IQUA

Cumann Ré Cheathartha na h-Éireann

Irish Quaternary Association
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Editor: Sarah Murnaghan

1. Introduction

Dear IQUA member,

Welcome to newsletter No. 48.

Thanks to all who attended the successful Autumn Symposium held at the GSI last December. Many thanks to the committee members particularly Gayle McGlynn, lead organiser of the event. An excellent programme of speakers (see extended abstracts below – item 5) proved not to disappoint and provided a stimulating set of talks on ongoing research and new insights into Quaternary tipping points. Thanks to all the speakers and the GSI for facilitating the meeting. Many congratulations to Prof Pete Coxon on receiving the inaugural Frank Mitchell Award (see item 6 for further details), which was presented at the Symposium.

Last year, IQUA also held an excellent fieldtrip to Co. Meath (see item 4 for further details). Many thanks are due to Bettina Stefanini and Gayle McGlynn for their extensive efforts in organising the trip. Thanks to all the contributors for sharing their inspiring knowledge of the Quaternary features in the area. We now have a very impressive IQUA fieldguide (no. 29) for north Meath, thanks to Bettina and Gayle, which summarises the detail of the trip very well. We also hope to organise another fieldtrip this year, and the committee welcomes all ideas and suggestions for the location/theme (for more information see item 7).

This year we look forward to the upcoming Spring meeting and AGM on Saturday 14th April (see item 3 for further details), which is being held at the School of Geography, Archaeology and Palaeoecology, Queen's University Belfast. Our thanks go to Rory Flood for leading the organisation of this year's meeting and the ^{14}CHRONO Centre for sponsoring the event.

Finally, many thanks to all who contributed to this edition of the newsletter.

Kind regards,
Sarah Murnaghan, St. Patrick's College, Drumcondra, Dublin 9.

2. IQUA Committee (2011/2012)

The IQUA Committee, following the 2011 AGM is as follows:
President: Prof Fraser Mitchell, TCD (continuing)
Secretary: Dr Bettina Stefanini, NUIM (continuing)
Treasurer: Gayle McGlynn, TCD (continuing)
Postgrad rep: Rory Flood, QUB (continuing)
Website manager: Dr Francis Ludlow, TCD. (continuing)
Publications Secretary: Gayle McGlynn, TCD (continuing)
Newsletter editor: Sarah Murnaghan, SPD (continuing)
Ordinary members: Dr Steve McCarron, NUIM (continuing), Sarah Murnaghan, SPD (continuing), Dr. Steve Davis, UCD (continuing), Ellen O'Carroll, TCD (continuing), Dr Graeme Swindles (University of Bradford) (continuing).

3. IQUA Spring Meeting and AGM 2012

The School of Geography, Archaeology and Palaeoecology, Queen's University Belfast (QUB), will host the Spring meeting and AGM on Saturday 14th April. The meeting will comprise a series of short (20 minute) talks focusing on new and ongoing Quaternary research taking place in Ireland and abroad, and is open to all. Prof Paula Reimer of the School of Geography, Archaeology and Palaeoecology (QUB) will deliver the keynote address entitled 'Reliability of radiocarbon dating mollusc shells from Irish sites'. Registration will commence at 9.30am and is free to all. Tea/coffee and lunch will be provided for attendees.

The Spring Meeting will be followed by the annual AGM. The IQUA committee strongly encourages all members to attend the Spring Meeting and AGM, to show support and appreciation of the organiser's efforts and help plan out IQUA activity for the year ahead. As usual, members are welcome to bring forward proposals for upcoming IQUA events (including the Autumn Symposium and the September fieldtrip) to the AGM for discussion.

Following the Spring Meeting and AGM, a wine reception for all attendees will be held in the School of Geography, Archaeology and Palaeoecology, which is being kindly sponsored by the ^{14}CHRONO Centre.

More details on the venue location and information (including accommodation and directions) can be found at: http://tinyurl.com/7mc7rp6

4. IQUA 2011 Annual Fieldtrip

IQUA Fieldtrip to North Meath, 2nd- 4th September 2011.

IQUA's 2011 fieldtrip returned to North Meath last year. Based in Kells, the trip comprised a fascinating collection of field site visits combined with excellent guidance from expert field leaders. The fieldtrip is summarised in detail in the IQUA fieldguide no. 29 prepared by Bettina Stefanini and Gayle McGlynn (2011). Some of the highlights of the trip are described below.

The 2011 fieldtrip started off somewhat differently to other years with a pre-meeting tour of Europe's biggest zinc mine, Tara mines, Navan.

IQUA members all geared up for the underground tour of Tara Mines, Navan

Many thanks to John Ashton (Chief Mine/Exploration Geologist, Boliden Tara Mines Ltd.) for facilitating our group. Our trip several 100m beneath the surface (well below the Quaternary!) was an education for us all on the geology of the lead and zinc orebody and workings of the metal mining industry in Ireland.

IQUA members examining lead and zinc ore minerals (galena and sphalerite) in the underground mine

The field meeting commenced on Friday evening at the Headfort Arms Hotel, Kells, with two outstanding talks by Mary Deevy and Frank Pendergast on recent archaeological finds in the area. We are very grateful to Mary for showing us some of the invaluable discoveries made during the construction of the M3 motorway. Much appreciation also goes to Frank Prendergast for sharing some of the most intriguing findings from these recent excavations. Frank described the fascinating morphology of the national monument at Lismullin, leaving us with some stimulating topics for debate afterwards in the Headfort Arms bar and indeed for the rest of the weekend!

IQUA members at Loughcrew – guided by Robbie Meehan (front left) and Frank Prendergast (front - second from left)

On Saturday morning we all enjoyed the short uphill trek to Loughcrew, Oldcastle, well worth the spectacular 360º panorama when we reached the top. Robbie Meehan's expertise on the glacial features of the surrounding landscape ensured that the context was set before Frank Pendergast got us all engrossed in the passage tombs and their archaeoastronomical significance.

Robbie Meehan continued to share his knowledge of the area at the next stop, Lough Bann. In addition to the classic karst crag and tail features Robbie also discussed some of the more recent water resource issues in the Lough Bann catchment, and the interactions between the hydrogeology, land use and water quality management in the catchment.

On Saturday afternoon, our glacial sedimentologists were in heaven in a gravel pit ('McGrath's pit') at Dromone!

IQUA members examine glacio-fluvial sediments in McGrath's pit, Dromone

The last stop on Saturday afternoon at Nobber involved an intriging venture to Moynagh Lough, where Rosemary Stewart provided an insightful overview of the vegetation and climate history of this hidden lough!

On Sunday Mark Hennessy's introduction to late medieval/Norman land management at Dowth gave many of us lay people great insight into the position and hierarchy of a Norman settlement at that time. The meeting concluded in Danestown where Emma Arbuthnot showed us to a fine example of a Ringwork Castle.

Many thanks again from the IQUA committee to all who contributed to the fieldtrip. A special thank you to Bettina and Gayle for organising an outstanding weekend.

References:

Stefanini, B. & McGlynn, G. (2011) North Meath. Fieldguide no. 29. IQUA. Dublin

5. IQUA 2011 Autumn Symposium

Quaternary tipping points: Exploring the dynamics of human and environmental change

Friday 2nd December 2011

Abstracts:

Keynote Address

From moraine to meadow and forest to farmland: Integrated modelling of Holocene land cover change.

Jed O. Kaplan
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The Holocene record of atmospheric CO_2 and methane concentrations is an enigma. Concentrations of both gases increased from the beginning of the epoch 11,700 years ago to about 10,000 BP, then declined for several thousand years, but by 6000 BP, concentrations of both gases were steadily increasing again. This mid-late Holocene rise in greenhouse gases is unusual; similar patterns are not observed during previous interglacials. While various mechanisms have been proposed to explain these changes in Holocene CO_2 and methane, there is one undisputed feature of this epoch that we know is different from the rest of Earth history: the existence of behaviorally modern humans. How humanity could have influenced the Holocene increase in CO_2 and methane concentrations is the subject of intense debate.

To quantify the role that humans played in the global carbon cycle over the Holocene, we developed an annually resolved inventory of anthropogenic land cover change from 8000 years ago to the beginning of large-scale industrialisation (AD 1850). Unlike most previous scenarios of Holocene land use change, our dataset incorporates the Boserupian theory of continuous intensification of land use through time. Early in the Holocene when populations were small, our scenario shows that land use in agricultural centres reached 8-10 ha per capita; by AD 1850 increasing population pressure and improved technologies

result in a drop below 1 ha per capita in productive regions of the world.

We used this dataset and an alternative scenario based on the HYDE 3.1 land use database (where per capita land use is essentially constant with time) to drive a dynamic global land surface model and simulate Holocene anthropogenic CO_2 emissions from deforestation and soil erosion. Our model setup allowed us to quantify the importance of not only initial deforestation, but also land degradation caused by shifting cultivation, soil erosion, and repeated episodes of land use followed by abandonment. Cumulative carbon emissions caused by anthropogenic land cover change to AD 1850 ranged between 325-357 Pg using our new scenario and between 137-189 Pg driven by the HYDE dataset. The larger emissions when using our new scenario are mainly a result of higher levels of per capita land use in the early and middle Holocene. Increasing population generally outpaces intensification so that the trend of carbon emissions is nearly always greater with time, but we observe reversals in emissions (carbon uptake) during periods of population stagnation or collapse (e.g., Black Death, European colonisation of the Americas). This study emphasises the important role of Boserupian intensification in human activities over the Holocene, and shows how extensive human impact on the Earth's land surface could have been in preindustrial times. These impacts have important implications for the evolution of the global carbon cycle and climate over the Holocene.

The Neoglacial transition – a 'tipping point' in the climate system?

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The general characteristics of what have come to be termed 'tipping points' in the climate system, and the related concept of 'tipping elements', are briefly outlined. The features of the Neoglacial Transition, recognised in many mid-Holocene palaeoenvironmental records, and the reasons why it may be considered a candidate tipping point, are then discussed. A strategy for determining whether or not the Neoglacial Transition was a tipping point in the climate system, and if so for identifying the probable underlying mechanism (or tipping element(s) involved), are then described. A research project that recently commenced following this strategy is outlined. Although this project is 'work in progress', a few preliminary conclusions that already have been reached are presented.

Synchronising short-interlude events of the last glacial cycle: the RESET tephra-'lattice' approach

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Gordon Manley Professor of Geography, Royal Holloway, University of London

Identifying 'tipping points' for environmental and human change during the last glacial cycle requires a robust chronology to determine (a) their precise timing and (b) their dispersive impacts. Most current age models fail to pin-point past changes with better than centennial temporal resolution, as will be exemplified with reference to recent work in the Lateglacial period. The problems are compounded for earlier periods, which makes it especially difficult to synchronise very short-term interludes, such as the Dansgaard-Oeschger cycles detected in the Greenland ice-core records and their posited equivalents in other areas. As a result, recourse is frequently made to curve-matching ('wiggle-matching') as a basis for 'synchronising' proxy records. One way to improve matters is to use time-synchronous stratigraphic markers as independent tests of age models and of the environmental theories that they underpin. RESET, an inter-disciplinary Consortium Research Project funded by the NERC (http://c14.arch.ox.ac.uk/reset/), has adopted this approach in an attempt to tighten the chronology of key events (climatic and human) in Europe during the last 100 kyr, and to test proposed causal links between them. The project uses the distribution and stratigraphic order of widely-distributed volcanic ash layers to build a 'chronological lattice' which connects diverse palaeoenvironmental records throughout mainland Europe and the Mediterranean. Realising this goal is being aided by the discovery of non-visible ash layers ('cryptotephra') in a number of new sites, which has greatly extended the geographical 'footprints' over which key ash layers can now be traced. The talk will provide an overview of RESET's progress so far and (if time permits) an indication of its future potential.

Becoming farmers: Linking human and environmental change in Neolithic Ireland

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Archaeology has much to contribute to our understanding of the responses of communities to the consequences of climatic change. Here, we present results from the Heritage Council's (Republic of Ireland) INSTAR-funded research project (2008-2010) 'Cultivating Societies: assessing the evidence for agriculture in Neolithic Ireland'. The project has been concerned with examining the timing, extent and nature of Neolithic farming in Ireland, against its wider palaeoclimatic and environmental backdrop. Bayesian analyses of palaeoenvironmental and archaeological ^{14}C data have allowed us to examine linkages between environment, climate, farming and settlement within a much stronger chronological framework – sometimes at generational time intervals – allowing us to explore the temporal and spatial character of this highly resolved dataset.

There is a coincidence between climatically-driven hydrological changes during the mid-Holocene, 4100-3200 cal BC, inferred from Irish bog oaks (Barratt et al. submitted) and other records, and the onset and development of agriculture in Ireland. The early stages of agricultural development occurred during a period of ameliorated climatic conditions; however, major environmental changes in the middle of the 4th millennium BC apparently impacted the progression of agricultural and archaeological activities at this time. We see changes in landscape use and hints of a decline of agricultural activities. Coincident with these events are potential changes in the Neolithic archaeological record, with far fewer signals of human settlement for the Middle and Late Neolithic, a lull in radiocarbon dated settlement activity from around 3300 cal. BC to just after 3000 cal. BC, when the archaeological record is almost completely dominated by burials of the passage tomb tradition. This may be at least partially related to low archaeological visibility of settlement structures, but this may not be the whole explanation. These changes are not just evident across Ireland but also further afield, suggesting wider impacts. It thus seems possible that environmental changes in the 4th millennium may have had cultural consequences.

Whither environmental determinism? Critiquing the influence of climate on later prehistoric and early medieval cultural developments in Ireland

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Climate change has sometimes been invoked as a catalyst for cultural change at many stages of Ireland's past. Simply put, it has been suggested that environmental downturn will have forced societies to change their behaviour, will have caused economic and political upheaval and, in the worst of instances, will have directly attributed to population collapse as a result of a failing subsistence base. Conversely, periods of apparent cultural 'expansion' have been seen as an indication of climatic conditions favourable for agricultural success. Such potential relationships between climate change and societal change cannot be denied, but can they be substantiated within the Irish archaeological record? There have been few attempts to test these relationships rigorously, perhaps reflecting the difficulties of overcoming the first major hurdle: the need to reconcile the diverse and often imprecise chronologies available for the datasets.

We examine selected facets of past cultural change of the Later Prehistoric and Early Medieval periods in the light of the available palaeoclimate records for Ireland, and consider whether there is any chronological basis on which to mount an argument for environmental determinism. Firstly we compile palaeoenvironmental reconstructions from Ireland and examine if there are discernible periods of climate change during the last four millennia that could have impacted on societies. Secondly, we consider whether the timing of Late Bronze Age hillfort construction, the Late Iron Age Lull, Early Medieval settlement expansion or peatland site construction during this timeframe shows any correlation with periods of climate change. Our findings highlight considerable complexity in the temporal relationship of culture change and palaeoclimate shifts, with changes in the archaeological record variably preceding, coinciding with or following climate change, and sometimes occurring irrespective of any perceptible climate event. Potential explanations for these diverse relationships are explored, including the limitations

of the datasets and the wider cultural significance of the archaeological site-types that are examined.

Crops, climate and corn-drying kilns: Tillage in early medieval Ireland

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The predominant view of agriculture in Ireland for the whole of the early medieval period (c400- c 1170) was that it was largely pastoral. The documentary sources indicate this bias as does the palynological record. However there always has been evidence for the contribution of tillage to the agricultural economy in the form of artefacts, including a few plough parts and regular finds of rotary quern stones on sites of this date.

Over the last 15-20 years, and particularly recently, the evidence has increased significantly. There are, for example, the discoveries of water-powered mill sites from over one hundred and twenty locations across the country. In addition, most excavations that have been systematically sampled have produced significant quantities of charred cereal remains. The contexts that have produced most such remains are, unsurprisingly, corn-drying kilns. Few corn-drying kilns dating to the early medieval period had been discovered prior to 1998. Since that time there has been an avalanche of such sites with the majority of them radiocarbon dated to between 300 and 1200 AD.

It may seem odd that there is a significant, perhaps even predominant, tillage component in some areas at this time, countering both the previous interpretations and the growing evidence, from palaeoecological sources, for a damper climate in post-Roman NW Europe. Consideration, however, needs to be given to ecological and cultural regional factors as well as the type of tillage practiced and the types of crops grown. The intention of this paper is to present this new evidence, raise a range of questions and attempt to propose some answers for some aspects relevant to a period that was subject to significant cultural and environmental changes.

Environmental changes in an oligotrophic salmonid catchment

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Drainage systems with low productivity, short spatey streams, upland lakes and peaty catchments characterise northwest European Atlantic coastal regions. These systems support internationally important migratory fish populations. Declines in Atlantic stocks of migrating fish have been apparent in the last few decades and are thought to be related in part to land use and land management practices associated with afforestation, agriculture and rural development. Few quantitative links have been established, however, between changes in catchment conditions where fish spawn, feed and grow and numbers of fish returning to the sea. Assessment of catchment degradation and risk status is limited by the lack of baseline data, while recorded declines in fish stocks have been coincident with other factors, such as increased marine mortality. This research uses a combination of techniques and data sources from an internationally important site in the west of Ireland for breeding fish to evaluate the affects of catchment change over time on salmon, trout and eel population levels.

6. The Frank Mitchell Award 2011

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At a small award ceremony following the Autumn symposium, the IQUA Committee were delighted to present the inaugural Frank Mitchell Award to Prof. Pete Coxon, TCD.

The award celebrates in a small way a distinguished contribution to Quaternary research and teaching. Pete worked with and was a good friend of the late Prof. Frank Mitchell from the time of his arrival at TCD in 1979. As Pete acknowledged during his acceptance speech, Frank played a pivotal role in directing the young(er) researcher's career towards the themes and locations that occupy Pete's extensive range of active research foci still. As one example, Pete's career-long love and research into

Clare Island and its palaeoclimatic history was initiated through visits there with Frank. As an example of the role played by Pete in turn he has continued to lead fieldtrips onto the island (and will do so again this year in May) and encourage new researchers to work on the island's glacial history.

Presentation of the Frank Mitchell Award to Prof Pete Coxon (left), TCD, by Prof John Lowe (right) of Royal Holloway (University of London)

Frank Mitchell was a leading impetus behind the establishment, ethos and rationale of IQUA. The committee feel that to have an award named in his honour that recognises commitment to the discipline and community forms a desirable, necessary and important part of our ongoing activity. The Frank Mitchell Award allows us to occasionally honour those who have given service as Frank did to the furtherment of our understanding of Ireland's history and climate in the way that he intended, through exemplary teaching, study and collaboration. We are delighted to have the inaugural award graciously accepted by someone who has done all that and more, at both national and international levels through his work as an inspirational teacher, dedicated researcher and conscientious administrator (most recently during two terms as Secretary General of INQUA). The award's initiation was warmly supported by Frank's family. They were particularly pleased to learn that Pete was to be the Award's inaugural recipient.

We wish to thank Prof Mitchell's family and Prof John Lowe, RHUL (current Vice President of INQUA) for making the award and its presentation possible. Lastly, we also wish Pete every continued success in his teaching and research career and thank him in advance for the commitment he continues to give his many friends in the global Quaternary research community.

7. IQUA Annual Fieldtrip and Autumn Symposium 2012

Suggestions for locations and offers to help organise the next IQUA Fieldtrip (September 2012) are welcomed by the IQUA Committee. Please contact the Secretary (Bettina Stefanini, email: stefanb@tcd.ie) with suggestions/ideas for discussion at the upcoming AGM.

Suggestions for an Autumn Symposium theme by potential convenors are also welcomed by the Secretary for discussion at the AGM.

8. Quaternary Research News

QRA Glacitectonics Workshop, Norfolk.
11-16th September 2011

M.E. Philcox, Geology Department, Trinity College, Dublin.
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The Quaternary Research Association held a meeting in Sheringham, Norfolk, last September, to discuss glacitectonics in general and the spectacular chalk rafts and deformed tills in the adjacent coastal sections in particular. About 30 people took part, some from Poland, Iceland and Scandinavia.

The first day and a half were devoted to talks and poster sessions, which included field examples of glacitectonic deformation, the role of permafrost (with spectacular examples from Siberia), micromorphological analysis of samples, new techniques for monitoring movement of glaciers and other applications. Irish topics (mainly posters) included moraines on the Clare coast, the dispersion of mineralized float from the Tynagh orebody, and glacitectonics in Killala Bay.

The remaining 2 ½ days were devoted to well led fieldtrips along the coastal cliffs. Characteristic features include large rafts (<10 m thick) of chalk derived from the North Sea; highly deformed tills enclosing clasts of unconsolidated, barely deformed (formerly frozen) sediment commonly >1 m across; and outwash gravels folded and thrusted almost as soon as deposited. The brown-grey tills include trains of small clasts of white chalk, which outline the multiple folding very clearly – what do we miss where such markers are missing?

The QRA guidebook* starts with a useful chapter on structural principles, and goes on to deal with specific aspects, using the coastal examples as illustrations, including micromorphology. There are also a glossary and up-to-date references on permafrost and glacitectonics as well as the local geology. The coastal sections are easily accessible and the QRA publication will cater for a self-guided visit. I thank the organisers and other participants for an excellent meeting.

* Phillips, E., Lee, J.R. and Evans, H.M. (eds.); 2011, Glacitectonics -- Field Guide. Quaternary Research Association.

9. Forthcoming workshops, seminars & conferences

***Dublin in the Grip of an Ice Age* 19 May 2012**

IQUA is delighted to announce its upcoming field tour to the Wicklow Mountains, taking place as part of the Dublin City of Science 2012. The trip is open to the public and involves a bus tour to the northern Wicklow Mountains. There will be a peat coring demonstration and an explanation of why the landscape now looks the way it does, the forests of the last 10,000 years and their clearance, and what the future may hold. Glacial features in the landscape including glacial corries, huge glacial lake basins and other features will be explored. The tour begins 8.30am, Saturday, May 19, and leaves from Nassau Street, central Dublin. Participants will be required to walk over some rocky and boggy ground. Full details and a booking form are available from Pete Coxon at pcoxon@tcd.ie (or 01 8961213).

***Russell Coope memorial seminar* 19 June 2012**
Scott Elias, Quaternary Research Association, 1 Kensington Gore London SW7 2AR, United Kingdom. www.qra.org.uk | info@qra.org.uk
S.Elias@rhul.ac.uk

I am pleased to announce that we have arranged for a day of talks to be given in honour of the memory of Russell Coope. The talks will be held on the 19th of June in the Geography Department of Royal Holloway, University of London. So far, roughly a dozen people have expressed an interest in presenting a paper at this meeting. I have booked the lecture theatre from 9:30 am until 5:00 pm, so we can have up to about 24 papers of 15 minutes' duration. There will be a morning coffee break, a lunch break, and an afternoon tea break. The cost of the coffee, tea, and lunch will be included in the registration fee of roughly £25. This fee will also include the cost of an abstract volume. We will set up an on-line store where you will be able to register for the meeting and pay the fee with a debit or credit card. I'll post the details within the next few weeks. In the meantime, please let me know if you would like to attend, and if you would like to p resent a paper. While most papers will concern Quaternary entomology, there will probably also be papers on vertebrate paleontology and Paleolithic archaeology, as Russell was also a contributor to these topics.

Looking forward to seeing many of you in June!

10. Other

INQUA secretary
Congratulations to Prof Pete Coxon who finished his two terms as INQUA secretary last July in Bern, Switzerland.

IQUA fieldguides
You can now buy .pdf copies of most of the IQUA field guides. Well done and thanks to Frank Ludlow for doing a brilliant job at sourcing, copying and uploading the guides to the IQUA website.

Irish Pollen Database
The Irish pollen site database is now online and can be downloaded from www.ipol.ie

New Environmental Jobs website: www.EcoCareers.ie
Dr Jenni Roche, Consultant Ecologist, Botanical Environmental & Conservation Consultants, Dublin 2
jroche@botanicalenvironmental.com

EcoCareers.ie is a new website advertising jobs, research opportunities and internships in the environmental sector in Ireland. The service is free to both employers and jobseekers, making EcoCareers.ie the only website of its kind in Ireland. Adverts for Irish vacancies within the Quaternary Sciences are very welcome. See www.ecocareers.ie for further details. www.ecocareers.ie is a new website set up by to advertise jobs, research opportunities and internships in the environmental sector in Ireland.

11. Recent Publications:

Edwards, C.J., Suchard, M.A., Lemey, P., Welch, J.J., Barnes, I., Fulton, T.L., Barnett, R., O'Connell, T.C., Coxon, P., Monaghan, N., Valdiosera, C.E., Lorenzen, E.D., Willerslev, E., Baryshnikov, G.F., Rambaut, A., Thomas, M.G., Bradley, D.G. and Shapiro, B. (2011) Ancient Hybridization and an Irish Origin for the Modern Polar Bear Matriline. *Current Biology* **21**, 1251-1258.

Wilson, P. (2011) Lake District hillslopes. *Geology Today* **27**, 149-153.

Wilson, P. (2011) Relict rock glaciers in Wasdale, western Lake District, northwest England: geofact or geofantasy. *Proceedings of the Geologists Association* **122**, 455-459.

Wilson, P. (2011). Secrets of the Wast Water Screes. *Earth Heritage* **36**, 13-15.

Wilson, P. (2011) The last glacier in Dovedale, Lake District. *North West Geography* **11**, 7-13.

Wilson, P., Telfer, M.W., Lord, T.C., & Vincent, P. (2011) Optically Stimulated Luminescence dating of loessic silts in northwest England. *Quaternary Newsletter* **124**, 39-42.

12. General Membership Items

Please let your students/colleagues know about IQUA and encourage them to join.

Join/Renew IQUA membership online via PayPal

2012 membership subscriptions are now due.

IQUA now offers a fast, safe, online payment system already familiar to many (**PayPal**) for joining IQUA or renewing your membership (!), and for purchasing past field guides (where available). The annual membership cost is: €15 waged; €10 students/unwaged.

PayPal allows you to pay securely with your credit/debit card via the IQUA website:

http://www.iqua.ie/Member/Mem_Hme.htm

Simply click on the relevant "Pay Now" button and follow the on-screen instructions. Upon completing the process, you will receive a confirmation receipt from PayPal, and shortly thereafter confirmation from the Treasurer of your membership status.

For the convenience of members, we are also offering a three-year membership option with automatic billing. PayPal will automatically debit your credit/debit card each year for the relevant amount (either €15 or €10). This happens each year on the date you initially join/renew. To try this option, click on the relevant "Subscribe" button. You can cancel the automatic billing any time before the three-year period is up by contacting the Treasurer.

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If you do not have access to our online PayPal system, which is our preferred method of dues collection, please cut out and complete the following form and send it with the relevant annual subscription (€15 waged; €10 students and unwaged) to the IQUA Treasurer at the address below.

Cheques should be made payable to IQUA. It is suggested that, for their convenience, members may wish to pay two or three years' subscription in a single transaction.

IQUA membership form

Name: ……

Address: ……

……

……

……

Telephone: ……

E-Mail: ……

Amount paid: ……

If you have any queries about IQUA membership, please contact the Treasurer.

Gayle McGlynn, IQUA Treasurer
Email: mcglyng@tcd.ie

Address: Department of Geography, Museum Building, Trinity College Dublin.

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IQUA e-mail listerver:
https://listserv.heanet.ie/iqua-l.html

If you are not receiving IQUA listserv emails, please sign up to the list at the location above. A request for subscription to the IQUA-L list goes initially to the list moderator first for cross-referencing with the current membership list.

B. Stefanini, IQUA-L Moderator

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