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Editor: Karen Molloy

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## Introduction

This issue of the Newsletter, which comes to you somewhat later than usual, contains *inter alia* an account of the Annual Symposium, abstracts from the recent Annual Discussion Meeting and an account of the AGM. It also highlights forthcoming events of direct interest to IQUA members.

It is with sadness that IQUA acknowledges the passing of Frank Mitchell a long standing friend and founding member of IQUA. An appreciation is included in this Newsletter.

As ever members are encouraged to continue to support the Newsletter and submit details of meetings attended, new research projects, new postgraduate projects, publications etc. The next Newsletter is scheduled for October and items for inclusion should reach me by September 30th.

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## IQUA Annual Symposium 1997: Problems, Approaches & Issues in the Irish Quaternary

The annual IQUA symposium was held at the Geological Survey of Ireland in Beggars Bush,

Dublin on Friday 21 November 1997. The symposium was concerned with the main problems and issues that arise while working in the time frame of the Irish Quaternary and how they should be approached and addressed. It consisted of four main sessions and included a wide range of research interests from dead midges to geographical databases on Western European coastal dunes.

The opening address was given by Michael Philcox, the chairperson of IQUA, who welcomed everyone to the symposium.

The opening session, entitled "Quaternary Timescales" was chaired by George Dardis. Unfortunately, **Mike Baillie** who was scheduled to deliver the first oral presentation could not attend, in his absence Jonathan Pilcher gave Mike's presentation followed by his own. Jonathan spoke of similarities and differences observed between narrow tree ring events observed in Irish bog oaks and acidity peaks observed in the Greenland ice cores. He relayed that Mike Baillie argued that these were related to large scale volcanic activity in the Northern Hemisphere, a theory that was well accepted.

There are however some discrepancies between these two which need to be rectified in order to achieve a "real" chronology for the Holocene.

**Jonathan Pilcher's** own presentation was based on recent developments in tephra studies in Ireland. He spoke of the increased findings of tephra layers over wider geographical areas and of a greater knowledge of dates associated with these layers. While an enormous amount of work has been done, much geochemical analysis remains to be carried out.

The third presentation in this session was given by **Jasper Knight** who was concerned with the chronology and dating of glacial events in Ireland. He spoke of Irish ice oscillations and the techniques involved in evaluating the timing of these oscillations. The two main types of dating employed are absolute dating ( $^{14}\text{C}$  and  $^{36}\text{Cl}$  isotopes) and relative-age dating (bedform patterns), which have been used to identify four distinct ice oscillations in Northern Ireland.

The final presentation in the first session related to the Irish coastal dune chronology during the Holocene and was presented by **Philippe MacClenahan**. One of the main aims was to investigate if dune chronology could be used in a climatic context. Four models were proposed for dune deposition with respect to sea level changes. It was concluded that no link exists between dune chronology and climate change. It is further thought that anthropogenic influences had no effect on dune dynamics.

The second session, "Multidisciplinary Projects", commenced after coffee and was chaired by Valerie Hall. It was based on the Lough Neagh Project and consisted of five presentations. An introductory talk was given by **Jonathan Pilcher** who spoke about how the project came

about. Research on Lough Neagh had been systematically ignored in the past.

**Suzanne Leroy** presented results of a multidisciplinary study into recent variability within Lough Neagh. Many different techniques have been employed in this study including magnetic susceptibility, loss on ignition and geochemical analysis. A very high sedimentation rate was found for the lake, along with strong evidence for eutrophication. Future investigations will examine the history of this eutrophication.

The third presentation in this session was given by **Clare Carter** on the use of dead midges as environmental indicators. She presented results from the analysis of *Chironomidae* from Lough Neagh. The chitinous head capsules of such midges can be identified and utilised to reconstruct past communities. In addition, many species are indicative of certain water quality conditions. Hence they provide a very useful insight into 'in lake' conditions. Enrichment of the lake (both short and long term) is evident from the research carried out. Natural enrichment can be seen from the long term record while enrichment visible from the short term record may be due to recent artificial lake lowering.

**Tania Baxter** presented results from part of her PhD project on detecting early Holocene water level changes in Lough Neagh using diatoms. Her research was initiated due to the conflicting hypotheses regarding lake level changes in Lough Neagh. She explained the difficulties associated with studying diatoms. She also outlined changes in the diatom assemblages that she has found and discussed their possible causes.

The final presentation before lunch was given by **Edward McGee** regarding sediment accumulation in Lough Neagh and its chronology based on  $^{210}\text{Pb}$  and  $^{137}\text{Cs}$  analyses. A sedimentation rate for Lough Neagh was calculated at  $6.2 \text{ cm yr}^{-1}$ . From his results an absolute chronology could not be assigned to the sediments recovered as the top metre was missing. However, a large peak in  $^{137}\text{Cs}$  measurements, taken as reflecting the fallout from nuclear weapons testing, suggests a 1963/64 date for a part of the core.

Lunch was followed by the third session entitled "Quaternary Databases" which was chaired by Michael O'Connell.

The first presentation in this session was given by **Valerie Hall** regarding what to do with prepared pollen residues. As there are no guidelines, no one really knows what to do with these samples. Valerie suggested cataloguing samples and relabelling them, matching them with their associated count sheets and making a list of cored sites and samples. Many of the peatland sites cored have been exploited recently and all that remains of them are the pollen contained in glass vials.

**Stephen McCarron** spoke of the automation of Quaternary geological data. He explained the inventory process he has adopted which involves observing, classifying and recording glaciofluvial landscape features for geological conservation. One of the problems that needs to be addressed however, is that of the development of a flexible data model to automate conceptual models of complex spatial patterns and distributions.

The topic of **Philippe MacClenahan's** second presentation concerned the proposed structure for a palaeoenvironmental geographical database

on western Europe coastal dunes. He explained how the database is collated and how data entries can be related both geographically and thematically using a reference code, not only on a site basis but on a 'within sequence' basis for an individual dune system.

The final session, entitled "Quaternary Landforms, Processes and Sediments", began with a presentation by **Jasper Knight** on patterns of glacial bedforms in Ireland. He spoke of temporal and spatial variation in bedforms and investigated how various drumlin features could have been created by ice mass variability in the late Pleistocene. He used two examples to illustrate the techniques he used in his study. He found that it is possible to correlate different ice forms and then different responses to varying forcing events.

**George Dardis** explained the difficulties in identifying various Quaternary sediments and depositional environments. Many sites in Ireland have been misinterpreted and have been incorrectly described. He referred to a deposit on a rock platform in Co. Clare which was too complex to be labelled as till and proposed that sea ice was an important factor in the formation of this deposit. He proposed a model which is capable of accommodating the complexity of the deposition process.

The final presentation was scheduled to be given by Peter Wilson. Unfortunately Peter could not attend and so **Pete Coxon** gave a presentation instead. He introduced his talk with some examples of large scale periglacial weathering and the type of timescales needed to account for such formations. He presented evidence of periglacial activity at a very old track through a gap in Killarney National Park, where it appears



that a large solifluction lobe was reactivated during the Little Ice Age.

Congratulations are due to George Dardis for the organisation of the symposium. Thanks are also due to the speakers and to the Geological Survey of Ireland for the use of their venue.

**Edwina Cole** (Department of Botany, TCD)

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## Joint IQUA/IGA Lecture

The joint IQUA/IGA lecture entitled *How climatic cycles can help to correlate marine and continental sediment during the Late Pliocene and Early Pleistocene: a palynologist's perspective* was presented by Dr Suzanne Leroy (Palaeoecology Centre, School of Geosciences, Queen's University, Belfast) at the Department of Geology, Trinity College, Dublin and in the Department of Geology, NUI, Cork. This lecture was well attended at both venues and the abstract is included below.

### Abstract

Climate is influenced by the position of the Earth in respect of the Sun (the Milankovitch theory). The amount of solar insolation received by the Earth has changed cyclically for the last millions of years at least. The periodicity of these changes, as observed in the oceans and on land, is of c. 20 ka during the Pliocene and of c. 41 ka during the Late Pliocene and Early Pleistocene (i.e. 2.6 to 0.9 Ma). Two examples, one from marine sediment and one from continental sediment, illustrate these regular and relatively rapid global changes.

A multidisciplinary study of core ODP 658 (Ocean Drilling Programme), off the coast of N-W Africa, provides the history of the increasing aridity across the continent from 3.7 to 1.7 Ma (Leroy and Dupont, 1994). Clay content is a good proxy by which to determine the decreasing importance of rivers flowing from the Anti-Atlas mountains to the Atlantic; whereas aeolian dust ( $>6\ \mu\text{m}$ ) content records the intensity of the Trade winds. Pollen analyses provide a step-by-step reconstruction of the sparse vegetation cover of a gradually expanding Saharan region.

The palynological diagram of Nogaret, a Late Pliocene lake in southern France, is dated of 1.9 Ma ago based on large mammal bones, K/Ar dating of regional volcanic activity and correlation to the marine oxygen isotope curves. The lacustrine sediment is yearly laminated. A year is 215  $\mu\text{m}$ -thick and made of three layers: a spring diatom layer, a summer layer of idiomorphic carbonate crystals and an autumn organic layer. The vegetation succession shows the progressive colonisation by trees after a glaciation during a c. 35 ka-long interglacial phase, (Leroy and Seret, 1992). The duration and the sequences of the climatic phases offer a surprising similarity to the one of our present interglacial, the Holocene.

Leroy S. and Seret G., 1992. Duration and vegetation dynamic of the Nogaret Interglacial (1.9 Ma, S. France). Tentative correlation with stage 75. In : Kukla G. and Went E. (eds), *Start of a Glacial, Proceedings of the Mallorca NATO ARW, NATO ASI Series I*, 3: 113 - 125, Springer Verlag, Heidelberg.

Leroy S. and Dupont L., 1994. Development of vegetation and continental aridity in northwestern Africa during the Late Pliocene:



the pollen record of ODP Site 658. *Palaeogeography, Palaeoclimatology, Palaeoecology* 109, 295-316.

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## **IQUA Annual Discussion Meeting 1998 - Abstracts of Papers and Poster**

### **Aspects of the Quaternary history of China with particular reference to the Loess Plateau**

**Michael O'Connell** Palaeoenvironmental  
Research Unit, Department of Botany, NUI,  
Galway

The Loess Plateau of central China constitutes one of the great archives of Quaternary climate change. Loess sequences, often 100 m thick and occasionally achieving a thickness of 300 m, have accumulated in this, and also in other parts of central Asia, over the past c. 2 million years. Loess deposits consist of wind-blown, silt-sized particles and hence are devoid of sand, boulders, etc. The silt that constitutes loess is about the same size as pollen, i.e. c. 20-60  $\mu\text{m}$  and typically 30  $\mu\text{m}$ .

Loess deposits typically consist of more or less unleached mineral horizons which are interrupted by palaeosols or fossil soils in which, like most mature soils, the magnetic susceptibility is greatly enhanced. The variation with depth in high magnetic susceptibility allows palaeosols to be readily detected. The cyclicity in the magnetic susceptibility curve matches that of the  $\delta^{18}\text{O}$  curve from ocean cores and this, in turn, is regarded as a reliable indicator of the variation with time of the extent of the polar ice cap.

The pristine loess deposits in a loess sequence are usually interpreted as forming during cold arid periods, i.e. glacial periods, while the palaeosol horizons develop during warmer and wetter periods, i.e. interglacials, when the quantities of wind-blown dust are greatly reduced. The loess deposits of central China therefore represent a complex record of the interplay between the variations in the intensity of the monsoon system and fluctuations in the distribution of steppe and dessert in the uplands in western and north-western China (cf. Derbyshire, E. (ed.) 1995. *Aeolian Sediments in the Quaternary Record*. Quaternary Science Reviews, 14, parts 7-8).

The loess record will be discussed in terms of the loess deposits in the Xi'an region, Shaanxi Province. Here the deposits are not as thick as in the Lanzhou region where several profiles have been recently studied but, being further to the east and hence further from sources of loess, the alternation of non-weathered with palaeosol horizons is more clearly defined.

Evidence of a human presence in the Xi'an region will be discussed with reference to Lantian Man, the earliest hominid record from China (1.15 million years (ma); cf. front cover of *Journal of Quaternary Science*, vol. 12, which features the cranium of Lantian Man and a mandible of younger age (0.65 ma) which was discovered in the same region), the Neolithic presence at the famous Banpo site (c. 7000 BP) and the Terracotta Army (Iron Age; Han dynasty, c. 200 BC). The classic karstic area, at Guilin, southern China, will also be briefly considered.

## **A New Late Glacial to Recent Site at Blessington, Co. Wicklow: Preliminary Pollen Results and Evidence for Slumping on the Margins**

**Michael Philcox and Tom Cooney, Trinity College, Dublin**

Recent bulldozing of overburden (!) on top of the gravels at Blessington has provided a cross-section >50 m long through a 5-m succession of laminated lake (pond) clays and overlying peat. Preliminary analysis indicates that a pollen record from Late Glacial to Recent is present and is well preserved.

The E-W cross-section reveals an asymmetrical shallow basin, floored by gravel cemented by ironpan, which rises steeply (locally c. 20°) on the W side to a level 9 m above the centre and 4 m above the highest preserved peat. The E margin is gentler, but is only partly preserved. The basal sedimentary unit c. 1 m thick in the centre consists of poorly laminated gritty clay with coarse sand partings and organic detritus. This is overlain by a light grey, well laminated clay 80 cm thick, containing pollen, overlain in turn by 3 m of peat.

The W margin of the peat includes bands of stony sand reworked from the substrate, and tongues of organic muddy diamict (slumps) <50 cm thick. The uppermost tongues extends >18 m into the peat; at the inner end it lies 80 cm above the local base of the peat; up slope it rests directly on the gravel substrate. A sand band has been traced to within 3.5 m of the centre, where it lies 90 cm above the base of the peat.

It is clear that the substrate material has been transported several metres into at least the bottom 1 m of the peat from the steep W

margin. Presumably pollen in the early marginal deposits has also been transported. It may be important, therefore, to consider what indications of slumping might be visible in core samples.

## **A Contribution to the Late Post-Glacial History of the South Wexford Coast**

**Amhlaoibh O h-Aonghusa, Dublin**

The coast between Tacumshin Lake and Crossfarnoge, or Forlorn Point, consists of low cliffs in drift which are eroding steadily, fronted by a generally sandy beach. The beach and the offshore shallows are strewn with large blocks of Carnsore granite as far as Crossfarnoge: this has been taken as the limit of this ice movement, but Carnsore granite boulders have been found at Cullenstown and it is probable that many more lie deep in Ballyteige Bay.

St Patrick's Bridge is a remarkable ridge of shingle extending from a point about 1700 m east of Crossfarnoge to the Little Saltee Island. At low tide about 250 m of its length is exposed off Little Saltee and about 1300 m at the shore end, while some 2600 m are underwater, to a depth of 2 m at the centre. The shore end is remarkably uniform, being about 30 m in width, cambered by about 0.6 m, and curving very gently in plan. Its sinuous course to the Little Saltee is revealed by the overfall it causes when the tide is running.

A similar feature, known as Sebbler Bridge, connects the two islands. Though it lies deeper, at up to 5 or 6 m, it also causes an overfall.

Various explanations have been offered for the origin of these Bridges: collision of tidal

currents, the remains of an end moraine, the remains of a tombolo, or as sarns. The parallel with the sarns in Cardigan Bay is not quite correct as these are the eroded remnants of lateral moraines.

As the H.W. mark at Namestown where St Patrick's Bridge meets the shore has receded by about 135 m since 1840 due to erosion, it is clear that the corresponding section of the Bridge has been formed since then. The beach-head shingle at this point forms a cusp: wave action can only move it towards this point from either side, and as the shore retreats by erosion of the drift, the shingle accretes to extend the Bridge. That this is the origin of the Bridge is confirmed by the fact that the stones forming the Bridge are identical in size and lithology with those in the shingle bands.

It follows from this that when the sea reached its present level after the last glaciation the Saltee Islands were connected to the land by an isthmus of glacial drift. Erosion formed beaches on both sides of the isthmus with bands of shingle at their heads. When erosion eventually cut the isthmus the shingle bands coalesced and then extended in both directions as erosion proceeded. The curving line of the ridge can be ascribed to variations in the relative power of waves from either side, while the gradual sapping of fine material from under the shingle would permit the ridge to sink to its present level.

### **Archaeological Geophysical Surveys and Excavation results from Cottier Village Sites on the Mahon Estate, Strokestown, Co. Roscommon**

**Kevin Barton, Applied Geophysics Unit, NUI, Galway and**

**Charles Orser Jr, Department of Anthropology, Illinois State University, USA**

This work began in 1995 when Charles Orser came to Ireland to investigate cottier village sites on the Mahon Estate. The objective was to study the cottier farmers, the poorest of Irish farmers, who would have lived on the Estate at the time of the Great Potato Famine of 1845 - 1849. The study involved investigation of available documentary sources and maps followed up by excavation of cottier house sites to document the lives and material possessions of the inhabitants in order to study their economy and position in the social structure of the time.

The cottiers are largely undocumented and Estate records rarely mention them except occasionally for an indication that rents had been collected from a Head, or Sub-tenant, who had sub-let land to cottiers. The location of cottier villages may have been omitted from early maps as surveyors often regarded the houses to be of little value. Cottier houses were simply constructed of mud or scraws with a roof thatched with straw or reeds. The houses rarely had solid foundations such as stone footings for the outer walls. At the time of the Famine there were many evictions and houses were torn down or left to decay. Today there is little evidence of these house sites except for occasional "bumps" in the ground where a house might have been.

Early work in 1995 involved fieldwalking in recently ploughed fields in the vicinity of possible cottier house sites. This work was encouraging and revealed artifact scatters but didn't identify house sites. A limited programme



of soil phosphate analysis was carried out in an area where house sites were suspected but it was difficult to be sure that the results indicated an area that would be productive when excavated. At this time a trial geophysical survey was carried out over the area of the phosphate survey. The magnetic susceptibility survey quickly showed a coincident anomalous zone and seemed to offer a quicker means of surveying for house sites when compared to soil sampling and wet chemistry which were required when using the phosphate method.

Further magnetic susceptibility and resistance survey work was carried out in 1996 prior to the first excavation being carried out on a phosphate anomaly with coincident, more refined, geophysical anomalies. The site was suspected to be that of a Head-tenant settlement known as the Murray site. Excavation revealed abundant pottery and the structural remains of a corner of a post-Famine house, an associated stone-box drain and some cobbled pavement. The excavation results were not easy to correlate with the geophysical images and the finding of the drain was a surprise.

In 1997 local folklore led us to two enigmatic "bumps" in a field that formed part of the former townland of Muliviltrin. Detailed topographic, magnetic susceptibility and resistance surveys indicated that these bumps were not natural and were cut by a number of linear features. The area was excavated in Summer 1997. The results correlated well with the geophysical anomalies with the finding of a hearth and a number of drains constructed of loose stones. The pottery finds here were very poor when compared to the Murray site possibly indicating, when taken with the paucity and simplicity of

other site features, that this was in fact the site of a cottier house.

Having obtained geophysical images and excavation results from two sites likely to be at opposite ends of the tenant farmer economy, we are now beginning to build up a picture of lives of these largely forgotten people. A third site, at Ballykilcline, has been surveyed and will be excavated in 1998 as part of this ongoing programme of study.

## **Poster**

### **Investigation of the within Site Spatial Variation of Peat Humification**

**Fraser J.G. Mitchell, Sebastian von Engelbrechten, Rosaleen Dwyer and Edwina Cole.**

**Department of Botany, Trinity College, Dublin**

Determinations of the degree of humification in peat profiles is becoming widely used as a climate proxy. Most published peat humification data rely on analysis of a single profile. Examination of contemporary bog surfaces illustrates a high degree of spatial variation which may bias humification data. The data presented explore the spatial variation in peat humification over time. A transect of ten peat cores across All Saints Bog, Co. Offaly have been analysed at 1 cm intervals and correlated using tephra analysis. Tephra analysis illustrates that depth alone cannot be used to correlate profiles. Consistent reproducibility of humification data was not achieved across the site. Spatial variations in peat humification demonstrate that this type of data should not be used as a climate proxy in isolation. Other

compatible data which may also influence peat humification (e.g. peat composition) should be used to qualify the humification record.

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## **Annual General Meeting 1998**

Date: May 2<sup>nd</sup> Venue: National University of Ireland, Galway

The meeting opened at 1500h, was attended by 4 members and chaired by Michael Philcox (Chairperson) who signed the minutes of the 1997 AGM as being an accurate record of that meeting.

The Secretary's report, which covered the main items to arise over the year, was circulated. The Secretary had represented IQUA at three meetings of the RIA National Committee for Geology (NCG). The NCG leaflet will be circulated to members in the next mailing.

The Secretary reported on the activities of the past year which included the well-attended annual two day field excursion to the Midlands organised by Fraser Mitchell and Cathy Delaney. The Secretary also reported on the Annual Symposium and the joint IQUA/IGA Lecture (details of both are given in this Newsletter).

IQUA membership stands at over 100 with 6 Corporate, 1 Honorary, 80 Ordinary and 15 Student members. The number of overseas members is gradually increasing.

The Secretary thanked Committee Members for their help over his four years of office and wished the incoming Secretary every success.

The Treasurer's report showed an excess of income over expenditure of £391.57 and a balance in the bank of £1480.17. The Treasurer said that the financial position was good and the balance was expected to cover anticipated expenditure in 1998/99. Ronnie Crieghton (Hon.

Auditor) was thanked for his help in the auditing and presenting the accounts.

The Newsletter Editor reported the publication of two Newsletters during the year and noted that members were now providing accounts of conferences they had attended. Supervisors of postgraduate researchers were to be encouraged to provide material on their own, and their students', projects.

The Secretary provided an outline of the proposed Autumn Excursion (see Newsletter item for further details) and ideas for the 1998 Symposium were discussed. The idea of commemorating the life and work of the late Frank Mitchell was proposed and the incoming Committee are to follow up on this.

The nominations for the 1998 Committee are as set out below:

Chairperson:	Michael Philcox
Secretary:	George Dardis
Treasurer:	Peter Glanville
Newsletter Editor:	Karen Molloy
Ordinary Members:	Eamon Cody, Andrew Connolly, Valerie Hall and Robert Meehan

These nominations were accepted unanimously. The Chairperson thanked the outgoing Secretary for his efforts on behalf of IQUA over the previous 4 years and, there being no other business, the meeting closed at 16.45h.

**Kevin Barton** (Applied Geophysics Unit, NUI, Galway)

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

**Jennings, E.** 1997. *Palaeoecological Studies Towards the Reconstruction of the Holocene History of Pinus sylvestris L. in Western Ireland*. Ph.D. Thesis (unpublished), National University of Ireland, Galway.

The aim of this thesis was to investigate the palaeoecology of Scots pine (*Pinus sylvestris* L.) with particular reference to pine woodlands on peat surfaces in western Ireland. Three main techniques were employed to achieve this aim, namely pollen analysis, dendrochronology and radiocarbon ( $^{14}\text{C}$ ) dating. In all, five sites were investigated for the above purpose in Counties Galway (Connemara) and Mayo.

At Ballydoo Bog, eastern Connemara, a small bog, in which many pine stumps were intercalated in the peat, was investigated as follows: systematic coring was carried out to determine the stratigraphy, a detailed pollen diagram that spans most of the Holocene was constructed, macrofossil analysis was carried out, and the pollen profile and two pine stumps were  $^{14}\text{C}$  dated. The studies show that pine played a major role locally from most of the period c. 8500-3000 BP, and during much of this time pine grew near or on the bog surface, especially between c. 5600-3000 BP. Dendrochronological investigations were not carried out because most of the stumps are either at considerable depths below the surface or, if exposed, had insufficient trunk timber for such investigations. Pine, at low population levels, persisted in the area until c. 2700 BP, and

may have finally died out as late as c. 1250 BP (AD 610) at which time widespread clearance of hazel and also birch took place in the context of an expansion of arable farming.

At Derryagher, 14 km south of Ballydoo Bog, 20 pine timbers were sampled. A tree-ring chronology (DTR P1M) was constructed and wood samples from this and from individual timbers not relating to the chronology were  $^{14}\text{C}$  dated. The chronology, DTR P1M, extends from c. 4600-4300 BP (c. 3400-2900 BC (BC dates are calibrated)) and two timbers gave outlier dates of  $5020 \pm 20$  and  $4180 \pm 20$  BP, respectively. The evidence points to pine growing uninterruptedly on peat for at least 1000 years.

Garrynagran, which is located approximately half way between Crossmolina and Céide Fields in north Mayo, contained numerous large pine timbers and also some oak trunks. Twenty-nine timbers were sampled and two pine tree-ring chronologies (GRN P1M and GRN P2M) and one oak tree-ring chronology (GRN OakM) were constructed and several timbers were  $^{14}\text{C}$  dated. The pine chronologies cover the periods c. 5700-5450 BP (c. 4500-4300 BC) and c. 4500-4000 BP (c. 3200-2700 BC). The oak chronology was correlated with the Belfast long oak chronology and spans c. 3100-2700 BC. At this site, a pollen diagram was constructed from a peat profile taken at a point where a small pine stump lay c. 50 cm above a layer of pine stumps. High *Pinus* pollen values are recorded from c. 7000-4100 BP and a more or less continuous record of pine stomata serves to confirm local presence of pine on the bog surface for this interval. More intensive sampling of pine timbers at this site may enable



the chronologies reported above to be joined and extended in either direction. Another noteworthy feature is solid pollen evidence for a substantial Neolithic Landnam that spans the interval 5000-4500 BP and hence is synchronous with that recorded at Céide Fields.

In western Connemara, smaller scale investigations have been carried out. In Connemara National Park, tree ring patterns for three pine timbers from the valley bog to which the published standard pollen profile, FRK II, relates. A short chronology (FRK P1M) was constructed and fixed in time by  $^{14}\text{C}$  dates (c. 4450-4300 BP; c. 3100-2900 BC). The implications of these and other results for the interpretation of the pollen profile, FRK II, are considered. At Crocknaraw, 5 km to west of Connemara National Park, pollen analytical investigations were carried out on peat immediately overlying mineral ground near the site of a pair of standing stones. The evidence indicated that pine was locally present as the profile opens, i.e. c. 5000 BP, and that pine continued to play a substantial role until 3200 BP.

In the Discussion, the results of the above investigations are considered in the light of evidence for the Holocene history of pine in Europe generally, and especially in Ireland and north-west Britain. Conditions appear to have been such that pine could grow on peat surfaces in Ireland and north-west Britain for most of the earlier Holocene. After c. 4000 BP, this phenomenon is seldom recorded though pine propagules were still common for at least another millennium. It is concluded that 4000 BP marks a distinct shift towards wetter and/or cooler conditions so that peat surfaces were too wet

for pine to establish and grow. The final decline of pine came about as a result of reduced availability of suitable habitat and increasingly intensive and extensive woodland clearances in the context of increased farming.

**Thompson, A. D.** 1997. *A Lake-Sediment Record of Lateglacial and Holocene Environmental Change from Molly's Lough, Co. Clare, Ireland*. Ph.D. Thesis (unpublished), University of Wales.

The work described here was undertaken with two primary objectives: (1) to determine the origin of laminated sediments in a small lake in western Ireland, and to explore their potential as a record of environmental variability; (2) to obtain a high-resolution record of Holocene vegetation dynamics, including responses to anthropogenic disturbance.

Molly's Lough is a small (30 x 70m) lake near Corofin, Co. Clare, western Ireland. Accelerator Mass Spectrometric (AMS) radiocarbon dates on terrestrial macrofossils from four levels in a 14.3m-long core show that the organic Holocene sediments accumulated at a mean rate of ~1.3mm per year. Laminated silts and clays form the lowest lithological unit, which was probably deposited in a proglacial environment between ~12,500 and 11,000  $^{14}\text{C}$  yr BP. Markov chain analysis shows the unit to consist predominantly of alternating couplets of silt and clay. Each of ~600 couplets is a varve, representing one year's sediment deposition. Time-series analysis of laminae thickness reveals cycles of ~50 and ~100 year duration, which are tentatively linked to sea-surface temperature and solar periodicity cycles.

Chemical and pollen distributions within the mid-Holocene lamination couplets show each to comprise one varve. Therefore, the 221 laminae were deposited in ~110 years. Time-series analysis indicates that variations in the annual erosion/sedimentation rates exhibited an ~11 year periodicity cycle. This may have been influenced by local changes in precipitation, controlled by the ~11 year solar sunspot cycle.

On the basis of lithological and palynological evidence the evolution of the local environment around Molly's Lough, from ~9,600  $^{14}\text{C}$  yr BP, can be divided into six main periods: initial post-glacial tree immigration (~9,600 - 9,510  $^{14}\text{C}$  yr BP); the development of primeval forest (~9,150 - 7,750  $^{14}\text{C}$  yr BP); the main forest phase (~7,750 - 5,200  $^{14}\text{C}$  yr BP); the prehistoric disturbed woodland and agricultural phase (~5,200 - 1,620  $^{14}\text{C}$  yr BP); the monastic and Anglo-Norman estate period (~1,620 - 700  $^{14}\text{C}$  yr BP) and the modern period (~700 - 0  $^{14}\text{C}$  yr BP).

Variations in the intensity of local anthropogenic impact were associated with the following events: early Neolithic disturbance and a subsequent decline in human activity (~5,400 - 4,000  $^{14}\text{C}$  yr BP); a late Neolithic-to-early Bronze Age clearance (~4,000 - 2,900  $^{14}\text{C}$  yr BP); a late Bronze Age lull (~2,900 and 2,500  $^{14}\text{C}$  yr BP); early-to-middle Iron Age clearances (~2,400 - 1,850  $^{14}\text{C}$  yr BP); a late Iron Age lull (~1,850 - 1,620  $^{14}\text{C}$  yr BP); woodland decline and agricultural expansion associated with monastic and Anglo-Norman estates (~1,620 - 700  $^{14}\text{C}$  yr BP) and a final phase (~700 - 0  $^{14}\text{C}$  yr BP) of local tree clearance, pastoral and arable activity.

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## **Forthcoming Events**

### **IQUA Field Meeting 1998: South Central Mayo, 10 -11th October**

Organisers : Kevin Barton and Karen Molloy

The excursion will be based in Claremorris. The following themes/topics will be included in the itinerary:

- 1) The bedrock and Quaternary geology of a multi-period archaeological landscape centred on Levallinree Lough, near Turlough, with examples of different monument types.
- 2) Modern and ancient Fulacht Fiadh at Lack East near Turlough.
- 3) Turloughs, geomorphology and hydrogeology to the east of Ballinrobe.
- 4) An integrated geological, archaeological, geophysical and palynological study at the Early Christian monastic settlement at Mayo Abbey, near Claremorris.

On the evening of Saturday 11th it is planned to have a reception, dinner and lecture in Claremorris.

For insurance reasons only fully paid up members of IQUA will be included in the excursion.

A full programme with details of accommodation etc. will be circulated to members in early August. In the meantime up to date information can be obtained from Kevin Barton at the Applied Geophysics Unit, NUI, Galway; Tel 091 - 524411 Ext 2690, Fax 091 - 525700, E-mail [Kevin.Barton@ucg.ie](mailto:Kevin.Barton@ucg.ie).

## NUMERICAL ANALYSIS OF PALAEOECOLOGICAL DATA WORKSHOP

24-28 August 1998, Trinity College Dublin

This workshop will be run under the 1998 Training of Trainers Programme administered by the HEA. The scheme is primarily aimed at teachers in tertiary level institutions but can also include post doctoral and postgraduate researchers.

This workshop aims to provide participants with comprehensive hands on experience of a wide range of numerical analysis techniques that can be applied to palaeoecological data. Short lectures will outline the theoretical basis and application of techniques and these will be followed by sessions in a teaching computer laboratory to enable the participants to gain practical experience using the techniques.

The broad outline of the workshop will be to include the following topics:

Data entry, manipulation and presentation

- Accessing and downloading data sets and software from the internet
- Multivariate data analysis
- Use of radiocarbon calibration packages, time-depth models and time series analysis
- Climate modelling with pollen response surfaces
- Analysis of participants' data sets

There will be some scope for including specific techniques requested by participants.

Each participant will receive a folder of detailed course notes and floppy disks containing sample

data sets and software that are not governed by copyright.

There will be no registration fee or other charges for participants. Furthermore, participants from outside Dublin will receive £40 per day towards their expenses plus £40 towards their travelling costs. Accommodation will be available on campus for participants.

It is intended that the workshop will start at 11.00 on Monday and end at mid day on Friday to facilitate travelling arrangements by participants. The number of participants is limited to 15 and so places will be allocated on a first come first served bases. Completed application forms should be returned by 25th May 1998.

Further details of the workshop and logistics will be supplied to those returning the application form.

Application forms available from: Fraser Mitchell, Botany Department, Trinity College, Dublin 2

Fax: (01) 6081147 Phone: (01) 6081811

E-mail: [fmitchll@tcd.ie](mailto:fmitchll@tcd.ie)

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### **Frank Mitchell (1912 -1997)**

Frank Mitchell died last November after a short illness. His death at 85 has deprived us of one of our most respected and popular Quaternary scientists. It is impossible to neatly pigeon-hole his contribution to Irish science because his explored such diverse avenues. He was a genuine interdisciplinarian, a rare breed in today's science of specialisation.



His research interests were ignited by Knut Jessen from Copenhagen who had been invited by the Royal Irish Academy to undertake a palaeobotanical investigation of Irish bogs in 1934 and 1935. Frank was employed as one of Jessen's field assistants whilst still an undergraduate at Trinity College Dublin. The war delayed the publication of Jessen's investigations until 1949 but this formed the background to Frank's later research which built on this foundation. The interpretation of changes in the vegetation of prehistoric Ireland led Frank into archaeology where he brought an entirely fresh insight which was much needed at the time. The third edition of *The Irish Landscape* was published shortly before his death and this superb book encapsulates his interdisciplinary approach as it explores the interplay of geology, biology, archaeology and socioeconomics.

In addition to a very active and highly successful research career, Frank also held many distinguished administrative positions which included the Registrar of Trinity College Dublin (1952-61), President of Dublin Zoo (1958-61), President of the Royal Society of Antiquities (1957-60), President of the International Union of Quaternary Research (INQUA) (1969-73), President of the Royal Irish Academy (1976-79), Pro-Chancellor of Trinity College Dublin (1985-87), President of An Taisce (1991-93).

Frank was also a founder member of IQUA (and QRA). He ran a number of field trips and was a regular contributor to meetings until very recently. Himself and Sibyl Watson became the first honorary members of IQUA in 1995.

Frank was the eternal student and this is illustrated in his compelling narrative *The Way That I Followed*. His enthusiasm never waned and in recent years he is famously reputed to have stated that he would trade his soul with the Devil in exchange for another 40 years. He was always eager to contribute to ongoing debates and was very generous of his time and encyclopaedic knowledge of the Irish landscape. A few months before his death he insisted on visiting a recently discovered interglacial peat deposit in Monaghan. He arrived brandishing a walking stick in one hand and a paper that he had published in 1951 describing the upper strata of the site in his other hand. His contribution to science was recognised by many national and international awards and distinctions which included being made a Fellow of the Royal Society in 1973.

He has left a wonderful legacy in the books and countless scientific papers that he has published (a paper on Valencia Island was submitted shortly before his death). This legacy will continue to enthuse a diversity of people with in an interest in landscape evolution for many years to come. Despite this, his enthusiasm and generosity will be sorely missed by all who knew him.

F.J.G.M.

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## RECENT PUBLICATIONS ON QUATERNARY RESEARCH IN IRELAND

- Caseldine, C., Hatton, J., Huber, U., Chiverrell, R. and Woolley, N. 1998. Assessing the impact of volcanic activity on mid-Holocene climate in Ireland: the need for replicate data. *Holocene*, **8**, 105-111.
- Glanville, C. 1997. Glaciolacustrine and glaciofluvial deposits defining the margins of uncoupling ice lobes in the southeastern midlands of Ireland. *Quaternary Science Reviews*, **16**, 685-704.
- Kelly, F. 1998. *Early Irish Farming (Early Irish Law Series, Vol. IV)*. Dublin Institute of Advanced Studies (School of Celtic Studies), Dublin.

Waddell, J. 1998. *The Prehistoric Archaeology of Ireland*. Galway University Press, Galway.

- Van der Meer, J.M. and Warren, W.P. 1997. Sedimentology of late glacial clays in lacustrine basins, central Ireland. *Quaternary Science Reviews*, **16**, 779-791.

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Contributions for the next IQUA Newsletter to be sent to: Dr Karen Molloy, IQUA Newsletter Editor, Palaeoenvironmental Research Unit, Department of Botany, University College Galway

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