

**THE PAST BENEATH OUR FEET: UCL'S NEW
INSTITUTE FOR CULTURAL HERITAGE SITS UPON A
CONSIDERABLE NATURAL SEDIMENTARY
HERITAGE.**

—
By Roger Flower¹ and Robert Taylor²
—

Many members of college will know that as part of an array of inspiring major initiatives for UCL, a new institute, the Institute for Cultural Heritage, is to be built adjacent to the Bloomsbury Theatre on Gordon Street. The new IfCH will promote heritage globally and mark a new dimension for heritage studies in the College. Preparations are well advanced for the new build and some of you will have noticed the ground clearance and surveying activities going on at the site between the Bloomsbury Theatre and 26 Gordon Square; across the road is the Institute of Archaeology. The IfCH building has already been designed and follows the appearance indicated in Figure 1; construction began in 2006 with completion scheduled for 2011.³ Five above ground stories are included with two main below ground levels, the latter providing archiving facilities whilst upper floors will accommodate offices, lecture theatres, exhibition space, laboratories and other research areas. Perhaps, the most important archival facility to be re-housed on three upper floors in the new Institute is the Petrie Museum. Commissioning of the IfCH new build was made after lengthy discussions predicated on a wish to develop infrastructure for the arts and humanities. Following a decade or so of debate, discussion and planning for the site, College assigned potential contractors including building design to the accomplished architects Jeremy Dixon and Edward Jones. Approval and final go-ahead for the new build was given in 2001 by the then Provost, Professor Sir Chris Llewellyn Smith. Consequently, Buro Happold Ltd, an international building engineering company, was appointed in 2003 to survey the building site and to undertake structural engineering

□

¹ Environmental Change Research Centre, Department of Geography, University College London, Pearson Building, Gower St. London WC1H 0AP.

² Soil Mechanics Ltd, Glossop House, Hogwood Lane, Finchampstead, Berkshire RG40 4Q.

³ As of April 2008, construction of the IfCH building is now under way and preparations for laying the foundations have begun.

responsibilities. Full funding for the IfCH building has still to be met and the cost is now in excess of 25 million pounds. However, more than 60% of this amount already has been obtained from a variety of sources including the Heritage Lottery Fund, Higher Education Funding Council for England, and the Wellcome Trust as well as by UCL itself.

Some Background and Historical Geography of the Site:

The Gordon Street site adjacent to the Bloomsbury Theatre has been awaiting development since the 1950s and during much of this time it was occupied by temporary buildings. These buildings were cleared in 2003/4 to make way for the new build following planning consent and finalization of plans for the IfCH. The site has an interesting and rather turbulent recent history that can be traced back to UCL's own origins in the 1820s when a consortium of Jeremy Bentham's 'disciples' founded the college on undeveloped land that now comprises the borough of Marylebone. Construction of the main college began in 1826, following the design of the architect William Wilkins. Ambitiously, the college was opened in late 1828. At this time, survey maps show a road immediately to the east of the UCL site that is now Gordon Street (then called William Street). The street continues southwards into Gordon Square and during the 1820s a row of substantial houses was built along part of the roads west side. House building continued in the 1850s with the completion of a new terrace (numbers 25 downwards, see Figure 2) but, of the original terrace, only number 26 Gordon Square remains today. UCL acquired the Gordon Square terrace properties in 1919-1922 with 24 Gordon Square becoming part of the Geography Department in 1921. All these houses are now accorded Grade II architectural status.

Land immediately north of the Gordon Square terrace (i.e. next to number 28, Figure 2) was built upon in 1843 when All Saints Church, designed by T. L. Donaldson, UCL's first Professor of Architecture, was constructed. By 1880, the whole west side of Gordon Street was developed but by the early 1900s the church had become less popular and UCL bought the property in 1914 for conversion into an imposing meeting hall. Finally, this was formally opened in 1927 and named the War Memorial Hall (Figure 2), dedicated to UCL staff lost in World War I. This hall (also called the Great Hall) served a variety of functions until September 1940 when aerial

bombing of London caused severe damage to several key UCL buildings. Not least, more than 60 m of Gordon Street frontage was destroyed including numbers 27 and 28 of Gordon Square/Street terrace. Ironically, the War Memorial Hall was also lost in its entirety; the full extent of the damage is indicated in Figure 3. During and immediately after WWII, the bombed area was cleared and levelled and housing either side made good but the plot occupied by the Memorial Hall and several other buildings remained vacant until ca. 1950. Then only temporary buildings were constructed and these prefabricated temporary 'huts' variously served as annexes for several Departments including Engineering and Geology. A number of initiatives for developing this site were made and, after a capital raising exercise, the Bloomsbury Theatre complex was built on the north part of the war damaged Gordon Street plot, opening in 1968. The remaining 'huts' were left sandwiched between the Theatre and (restored) number 26 Gordon Square until being cleared for the IfCH. Initially, the proposed new institute was named the 'Panopticon', based on Jeremy Bentham's late 18th century ideas about building an all around surveillance house with correctional facilities for misceants. With connotations of a tread-mill, this name was subsequently and sensibly changed to the Institute for Cultural Heritage.

Some Environmental History of the Site:

As part of any new building of significance, a site survey is undertaken to assess suitability of the ground for building; this is a pre-requisite in UK buildings regulations. Exploring the ground stratigraphy and assessing sediment geophysical characteristics are of crucial importance for planning adequate structural foundations. Buro Happold used Ground Explorations Ltd. to carry out several drill coring surveys in the Gordon Street area. First recorded drill cores were made in 1964 in preparation for the Bloomsbury Theatre and subsequently in 2002 for the Nanotechnology Centre (immediately north of the Theatre). From late September 2006 some readers may have seen (and heard!) the new drilling operations being undertaken on the remaining cleared land adjacent to the Theatre (Figure 4). In order to test the structural properties and assess ground suitability for the new building, rotary drilling and cable percussion techniques were used at three locations BH1, BH2 and BH3 across the site in a north-south line with 12.5 m separating each drilling (Figure 5). The drillings penetrated to a depth of about 40 m below ground level, just short of the Upper Cretaceous chalk bed rock. Despite several major sediment hiatuses, core samples

retrieved therefore spanned a remarkable 65 million years of sedimentary history.

The borings revealed a rather incomplete stratigraphic sequence with some depositional sequences being lost through past erosion episodes. The sequence nevertheless is rather typical for this part of London. The upper 3 m of material (Figure 5) consists mostly of 'made ground', building rubble and soil overlying a thin sand layer and brown. The disturbed grey mottled cohesive sediment below the sand layer tentatively include 'brickearth', a once a widespread deposit in London (prior to development). It is a wind blown fine grained silty material, deposited during the last glaciation of the Pleistocene Epoch (a period of Ice Ages that spanned most of the past 220,000 years). Below the disturbed layer typically much coarser grained gravely, former river terrace (flood) Pleistocene deposits, occur. These Lynch Hill gravels (Figure 5) are characteristically orange-brown in colour and, in BH3, are about 2.5 m thick and date to the middle Pleistocene (ca. 300,000 yrs BP). In the western part of the London basin these deposits are known to contain early hominid artefacts and a variety of fossils. In Kent, the similar but slightly older Boyn Hill gravels were made famous in 1937 by yielding the remarkable Swanscombe human skull and associated Palaeolithic flint implements.

At about 7.5 m in BH3 the Quaternary sediments overlie unconformably the London Clay Formation; a deposit of sticky fine grained clay sediments, orange brown for the top two metres or so (oxidised by past weathering) then dark grey below (Figure 5). This massive deposit, much favoured by the London Underground, is of Eocene age and accumulated below a shallow sea some 55 million years BP. More recent, Pliocene, Miocene and Oligocene sediment sequences are missing entirely from the Bloomsbury stratigraphy. The London Clay extends to 13.5 m depth in BH1 and BH3 but to 16.5 m in BH2 perhaps indicating that its base deepens northwards, towards the Bloomsbury Theatre. Below these clays, sediments of the Lambeth Group are encountered. These fine grained cohesive Palaeocene (58-65 million years BP) sediments, mostly red-brown and blue mottled, going to grey at the base, occupy the greatest proportion of each drill core (see the photograph insert in Figure 5). They are essentially shallow water, marine (Woolwich Beds) and non-marine (Reading Beds) sediments laid down fairly rapidly at the end of the Palaeocene Epoch. Their sandy basal section comprises the ~ 1m thick greenish grey sand of the marine Upnor Formation.

The sequence represents a shallowing of the seas at that time as does the last section encountered, the Thanet Formation. This dark grey sandy sediment, about 3-3.5 m thick, contained a few part decomposed marine shell remains, and was deposited immediately prior to the Upnor. A thin layer of black flints (the Bullhead Bed) typically occurs at the base of the Thanet Formation. All three drill cores were stopped at this hard layer, at about 40 m depth, to avoid penetrating the (Upper Cretaceous) Chalk and possibly polluting its aquifer.

The whole stratigraphic section displayed in sections BH1-3 seemed devoid of macrofossils except for the few marine shell remains in the Thanet beds, but a previous core from the area yielded rare wood fragments in the London Clay. To examine BH3 (located at 51.52471°N, 0.13246°W) in more detail, ten sub samples were taken for further investigation. These included 16.5 m depth, where sediment contained amber coloured nodules, and 25.5 m depth, where sediment was very fine and uniformly black (Figure 5). Microscopic examination of all ten samples indicated little or no pollen and no diatoms (siliceous microalgae); the abundance of fine sand grains however increased in the

deepest samples. Systematic measurements of water content, organic matter and carbonate showed (Figure 6) that the percentage water (of the sediment dry weight) was less than 20% in all samples except those at 16.5 and 25.5 m. Organic matter (as a proportion of dry sediment) was below 6% except at 26.5 m where it reached 26%; carbonate was less than 3% except at 16 and 25.5 m where it reached 23 and 6% respectively. Using the Geography Department's newly installed X-ray fluorescence spectrophotometer, element concentrations in the BH3 sediment sub samples were also measured (Table 1). Over 50 elements were assayed but only those showing major changes in concentration are given in Table 1 where the concretions at 16.5 m are immediately distinguished by a high calcium concentration. The organic rich sediment at 25.5 m is also distinguished by high concentrations of sulphur, copper, arsenic, selenium and uranium. Samples near the base of the Lambeth Group (at 30m depth) are unusual in possessing highest values for cerium and zirconium.

Table 1. Element concentrations (as mg or µg g⁻¹ dry sediment) in ten sub samples in core BH3 taken from the London Clay Formation and the Lambeth Group sediments. Note, bt indicates below detection limit.

Depth (m)	Calcium mg	Sulphur mg	Copper µg	Arsenic µg	Selenium µg	Uranium µg	Cerium µg	Zirconium µg
7	5.7	6.5	33	12	1	10	52	247
14	3.8	5.5	25	8	0.9	7	52	283
16.5	223	1.7	19	3	1	bt	51	92
19	3.2	0.4	49	5	2	bt	58	192
23	12.9	0.3	34	8	1	bt	87	207
25.5	6.4	77.8	347	160	12.7	15	68	172
30	2.8	0.3	29	9	0.7	bt	199	388
32.5	2.7	0.1	13	20	8.4	4.4	27	285

The geochemistry of sediments in BH3 is indicative of major environmental changes that have affected sediments accumulating in the Bloomsbury area over geological time. The stratigraphic sequence is predominantly marine in origin and the nature of the accumulated sediments reflects both differing sediment sources and sedimentation processes. Coarse, sandy material at the base of the sequence is indicative of a high energy environment at a coastal margin. Less shallow water conditions followed during deposition of the Lambeth Group sediments and are attributable to various

shallow sea, lagoonal or estuarine environments. The London Clay Formation is indicative of marine conditions and sea level changes in a series of complex cycles. Of the two levels in BH3 of particular interest, 16.6 m and 25.5 m, the upper possessed crystalline nodules of calcium carbonate coloured amber in the fresh state by iron staining and probably marks a hiatus in sediment accumulation. The lower fine black sediment is clearly organic and rich in sulphur and with high metal concentrations (probably present as sulphides). Further microscopic

examination of this sample revealed an abundance of fine silt sized mineral grains 2-10 μ m in diameter, occasional 300-400 μ m long lenticular crystals (which dissolved slowly in dilute acid suggesting calcium sulphate) and a few sherds of volcanic glass. Differential dissolution of rare mineral aggregates (up to 0.5 mm long) initially yielded more lenticular crystals and then a brown branching fibrous organic core. From this preliminary examination it is thought that at least some of these mineral encrusted organic filaments have originated from benthic marine organisms but have been extensively reworked and diagenetically altered. At the core base, higher concentrations of heavy metals indicate that the clastic particles originated from a different erosional source.

Some implications from the sediments at the Bloomsbury site

The drillings on the IfCH site were primarily carried out to assess geoenvironmental and geotechnical aspects of the ground and to prove the suitability of Eocene and Palaeocene sediments in this area of Bloomsbury for supporting structural building requirements. The stratigraphy together with geophysical measurements made by the drilling team seem to indicate that the ground is suitable for building and results are unsurprisingly little different from the earlier ground surveys for the Bloomsbury Theatre. One difference is that the new Institute will have two below ground stories necessitating excavation deep into the London Clay. The few small drill core samples examined have revealed little evidence of the animals and plants that occupied the past land and seascapes recorded in the sediments below the site. However, much greater amounts of material will be removed from the area in the near future when the IfCH foundations are established. It is possible that large fossils (mega fauna) and even early hominid artefacts could then be discovered in the Pleistocene Lynch Hill gravels and Eocene plant remains in the London Clay.

Regarding any cultural heritage that may be associated with the sediments associated with the new Institute, there is little of significance and only the upper 3 m of 'made' ground are culturally derived. Direct human disturbance, essentially from building activities, but including conflict damage within the past 200 years, has contributed to the upper sediment matrix. Some former building foundation remains were present but infill and turbated clays form the sediment bulk. Some rubble is doubtless derived from the old church and the Memorial Hall destroyed in WWII. Even today the site remains unverified for unexploded ordnance. Although

pollen analysis was not done, there seems no sedimentary evidence of the pastoral activities which probably marked the last two thousand years or so of site occupation. The first clearly *in situ* sediments present in the Bloomsbury cores are the Lynch Hill Gravels which, at 3 m below the modern ground surface, are already nearly half a million years old. The early European hominids, who ranged over these Pleistocene river terraces exploiting the wetland resources of the area, must have had a negligible environmental impact. Furthermore, it is arguable whether they possessed any culture worthy of heritage.

The evidence of past great rivers, flood plains, shallow seas and estuaries contained in the Bloomsbury sediments do amount to a considerable natural heritage. The past landscapes and ecosystems that existed from the geological past through to historical times have exerted fundamental influences on the development of human populations and their cultural attributes. Cultural changes were at first gradual but now the combination of large populations and abundant power means that some cultural processes are threatening our biosphere. Cultural activities are now shaping our environment as never before and are epitomised in microcosm by our new IfCH occupying a once natural landscape! Nevertheless, it is to be hoped that some of the intellectual impetus generated by the new Institute will help integrate our cultural and natural heritages in ways that lead to a better understanding of their interactions. As ever, learning from the past is a crucial part of understanding environmental changes and this can help promote harmony where culture and landscape are now in conflict.

© Roger Flower and Robert Taylor, 2007
*Respectively from the Environmental Change Research Centre,
Department of Geography, UCL, and from Soil Mechanics
Ltd., Berkshire.*

Acknowledgements

This report was undertaken with the co-operation of planners, managers and site workers involved with preparation of the IfCH site. The drillers who extracted the cores and samples were Ian Patterson and James Bancroft. Analyses were incorporated into equipment calibration procedures in the UCL Department of Geography and sediment quality measurements were made by Hong Yang and Simon

Bexell. Also in the Geography Department, Simon Turner, and Janet Hope helped with sediment procedures. John Catt, Negley Harte, Hugh Prince and Peter Wood kindly contributed to the historical context. We are also grateful to Negley Harte for giving permission to use Figures 2 and 3. Richard Furter (UCL Estates and Facilities) and Sally MacDonald (UCL Museums and Collections) are thanked for providing planning information. Artwork is by Dia Williams.

Further Reading

Harte, N. and North, J. 2004. *The World of University College London 1828-1978*. 3rd Edition. Eyre & Spottiswood, London.

Ellison, R., Woods, M.A.M., Allen, D.J., Foster, A., Pharroh, T.C. and King, C. 2004. *Geology of London*. British Geological Survey. HMSO.

Olsen, D. 1982. *Town Planning in London*. Yale University Press. New Haven.

Slumber, M. G. 1996. *London and the Thames Valley*. 4th Edition. British Geological Survey. HMSO.

Bromehead, C.E.N. 1925. *The Geology of North London*. *Memoirs of the Geological Survey of England and Wales*. HMSO.

Figures

Figure 1. The new Institute for Cultural Heritage as planned to occupy the now cleared Gordon Street site (the image is from the Institute's UCL web site: <http://www.ucl.ac.uk/ifch/building>).



Figure 2: A street plan of the UCL site made in 1923 showing the then unfinished War Memorial Hall (formerly All Saints Church) standing adjacent to house number 28 Gordon Street.

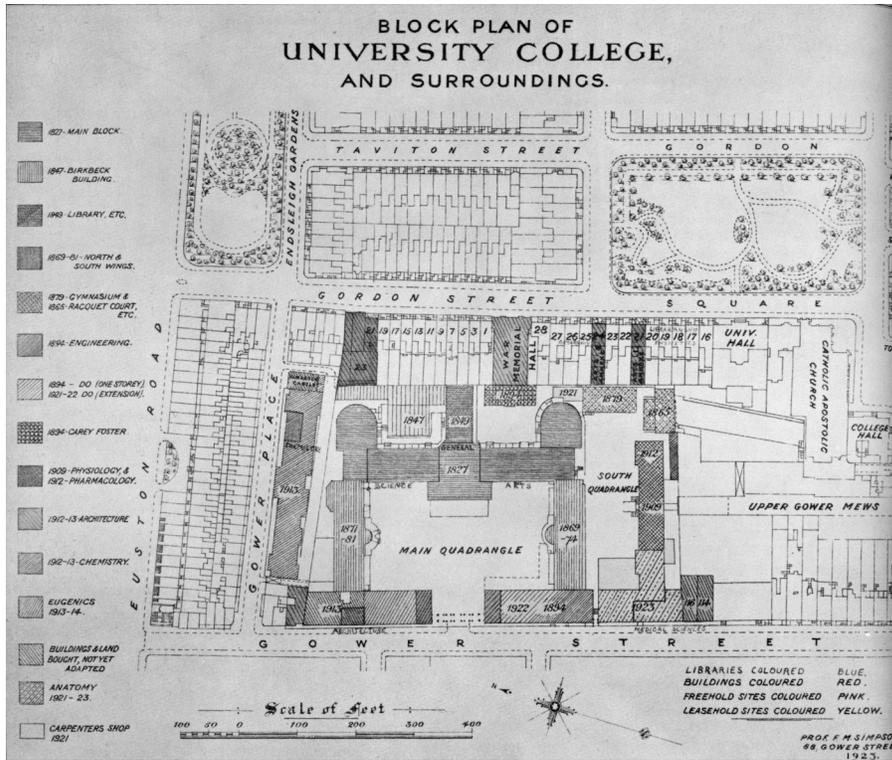


Figure 3. The remains of the War Memorial Hall and adjacent buildings following WWII damage in September 1940 captured in a photograph that looks through the bomb site to the essentially undamaged buildings on the east side of Gordon Street.



Figure 4. Ground survey and sediment drilling operations being carried out at the site of the planned Institute for Cultural Heritage in October 2006. Left: the drilling rig adjacent to the Bloomsbury Theatre in the process of making bore hole 2 (BH2, see Figure 5). Right: core rods and sediment sample containers.



Figure 5. A summary of the stratigraphy of sediments at the site of the proposed new Institute for Cultural Heritage as determined from three exploratory drill cores (BH1-3) that run across the site, north to south. The main features of the succession are shown and, for borehole BH3, are summarized in the text. An image of the mottled sediment typical of the Lambeth Group is displayed as an insert.

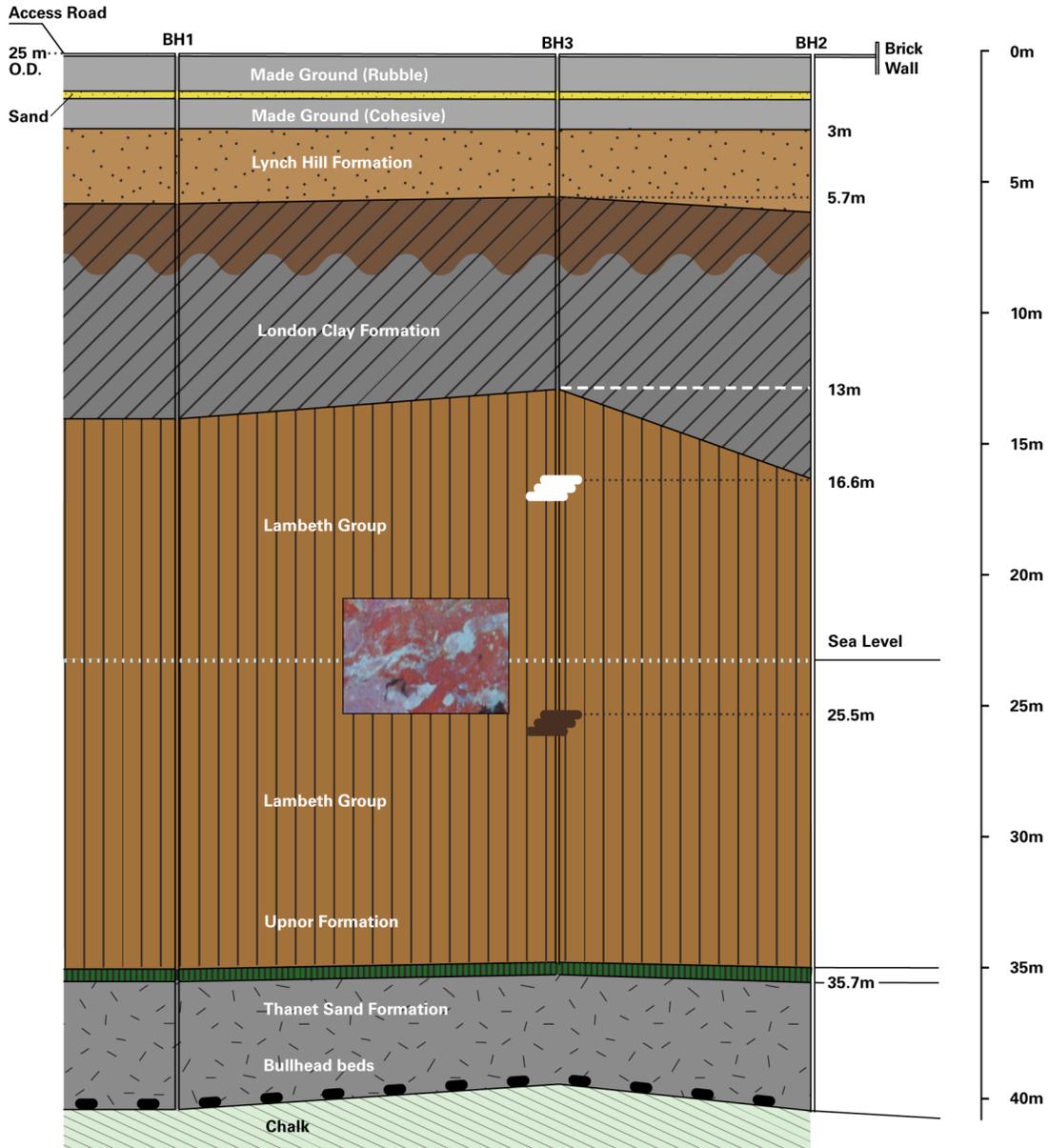


Figure 6. The percentage water content, organic matter and carbonate in selected sediment samples from drill core BH3.

