in the 1930's. The database will be developed within a Microsoft Access format that will link with a GIS (ArcView) and be accessible on the World Wide Web. This format is designed for ease of access and to engender spatial data analysis of the collated pollen data. Although it is early days, the database has the potential to include in excess of three hundred and fifty pollen

records. Secondly, the database will be available to investigate spatial and temporal aspects of Irish vegetation dynamics such as the interaction with climate change, human populations and links between palaeoecological and climate / vegetation model based reconstructions, both within a local and wider European context.

The database will contain the raw pollen data (counts) and associated metadata (analyst, publications, radiocarbon, site details, stratigraphy *etc.*). It is envisaged that the database will be of long-term benefit to the Irish palaeoecological community, and once set up should be developed and used outside the initial scope and duration of the project to best serve the present and future Quaternary Research communities working in Ireland.

Soil and subsoil mapping as part of the EU Water Framework Directive - baseline environmental mapping for Ireland

Robbie Meehan, Bulfin, M., Cronin, C., Fealy, R., Green, S., Loftus, M. and Radford, T., Teagasc, Kinsealy

The Water Framework Directive (2000/60/EC) came into force on its publication in the Official Journal of the European Communities on 22 December 2000. The Directive establishes a strategic framework for managing the water environment and sets out a common approach to protecting and setting environmental objectives for all groundwaters and surface waters within the European Community.

At the heart of the Directive is the requirement to produce a strategic management plan for each river basin district in the country, setting out how the objectives are to be achieved. The plan must be based on a detailed analysis of the pressures on the water bodies within the river basin, and an assessment of their impact. In Ireland, practical implementation of the WFD will take place in the context of River Basin Management Projects, which will be led by local authorities. These projects will provide the major portion of the basic data requirements and necessary analysis for the characterisation of river basins, the identification of pressures and impacts, the mapping of locations and boundaries of water bodies, the establishment of integrated water monitoring programmes, the establishment of programmes of measures for the preparation of RiverBasin Management Plans.

Of particular importance to the initial characterisation of groundwater bodies are the 'overlying strata', or the geological materials overlying the water table in unconfined groundwater bodies and overlying the top of the geological unit forming confined groundwater bodies. These strata consist of soils (topsoils) and subsoils such as till, alluvium, lake and estuarine fine-grained sediments, peat and sand/gravel deposits that are not classified as aquifers or groundwater bodies.

Therefore, identification of the general character of overlying strata is required to enable:

i) Assessment of potential pathways of contaminants to groundwater,
ii) Evaluation of the vulnerability of groundwater to contamination and
iii) Analysis of recharge to groundwater.

To enable these criteria to be identified, a number of datasets are required. Included in these are soils maps of the RBD, subsoils/parent material maps of the RBD, a rock outcrop map, compiled depth to rock data, a map depicting extremely vulnerable areas with respect to groundwater, and a preliminary assessment of general recharge acceptance and runoff characteristics. Arguably the most important of these are the soils and subsoils/parent material maps (broadly equivalent to the Quaternary geology). Soils data has been mapped for c. 44% of the country (An Foras Taluntais-AFT), at the detailed reconnaissance level based on the limited parent material data that was then available. Subsoil data are available at reconnaissance scale for c. 30% of the country (GSI).

The Forest Inventory and Planning System Irish Forest Soils (FIPS-IFS) project, which was undertaken by Teagasc, Kinsealy (1998-2002), had as its objectives the development of a digital soil classification for the non AFT mapped counties. A potential forestry productivity ranking was then attached to this productivity ranking. FIPS-IFS devised a first approximation soil classification for those areas not previously surveyed by AFT. Inherent in this was the production of a soil parent materials (subsoils) map. This was the first time detailed mapping linked the two interrelated environmental media of soils and subsoils in Ireland. This provided the appropriate framework for the spatial planning of forestry.

The Groundwater Working Group for the Water Framework Directive proposed that Teagasc, Kinsealy produce the soils and subsoils/parent material maps of the RBD. Therefore because of this, the FIPS-IFS Project Mapping at Teagasc, Kinsealy, has been extended until end 2005, to cover and re-map AFT counties with the FIPS-IFS methodology. The talk will cover the methodology used by FIPS-IFS and examine areas of the project of particular interest to Quaternary scientists.

Understanding woodland dynamics during the Late Holocene in Ireland and its affects on native woodland entomo-fauna - issues for forthcoming research

Eileen Reilly, Palaeoecology Centre, Queens University Belfast

Palaeoentomological and modern entomological research, most notably in Britain, has indicated the faunal impoverishment of woodland-dependent insects (e.g. Whitehouse 1997; Alexander 2002). Ireland's entomo-fauna is particularly impoverished when compared with Great Britain and mainland Europe and knowledge of its history is extremely poor. Limited palaeoentomological research to date, however, indicates that Irish wood-dependent fauna was once richer than it is today and some important differences between Ireland and Great Britain have also emerged regarding the distribution of certain wood-dependent species during the Late Holocene (e.g. Reilly 2003). Anthropogenic factors relating to woodland exploitation, estate management and grazing pressures as well as subtle climatic change during the so-called 'Little Ice Age' may have combined to cause the relatively recent 'extinction' of certain wood-dependent species. Late Holocene palaeoentomological research on natural deposits has not been carried out to any great extent in Europe to date and is seen by some researchers as vital to our understanding of present-day faunal impoverishment (e.g. Wagner 1997). This is the aim of new research at the Palaeoecology Centre in Queen's University Belfast, and this short paper introduces the reasons driving the research, the proposed methodology and its potential contribution to other current research agendas e.g. understanding grazing-vegetation interactions (e.g. Bradshaw & Mitchell 1999; Svenning 2002).

Alexander, K.N.A. (2002). *The invertebrates of living and decaying timber in Britain and Ireland – a provisional annotated checklist.* English Nature Research Reports, No.467.

Bradshaw, R. & Mitchell, F.J.G. (1999) The palaeoecological approach to reconstructing former grazing-vegetation interactions. *Forest Ecology and Management* 120, 3-12.

Reilly, E. (2003 forthcoming) The contribution of insect remains to understanding the environment of Viking/Medieval Dublin, 45-60. In Duffy, S. (ed.) *Medieval Dublin IV.* Four Courts Press.

Svenning, J-C. (2002) A review of natural vegetation openness in north-western Europe. *Biological Conservation* 104, 133-148.

Wagner, P.E. (1997) Human impact or cooling climate? The 'Little Ice Age' and the beetle faunas of the British Isles, 269-277. In Ashworth, A.C., Buckland, P.C. & Sadler, J.P. (eds.) Studies in Quaternary Entomology; an inordinate fondness for insects, *Quaternary Proceedings* 5. Wiley.

Whitehouse, N.J. (1997) Insect faunas associated with *Pinus* L. from the mid-Holocene of the Humberhead Levels, Yorkshire, U.K., 293-303. In Ashworth, A.C., Buckland, P.C. & Sadler, J.P. (eds.) Studies in Quaternary Entomology; an inordinate fondness for insects, *Quaternary Proceedings* 5. Wiley.

Distinguishing primary glacial deposits and glacial landforms in an area of multiple glaciations: a case study from Connemara.

David Chew and Pete Coxon, Departments of Geology and Geography, Trinity College Dublin.

Ireland's diverse and rugged scenery is the product of both long-term landscape evolution and repeated Pleistocene glaciation, the latter occurring over the last 2.6Myr. However, despite over 150 years of research our knowledge of the timing of the events of even the last glaciation (Midlandian) remain poor because of our continued inability to place Quaternary sequences within a firm stratigraphic framework (Coxon 2001).

Western Ireland exhibits particularly impressive evidence of glaciation and yet apart from the presumption that the larger moraines are last glaciation (including recessional and readvance events) and the smaller, cirque moraines, are Younger Dryas it has not been possible to elucidate a reliable glacial stratigraphy. However, published work (e.g. Orme 1967 and Synge 1968) has suggested that distinct, pre-last glaciation, glacial limits exist and in order to begin the process of shedding light on Ireland's glacial history we need to begin dating the major ice limits, landforms and sediments.

Research in the area between Bertraghboy and Kilkieran Bays (*Iorras Aintheach*) in southern Connemara has identified palaeosols of Neogene and Pleistocene ages (Coxon 2001b). The latter palaeosol, possibly Middle Pleistocene in age, separates 2 diamictons draping the flank of Cnoc Mordáin and as such may allow an initial differentiation of glacial episodes in the region, which is an important one as it lies in the path of ice emanating from the Connemara uplands to the north.

Coxon,P. 2001a *Cenozoic: Tertiary and Quaternary (until 10,000 years before present.) in*: Holland.C.H. *A Geology of Ireland. (Second Edition).* Scottish Academic Press, Edinburgh. pp387-427.

Coxon,P. 2001b. Understanding Irish landscape evolution: Pollen assemblages from Neogene and Pleistocene palaeosurfaces in western Ireland. *Proceedings of the Royal Irish Academy*, **101B** (1–2), 85–97

Orme, A.R. 1967. Drumlins and the Weichsel Glaciation of Connemara. *Irish Geography*, **5**, 262-274.

Synge, F.M. 1968. The glaciation of West Mayo. *Irish Geography*, **5**, 372-386.

The Quaternary Geology of the Dublin Port Tunnel Project.

Jacqueline Skipper, Natural History Museum London,
Ben Follett, Haswells Consulting Engineers, Dublin Port Tunnel Project

The Dublin Port Tunnel is the largest ever continuous excavation to have been engineered in the Dublin area, extending as it does from the Coolock Roundabout at Santry in the north to Dublin Port in the south. When finished, it will consist of a total of 5.6 km of new motorway. Of this, 2.6km will have been be constructed in tunnels bored using a tunnel boring machine (principally through Carboniferous limestone) at depths of up to 35m. In addition, 1.9km will have been constructed in 'cut and cover'(supported open) excavations, up to 20m deep. Because of the size of this project the excavations have given a unique insight into the Quaternary geology of the north Dublin area. In addition, the engineered design of much of the project has depended heavily on very high standards of geological logging, stratigraphical and palaeoenvironmental interpretation. This in turn has enabled in a revision of the Quaternary stratigraphy of the north Dublin area from the former '30 metres of boulder clay' to the recognition of three separate till sequences topped by palaeosols in the north and cut down into and infilled with four fluvial to marine deposits in the south.

Immediately overlying what is frequently a rafted contact with the limestone at least 5 m of the **Lower Black Till**, a very sticky stiff black diamicton with occasional gravel and silt lenses. Overlying this, with an often rafted, but always sharp contact is up to 20 m of the **Lower Brown Till**. This till varies from dark brown to light reddish brown in colour and is very lithologically variable, comprising a diamicton towards top and bottom but containing a number of marginal marine facies (rhythmites, ripple drifts and shell debris) in the middle part.

Above these are up to 10m of the **Upper Black Boulder Clay**, a very stiff dark grey diamicton which has many features indicating an origin as a lodgement till, such as lines of faceted cobbles with associated rare permeable lenses. This upper surface of this till is weathered for up to 3 m and this complex pedogenic horizon is termed the Weathered Brown Boulder Clay.

In Fairview Park in the south of the project the Upper Black Till is progressively cut down into approaching the Tolka River estuary. This large channel is infilled at the base with the **Lower Gravels**, which appear to be related to melting at the end of the Upper Black Till glacial retreat, and are interbedded with these deposits. Overlying these are the grey laminated silts and fine sands of the (popularly known as the **Port Clay**) which has been dated as Late Glacial Interstadial on pollen assemblages (Coxon, *pers com*). The Port Clay is overlain by the coarse **Upper Gravels**, found to contain Younger Dryas pollen (Coxon, *pers comm*), and these in turn are overlain by the modern estuarine shelly laminated clays which were reclaimed in 18(when?) and were covered with landfill rubbish from Victorian to Edwardian times.

IQUA Annual General Meeting 2003
Date: April 12th
Venue: Trinity College Dublin

A synopsis of the minutes
Recorded by Susan Hegarty

Apologies were received from Mike Simms, Daniel Praeg, Janice Fuller, Catherine Dalton, Ronnie Creighton and Barry Long. The minutes of the previous AGM were circulated by e-mail and were passed by those present. No matters were arising.

Chairperson's report: Pete Coxon noted that IQUA held the full quota of meetings it set itself at the last AGM. A successful Field Meeting was held in Kilkenny, and an equally successful Autumn Symposium, attended by approximately 50 people, was held in the GSI in early November. Pete noted however that the turnout at these events was poor in general. He felt that if the membership were better informed attendance would be improved. This is an issue that the committee needs to tackle.

At the AGM of the Quaternary Research Association it was suggested that a joint IQUA/QRA fieldtrip be held in April 2005, with Colm O'Cofaigh, Dave Evans and Pete Coxon as leaders. A field guide for this meeting will be produced.

Pete approached the Royal Irish Academy to see about having an official national representative at INQUA. The RIA was happy with the idea and will sponsor Pete to go to INQUA 2003 in Reno as the national representative.

Valerie Hall suggested that IQUA see how we are best represented at the various levels within the RIA. Perhaps it would be best for the chairperson to be the representative of IQUA on the commission for geology of the RIA (at present Michael Philcox is the rep.). This may provide a stronger link between the RIA, IQUA and INQUA. Valerie noted that it is a pity that at times Ireland is overlooked by INQUA, given that Frank Mitchell was president of INQUA.

There was no correspondence

Treasurer's report: Robbie Meehan informed the meeting that the official audit was carried out last week. In 2002 IQUA's funds increased and now there is €1600 in the bank. Robbie looked into the possibility of setting up a Direct Debit system, as discussed last year, however it would be too costly to run. The increase in the membership fees was not negatively received by the membership. At present we have 115 members, 3 honorary members and 8 corporate members.

This was Robbie Meehan's last treasurer's report. He thanked everyone for their help. Pete thanked Robbie for the brilliant job that he has done over his four years as treasurer.

The secretary's report was covered by the Chairperson's report.

This year's Autumn Field Meeting will be to the Sperrin Mountains in Northern Ireland. Steve McCarron will lead the trip and produce a field guide.

It was suggested by Michael Philcox that the focus of the Autumn Symposium be on biota with particular emphasis on vertebrates. This was agreed by those present as an interesting topic, particularly given the interest in vertebrates stemming from the recent BBC programmes of *Walking with beasts* etc.

The date for the next AGM will be this time next year.

Paul Dunlop, Michael Gibbons and Andy Richards were elected on to the IQUA committee. Susan Hegarty will act as Secretary and Catherine Dalton will become Newsletter Editor. Janice Fuller and Robbie Meehan have retired from the committee.

A committee meeting will be arranged for early May to discuss matters arising from the AGM and to appoint a new Treasurer.

Report on the IQUA Annual Symposium 2002

The IQUA Annual Symposium on 'Multiple Proxies for Environmental Reconstruction' was held at the Geological Survey of Ireland, Dublin, on the 1st of November 2002. Multi-proxy studies of past climates and environments have experienced considerable developments, mainly because of the awareness of the value of reconstructing geological and natural ecosystems and predicting the exchange and consequences of future climatic changes.

David Keen (Coventry) was the keynote speaker and he opened the meeting by describing the potential and limits of multi-proxy studies. He provided some examples of palaeoenvironmental reconstructions using a large body of indicators, instigating discussion when he highlighted the difficult challenges that a full potential multi-proxy approach presents. Inference models from multi-proxy investigations are now the norm, however the studies should proceed with regard to the controls on the existence of species in life and a good understanding of the taphonomical and dispersal processes of the organisms. Using examples from warm and cold stage deposits, he stressed the complementary nature of fossil groups for environmental reconstructions.

Michael O'Connell (Galway) gave a highly informative presentation on the development of the TIMECHS project. Based in biological and geochemical proxies, he and his colleagues tracked the environmental change in Inisheer during the Holocene. The project has produced a multitude of results. Some highlights include evidence of a possible marine incursion during the early Holocene, possible correlations with the 8.2k event, open forest cover before the Neolithic and possible correlations of varve formations with the sun spot cycle.

Another source of information on Quaternary climate change is derived from glacigenic deposits. The presentation by Andy Richards (Limerick) discussed the problems associated with a Late Midlandian Cold Stage deposits at Bridges of Ross, Co. Clare, their implications to the understanding of Late Quaternary landscape development in Ireland, and how a multi-proxy approach could broaden our knowledge of these deposits.

Nicki Whitehouse (Belfast) outlined the value and application of Coleopteran (beetle) data. She elegantly illustrated how Coleoptera could be considered in association with pollen data. Discrepancies in climate reconstructions using Coleoptera and Chironomids were also considered.

Evidence from archaeological locations traditionally provides an important source of information on past climates and environments in particular geographical areas. The study of prehistoric environmental change by Chris Caseldine et al. (Exeter) discussed the Holocene environmental evolution on Achill Island based on lithological and biostratigraphic evidence. This revealed extensive evidence for the presence of an island-wide event represented by a silt layer. The multi-proxy palaeoenvironmental data, including pollen and plant macrofossils, will significantly contribute to the understanding of this single silt layer and help to determine the age and likely impact of this event on the landscape and human occupation.

The presentation by Ingelise Stuijt (Discovery Programme) illustrated the palaeoenvironmental variations that are recorded at prehistoric sites on Derryville Bog, Co. Tipperary. In an integrated interdisciplinary palaeoenvironmental and archaeological study combining the peat stratigraphy, hydrology, pollen, macrofossils and testate amoebae, Coleoptera and wood and charcoal analyses provided great insights on the evolution of the bog and the surrounding dry-land landscape.

David Taylor and Julius Bunny (TCD) explored the relationships between climate history and political-economical change in western Uganda over the last 1000 years. The current results show a relationship between some of the major socio-economic changes and significant changes in climate and vegetation in the region. They encouraged the use of comprehensive multiple proxies of palaeoenvironmental data from sedimentary basins close to major archaeological sites to improve our knowledge and understanding of these relationships.

The final presentation by Gill Plunkett (Belfast) emphasised the importance of a good chronological control and the value of tephrochronology to multi-proxy studies. Dates obtained from tephra analysis are often of higher precision than radiocarbon dates. Tephra layers have a great potential for accurate correlation of multi-proxy data from two or more sites and can provide insight on the impact of volcanic events on the vegetation during the Holocene.

This successful event was extremely well attended and lively debate followed each paper. Catherine Dalton must be congratulated for putting together such a stimulating programme that demonstrated the value of a wide range of proxy methods and their combined application to the Irish Quaternary.
Manel Leira, TCD

Thesis abstract

Pathways and processes of Late Pleistocene subglacial meltwater flows, County Kilkenny
Susan Hegarty, PhD Thesis,
Dept. of Geography, UCD

The thesis looks at a particular aspect of the Quaternary history of County Kilkenny. The aim of the research was to look at the subglacial hydrology of County Kilkenny and, in particular, to examine the influence of the bedrock transmissivity and permeability on the overlying glacier. Four hypotheses were set up after a literature review of existing data. These were 1) that the whole of the study area was covered by ice during the last glaciation; 2) that the presence of assemblages of bedforms indicates particular basal conditions during the ultimate stages of the last glaciation to affect the area; 3) that these patterns of bedforms relate to the underlying bedrock substrate and its permeability and transmissivity and 4) that subglacial subterranean flow may have been an important drainage conduit in the study area during the last glaciation.

In order to examine these hypotheses the glacigenic deposits of the area were mapped and described by the author. Glacial bedforms were mapped using a digital elevation model provided by the Ordnance Survey. Geomorphological features, such as meltwater channels, were also mapped from this DEM. All available information on the bedrock of the study area were incorporated into a GIS, of which the DEM formed the base. This GIS allowed the manipulation of large quantities of data and spatial correlations to be examined.

The results suggest that the distribution of bedrock lithologies plays a major role in the geographical distribution of forms of drainage conduits to be found in the area. Lodgement tills occur preferentially on areas of moderate permeability bedrock and are absent on areas of karstic bedrock. Glacial bedforms also occur preferentially on particular aquifer categories, such that crag and tail features and glacial flutes are located on moderate aquifers. Nye channels occur on areas of poor transmissivity, friable bedrock. This has been interpreted as indicating the importance of the transmissivity of the substrate in influencing the subglacial hydrology of the ice sheet. Results also show that subglacial subterranean karstic flow was an important subglacial meltwater conduit in the study area during the last glaciation

Recent publications on Quaternary Research in Ireland

Hall, V.A. 2003. Assessing the impact of Icelandic volcanism on vegetation systems in the north of Ireland in the 5th and 6th millennia BC. *The Holocene* 13 (1) 131-38.

Wastegaard, S., Hall, V.A., Hannon, G.E., van den Bogaard, C., Pilcher, J.R., Sigurgeirsson, M.A. and Hermanns-Audardottir, M. 2003. Rhyolitic tephra horizons in northwestern Europe and Iceland from AD 700s-800s: a potential alternative for dating first human impact. *The Holocene* **13**, 277-283.

Mitchell, F.J.G. .2000. The development of Ireland's tree cover over the millennia. *Irish Forestry*, **57**, 38-46.

Knight, J. 2002. Subglacial water storage, bedform patterns, and Late Devensian ice sheet dynamics in north-central Ireland. Global and Planetary Change, 35 (3-4), 237-253.

Knight, J. 2003. Evaluating controls on ice dynamics in the north-east Atlantic using an event stratigraphy approach. Quaternary International, 99-100, 45-57.

Note: special double issue of *Biology and the Environment: Proceedings of the Royal Irish Academy*, **101B**, Nos 1-2 .2001. (includes several papers on Quaternary research in Ireland some of which were mentioned in the previous Newsletter).

IQUA wishes to acknowledge the support of our Corporate and Institutional members:

John A. Wood Ltd., Roadstone Dublin Ltd., Geological Survey of Ireland, Environmental Protection Agency, Roscommon County Library, Bergakademie, Freiberg, Germany, EX LIBRIS, Frankfurt, Germany, Natural History Museum, London.

Contributions for the next IQUA Newsletter should be sent to:

Dr Catherine Dalton, Dept. of Geography, Mary Immaculate College, Limerick;

Catherine.Dalton@mic.ul.ie