

A Mammoth Question: What Can Underwater Prehistoric Sites Tell Us About the Peopling of the Americas?

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The role of the southeastern United States in the initial peopling of the Americas remains unresolved in part due to the paucity of stratified and intact terminal Pleistocene (Paleoindian) archaeological sites. Florida's underwater archaeological sites are an exception. Here, undisturbed artifact-bearing deposits frequently contain an abundance of organic material making them promising localities for the recovery of artifacts in stratified and dateable contexts. For my dissertation, I am conducting a thorough geoarchaeological appraisal of underwater sites in Florida where artifacts are purportedly associated with the skeletal remains of extinct Pleistocene fauna. Many of these purported associations were declared decades ago, often after only cursory investigations. Other sites, due to controversially old radiocarbon dates, were dismissed given their incompatibility with the overarching Clovis-first paradigm, which, accordingly, limits the arrival of humans in the Americas to the

appearance of the Clovis culture, ~11,500 BP. Among these controversial sites, is the Guest Mammoth site.

Preliminary investigation of the site in 1973 revealed three possibly butchered Columbian mammoths associated with a 'Clovis-like fluted point' and stone tool maintenance debris buried in the bank of the Silver River in central Florida. An inaccurate radiocarbon age (~11,500 BP) was obtained from an impure sample of mammoth bone and the site was never widely accepted. Despite four decades and the loss of nearly the entirety of the recovered remains and excavation notes, the significance of the Guest Mammoth site can be summarized as follows: (1) No mammoth-kill site has been recorded east of the Mississippi, suggesting that eastern Paleoindian populations practiced a different subsistence strategy than western groups; (2) the date obtained in 1973 was on unpurified collagen and thus should be interpreted as a minimum age, suggesting that the site may be older than ~11,500 BP; and (3)

if the site is intact and Clovis in age, it will be among the few well-dated Clovis sites in North America. If the age falls outside of the range of Clovis, then the site is either pre- or post-Clovis, both of which are significant.



Figure 1. Project director, Morgan Smith examining mammoth bones in nearby Silver Spring.

In 2015 and 2016, I conducted a remote sensing survey to relocate the Guest Mammoth site. In July of 2017, I directed a team of underwater archaeologists in the excavation of a portion of the site to determine how much of the site remained, to evaluate the stratigraphic integrity of the site, and, if possible, recover artifacts and obtain additional bone samples for radiocarbon dating. Additional mammoth bone specimens were recovered and are being pretreated via XAD collagen purification prior to radiocarbon dating. A series of cores from the site are being subsampled for sedimentological and palynological analyses as well as for radiocarbon dating to better understand the depositional history and environmental context of the site. An improved understanding of the site formation processes will enable a more meaningful evaluation of the possibility that artifacts associated with the mammoth remains have been reworked, vertically displaced, and redeposited in a disturbed context. The reinvestigation of sites like Guest Mammoth is essential not only to establishing a regional baseline for the timing of human occupation, but also to developing and testing new models of the initial peopling of the Americas.

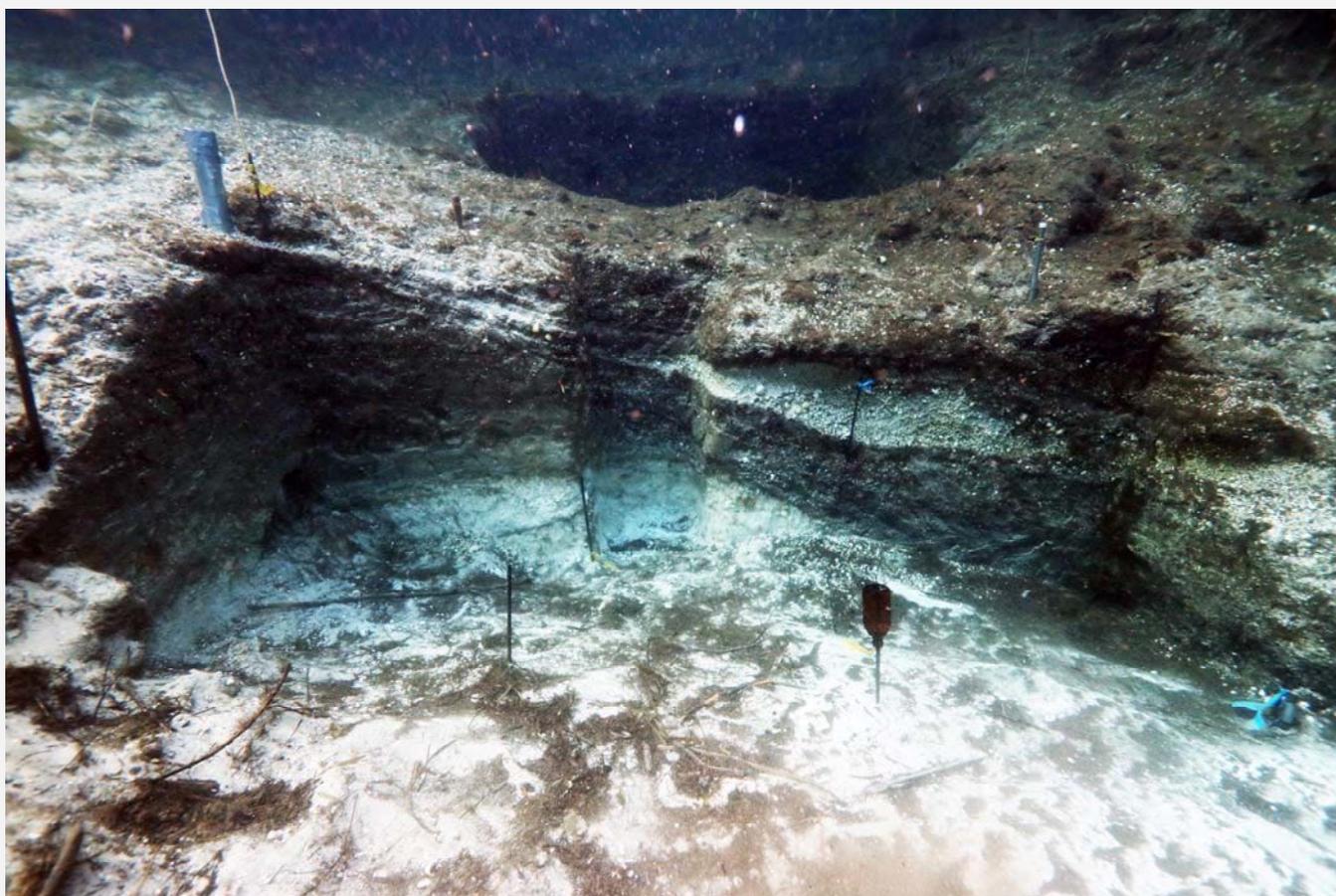


Figure 2. Stratigraphic profile (~1.3 m) of Guest Mammoth site exposed during 2017 excavations.

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Research Updates

By Paul Karrow

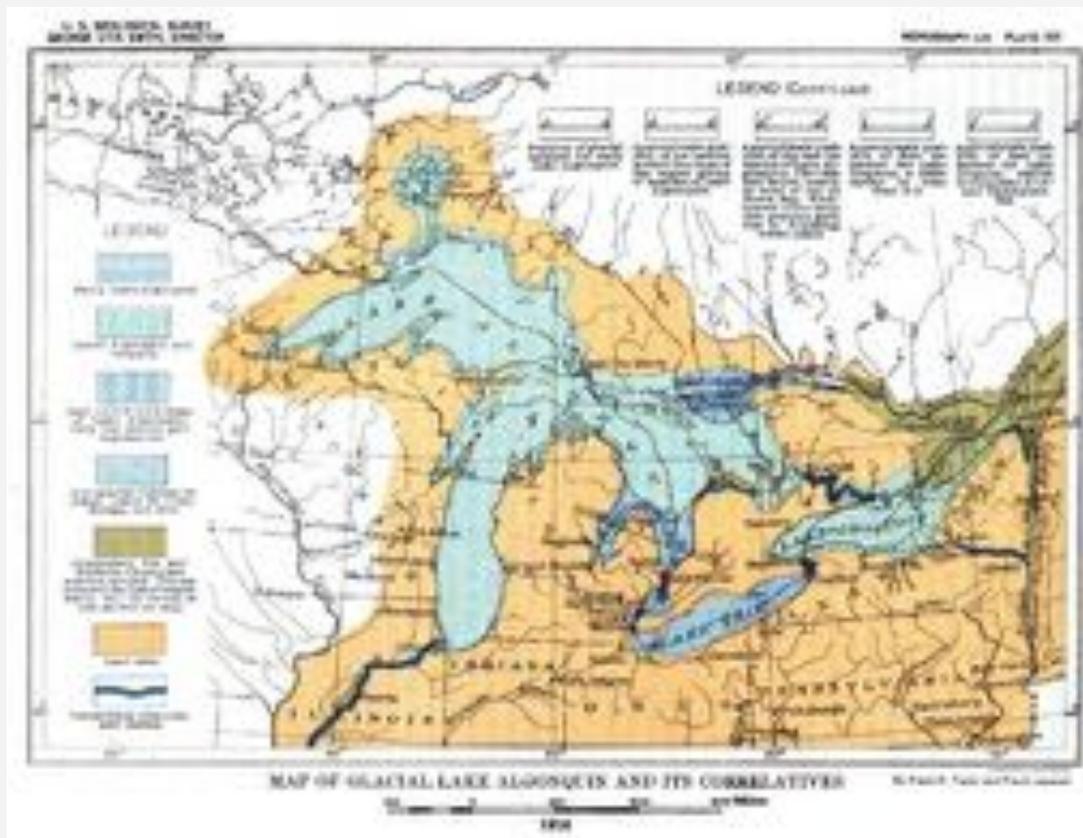
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Nearing completion is a project centered on a core retrieved from a kettle lake near North Bay, Ontario. The site was a delta of Lake Algonquin, the largest of the glacial lakes of the Great Lakes area, which drained rapidly down the Ottawa and St. Lawrence river valleys by ice-dam failure near 10,000 years ago. The project is under the leadership of Ryan Rabett, Queens University, Belfast, Northern Ireland, and several colleagues doing varied studies including palynology and distal tephra. This work will link to previous work on the history of the glacial lakes in the North Bay area and the Sudbury areas.

Also nearing completion is a project led by J. H.

McAndrews, Royal Ontario Museum, and colleagues, on the pollen and plant macrofossils of the Interglacial Don Formation, Toronto, Ontario.

Under way is a combined mollusc (G. L. Mackie, University of Guelph), ostracode (B. B. Curry, Illinois Geological Survey), and microvertebrate (K. L. Seymour, Royal Ontario Museum) study of several sites at Fort Erie, Ontario. This project was born in documentation of rich archaeological finds related to the proposed twinning of the Peace Bridge between Fort Erie and Buffalo, New York, chiefly carried out and well published in the 1990s and later. Isotope work by Fred Longstaffe, University of Western Ontario, will follow.



Map of Glacial Lake Algonquin and its Correlatives (USGS). By Frank Leverett - The Illinois Ice Lobe; U.S. Geological Survey, Monograph, #38; Government Printing Office; Washington, D.C.; 1899, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=32309377>

Recent Graduates

Alexis M. Mychajliw (2017) From the Pleistocene to the Anthropocene: fossils, genes, and the future of Caribbean mammals. PhD thesis, Stanford University, California. Advisor: Elizabeth A. Hadly

Abstract: Islands are widely touted the ideal laboratories in which to study fundamental evolutionary processes. However, islands are also designated as global conservation priorities given their exceptional vulnerability to modern human activities. A glance at the historic past reveals more than half of all extinctions since 1500 AD have occurred on islands, and evaluation of the fossil record has uncovered massive prehistoric extinctions across the Quaternary. Taken together, these extinctions in the recent and deeper past suggest that islands also provide critical opportunities to illuminate fundamental extinction processes -- the other side of the evolutionary coin. In this dissertation, I use insular faunal records to disentangle the mechanisms underlying extinction dynamics across the Pleistocene and Holocene, and I follow the trail of surviving species to understand what new selective pressures they face in the Anthropocene. This narrative of extinction and survival through time, spanning the Pleistocene to the Anthropocene, offers a practical lesson in how to apply hindsight of the past in guiding conservation planning for the future. The islands of the Caribbean are on the frontlines of global change; they face rapid deforestation, sea level rise, a burgeoning human population, and an onslaught of invasive species. My dissertation crosses traditional disciplinary and temporal boundaries by interrogating paleontological, palynological, archaeological, ecological, and genetic lines of evidence across the past 15,000 years to holistically reconstruct the dynamics of change in this system at the species and community levels. The first portion of my dissertation leveraged a dataset of over 1,500 radiocarbon dates to reconstruct the rami-

fications of human arrival in the Caribbean, distinguishing the impacts of Archaic, Ceramic, and European cultures. This analysis identified the selective loss of large- and small-bodied mammal species, with only medium-sized species alive Hispaniolan *Solenodon*, *Solenodon paradoxus*, to understand what traits promoted its persistence in the past and its survival in the present.



The solenodon, a Eulipotyphlan, is considered a "living fossil", and its continued survival represents the conservation of over 50 million years of unique evolutionary history.

I investigated whether dietary generalism and flexibility are the mechanisms underlying solenodon survival using feces, which provide a rapid snapshot of an animal's resource use. I applied two complementary approaches: stable isotopes and DNA metabarcoding, and revealed that solenodons inherited a generalist Holocene niche and are able to flexibly feed from numerous taxonomic and trophic groups.

These data suggest that, ecologically, the Anthropocene provides resources suitable for solenodon survival. Finally, I assembled a long-term picture of solenodon survival by providing multiple historic baselines of genetic diversity for the species across the past hundred years. Sequences from museum specimens revealed the recent, extensive loss of genetic diversity and connectivity across the island. Thus, while solenodons may be able to cope with changing

landscapes at the population level, as a whole their range has collapsed, likely linked to predation by dogs and other human activities. These findings, integrated into a broader context of Caribbean extinctions, suggest that in some cases, survival mechanisms of the Pleistocene/Holocene may not align with the traits needed to thrive in the Anthropocene. Together, these data implicate recent (post-industrial) human activity as the main driver of solenodon decline in the Caribbean, creating a new extinction filter independent of ecological generalism and body size as in the past. Hands-on, collaborative management on the ground is necessary to ensure the survival of this "living fossil".

Alexis is now a postdoctoral fellow at the La Brea Tar Pits & Museum.

Recent Publications

Bravo-Cuevas, V.M., Rivals, F., Priego-Vargas, J. (2017) Paleoecology ($\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ stable isotopes analysis) of a mammalian assemblage from the late Pleistocene of Hidalgo, central Mexico and implications for a better understanding of environmental conditions in temperate North America ($18^\circ - 36^\circ \text{N Lat.}$). *Palaeogeography, Palaeoclimatology, Palaeoecology* 485, 632-643.

Barnett, P.J., Karrow, P.F. (2017) Ice-marginal sedimentation and processes of diamict deposition in large proglacial lakes, Lake Erie, Ontario, Canada. *Canadian Journal of Earth Sciences*. <https://doi.org/10.1139/cjes-2017-0006>

Karrow, P.F., MacDonald, R.I. (2016) The geological and biological environment for human occupation in Southern Ontario: laying the groundwork for human paleoecology. Ontario Archaeological Society Annual Symposium, Waterloo, Ontario, November 5, 2016.

Marlon, J.R., Pederson, N., Nolan, C., Goring, S., Shuman, B., Robertson, A., Booth, R., Bartlein, P.J.,

Berke, M.A., Clifford, M., Cook, E., Dieffenbacher-Krall, A., Dietze, M.C., Hessel, A., Hubeny, J.B., Jackson, S.T., Marsicek, J., McLachlan, J., Mock, C.J., Moore, D.J.P., Nichols, J., Peteet, D., Schaefer, K., Trouet, V., Umbanhowar, C., Williams, J.W., Yu, Z. (2017) Climatic history of the northeastern United States during the past 3000 years. *Climate of the Past* 13, 1355-1379.

McCarthy, F.M.G., Gao, C., Kerr-Lawson, L.J., McAndrews, J.H., Turton, C.L., Karrow, P.F. (2017) Paleobotanical record of Sangamonian interglacial deposits from eastern North America – Insights for the 21st century. Geological Society of America, Northeastern/Northcentral Joint Meeting. Abstracts with Programs, v.49.

Spooner, I., Principato, S., Hill, N., White, H., Dunnington, D., Neily, T., Stolze, S. (2017) Late Holocene records of changing moisture regime from wetlands in southwestern Nova Scotia, Canada: implications for wetland conservation and restoration. *Northeastern Naturalist* 24, 331-348.

Job Opportunities

Three Assistant Professorships at the Department of Geography at Durham University, UK



1. ***Assistant Professor in reconstructing palaeoclimate and palaeoenvironmental change***

Research expertise in reconstructing past climates and/or environmental change, to complement and/or expand our existing research profile. We welcome applications from candidates who have experience in analysing terrestrial, lacustrine and/or marine archives. Deadline: **24 November 2017**

https://www.dur.ac.uk/resources/hr/recruitment/academicrecruitment2017/GEOG18-4JD_060917.pdf

2. ***Assistant Professor in sea level change***

Research specializing in sea level change, with expertise that complements and/or expands our existing interests and expertise on (i) long-term trends in both tropical and high-latitude regions; (ii) records of abrupt events (e.g. earthquake induced change); and (iii) monitoring of recent and ongoing coastal evolution. Deadline: **24 November 2017**

https://www.dur.ac.uk/resources/hr/recruitment/academicrecruitment2017/GEOG18-4JD_060917.pdf

3. ***Assistant Professor in Earth surface dynamics and geohazards***

An individual to complement and extend our world-leading research into the rates, patterns and drivers of environmental processes, in which we seek to understand and predict how they control sediment transfers, biogeochemical reactions, carbon fluxes across landscapes and geohazards.

We have exceptional laboratory facilities to support these posts. Recent investments include a multisensory core logger, XRF scanner, X-ray facility, GC-MS and GC-IRMS for compound-specific isotope analysis, alongside IC, ICP-MS and ICP-OES for inorganic trace and major element analyses. A range of materials (pollen, diatoms, foraminifera and organic biomarkers) are routinely prepared and analysed. Our field equipment includes advanced laser scanning equipment and vehicles, a boat and several UAVs, alongside an extensive suite of GIS and remote sensing software and back pressure shear boxes and stress path cells in the Landslide laboratory. and Outwith the department, we work closely with numerous interdisciplinary initiatives in the University. Many staff contribute to the pan- University Institute for Hazard, Risk and Resilience. For more information about the department: <https://www.dur.ac.uk/geography/>

Please contact the Head of Department, Professor Mike Bentley (m.j.bentley@durham.ac.uk) with queries.

Research Data Technician

Concord University Research and Development Corporation, Athens, WV

The US National Science Foundation has funded a 1-year pilot the EarthCube Integration project **THROUGHPUT**: Standards and Services for Community Curated Repositories.

This project aims to link together multiple databases containing information on paleoecology, lake cores, marine cores, geochemistry, geologic samples, tephra deposits, etc. and will better align these resources to community-developed data standards and best-practices. By doing this, the THROUGHPUT pilot will begin reducing the constraints of data heterogeneity and data accessibility as barriers to scientific progress.

Partner institutions include Concord University, Columbia University, the Consortium for Ocean Leadership, Northern Arizona University, the University of Wisconsin-Madison, and the University of Minnesota-Twin Cities. Data partners include EarthChem (<http://www.earthchem.org>); the Flyover Country mobile data discovery app (<http://fc.umn.edu>); IODP – the International Ocean Discovery Program (<https://www.iodp.org>); LacCore – the National Lacustrine Core Facility (<http://lrc.geo.umn.edu/laccore/>); CSDCO – the national Continental Scientific Drilling Coordination Office (<https://csdco.umn.edu>); LinkedEarth (<http://linked.earth>); the Neotoma paleoecology database (<https://www.neotomadb.org>); several volcanic eruption & tephra databases; and others.

Tephra data is one of the key science use cases on this project, and THROUGHPUT will thus serve as a significant step on the way toward developing a globally-integrated system for tephra data. The project has funding to hire a M.S. or Ph.D. level research data technician to work with partner tephra laboratories & research groups to incorporate tephra data into open access repositories. The desired start date for this position is January 2018. The individual hired will be based at Concord University in West Virginia, USA.

An advertisement for the position is available online: https://www.indeed.com/viewjob?t=research+data+technician&jk=119afb4780bb7397&_ga=2.139858547.1934626546.1508336419-102207104.1500917288

Conference Announcements

CANQUA/AMQUA 2018

Joint meeting of the Canadian and American
Quaternary Associations

Crossing borders in the Quaternary

7-11 August 2018



Proposed sessions

1. The Quaternary Record of Aeolian Systems in Mid- to High-latitudes
2. Island Biogeography in a Changing World: an Interdisciplinary Roadmap from the Quaternary
3. Empirically Testing Paleoglaciological Hypotheses and Models
4. Human-environment Interactions during the Holocene
5. Mapping the Quaternary – Advances and Applications of Surficial Geology Mapping
6. Reducing the “Time to Science”: Data Management in the Quaternary Sciences
7. Improving Understanding of Quaternary Environments through Multi-proxy, Network, or Statistical Advances
8. The Relict Permafrost Environment
9. Wildfire in the Quaternary
10. High-resolution Records of the Common Era
11. New Perspectives on the Use of Karst Basins for Paleoenvironmental Research: Implications for Paleoclimatology, Paleontology, and Archaeology

Registration opens December 2017
<https://www.quaternary2018.com/>



Quaternary Research in Ireland and the Irish Quaternary Association (IQUA)

Ireland's famously beautiful landscape contains a wealth of evidence for a dynamic Quaternary history. With dramatic glacial landforms, varied coastlines, extensive peatlands, innumerable lakes, and a rich archaeological heritage, the island has long fascinated Quaternary scientists. Indeed, Ireland has a history of Quaternary research dating back to the nineteenth century, including famous visits by Agassiz in 1840 and Cuvillier-Leprieux in 1883, and its diverse Quaternary archives continue to provide fruitful avenues for research.

The Royal Irish Academy (RIA) Committee for Quaternary Research in Ireland was established in 1934, providing a key stimulus for the study of Ireland's Quaternary history. In the 1970s, the Irish Quaternary Association (IQUA) was founded with a view to co-ordinating and energising all aspects of Quaternary research in Ireland and passing on existing expertise through conferences and especially field excursions. Notable contributors over the lifetime of the Association include Frank Mitchell, Francis Sygne, Alan Smith, Bill Watts, Marshall McCabe and Willie Warren. The INQUA Congress held in Birmingham in 1971, which included excursions to Ireland led by Watts and Sygne, gave a further impetus to Quaternary studies in Ireland. Frank Mitchell, as President of INQUA for the intercongress period 1969-1975, and later through his classic book, *Reading the Irish Landscape*, also greatly helped in highlighting the multi-dimensional character of the Quaternary record in Ireland.

Currently, IQUA is a thriving organisation with well over 100 members, and disseminates information about its activities through its webpage (www.iqua.ie) and email list. The link between the RIA and INQUA continues to be positively fostered, by active Quaternary scientists represented on the RIA's Geoscience Committee (formerly the National Committee for Geology), and by funding IQUA's national delegates to attend INQUA congresses. Furthermore, the recipient of IQUA's inaugural Frank Mitchell Award for Distinguished Service to Quaternary Research and Teaching, Pete Cooney, has served as both IQUA President (2009-2012) and as Secretary-General of INQUA (2003-2011), thus strengthening the link between IQUA and INQUA.

The following links will give you a sample of the Congress facilities and Ireland's Quaternary science community and landscape:

The Irish Quaternary Association (IQUA): <http://www.iqua.ie>

IQUA Field Excursions: <http://www.iqua.ie/publications.html>

The Convention Centre Dublin (the Congress Venue): <http://www.theccd.ie>

Wild Atlantic Way (Ireland's scenery): <http://www.wildatlanticway.com/home/>

Sign up for Congress Newsletters: www.inqua2019.org

XX INQUA
Congress 2019
25th - 31st July 2019
Dublin, Ireland



Details of the Pre-, Mid- and Post-Congress Field Trips are now available on the web: <http://www.inqua2019.org/field-trips/>. Full details and costs will be posted at the end of November this year.

The organizers invite preliminary suggestions for sessions (<http://www.inqua2019.org/programme-themes/>). Please contact the Chair of the Scientific Program, Keith Bennett.

www.inqua2019.org

