LATE QUATERNARY ENVIRONMENTAL CHANGE AND ARCHAEOLOGY: CASE STUDIES IN THE LOWER BANN VALLEY AND BELFAST DISTRICT

Autumn Fieldtrip 2006

Irish Quaternary Association

Edited by Graeme T. Swindles
Contents

Page   Organisation

3       Schedule
4       Directions

Theme I: Environmental change

5       Geology of Northern Ireland
6       Cavehill and ‘setting the scene’
9       Dead Island Bog
15      Palaeoenvironmental studies in the Lower Bann Valley
16      The Pollan of Lough Neagh

Theme II: Archaeology

17      The Giant’s Ring and the Ballynahatty Ceremonial Landscape
24      The White House

Editor and contributor:
Graeme T. Swindles
School of Geography
University of Leeds
Leeds
LS2 9JT
UK

Other contributors:
Barrie Hartwell
School of Geography, Archaeology and Palaeoecology, Queen’s University, Belfast
Queen’s University Belfast

Thom Kerr
School of Geography, Archaeology and Palaeoecology, Queen’s University, Belfast
Queen’s University Belfast

Acknowledgements:
Many thanks to Phil Barratt, Gill Plunkett, Mike Simms and Nicki Whitehouse for contributions in the field. Many thanks to the Geological Survey of Northern Ireland.

Cover photograph shows characteristic peat stratigraphy at Dead Island Bog, Northern Ireland

© Cumann Staidéar Ré Cheathartha na h-Éireann, Baile Átha Cliath
Irish Quaternary Association, Dublin

ISBN 0947 920 366
Schedule

**Friday 29th September**

Welcome meeting in the Parlour Bar, Elmwood Avenue, Belfast at 7.30pm

**Saturday 30th September: Environmental change**

Leave from outside QUB School of Geography (Elmwood Avenue) at 10.00am

Morning: Cavehill (Mike Simms and Graeme Swindles)

Afternoon: Lower Bann Valley (Graeme Swindles, Gill Plunkett, Nicki Whitehouse and Phil Barratt)

**Sunday 1st October: Archaeology**

Leave from outside QUB School of Geography (Elmwood Avenue) at 10.00am

Morning: Trip to the Giant’s Ring, followed by a visit to the White House (Barrie Hartwell and Thom Kerr)

---

Map of Northern Ireland
Directions

DIRECTIONS TO CAVEHILL: To get to Cavehill from the QUB geography department, turn right at the end of Elmwood Avenue onto the Lisburn Road, get into the left-hand lane and turn left down Sandy Row, cross Boyne bridge/Grosvenor Road into Durham Street, continue onto Barrack Street and turn left into Divis Street. Take the right hand lane immediately and turn right onto the Westlink (Northbound). Come off Westlink at next exit (sign for Glengormley) and turn left into Clifton Street. Remain in the left-hand lane to and through Carlisle Circus roundabout. Take the second exit onto Crumlin Road and remain as far as possible in the left-hand lane past the old courthouse (left) and old Crumlin Road Jail (right). Proceed directly on the Crumlin Road for approximately 1.5 miles to the Ardoyne roundabout. Take the third exit and remain on the Crumlin Road for approximately another 2.5 miles until you come to a horseshoe bend which takes a sharp left turn. Approximately 100 yards after the apex of the horseshoe bend take a right turn onto the Hightown road. Continue climbing the Hightown road to a short distance from the summit, when you will see the sign for Cavehill County Park to your right, enter the car park.

DIRECTIONS TO DEAD ISLAND BOG: Leave Belfast and get onto the M2 (northbound). Travel north and come off the M22 at junction 2. Head into Randalstown (you will see a big viaduct on your left). Keep on straight through Randalstown and head towards Portglenone. Head through Portglenone and we will meet at the other side of the Bann bridge. If I miss you, keep on going to Clady and you will see a sign for Clady/Inishrush to the right. Take this road and the one to the left after the small bridge. Keep going and eventually you will see the other cars.

DIRECTIONS TO THE GIANT’S RING: Turn right onto the Malone Road from Elmwood Avenue, head straight up the Malone Road until you get to the roundabout, take the left-hand exit, head on towards Shaw’s Bridge, get into the right hand lane and turn right onto the Ballylesson Road. Keep on until you see the signs for the Giant’s Ring; follow them (I will meet you on the Ballylesson Road to stay in convoy).

DIRECTIONS TO WHITE HOUSE: Take the M2 motorway leaving at Junction 2 (Greencastle). Turn right onto the A2 (Greencastle/Rathcoole) and continue along the Shore Road. Just after the Abbey Centre turning and Merville Garden Village on the left, turn right into White House Park.
Geology of Northern Ireland

Cavehill and ‘setting the scene’

Graeme T. Swindles

Cavehill is probably the most famous of the Belfast Hills, forming part of the south-eastern border of the Antrim Plateau. It is distinguished by its famous ‘Napoleon’s Nose’, an outcrop of basalt which resembles the profile of the famous emperor and is said to have inspired the famous novel Gulliver’s Travels.

Characteristic Tertiary basalts cliffs on Cavehill

At Cavehill we will set the geological scene for Northern Ireland. The hill owes it characteristic shape to Tertiary (Palaeogene) basalt lava flows which are underlain by the Cretaceous Ulster White Limestone Formation, which commonly contains flint nodules and fossil belemnites. The view from Cavehill illustrates the boundary between the County Antrim-type rocks of Tertiary basalt and Cretaceous limestone and the Silurian/Ordovician shales and Greywacke of County Down. The underlying Triassic sandstones are visible around the edges of Belfast Lough.

The till sections present in the Belfast area are typically orange-red in colour, as much of the fines were derived from the Triassic sandstone and Marl. The tills also contain abundant basalt and limestone clasts. During the last glacial maximum the eastern end of the Lagan valley was dammed by ice and runoff into the resultant lake from the hills to north and south which laid down the deposits locally known as the Malone and Knock Sands. In the central part of the basin it comprises up to 20m of red-brown sands clearly derived from the Triassic Sherwood Sandstone Group. Fine red clays were also deposited which were used as brick clay for Belfast. There is also much evidence for late glacial and Holocene sea-levels in the area including peat beds overlying the basal red sands (which indicate a sea-level low stand). These peats underlie grey marine mud locally known as ‘sleech’ on which Belfast is built. The ‘sleech’ was deposited during the mid-Holocene sea-level high stand. The sea-level history of this area reflects the complex interplay of eustatic,
isostatic and local factors. Raised palaeo-shorelines from the mid-Holocene can be found at the Shore Road and at Tillysburn in Belfast.

Upturned and deformed laminated structures, and gravel 'rib' below, of the fluid-escape structure, possibly associated with pingo development in the Malone sands (photo and interpretation by Mike Simms).

Sea-level changes in County Antrim (after Carter, 1982; Lambeck, 1996)
Bibliography


Dead Island Bog

Graeme T. Swindles

Area (ha): 54.5
Location: 2.5 km northwest of Inishrush, County Londonderry.
Latitude: 54° 53' 15" N
Longitude: 06° 32' 51" W
Irish Grid Reference: C931053

Dead Island is a relatively intact lowland raised bog forming a distinct peatland unit set amongst low drumlins. The bog is one of the best remaining examples of a lowland raised bog in the flood plain of the Lower Bann. The intact bog surface exhibits a well defined dome with characteristic vegetation and structural features, including hummock and lawn complexes and small shallow pools. The bog surface is permanently wet and supports a dense and diverse cover of Sphagnum bog-mosses including the rare hummock forming moss Sphagnum austinii. The lagg surrounding the intact bog has been cut for turf in the past, creating a mosaic of habitats ranging from acid grassland through dry heath to acid woodland dominated by Birch with occasional Rowan.

Notable species include Sphagnum austinii, forming several small, hummocks scattered over the surface, cranberry Vaccinium oxycoccos, and great sundew Drosera longifolia in several of the pools.

Main features of interest at Dead Island:

- Very distinct lithostratigraphy observed in sections
- Multiple Icelandic crypto-tephras
- Testate amoebae – diverse on the surface and well-represented in peat cores
- Decline of Sphagnum austinii in the Medieval period
- Increased influence from human activity in the surrounding area over the last 1000 years (airborne eutrophication from land clearances)
- Spheroidal carbonaceous particle (fly ash) record
- Retardation of bog accumulation in recent times

A 4500 year record of ‘effective precipitation’ has been reconstructed from Dead Island using a testate amoebae-derived water table reconstruction, humification analysis and plant macrofossils. Here are some key points:

- Problems with inter-proxy variability
- Little Ice Age, Subboreal/Subatlantic transition, Roman Warm Period
- Persistent and statistically significant climate periodicities
- Evidence for solar-forced climate change?
- Decline of Sphagnum austinii possibly due to climate deterioration and airborne eutrophication
Air photo of Dead Island Bog, taken in 1954 (Panchromatic RAF series, QUB collection).
Topographic profile of Dead Island Bog
Lithostratigraphic profile of Dead Island Bog
High bog surface wetness from ca. 1500-1850 at neighboring Fallahogy and Dead Island bogs, suggesting a coherent response to the Little Ice Age climatic deterioration. The graph on the left is a hydroclimate index applied to plant macrofossils (Barber et al., 2000); the one on the right is a testate amoebae-derived water table reconstruction (Swindles, 2006).

Reconstruction of Holocene climate change from peatlands in the north of Ireland: PhD thesis abstract (Graeme Swindles)

The aim of this study is to generate Holocene climate proxies from peat stratigraphy in the North of Ireland. High-resolution palaeohydrological records are presented from three raised bogs in Northern Ireland spanning a period from the Hekla 4 tephra isochrone (2395-2279 cal. BC) to the present day. Multivariate statistical analysis of contemporary testate amoebae in Northern Irish ombrotophic bogs shows that water table depth is the most important edaphic control on the distribution of these organisms. A testate amoebae-water table depth transfer function is constructed for Northern Ireland peatlands using weighted averaging (tolerance downweighted) regression and calibration. This enables the quantitative reconstruction of mire palaeohydrology from fossil testate amoebae assemblages. The water table reconstructions are supplemented with humification analysis of the peat profiles to provide two independent proxies of effective precipitation. Tephrochronology, radiocarbon dating and spheroidal carbonaceous particles are used to chronologically constrain the palaeohydrological records.
There is a high degree of similarity between the records from the different peatlands, despite the sites having contrasting hydromorphological and floristic characteristics and being located in contrasting regional climatic settings. This illustrates the allogenic effects of climate overshadowing the strength of signals related to the autogenic development of the individual peatlands. It is suggested that the testate amoebae-derived proxies are more plausible in ecological terms, and that humification signals are sometimes influenced by other non-climatic factors. Significant shifts to wetter conditions are inferred at 2100 cal. BC, 1500 cal. BC, 1240 cal. BC, 750 cal. BC, 140 cal. BC, cal. AD 280, cal. AD 470, cal. AD 700, cal. AD 1140, cal. AD 1450 and cal. AD 1660. The most prominent wet-shift is the one at 750 cal. BC, which is supported by plant macrofossil analysis. The water table records reveal a very dry-phase in all the sites from cal. AD 10-450, suggesting lower than the present day water table depths. Periods of acknowledged Holocene climate are represented in the palaeohydrological records including the Little Ice Age (AD 1450-1850), the Medieval Warm Period (AD 1050-1150), the Dark Ages Climate Deterioration (after c. AD 700), the Roman Warm Period (AD 10-450) and the Subboreal/Subatlantic transition (c. 750 BC). Comparison of the palaeohydrological proxies from one lowland raised bog with instrumental climate data from the Armagh Observatory suggests that summer temperature has been an important control on bog surface wetness over the past 170 years.

Spectral analysis reveals significant periodicities of c. 260, 380, 560 and 1080 years in the replicated palaeohydrological records, that may be attributed to known climate cycles. Periods of wetter conditions in Northern Irish peatlands coincide with times of high lake levels in Europe and seem to be related to wider Holocene cooling events. Many of these events are associated with periods of reduced solar activity as inferred from the \(^{14}C\) calibration curve, especially during the late Holocene anomalies (Wolf, Spörer and Maunder minima) and the Homeric minimum in the first millennium BC (c. 850 cal. BC). However, the precision provided by tephrochronology shows that many of the wet-shifts are not entirely synchronous with the solar minima. This may suggest non-linear responses of the climate system to small changes in solar activity in the Holocene period.

**Bibliography**


Palaeoenvironmental studies in the Lower Bann Valley

Graeme T. Swindles

- ‘Landnam’ detected in the pollen records of Sluggan and Fallahogy bogs (Alan Smith and Valerie Hall)
- Late-Glacial sequences and tephras at Sluggan bog (John Lowe)
- The palaeoenvironmental record preserved in bog pines and oaks from Ballymacombs More (Phil Barratt). The recent introduction of mechanized milling of peat for the horticultural trade at this site has revealed a staggering collection of bog oaks and pine.
- The Chironomidae of Lough Neagh: fossil remains record changes in oxygen levels and food availability during the Holocene. Changes in the late Holocene reflect human impacts on Lough Neagh (Clare Carter).
- Late Holocene climate change – Wetter conditions registered during the Little Ice Age at Fallahogy bog, based on plant macrofossils (Keith Barber).
- Diatomite age and formation at Newferry (Gill Plunkett).

Bibliography


The Pollan of Lough Neagh

Graeme T. Swindles

Lough Neagh is the largest lake anywhere in the United Kingdom, with an area of 150 square miles (388 square kilometres). It dwarfs all others on the island of Ireland. It is also the third largest in Western Europe (after Lake Geneva and Lake Constance). Approximately 20 miles (30 km) long and 9 miles (15 km) wide, Lough Neagh is situated some 20 miles (30 km) to the west of Belfast. It is very shallow around the margins and the average depth in the main body of the lake is about 9 metres (30 feet); although at its deepest the lough is about 25 metres (80 feet) deep.

*Coregonus autumnalis* (Lough Neagh Pollan)

The Pollan is one of the few freshwater fishes native to Ireland. Their limited distribution suggests that they may have been one of the first fish species to colonise freshwater lakes in Ireland at the end of the last glacial period. During deglaciation, isostatic uplift led to some lakes being isolated from marine influence. Today Pollan are restricted to two lakes on the Shannon, Lough Ree and Lough Derg and in Lower Lough Erne. Documentary evidence suggests that they were present in Upper Lough Erne in the past, although now their status is uncertain. The healthiest population of Pollan in Ireland is found in Lough Neagh. In the past there was a successful fishery and the Pollan were sold locally and exported as food and fish bait. In recent years, the populations of Lough Neagh Pollan seem to have undergone a decline which is probably related to pollution and eutrophication.

**Bibliography**

Northern Ireland priority species
http://www.habitas.org.uk/priority/species.asp?item=42768


The Giant’s Ring and the Ballynahatty Ceremonial Landscape

Barrie Hartwell

The plateau of Ballynahatty covers 100ha of the Lagan Valley, overlooking a loop in the River Lagan just 8km south-west of the centre of Belfast. The Giant’s Ring sits on the south-east end of the plateau and at over 200m across, is one of the largest and best-preserved late Neolithic henges in Ireland. Survey and excavation by Queen’s from 1990 until the final season in January 2000 (grant-aided by EHS-NI) have shown this to be part of a much more extensive ceremonial landscape.

The view of the Giant’s Ring on the previous page was taken from the north in mid-May 1984 after a very dry winter and spring. The bank material was derived from a broad (15m), shallow, (1.5m) quarry ditch on the inside of the bank. This shows as a darker band of grass in the photograph. The bank is constructed around a passage grave - now devoid of its covering mound - which was itself one of at least ten similar or derivative tombs. Between the tomb and the quarry ditch are three dark concentric lines probably representing the contiguous holes of large post settings. At lower right, a pale cropmark in the winter barley may represent a burial mound recorded as having been destroyed in the 18th century. Below is a section through the bank of the Giant’s Ring based on the 1954 excavation by Pat Collins:
The present valley floor is a drift landscape, covered by mixed glacial sands, gravels and clays with sandy ridges providing a light, easily cultivated soil. Extensive crop marks again appeared in the dry summer of 1989 and in Ballynahatty the most extensive mark was of a large enclosure (BNH5) in the field to the north of the Ring, over 100m long with a smaller enclosure (BNH6), 16m in diameter, within it, both defined by paired lines of pits. There appeared to be four posts within BNH6 and a clear entrance to the east. No corresponding entrance could be seen through BNH5, though there was extensive masking at this point. A double row of pits seem to be attached to the end of BNH5 but at a slightly different orientation to the entrance in BNH5. The combination of sandy glacial till and the prevalence of good indicator crops provides great potential for airphotos in the Lagan Valley. Unfortunately, the rainfall characteristics are such that they only occur when a dry summer is preceded by both a dry winter and spring - a rare occurrence in Northern Ireland.

The photo below shows the extent of the excavations in 1996. Apart from the central square setting, the 1989 photo picked up nearly all the deep postholes of the inner enclosure and those of the outer enclosure. However, it gave little clue to the complexity of the entrance.
After excavation, the inner enclosure (below) was shown to consist of holes over 2m deep which would have held posts the size of telegraph poles. The central square of postholes was much shallower and supported a platform.

The diagram below shows the typical postholes of the inner enclosure. The primary fill around the post was often more compact than the surrounding natural soil. The secondary fill of charcoal, soil and stones, deposited after the post had been removed, acted as a wick to bring moisture from the
damper subsoil to the surface resulting in the very clearly defined cropmarks in the airphoto. This effect only occurred with postholes greater than 1.5m in depth.

The post positions as recorded in the bottoms of the post holes, where they were not subjected to displacement by settlement, show that the BNH6 structure is remarkably symmetrical along a line passing through the entrance (see below). The whole of BNH6 can be laid out by generating a series of concentric lines from three fixed points on a straight line using a unit of measurement of 1.3m, close to twice Burl's theoretical 'beaker yard'. Regularly spaced concentric circles were marked out from A and B and then postholes marked by a measuring stick or by the intersection of arcs concentric to C. The structures in B used the diameter D.

Below: A reconstruction of BNH6. It was probably an elaborate excarnation site where bodies were exposed on a platform. The bones may then have been cremated and/or buried as an individual or they may have joined a larger collection of bones, surviving as an anonymous but permanent 'ancestor'. The two cubicles in front of the entrance may have been ossuaries.
The final excavation plan (see over), summarises all eleven seasons of work and reveals a complex series of structures making full use of a low ridge for the initial approach to the entrance from the east and a later east-west façade which enhances the effect from the passage tomb to the south. A line of posts extend south from the Annexe façade directly aligned on the passage tomb to provide a physical link to the proposed timber circles in the Giant's Ring. The surrounding area acted as a magnet for possibly hundreds of burials through the Later Neolithic. The dating evidence centres around 2700 Cal BC with the exception of one C14 date which indicates that there was occupation in the area of BNH6 about 1000 years earlier. Three types of pottery were found - Carrowkeel Ware associated with the passage tomb complex, Grooved Ware associated with the timber buildings and a Beaker potsherd which shows that interest in the area continued into the Bronze Age.

This unified and conceptually advanced complex of buildings has been designed and executed with great skill and precision. Although the plan of BNH6 appears to be based on a standard formula, it is the product of a skilled practitioner and must reflect established rituals. It is integrated flawlessly into the elaborate entrance structure of the larger enclosure, BNH5, to provide a carefully conceived series of barriers, corridors, and rooms which choreograph movement through the complex and ensure that the excarnation platform at the centre of the inner enclosure cannot be seen until the last moment. Then, on the final approach, a person walking across position B would arrive at a critical point at which the inner secrets would be revealed. They would see the entire contents of the two entrance structures (the bones of the ancestors?) and looking through the entrance to BNH6 they would see how the corpse is transformed on the excarnation platform by the process of decay and identity is stripped away to be replaced by the anonymity of the ancestors.

**Bibliography**


APPENDIX : Giant's Ring and Ballynahatty complex

[Image of Giant's Ring and Ballynahatty complex]

[Image of Giant's Ring and Ballynahatty complex]

http://www.lisburn.com/books/historical_society/volume9/volume9_1.html
• Posts or features (all phases) located by excavation
○ Post locations estimated or located by air photography
— Limit of excavation
C Cremation deposit
F Façade
P Pit
The White House

Thom Kerr

The White House in the borough of Newtownabbey is widely believed to be the oldest building in the Belfast area. The building’s rich historical heritage includes acting as an assembly point for the forces of William of Orange ahead of the Battle of the Boyne. It is also believed that Thomas Blood sought refuge here before his theft of the crown jewels in 1671. Dating from 1569 The White House is so-called because it was once coated in a white limestone rendering which made it useful as a navigation marker for vessels travelling up the Lough towards Belfast.

In 1574, Elizabeth 1 gifted the building to Major Brunker in recognition of his service in the Spanish Wars. At that time the Grade B1 Listed building was probably a tall, square townhouse of perhaps four or five storeys. The walls of the house are three feet thick and the original house was clearly of a robust linear design. At some point during the Plantation period of the 16th and 17th centuries, three almost circular turrets were added. The building continued to serve as a residence until 1840. The property subsequently found use as a stable and barn, but by 1923 had become largely derelict. The building was later converted for use as a gospel hall. Today it is little more than a shell and due to its fragility has remained unused for a number of years.

Photograph of The White House

Bibliography

The White House