



1. Introduction

Dear IQUA member,
Welcome to newsletter No. 45.

IQUA welcomes all new members. We encourage everyone to use our Listserver facility to broadcast relevant notices by e-mail to the membership during the year.

A successful and well attended postgraduate Spring Meeting was held in Limerick on March 27th (see item 4). Thanks to all the speakers, who presented a very interesting array of talks (see abstracts under item 6). Many thanks to the organisers of the event, Dr. Angela Hayes (Mary Immaculate College, UL) and Dr. Robin Edwards (TCD), and the Dept. of Geography, MIC for facilitating the meeting and the AGM. The new Postgraduate Radiocarbon Dating Awards were launched at this year's AGM and are detailed under item 7.

The forthcoming IQUA Autumn Symposium (on November 26th) will focus on Quaternary research on Ireland's Atlantic margins (see item 3). Queries and suggestions can be directed to Dr. Catherine Dalton (MIC) or Dr. Stephen Mc Carron (NUIM). We look forward to seeing as many members as possible in attendance. We are making every effort to bring together an exciting and informative group of speakers and would encourage everyone to attend and publicise the meeting to potentially-interested colleagues in the marine- and oceanography-related disciplines.

Sincere thanks to Stephen Mc Carron (NUIM) for his work as editor of the IQUA newsletter over the last three years. Also, thank you to all who contributed to this newsletter.

Best wishes,

Sarah Murnaghan, Dept. of Geography, TCD, July 2010

2. IQUA Committee, 2010

The IQUA Committee, following the 2010 AGM is as follows:

President: Prof. Pete Coxon, TCD (continuing)

Secretary: Dr. Stephen McCarron, NUIM (continuing)

Treasurer: Mr Francis Ludlow TCD (continuing)

Postgrad rep: Gayle Mc Glynn, TCD (continuing)

Website manager: Dr Robin Edwards, TCD. (Continuing)

Publications Secretary: Dr. Stephen McCarron, NUIM (continuing)

Ordinary members: Donal Mullane (continuing), Dr Graeme Swindles (U. of Bradford) (continuing), Dr Bettina Stefanini (continuing), Sarah Murnaghan (elected).

Offers to stand as an Ordinary Member (3 year post) at the upcoming AGM are welcomed by the Secretary. No other posts are open for election in 2010.

3. IQUA Autumn Symposium 2010

IQUA Autumn Symposium 2010: Quaternary Research on Irish Atlantic Margins.

Date: Friday 26th November 2010

Venue: Geological Survey of Ireland Lecture Theatre, Ballsbridge, Dublin 4

This day of talks and informal discussion aims to bring together an extensive community of Irish researchers focussed, in various ways, on unravelling the palaeoenvironmental archive contained within the sediments, landforms and biota of Ireland's Atlantic shelf and coastal embayments. The scope of the symposium will encompass new research on: landform and sedimentary records of glacial events over several glacial cycles and the influence of palaeoceanographic events; the sedimentary records of life and environmental processes within western coastal embayments and developments mapping our submerged

archaeological record. The symposium will be marked by keynote talks from invited speakers and aims to provide a rich and varied programme of interest to all existing and future IQUA members! All queries and suggestions should be directed to Dr. Catherine Dalton (catherine.dalton@mic.ul.ie) or Dr. Stephen McCarron (stephen.mccarron@nuim.ie).

4. IQUA Spring Meeting and AGM 2010

The 2010 Spring Meeting and AGM took place on Saturday 27th March in the Dept. of Geography, Mary Immaculate College, UL. The meeting was well attended. Abstracts of talks presented at the meeting are listed under item 6. The Postgraduate Prize was awarded with congratulations to Jennifer Roche, TCD. The committee thanks are extended to Dr. Angela Hayes and colleagues in MIC, and Dr. Robin Edwards in TCD for their great efforts in hosting a very successful meeting.

The AGM followed the Spring Meeting and was also well attended. Any changes to the Committee are listed below. The new Postgraduate Radiocarbon Dating Awards were also launched (detailed under item 7).

5. IQUA 2010 Annual Fieldtrip and Symposium

The IQUA fieldtrip will take place on the beautifully scenic Beara peninsula, under the leadership of Prof William (Billy) O'Brien (UCC) author of *Local Worlds* (Collins Press, 2009) and several publications on Ross Island and Bronze Age mining. The meeting will explore the archaeology of early farming systems in a marginal landscape as well as all other aspects of Quaternary landscape development usually covered on IQUA fieldtrips.

It will take place on 10th-12th September and will be based in Castletownbere, Co. Cork. The registration fee including a printed field guide will be €20/30 for members/non-members, €10/15 for student members/non-members. We ask members to please book early to facilitate the fieldtrip organisers. In addition to the membership benefits listed on the website, IQUA is pleased to offer a reduced student fee for early bird bookings for its annual Field Meeting. For further details contact Bettina Stefanini, stefanb@tcd.ie.

6. IQUA 2010 Spring Meeting Abstracts

Preservation of Quaternary oceanographic processes in continental slope deposits, Porcupine Bank, NE Atlantic Ocean.

Owen^{1*}, N.L., Edwards¹, R.J., Toms², L. and Haughton², P.D.W.

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Previous studies of the western margin of the Porcupine Bank (NE Atlantic Ocean) have revealed an area of the slope that lacks evidence of the debris flow lobes or surficial slide scars that are prevalent on most slopes that flank the Rockall Trough, suggesting that down slope remobilization of sediments is largely absent. This study investigates the sediments deposited on this portion of the slope to determine their potential utility as records of palaeoceanographic changes in the Rockall Trough / Porcupine Bank region. An assessment is made of the length, resolution and quality of the records preserved in cores along a depth transect through this site, by correlation with other records and the development of age models. The integrity of the records is assessed via examination of the fragmentation of foraminifera, geochemical data and comparison of larger and smaller size fractions of foraminifera. Key findings include the identification of an interval of apparent sea-ice cover of the Porcupine Bank during the last glacial, based on the absence of sub-polar taxa from the planktonic assemblages, which displays some temporal variation that appear to be related to the dynamics of the British Irish Ice Sheet. The results suggest that this area has the potential to provide useful palaeoceanographic information, provided an understanding of the taphonomy of the deposits is acquired.

Test size variation of planktonic foraminifera during sapropel deposition in the eastern Mediterranean Sea.

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The sedimentary sequences of the eastern Mediterranean Sea are interspersed by black-coloured, organic rich deposits called sapropels. Ranging in thickness from a few millimeters to as much as tens of centimetres these sedimentary

layers have been deposited throughout the late Cenozoic. Despite intensive research the exact environmental conditions that led to the deposition of these sapropels are not yet fully understood. Using planktonic foraminifera as a proxy, this research focuses on the deposition of several sapropels. In addition to the more commonly studied sapropels (S1 and S5) S3 and S6 have also been investigated. The principle aim of this research is to reconstruct the palaeoenvironmental conditions during these depositional events. In addition to using the traditional method of analysing faunal assemblages, particular emphasis will be placed on assessing the test size variation of individual species of planktonic foraminifera. This technique has been applied to other events in Earth history but not in relation to sapropel deposition. It is hoped that the result will provide an insight into the palaeoecology of this extreme physical environment.

The research is based on data extracted from ODP core 969A (latitude 33.84N, longitude 24.88E, water depth 2200.3 m). With the exception of S1 (7 cm), the thickness of each sapropel (S3 – 28 cm; S5 – 28 cm; S6 – 41 cm) allows each event to be analysed at a sufficiently high resolution. Two mixed layer species (*Orbulina universa* and *Globigerinella siphonifera*) and one deep dwelling species (right coiling *Neoglobquadrina pachyderma*) were chosen for size analysis thereby allowing the effects of the sapropelic environment to be examined throughout the water column.

Preliminary results indicate that although both are mixed layer species *O. universa* and *G. siphonifera* respond differently to sapropel deposition with regards to test size. With the exception of S1 (where an increase is observed) *O. universa* appears to record an overall decline in size throughout both S3 and S5. In contrast, *G. siphonifera* increases in size during the deposition of all 3 sapropels; while the deeper dwelling *N. pachyderma* records little change in size at all.

Holocene Coiling Variation in the Planktonic Foraminiferal Species, *Globorotalia truncatulinoides* in the western Mediterranean Sea.

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This research focuses on the coiling variation of *Globorotalia truncatulinoides*, an extant species of planktonic foraminifera. The aim of the research is twofold, firstly, to assess the potential use of *G. truncatulinoides* as a biostratigraphic marker in the western Mediterranean Sea during the Holocene and secondly, to assess the relationship of coiling direction with environmental parameters such as sea surface temperatures (SSTs).

The test of *G. truncatulinoides* is constructed of trochospirally arranged chambers that exhibit alteration between sinistral and dextral coiling. Quantitative analysis of the coiling variation of both coiling types have been analysed in 4 western Mediterranean Sea cores, in 3 distinct sub basins (Gulf of Lion and the Balearic and Tyrrhenian basins).

The Holocene basin-wide distribution of *G. truncatulinoides* indicates significant biostratigraphic correlation in all 4 cores, with species distribution represented in three synchronous phases; (Phase 1: ~12.0-9.0 cal kyr BP, Phase 2: 9.0-6.0 cal kyr BP and Phase 3: 6.0 cal kyr BP to the present). The relative abundances based on total species counts of sinistral and dextral *G. truncatulinoides* indicate peak dominance of the dextral variant at ~5.3 cal kyr BP in the Balearic and Tyrrhenian basins and at ~4.4 cal kyr BP in the Gulf of Lion.

The coiling direction of *G. truncatulinoides* was compared with SSTs reconstructed using the Artificial Neural Networks (ANNs). The distribution of *G. truncatulinoides* indicates a mid- late Holocene positive relationship with increased SST, in particular, for the sinistral coiling variant. Both coiling varieties indicate a mid Holocene increase in abundance synchronous with an early-mid warming phase, however only the sinistral variant indicates a late Holocene SST relationship. Overall maximum abundances of the sinistral coiling species occur at higher SSTs than maximum abundances of the dextral coiling variety. The maximum faunal abundances of the dextral variety occur only when the sinistral variety abundance is low (<4%).

Testing relative sea-level change simulations: a marine geophysical perspective.

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Simulations of past relative sea-level (RSL) change has ignited a lot of interest worldwide in the recent years. The issue of whether the current generation

of glacial rebound models (GRM) is capable of accurately simulating the rate and magnitude of past RSL change immediately following deglaciation is an area of current debate. The rapid melting of the British-Irish ice-sheet provides a case study that can provide critical constraints on GRM parameters. Despite their significance, Irish RSL curves remain poorly constrained by data, and the latest model simulations are incompatible with some field based reconstructions. This talk will introduce my PhD project which aims to use a marine geophysical approach, utilising new data from the Joint Irish Bathymetric Survey (JIBS) project to examine submerged landscape and coastline features along the northern coast of Ireland, with the objective of better constraining the RSL history in the area. A short case-study of features observed so far around the rocky coast of Rathlinn island will be presented.

New Insights into the Development of Skellig Michael based on Recent Research.

Gibbons, M.

In O’Carragáin’s pioneering study of the early monasticism of the southwest the monastery on Skellig Michael has been interpreted as a classic Cenobitic monastery. However a series of new discoveries together with a re-evaluation of a series of little known features outside the monastic enclosure may transform our understanding of the island and challenge the current interpretation of the development of the site.

Among the more important of the new discoveries is a newly discovered routeway and staircase possibly linking up with two of the three previously known staircases. The identification of a fourth major staircase/routeway is potentially of considerable significance in assessing the overall growth development and decline of the site.

The identification of another rock-hewn cross overlooking the new staircase is also significant. It is one of only three on the island and in the country as a whole. This unique group of crosses are of critical importance; unlike virtually all of the other crosses on the island they can be studied in their original location and may have had a vital symbolic role; possibly a reminder of the Biblical scene in which Christ names St Peter the rock and states that he is the rock upon which the church is built. In this case the cross on Skellig becomes the literal rock of the island, and the rock from which the church (as in the monastic community) has been hewn.

It was possibly part of a system of pilgrimage stations, of which the well known climb to kiss the

pillar-slab on the South Peak might have been a late survival. The newly discovered staircase may relate to an earlier, more eremitical form of monasticism, on the rock prior to the construction of the main monastery in its current location around the 10th century AD. Alternatively its construction may have been the result of a consciously planned pilgrimage-round similar to the redesign of Inishmurray around the beginning of the 2nd millennium AD identified by O’Sullivan and O’Carragáin.

On the Little Skellig the remains of a structure, normally covered during the summer by the dense flocks of nesting gannets, had been identified by local historian Des Lavelle as early as 1976. Its existence has now been confirmed and the remains photographed; possibly the last remains of a remote and related oratory complex similar to that on the South Peak although the possibility that it was used to food procurement and Pochin-Mold’s theory of the “fat monks” of Skellig cannot be ruled out.

Holocene dynamics of *Pinus sylvestris* (Scots pine) in Ireland and palaeoecological evidence for its continued survival in the Burren through the late Holocene.

Roche, J.R.¹, Mitchell, F.J.G.¹ and Waldren, S.¹

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P. sylvestris is known to have colonised Ireland relatively early in the Holocene, becoming an important component of certain marginal habitats before undergoing a dramatic decline. The species is widely believed to have been extirpated during the early medieval period. It had been reintroduced to Ireland by the eighteenth century and is currently widespread and naturalising in semi-natural habitats. As a result of its extirpation and reintroduction, the native status of *P. sylvestris* in Ireland is disputed and the relevant conservation and forest management strategies are often disjointed. For example, the Irish Native Woodland Scheme provides financial incentives for the planting of *P. sylvestris* in semi-natural habitats, whereas the Irish Peatland Conservation Council lists it as an invasive non-native species. Clarification of the native status of *P. sylvestris* in Ireland is therefore urgently required.

In order to develop an improved understanding of the Holocene dynamics of *P. sylvestris* in Ireland, it was necessary to review existing palaeoecological data. A database of site attributes and *Pinus* pollen frequencies from 84 palynological sampling sites

throughout Ireland was compiled and added to a Geographic Information System. Isopoll maps were prepared at 500 year intervals from 11,500-0 cal BP, using the inverse distance weighting method of spatial interpolation. Mean *Pinus* pollen frequencies were calculated for each time interval. Spearman Rank correlations were calculated for location, altitude and *Pinus* pollen frequencies. The arrival, expansion, decline and reintroduction of *Pinus* were clearly illustrated by the isopoll maps and mean *Pinus* pollen frequencies. *Pinus* pollen frequencies were significantly correlated with altitude and location during various periods of the Holocene. The isopoll maps and correlation analyses generally supported accepted patterns in the Holocene dynamics of *Pinus* in Ireland, such as its retreat into upland areas during the *Alnus* expansion and the east-west progression of the decline. However, the isopoll maps suggest that *Pinus* arrived first in western, rather than south-west Ireland and high pollen frequencies persisted in localised areas of western Ireland during the period when *Pinus* was thought to be extinct in Ireland.

The decline and presumed extinction of *Pinus* in Ireland is of great interest as its date varies considerably and the presumed cause differs among sites. The available evidence suggests that *Pinus* survived until relatively late in the Burren, western Ireland. The vegetation history of an apparently naturalised pinewood in the Burren was examined using palaeoecological techniques. Pollen, macrofossil and loss on ignition data from Rockforest Lough covering the last 2000 years were examined and interpreted in relation to historical sources. A relatively stable vegetation history was recorded, despite considerable human activity. The dominant vegetation type was an open pinewood with abundant *Corylus*. Woodland cover seems to have been continuous, although a gradual expansion of open ground, particularly grassland, was recorded. This may be attributable to the management of the Rockforest Estate. Remarkably, no *Pinus* decline was recorded. *Pinus* pollen was represented continuously from 2000 cal BP (50 BC) to the present day at values consistently in excess of 38% and macrofossil evidence demonstrated the local presence of *Pinus* at 1110 ± 60 cal BP (AD 840). This indicates that a relict population of *P. sylvestris* has persisted in the Burren to the present day, challenging the established view that the species became extinct in Ireland. These findings have potentially significant implications for palaeoecological research and the conservation management of *P. sylvestris* in Ireland.

Palaeolimnological reconstructions of two coastal brackish lakes: Lough Furnace (Co. Mayo) and Lough Murree (Co. Clare), Ireland.

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Coastal brackish lakes represent the boundaries between freshwater and marine ecosystems and are dynamic ecotones. Variation in coastal lake salinity is caused by precipitation, land runoff, land use as well as tidal marine inflow, and sea level change over time. This research analyses the palaeolimnology of two brackish lakes on the western coast of Ireland with contrasting characteristics. Lough Furnace (Co. Mayo) has a mean depth of 5.37 m and a maximum depth of 21.5 m and receives a continuous oligotrophic freshwater inflow. It also has a tidal inflow from Clew Bay through the Burrishoole estuary. Lough Murree (Co. Clare) is shallower (2.3 m max. depth) and more productive. It has limited communication with the sea via underground limestone fissures and storm floods. Sediment cores have been extracted from both lakes, and have been dated using ²¹⁰Pb (including ¹³⁷Cs and ²⁴¹Am) gamma ray spectrometry and radiocarbon (¹⁴C) Accelerator Mass Spectrometry. Biological fossils examined include diatoms, foraminifera and ostracoda. Lithostratigraphical analysis, carbon and nitrogen stable isotopes and C:N ratios will support the fossil

analysis and enable palaeo-reconstructions to track

regime shifts in the past that may be linked to land use, hydrology and climate change.

7. Notices

Radiocarbon award

IQUA is pleased to announce an exciting new grant scheme in conjunction with the CHRONO centre, Queen's University Belfast. Grants of three, two and one AMS ¹⁴C dates will be awarded to postgraduate IQUA members on the basis of a competitive application process.

The rules in brief:

Applicants must be working towards a MA or PhD degree and be a member of IQUA for a minimum of three months when the application is made (six

months from 2011). The closing date for 2010 applications is October 31st (for 2011 the closing date will be in April of that year). For the full award rules contact Bettina at stefanb@tcd.ie. Please arrange IQUA membership through the website: <http://www.tcd.ie/Geography/IQUA/Index.htm>

PhD studentship

The Environmental Change Research Centre, University of London are seeking well-qualified students with first degrees or masters degrees in Environmental Science, Earth Sciences, Geography, Chemistry or Biology for a fully funded NERC PhD studentship, which aims to provide a better understanding of how the oxygen isotope signal in chironomids can be used for palaeoclimate reconstruction. This will be supervised by Professor Jonathan Holmes and Dr. Viv Jones at the ECRC and Steve Brooks at the Natural History Museum.

For students to be eligible students for full funding they need to be UK residents. The successful applicant will be awarded NERC maintenance for three years (for 2009-2010, this is £15,290 including London weighting). University fees will be paid from the grant, along with costs for analyses, travel and fieldwork. For more details please contact Viv Jones (ucfavij@ucl.ac.uk) or Jonathan Holmes (j.holmes@ucl.ac.uk) or visit <http://www.geog.ucl.ac.uk/admissions-and-teaching/postgraduates/new-phd-research/phd-research-opportunities#VJ>

8. Recent PhD completions

A multi-proxy palaeoceanographic investigation of slope deposits on the Porcupine Bank, NE Atlantic Ocean.

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Previous studies of the western margin of the Porcupine Bank (NE Atlantic Ocean) have revealed an area of the slope that lacks evidence of the debris flow lobes or surficial slide scars that are prevalent on most slopes that flank the Rockall Trough, suggesting that down slope remobilization of sediments is largely absent. This study investigates the sediments deposited on this portion of the slope to determine their potential utility as records of palaeoceanographic changes in the Rockall Trough / Porcupine Bank region. An assessment is made of the length, resolution and

quality of the records preserved in cores along a depth transect through this site, by correlation with other records and the development of age models. The integrity of the records is assessed via examination of the fragmentation of foraminifera, geochemical data and comparison of larger and smaller size fractions of foraminifera. A taxonomic framework for the benthic foraminifera is established and a new species, *Fissurina porcupinensis* sp. nov. is described. This study also employs a multi-proxy approach to determine sea surface temperature, water mass and benthic species distribution changes through time based on assemblage studies of foraminifera and geochemical data. Key findings include the identification of an interval of apparent sea-ice cover of the Porcupine Bank during the last glacial, based on the absence of sub-polar taxa from the planktonic assemblages, which displays some temporal variation that appear to be related to the dynamics of the British Irish Ice Sheet. Benthic foraminifera preserved during this interval indicate that the seasonal phytoplankton bloom that is currently present in the NE Atlantic Ocean may have been absent. Multi-proxy geochemical data shows that the flux of northern and southern sourced water masses changes with glacial-interglacial variations and could be related to stability in sea surface temperatures, but that smaller scale processes (such as Heinrich events) can also be detected and studied in these deposits. Examination of benthic foraminifera reveals that assemblages of larger sized foraminifera appear to be less prone to intra and inter core mixing compared to smaller sized specimens. Although there is a clear variation in assemblages of foraminifera both spatially and temporally, no very clear link with bottom current activity or other physical oceanographic processes can be identified that could not also be explained by productivity variations. A dynamic equilibrium between food supply and environmental stability is proposed to explain the down slope pattern of species diversity. The study concludes that an area such as this clearly has the potential to provide useful palaeoceanographic information, provided a prior knowledge of the taphonomy of the deposits is acquired, and suggests some future research that could be conducted in this region based on the findings of this project.

9. New Publications

Greenwood, S.L. and Clark, C.D. 2009. Reconstructing the last Irish Ice Sheet 1: changing

flow geometries and ice flow dynamics deciphered from the glacial landform record. *Quaternary Science Reviews* **28**, 3085-3100.

Greenwood, S.L. and Clark, C.D. 2009. Reconstructing the last Irish Ice Sheet 2: a geomorphologically-driven model of ice sheet growth, retreat and dynamics. *Quaternary Science Reviews* **28**, 3101-3123.

Swindles, G.T., Blundell, A. Roe, H.M. and Hall, V.A. 2010. A 4500-year proxy climate record from peatlands in the North of Ireland: the identification of widespread summer 'drought phases'? *Quaternary Science Reviews* **29**, 1577-1589.

Swindles, G.T. and Plunkett, G. 2010. Testing the palaeoclimatic significance of the Northern Irish bog oak record. *The Holocene* **20**, 155-159.

Tarplee, M.F.V. and van der Meer, J.J.M. 2010. Irish Ice Sheet sector dynamics as indicated by the Tynagh mineral deposit erratic assemblages. *Proceedings of the Geologists' Association* **121**, 32-42.

Telfer, M.W., Wilson, P., Lord, T.C. and Vincent, P.J. 2009. New constraints on the age of the last ice sheet glaciation in NW England using optically stimulated luminescence dating. *Journal of Quaternary Science* **24**, 906-915.

Vincent, P., Lord, T., Wilson, P. and Telfer, M. 2010. OSL sheds new light on karst loess. *Earth Heritage* **33**, 18-19.

Vincent, P.J., Wilson, P., Lord, T.C., Schnabel, C. and Wilcken, K.M. 2010. Cosmogenic isotope (³⁶Cl) surface exposure dating of the Norber erratics, Yorkshire Dales: further constraints on the timing of the LGM deglaciation in Britain. *Proceedings of the Geologists' Association* **121**, 24-31.

Wilson, P. 2010. *Lake District Mountain Landforms*. Scotforth Books, Lancaster.

10. Forthcoming Workshops, Seminars & Conferences

The British & Irish Diatom Meeting, for Professionals, Students and Amateurs

Venue: Glenree Reconciliation Centre, Co. Wicklow, IRELAND

Date: 22-24th October 2010

Organisers: Catherine Dalton and David Jewson

The 2010 British Diatom meeting is travelling to Ireland. The meeting will be held at the Glenree Reconciliation Centre (<http://www.glenree.ie>) in the Wicklow Mountains. The weekend will follow the usual pattern of offered talks, posters, walks and discussion. If you would like to make an oral or poster presentation, please submit your abstract to catherine.dalton@mic.ul.ie by September 10th 2010.

11. General Membership Items

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

Join/Renew IQUA membership online via PayPal

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). Prices are the same as for those joining/renewing by post, namely, €15 Waged or €10 for students/unwaged per year.

PayPal allows you to pay securely with your credit/debit card via the IQUA website. Please see the link below. 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 (currently: ludlowf@tcd.ie).

http://www.tcd.ie/Geography/IQUA/Member/Mem_Hme.htm

Francis Ludlow, TCD.

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 form below and send it with the relevant annual subscription to the Treasurer of IQUA:

Full members €15.00 (£10); students and unwaged €10.00 (£7)

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Please also check the date on your address label (e.g. on Newsletter envelope) and contact the Treasurer if you think it is incorrect.

Treasurer:
Mr Francis Ludlow, Dept. of Geography, TCD,
Dublin 2.

Cheques should be made payable to IQUA. It is suggested that members pay two or three years subscription on a single transaction, to cut down on bank charges and maintain an active membership for a longer time period.

IQUA will accept Sterling cheques, although a small handling charge will be incurred.

<p>IQUA e-mail listserver: https://listserv.heanet.ie/iqua-l.html</p>

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.

S. McCarron, IQUA-L Moderator

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