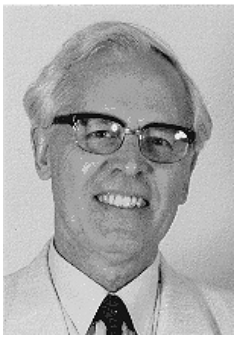
INTERVIEW

An Interview with Don Brothwell, Emeritus Professor, Department of Archaeology, University of York

Conducted 31st July 2003 by Julie Eklund (transcribed by Steve Townend, edited by Scott Haddow and Steve Townend)



Don Brothwell is Emeritus Professor at the Department of Archaeology, University of York. He was awarded an honorary doctorate from the University of Stockholm for his contributions to bioarchaeology while at the Institute of Archaeology, UCL (1974-1993). His interests lie mostly in the broad field of archaeological science, but particularly in human palaeoecology. Professor Brothwell has a special interest in the archaeology of food, the disease ecology of past populations (humans and domestic livestock), the micro-evolution of humans and associated domesticates and the potential application of DNA studies to the resolution of bioarchaeological problems. These research interests range across a very broad temporal span, from Pleistocene to mediaeval times, and he considers the world to be his area of research, but is especially interested in Europe and the New World.

Your research interests were once described by Graeme Barker as "…very broadly, the field of environmental archaeology: bones, both fossil and recent; bodies, both human and animal; rats, bugs, and unpleasant diseases; the dental hygiene or final bowel movements of some poor casualty of history…" (Barker 2002: 110). How do you feel about that description? Is it an accurate summary?

I think it probably is, yes. Although I have interests beyond that – does that include human evolution for instance? I suppose it does. When I first went to the Natural History Museum, London, my interests were as much in human evolution and micro-evolution as the broader issues Graeme gives in his comment. I've also maintained an interest in other aspects of archaeology. I produced some years ago this fairly popular book on food, which is still in print (Brothwell 1969). I've also, for instance, been recently continuing experimental work on the vitrification of fortification walls in Scotland, and that at least falls outside Graeme's description.

The other thing that I have a long term interest in is art, but admittedly I haven't done much about it except edit a book on aspects of art and artists. I am an art school dropout, and I thought at first that I was going to go into art teaching, but I began to read around archaeology and anthropology in general and I got bitten by this bug, so I dropped out and abandoned the idea of being an art teacher. I have always had an interest in art – but I haven't pursued it as, for instance, Peter Ucko the present Director of the Institute of Archaeology, UCL [*] has done – but this is an area that still intrigues me. I'm particularly interested in the question of how you evaluate it in a precise and comparative way. To what extent, as anthropologists or archaeologists, should we be trying to evaluate it in a cold, scientific way? Art is seen as something which you evaluate by a somewhat different method, in an 'arts based' aesthetic sort of way, as it were. It seems to me, however, that art is concerned with technical abilities, your response to the society you

are in, the demands of that society and your creative abilities. A lot of these things, if you were to evaluate them properly, I would have thought, demanded a scientific methodology. You are dealing with creativity in a population, you are dealing with lots of people who are creating some form of art – it might be on pottery, it might be on cave walls and so on. I can go into the cave at Lascaux and exclaim, "What a lovely wall painting," and that's the 'Brothwellian' aesthetic response, but that is not the same as evaluating art in a serious academic way that can be understood by colleagues and repeated in relation to other cave art or art in other aspects of archaeology.

How then did you move from art to archaeology? How did you get caught up in archaeology?

As I said, I was reading around archaeology and anthropology generally. It all started because, as a boy of about 12 or 13, I was shown material being recovered from the Trent gravel works, where they were excavating gravels from the beds of the River Trent. What was coming out was a mixture of faunal material, some of it probably Neolithic in date, which was also mixed in with late Pleistocene material, mammoth teeth and various other things. There was also Neolithic pottery and human bones coming out. I became captivated by this, and I used to visit the local gravel works to see the office manager to see what they'd got. That was the first thing that whetted my appetite. I lived relatively near an Iron Age fort at Breedon-on-the-Hill in Leicestershire, and this was excavated by Dame Kathleen Kenyon who was, of course, a lecturer at the Institute until she went to Oxford. I went up there and I saw her excavations, which were fairly brief; she was only given rather modest funding to explore the site. Part of the hill on which the hillfort stood had already been blasted away for road metal. I saw where she'd been digging and had taken sections through the Iron Age ramparts, but she had also explored a cemetery inside the Iron Age fort, and she wasn't sure whether it was Iron Age or Anglo-Saxon. She came to the view that it was Anglo-Saxon, that these were row graves that didn't look like any Iron Age burials that had ever been found in Britain, but she only excavated something like – I can't remember the exact number – 12 or so; a modest number.

When I went up there they were being blasted down, skeleton after skeleton into the base of the quarry, so I asked permission of this one-legged quarry manager who said, "Yes, yes, you can dig up there, no archaeologist ever falls to his death from the top of the quarry face". That was the sort of attitude to insurance policies and danger in those days. So I went up there as a schoolboy with a number of school pals and started to excavate. We saved quite a few skeletons or parts of skeletons, which are now in the Royal College of Surgeons in London. That was another boost to my interests.

After that, again still in my teens, I can't remember how, but I got drawn into an excavation at Thurgarton in Nottingham, funded by Boots the Chemists because it was on their land. It was a mediaeval site with burials coming out, so I was involved in excavating them. The other thing about Thurgarton, which was very interesting, was that an appreciation of the environment within which the archaeological site was placed was clearly important. We had the problem of knowing whether, at the apparent base of the

burials, we were down onto natural rock. This was Triassic sandstone and it looked to me, when we came down to a certain level, as if it was fairly intact geological strata, but fortunately we had a visit from a Professor of Geology at the University of Nottingham who was very suspicious of the apparent rock base. He thought that the sandstones were too high in this area to be natural outcrops and that there should have been far more soil and degraded rock above the level of the undisturbed strata, so we dug down some more, and lo and behold there were more burials. That was an interesting lesson in geology in relation to archaeological sites. It was at that time that another member of the Institute turned up, this funny blue-nosed gangling character who was introduced as Professor Childe, so I met Gordon Childe for the first time in the field. Then, of course, I was to see him later because I took two courses that he was running at the Institute.

After those three things I decided that I really ought to re-think my life and not carry on and take a diploma in art or whatever. I had to re-think my school qualifications, and I decided that I ought to take three A-levels in the sciences, so I had to start studying geology, biology and chemistry from scratch, having abandoned art. The only way I could do that was really to work in a chemistry laboratory in Nottingham. This was the chemistry laboratory of what was then the Nottingham Technical College but is now Trent University. It was quite an interesting time, I learned a lot of chemistry at that period of my life, and it's always been very useful to me throughout – helping me to understand all the work in archaeological chemistry – so it really was a very useful experience. Also it gave me the opportunity to work at three A-levels; then eventually I was offered a position at University College [London] to do anthropology with associated subjects.

Unfortunately, at the time I'd been deferred from National Service because I was doing further studies. Then of course, as soon as I'd finished my A-levels I got a letter saying, "Her Majesty wants you in the Army," so I had to tell Her Majesty that I wasn't prepared to go in, and thus I finished up in Lincoln Prison for a while, which was an extremely formative period of my life, I must confess. The food was good, believe it or not, but I can't say the cells were too enjoyable. It was quite good fun. I think everybody ought to have a period in prison because you realise how absurd it is. I don't know what the prison population of Britain is now, but an absurd figure, and most of these people aren't violent and likely to do anybody any harm, so to put them in gaol is just a crazy, expensive way of going on. With me there were even people who were certified as 'defective' and so on, and we were all crowded together. It's an absurd state of affairs.

I'd already started collecting animal skeletons and skulls and things, and I came out, I'm pleased to say, with another skull, this time of a bulldog that I'd picked up in the prison grounds on one of my exercises. At the time we were not allowed to bring anything out, and I had to request paper from the prison governor so that I could actually write notes, records and various other things, but when I came out they were all confiscated, and I said, "I found this skull. Could I take that out?", "No!" I couldn't take it out. Anyway, on the way out, as on the way in, you strip down starkers and you move from one part of the prison to the other, so off came my prison greys and so on, and I

put on my other clothes. As I was leaving the prison, I felt in my pocket and there was this skull. One of my friends in prison had obviously put it there. I didn't know how prison would fit in with university, but in court they knew that I had been offered a place at UCL so they let me out in time to take it up, which was kind of them.

How was your time at the Institute and UCL? Who did you study with?
I was in the Department of Anthropology, and it was quite a small department then. There was Daryll Ford, who was a terrible teacher and no good as a professor at all. There was Mary Douglas, but she was very junior, still really trying to get to grips with how to teach and lecture and so on. Phyllis Kaberry was great, she was Reader in Social Anthropology and I learned a lot from her. It's strange this, it's very difficult to evaluate why a certain person can stimulate you while others don't, but her lectures I found intriguing and her work, for instance, among the Abalam of New Guinea, was absolutely enchanting. Nigel Barnicot was a reader then but became Professor of Biological Anthropology, with the first chair in the subject in Britain. He was stimulating but not necessarily a good lecturer, which raises this question: Why are people sometimes stimulating, yet you may feel that they're absolutely awful at giving nice, flowing lectures with lots of slides and so on?

Although it is thought that the Institute didn't do any undergraduate teaching or offer undergraduate degrees until much later on, in fact, there was a close relationship between the Institute and Gordon Childe with the Department of Anthropology, so that in fact you could cover archaeology with anthropology and quite a few of us did. I did a course on prehistoric European archaeology and a special paper on British prehistoric archaeology, as well as my anthropology subjects. On top of that, I also wanted to do vertebrate zoology, so I was really very lucky to have people like Sir Peter Medawar who was a Nobel Prize winner for some of his early tissue transplant work. I also had Professor Hans Gruneberg who was a geneticist working on mammal skeletal variation, so that really held my attention. I also attended the human genetics lectures of Professor Lionel Penrose. Lionel again was a very uninspiring lecturer but an inspiring man when it came to putting out ideas. I did geology as well, and again I found that very good, just to have more of a grounding as I'd already done A-level geology. I increased my knowledge of mineralogy, geomorphology and palaeontology, and again that's helped right the way through my interests in archaeological science in a fairly broad-based way. The problem was that really, I had bitten off more than I could easily chew; there was far too much laboratory work and so on. I do know that, in anthropology, they were a bit anxious about me because I was being tugged in too many directions. Anyway, I survived. Just about.

You have worked in both a museum environment, the British Museum of Natural History (1962-1974), and in universities, first at the Institute of Archaeology, UCL (1974-1993) and then at York University (1993-present). Why did you ultimately choose a university career over a museum post?
What happened was, I was lucky, and a bit surprised, to be offered this demonstratorship in the Department of Archaeology and Anthropology at Cambridge, so I left UCL to take

up my first job in another university. There I was, teaching biological anthropology, but I also got to know this archaeologist who many students were attracted to, a bit of a rogue really, but he was also very nice and certainly a very stimulating colleague; Eric Higgs. In fact we got together in the early 60s and produced the first edition of *Science and Archaeology* (Brothwell and Higgs 1963). That all came about because of my growing friendship with Eric. It was a nice period. Science was really beginning to lift off, and one or two people were thinking about publishing books, one for instance being *Archaeology and the Microscope* (Biek 1963), and Pyddoke at the Institute was assembling papers, which were published as *The Scientist and Archaeology* (Pyddoke 1963). It was a time when various people were beginning to think about the sciences moving into archaeology and how the scientist had contributions to make to resolving problems in archaeology. So Eric and myself compiled and edited the volume, and it was great fun. At the time I was also writing *Digging up Bones* (Brothwell 1963), which I was doing because I couldn't find anything which advised archaeologists on what to do with their bones. There were all these sites producing skeletal material and there seemed to be no handbook which people could go to, so I got a bit locked in on that as well.

I then got an interest in teeth, don't ask me why, but I did. This was because I was programme secretary for the Society for the Study of Human Biology at the time, and I proposed that one of our meetings should be on dental anthropology. I then had the job of collecting the papers together and editing the volume, so it was a fairly busy period. Cambridge was my first job, then, but the demonstratorships were only for three to five years.

At the time, Kenneth Oakley, along with the Director of the British Museum of Natural History, Sir Gavin DeBeer, who was a very important biologist in terms of developing anthropology at the museum, were advocating the creation of a sub-department of anthropology embracing prehistoric studies in general. It was planned that this should eventually develop into a full anthropology department. So I joined the British Museum (BM) with Kenneth, who was a nice colleague; a geologist who had moved more and more into human palaeontological studies. It was a good period. We already had a large collection of skeletal material which was partly BM in origin, but also we took over the Royal College of Surgeons' massive collection, and the University of Oxford Department of Anatomy handed over their material, so we had this enormous collection of skeletal material handed to us. So far most of it remains intact, although with the growing pressures from many tribal communities, one just wonders how long some of it will last as a national collection. I remained there for 12 years and the sub-department gradually expanded. That's all gone now, I'm afraid, due to economics it has once more been compressed back into the Department of Palaeontology. Before I left, I was pleased to be able to engineer posts for Peter Andrews, who is a palaeontologist of very considerable stature, who worked on Miocene and Pliocene hominids and hominoids, and for Chris Stringer who is still there and certainly one of the world's experts on hominid evolution. It was nice to see them established before I left, but then I wanted to go back into university life.

Why is that?
Well, I felt that either you're a museum person or you're not, and I wanted to go back and have the stimulation of teaching and interacting with students, because they are prompting you all the time to consider what you are talking to them about and drive you to think about your subject. I like that sort of stimulation and links with the student community. At the time, Ian Cornwall was retiring from the Institute, and Geoff Dimbleby very kindly suggested that I should apply for the job, so I moved there to take over his work, which was absolutely ideal for me because Ian was also interested in a broad comparative view of skeletal material in all vertebrates right the way through to humans. His interests also extended to other things such as soils – well, soils were not my particular concern, but I was interested in other fields such as the geological aspects of archaeology. So although we didn't completely overlap, we had many things in common.

I remained there for 20 years, I think – a life sentence – and then I wanted to change, just for my final years. I had been involved with York before the department was created in fact. Funnily enough, I was actually taking York University students to an excavation I was doing in the Orkney Islands in the late 60s and early 70s. I was offered these students as it were; a colleague up at York said, "Why don't you invite some of the students who are interested in Old English and have archaeological interests to join you?" They were supported on a certain amount of funding from York so they came up.

I was also involved, over 20 years ago, in the establishment of the Environmental Archaeology Unit up in York. Geoff Dimbleby, Peter Addyman and myself proposed that there should be some sort of laboratory here to evaluate the environmental material coming out of the excavations in York which are nice, waterlogged and rich in organic material. Again I was drawn into the York archaeological environment. So I had some links with York already, and I thought it would be nice if the department, which didn't really have any major science teaching at all, would allow me to develop something. So I came up, and I was rather lumbered, I must confess, with all the science teaching. I did an introductory course on archaeological science, and you name it, I did it, but I must say that I read a lot about archaeological chemistry and so forth that I didn't know about before, so it was a most stimulating time. Ron Cooke had just arrived from University College London, where he was head of the Department of Geography. He had also just been established as Vice Chancellor at the time I was arriving at York, and he gave me great support.

Of course, now with my retirement, we have Terry O'Connor, an Institute graduate, established in the Chair of Archaeological Science, and I also have other colleagues who are involved in archaeological science teaching. The Environmental Archaeology Unit, which was in biology, has also been transferred to the department, so now we are becoming quite a stronghold, particularly on the environmental archaeology side. It's satisfying that within 10 years I've seen quite a transformation.

You mentioned your book *Digging up Bones* (Brothwell 1963) previously. Did you expect it to have the popularity and longevity that it has had?
No, I didn't at all. I started writing it in 1960 and it was published in 1963. It's since run to a number of editions and been translated as well, but I can't remember where. I thought it would have a two or three year life – it's been very surprising that it's gone on so long. At first, of course, I didn't get any royalties because it was published by the British Museum of Natural History, and I was working there, but then, fortunately, when I left – and I didn't leave for that reason – I got royalties. It's good now that it has an American publisher, Cornell, because it's useful to have distributors beyond the Old World and beyond Europe. It has been a surprise, I must say.

Cornell now want another edition, and this time I've invited Simon Hillson to join me because I feel that he is *the* specialist on teeth. After 40 years I'm tired of it – I must confess – so it's a hard battle for me to do another edition; but we will produce one. Simon has done most of his writing, and at this very moment I am flogging away, and I hope to finish by the end of August or into September, so with luck, there will be a manuscript with publishers before the end of 2003.

You have worked on two of the more remarkable recent discoveries of human remains, the Lindow Man (1983-1984) and the Tyrolean Iceman (1991). Did you notice a change in approach to the collection, conservation or analysis of those remains in the time between the two finds?
I think people are learning slowly but surely from these various finds and certainly from Lindow and the Ice Man. I think the circumstances were different, and therefore the conservation and the early stages of treatment were rather different. The Lindow Man benefited from the fact that the local archaeologists in the Manchester area contacted the British Museum pretty well straight away, or via the police who were also drawn in, and therefore the conservation laboratory was involved early on. The body was cut out in a block with the peat and taken into the conservation lab in London. It was very gratifying that right from the arrival of the block – and I was drawn in at that stage in the proceedings – the conservators were there with us, concerned about the conservation of anything that was going to appear within the peat. All we saw at first was a small part of the body, in fact a part of the lower abdominal area, because that was where the peat-cutting machinery had disturbed the body. This was extremely gratifying, but even then there were some lessons to be learned, for instance, you have even got to keep your distilled water very fresh because it deteriorates, which we didn't realise at first. Even then, with all these decades of experience, we were still having to re-think certain aspects. The conservation generally was excellent. We were checking the temperature all the time, making sure that it was kept cool and so forth, so it was fairly strictly controlled by the conservation department.

The difference then with the Ice Man was that there had been this frozen body found, and I had read with alarm that they were treating it with phenol. The problem there was that it was growing mould, and I wrote to Innsbruck expressing some concern because I was worried that they might be altering the chemistry of the body if they were applying

things like phenol. At that point I was invited to join a little international group to be concerned with the body. I went to Innsbruck on a number of occasions and saw this remarkable man, and they asked me to make statements periodically as to the conservation control and stability of the corpse. After this original bloomer it was in fact well controlled, they kept the temperature down and the humidity steady and everything was fine. The reason why it grew the mould was because in the early stages they didn't think that it was prehistoric.

When Professor Rainer Henn – the professor of forensic medicine [University of Innsbruck] – first saw it, he thought it was maybe 50 years old. He was puzzled by the flint knife but, believe it or not, he thought that the man might be an escaped prisoner of war who had made an artefact in order to skin rabbits or butcher small animals, even while on the run. That sounds absurd now but you can understand why he thought that because most of the glaciers in that area, once they have a body in them, tear it to pieces as the ice moves. As the glacier moves down, the body is slowly dismembered, but this body was above the ice flow. Well, here was this corpse, high up in the top of the glacier so Henn thought, "Well, it's not going to be very old because it's still intact, frozen at the top". What he hadn't realised was that it was just above the glacial movement and it wasn't actually part of the main glacial surge. It was protected in its own little niche up at the top of the mountain. So it was reasonable then that he thought that it was somebody fairly recent. As a result he allowed the press to come in. The body was brought out from its cold storage, everybody breathed all over it, used flash cameras and so on. The result was that the temperature of the body went up, mould spread rapidly so there was panic all of a sudden and everybody got the message at last. Then Konrad Spindler, the archaeologist, came in and realised from the copper axe that he had something really quite unique; so then, everything changed.

It was very carefully researched by people, particularly in Austria, and I was allowed to request certain tissues. This did present them with certain problems because although it had international interest, they couldn't provide tissue for everybody because there wouldn't have been any body left, so they had to be fairly mean and fairly severe about it. What I wanted was dental calculus because I was interested in seeing whether I could find food debris trapped in the calculus, but try as we may, we couldn't find any thick deposits of calculus. I think the individual probably had dental calculus but that it splintered off because of the frosting and went down the throat of the individual, or was in the back of the mouth. We couldn't see anything, we tried to illuminate the back of the mouth, but I didn't get anything out. I did manage to get a small sample of gut contents, which Tim Holden worked on after he had finished his PhD at the Institute, mainly working on New World bodies. He had expertise of other food debris, so he was drawn in.

The other work was my own on hair. I was hoping to get longer pieces, but they were all quite small fragments that were found in his clothing. I collaborated with a colleague in Oxford using proton induced X-ray emission analysis. We did very detailed trace element analyses of the hairs, comparing the results with red deer hair also from the same site. One of the questions was: To what extent had the chemistry of the hair

changed because it had been in a frozen environment where taphonomic factors could still act? We were concerned to know to what extent there might have been shunting of elements in and out of the hair, so it was useful to have red deer hair and human hair to consider the differences in the chemistry. One thing we found in the Ice Man, which confirmed other analyses that had been done in Austria, was that there was arsenic deep within the hair itself and on the surface was copper. So it did look as if the man was not just carrying around a copper axe. It looked as if he had actually been processing copper because how, otherwise, would he have got the impurity of the copper ore, which contained arsenic, incorporated within the hair unless he was actually breathing in fumes from the processing? We were able to confirm this fairly clearly as the red deer hair was free of copper and arsenic. Now the body is locked away in the museum in Bolzano. They are still planning to research on the body further, but it's not so easy to do.

You have had a sustained research interest in early humans. What are your thoughts on the present state of our understanding of human evolution?

One aspect of human evolution that I would like to see far more debate on, is that although, ever since the days of Darwin, we have accepted that we have large brains and that they are somehow linked to the evolution of our advanced societies and cultures, clear evidence is missing. I remain unconvinced that brain increase really is linked to the final stages of our social and cultural evolution because brain size had increased significantly before we changed into advanced hominids with late Pleistocene cultures and societies. We didn't have motor cars, we didn't have advanced technology and yet we had large brains. The only thing, I suppose, that could be used to argue in favour of needing larger brains would be social complexity and linguistic complexity. Even there I am not at all convinced. I don't know to what extent we would have had complex languages by the time we had large brains. When I say large brains, I mean the range of brain size seen in *Homo erectus* for example, extending through to brain capacities of 1200cc. That is all well within the range of variation for modern human populations. I wouldn't have thought that we needed an extremely complex language. The other question, of course, is to what extent are we underplaying the abilities of other primates and other vertebrates to understand languages? There are growing studies on, for instance, the capabilities of parrots and ravens to understand it and respond to a large range of language, albeit a human language. There is, I think, a growing awareness that chimpanzees understand a simple language if you teach them, and they can use it very sensibly. Maybe the reason why they don't have a more complex language is because they don't need it. So we continue to know more about changes in morphology and physique, but the brain remains a mystery.

There has been a real shift in attitudes regarding human remains, towards re-burial and repatriation. There is now increasing emphasis placed on the use of databases for all aspects of archaeology to improve the storage and sharing of information. Do you think databases can ever replace collections of human remains?

This comes back to the problem of handing back material to tribal communities. First of all, they should not be told that the material has been worked on and finished with because we are always asking new questions; new scientific equipment becoming available and so on. Ten or 15 years ago, DNA work was at a very elementary stage, whereas now things are greatly improved, techniques are better and we're learning all sorts of lessons about extraction of DNA, and I'm sure this will continue into the future. Beyond DNA there will be other things we will want to do with this kind of material, so it is important, I think, to retain either access to whole bodies or the alternative, I suppose, is to sample and probably freeze material from these bodies. That raises another issue which I don't think has been debated. Should one be able to apply to tribal communities to take small samples? People cut their hair, cut their fingernails; there are all sorts of ways in which they discard pieces of themselves, so why can't we have samples of that kind of material for preserving and studying into the future? For that matter, surely there wouldn't be much harm in allowing a small finger bone to be retained for analysis? Repatriation with curation or reburial does raise an interesting issue: long term conservation, either of whole material or small samples of it, and access for further studies.

And it's not just tribal communities that we are dealing with these days. In Britain, there is a trend towards the return of material to local communities, for instance in Scotland in the last few years there has been considerable re-burial of material at the site of Tarbat in the northeast of Scotland, at Whithorn in the southwest of Scotland, and at Ensay in the Outer Hebrides. All this material has been returned to local communities for re-burial. In my experience even in England, there was a very rapid re-burial of mediaeval material in Chichester many years ago. I also had the unsatisfactory experience of starting work on the Jewish mediaeval cemetery in York, which then had to be returned somewhat rapidly and prematurely because of the objections of certain rabbis, and it's now re-buried. So it's not just tribal communities but local communities that are going to be demanding repatriation more and more. This is bad news for scientific investigations. We are entering a period when religious hocus-pocus holds increasing power.

What we should be doing is thinking very seriously, and somewhat urgently, about at least assembling a good database. I would also argue, again, for the retention of small tissue samples (hair, bone, skin, *etc.*), and keeping this material for chemical or DNA study, *etc.* We really ought to be assembling an internationally agreed range of essential data. The problem is, believe it or not, that this was discussed internationally before the Second World War – there were committees to discuss what should be measured and all the rest of it – and it was all abandoned, not because people couldn't agree but probably because the Second World War took us all over and nobody ever returned to discuss this question. I do think that we need action now. It is rather regrettable that the Brits, for instance, take a range of measurements that aren't necessarily the same ones that our colleagues in Germany take or that the Americans take. We are gradually beginning to agree on many of these measurements and other methodologies, but there is also a lot of data that we don't in fact all take. For example, I could read a report on Amerindian material and find that the various non-metric or metric data wouldn't necessarily be the

same as those that I record for my skeletal material. This is a shame because there will be a time when a lot of this material is going to be handed back. Some of it is going to be re-buried, but fortunately, I think a lot of it will not be, and local communities will take over its curation instead.

The display of human remains has also been a subject of much discussion lately, for example Professor von Hagens' BodyWorlds exhibition was in London last year and created quite a stir. Do you have any opinion on this issue?

Everybody seemed to think that his display was great fun. I didn't actually see it; I thought it was a dubious idea, but a lot of people thought it informative. I was interested in plastination some years ago as a possible way of preserving, say, bog bodies long term because there is this question of the extent to which they will deteriorate over time. Plastination seems to be a way of retaining the appearance visually but also ruining it for any further analysis, so I rather turned away from the idea that it could be used for archaeological materials.

As regards the display of archaeological material and particularly human remains – I would mention the display which was put on at the Museum of London: the *London Bodies* exhibition. Now, I did go to that and it was a very well organised display explaining why skeletal material was of interest, and that you could get a lot of information on early disease, evaluate the demography of early London populations from skeletal material and so on. It was visited by thousands, and there was a very nice supporting publication to go with it. The whole exercise was a great success. As far as I know – and I did talk to my colleagues in the museum about it – the public did not have strong objections to it at all. It does suggest that this idea that people would all protest strongly and turn away from human remains and write to their MPs and so on is a lot of nonsense.

There is also an increasing interest in 'forensics' being taught in archaeology departments, consisting primarily of skeletal analysis. What are your thoughts on the popularity of such courses with students and the readiness of departments to offer these courses, particularly considering the job opportunities available?

This is something that has concerned me. I was an external examiner concerned with one of the forensic courses some years ago, and I've taken an interest in the development of these courses, but I do feel that in Britain – I don't know how many are offered in Europe and the New World – that we have now reached saturation point. I think there are probably too many universities offering these courses. They are very variable courses and maybe that's a good thing because at least then people can pick and choose to some extent. Some courses are very broad based and others are fairly narrow, just concerned with human bodies and human remains, whereas others are concerned with electronic surveying of the ground for possible graves and so on. So there is a certain amount of variation, but I think there are far too many students attracted to the courses. They are paying for these masters courses and then finding that in Britain there are

very, very few jobs in forensic science laboratories that would be involved with human remains. Even in the States and Canada there is a very modest number of individuals required to do this kind of work. So one might hope that the number of universities offering these courses is reduced. There is no reason, of course, why it shouldn't be seen as a worthwhile academic course – forensic archaeology or forensic anthropology – but really to limit the numbers of individuals. Having said that, why do you study archaeology or forensic archaeology? If you have an interest, if it satisfies your curiosity, then this is the major requirement, really, of the academic course.

You have long promoted the integration of scientific techniques into archaeology. You have co-edited two of the classic volumes addressing this issue, *Science and Archaeology* in 1963 and in 2001 *The Handbook of Archaeological Sciences*. You also helped to found the Journal of Archaeological Science. Do you feel that there is still a strong divide between archaeologists that are theory based and those that are more science orientated? Do you see a division in those terms?

Yes, I'm afraid I do. I published in the Proceedings of the *Archaeological Sciences '97* conference (Brothwell 2001) saying just that; we have this division. People like myself have been involved in emphasising the importance of archaeological science in two ways, that is, scientific investigations within archaeology, and also embracing the sciences beyond archaeology and seeing the value of some of this expertise and equipment being applied to archaeological problems. Unfortunately, in going on about archaeological science we've in fact helped to condemn ourselves to a sort of apartheid situation which I think is still strong, and that we're seen to be marginal; of great value to archaeology but not really a part of archaeology. I don't see it that way at all.

I see archaeology as basically science; that even excavations are a method of sampling which goes back to the 19th century when it was part of human palaeontology and geology. So much of Pleistocene studies were done by geologists and palaeontologists, and excavation is really the same kind of thing; you are evaluating strata. They might be humanly modified and humanly produced strata but nevertheless it is strata and you are studying the deposits. They're not fossil ammonites but they're pieces of pottery and so on, and you're considering the environment in the same sort of way that 19th century geologists were interested in environmental change, glaciations and inter-glacials and all the rest of it. I personally see most of archaeology as science.

The debatable question really is: What isn't science? I have been reading around archaeological theory, and I'm somewhat dismayed by some of the writing within this field; sometimes it's positively anti-science, and also there is a lack of interest, or a lack of awareness, that the science side of archaeology also has plenty of theoretical issues as well. If you look in one of these books calling itself 'theoretical archaeology', there is little or nothing on archaeological science theory at all. Something has got to happen; we have got to get rid of this apartheid.

Maybe we are at fault to some extent by banging the science drum and saying, "Archaeological science is important." It's time for all of us to settle in with the fact that we're all concerned with archaeology and just regard ourselves as archaeologists. The thing is, of course, we are still viewed in terms of the major academic institution that is concerned with archaeology, the British Academy, which represents the arts side of scholarly research. My argument is that if we are properly regarded, then we should be associated with the science side, that is with the Royal Society, which is concerned with the sciences within the academic world. The result is that the science side is rather excluded from consideration within the British Academy, at least as regards membership. This is an odd state of affairs, and I would guess that in the next few decades it will all be resolved. Perhaps archaeology is such a mongrel subject that it should be thrown out altogether!

In the introduction to the proceedings of the *Archaeological Science '97* conference (Brothwell 2001), you also warn that archaeological science is losing touch with the social side of archaeology and is perhaps reverting to being more object focused again, do you think there is a conflict of interest there?

I think I see all of archaeology – whether you call yourself an archaeological scientist or an archaeologist on the other side of this non-existent fence – I see us all as having a fairly simplistic view of society or human behaviour at the moment. I think some of my colleagues maybe think that they are more into society and culture, but I think that there is not very much evidence that we are looking across into other academic disciplines and embracing them properly.

There was, some years ago, a bit of trouble to do with the development within biology of 'sociobiology', which was concerned with animal societies – including human ones – and how even with these there is a Darwinian basis for their survival and progression; that these societies were, in other words, controlled by Darwinian biological factors. There was shock-horror in some quarters, although there was no real reaction from archaeologists, but the social anthropologists said, "This is nonsense! You can't apply sociobiology to humans because we're so complex!" I think the sociobiologists who tried to do it were very naïve. They were naïve because humans are indeed extremely complex and culture carries a lot of, frankly, behavioural nonsense along with it.

Think about 'cultural crazes'. When I was younger there were things called hula-hoops which you gyrated about your body. There are all sorts of crazes that have come in and been picked up by people for no rational reason. These clearly have no 'survival value'; it's a creative and economic thing. One has to realise that we are a complicated lot, the human species, but a lot of it is cultural 'froth' and it's no use pretending that it has basic biological value. This is getting back to the issue that we are complex, and we need to understand this more.

It seems to me that the only way to improve is by looking past anthropology and archaeology to social psychology, for instance, and other sciences. We need to know more about animal behaviour and particularly behaviour in the more intelligent species like

certain birds; I was mentioning parrots and ravens, but also the higher primates like chimps. Chimpanzees in particular are being studied more and more, and it's becoming very clear that they are far more conscious and aware of the world than we have given them credit for in the past. We talk a lot about problems in relation to our own consciousness, but we have got to get settled in with the idea that other species have degrees of consciousness as well. So I would certainly argue for having meetings and symposia bringing together colleagues in social psychology, in animal ethology, behavioural studies and so on.

The other thing I've been going on about is that it's high time that we started being aware of the fact that in, say, the British community at large at the moment – some, perhaps a significant percentage of us, will be registered as in some state of neurotic crisis or breakdown, and there will be quite a percentage of us – maybe as many as a few per thousand – who will be schizophrenic at some point in time. In other words, reality is not constantly the same for us all, and what's more, reality for myself as a boy was not the same as reality for myself now. Thinking back, you can remember to some extent what you thought as a child, and it's not the same as now. Maybe if I eventually move into a state of Alzheimer's I'll be in a very different category of reality as well.

We tend to think of people in the past – the Vikings or the Romans – as just being all normal, or only reacting fairly rationally to things in society; absolute nonsense. Think of the societies that Rome was imposing itself on. What stresses were there in these societies? What were the reactions as a result of these stresses, perhaps especially in children? We know, for instance, from the troubles in Northern Ireland and elsewhere that there were more breakdowns, or there were more changes in the mental health of these communities, as a result of stresses. This is never mentioned in archaeology, never mentioned in anthropology in general. Of course, it is mentioned in medicine these days because there is a growing awareness that quite a few of us are going nuts to some degree. So I feel that both archaeology and other aspects of anthropology need to look beyond their own domains more and more to social psychology, neurosciences, even the nature of the chemistry of the brain that we don't know enough about yet.

In *Science and Archaeology* (Brothwell and Higgs 1963), there is a warning of potential territorial conflicts between archaeologists and other scientists – do you think this became as serious a problem as suggested, or has the collaboration between the two sides been more harmonious than expected?

That's an interesting question. I'm not able to speak for, say, my colleagues in archaeological chemistry and whether they have found any resistance in pure chemistry to their applications to archaeological materials, but in the field of zoology, there might have been – in my experience – a slight resistance to the idea that those in archaeology looking at animal domestication were not real biologists but sort of pseudo-biologists, and therefore not able to understand the real biological implications of studying this early material. I think that has probably passed now. I think there probably was resistance and some reluctance to give some of us credit for being able to understand the whole biological nature of domestication for instance. Now, perhaps because biology, more

and more, has moved into cell biology and is becoming so divorced from looking at old bones and domestication and the micro-evolution of Pleistocene fauna that biologists have rather tended to dump it all with us so that, if anything, we are the specialists on the evolution of Pleistocene and Holocene mammals, rather than those within the field of zoology. I'm not saying there aren't zoologists left that do this kind of work as well, but they're becoming rarer people now.

A common complaint in the past has been that osteologists and zooarchaeologists have not been fully integrated into excavations, and their contributions have only been seen as appendices. Do you think such specialists are now more included in the planning, excavation and writing up of projects, or is progress in this still required?

I think that progress is still required. Perhaps the specialists' work, say on the fauna, is better considered by those finally writing up the overall reports, and certainly those of us who are working on bones are drawn in more and consulted more, but I think there could still be far more improvement. I still find that the work I do tends to be a bit marginalised, or that I'm not properly informed about how things are going, and I don't have a chance to read what my colleagues are writing as an interpretation of what I've been trying to say in my part of the report. I submit my work, but often I don't see their final overall evaluation before it's published. There is still progress to be made there.

The AHRB Centre for the Evolutionary Analysis of Cultural Behaviour at the Institute of Archaeology, UCL, directed by Professor Stephen Shennan, aims to apply "biological methods to advance understanding of the evolution of human cultural behaviour". Is this the type of approach you might advocate?

Yes. I think that this is a very interesting and worthwhile development because behind culture one has got to see the biology of human populations, and that means the biological basis of human behaviour. So it's sensible that one should see this as a background perspective when you're considering cultural variation. Incidentally, I'm not quite sure what 'culture' means; is there a British 'culture' today and if so, what is it? Does it consist of Mars bars and MacDonald's and the preference for certain kinds of motor cars? If that's 'culture', what on earth is it all about?

I do think, again, when discussing sociobiology, that they obviously failed to realise that a lot of culture is in fact behaviour which has no relevance to survival and really doesn't make much sense in terms of adaptive and long-term social importance. There are features which, perhaps, have just been caught up for one reason or another because we try to give explanations. I suppose this is the thing; we are trying to, at times, problem-solve without being able to do so very sensibly. For instance, years ago, my professor, Lionel Penrose, pointed out that you can graph, as an aspect of human behaviour or culture, the use of a now obsolete medicine. This will come in because it looks as if it's going to stop you having spots or whatever, then more and more medics think, "Oh well, lets try it," and so on. You can then actually graph the sale of the drug and its use by GPs. Eventually it reaches a peak, and then people think, "Christ, its

not working," the patients are coming back more covered in spots and gradually, if you continue to graph it, the sales and use drop down to nil. I suppose that's the equivalent of the hula-hoop where you have a craze and people do something for a period of time, and for some reason or other they swing in and out of fashion. Somebody makes a lot of money, but exactly what the significance of this is to a culture is very difficult to know. All I'm trying to say is that clearly, one is wanting to get at significant common denominators of human behaviour within a society; what lasts, what has survival value, what is of long-term relevance, what is linked to – for example – worries about invasions from without, xenophobia, as opposed to what is just pure cultural 'froth'. So yes, the approach that the Centre for the Evolutionary Study of Cultural Behaviour is taking has value.

Again in the introductions to both *Science and Archaeology* (Brothwell and Higgs 1963), and the *Handbook of Archaeological Sciences* (Brothwell and Pollard 2001), the development of archaeology is likened to the growth of a human, going through infancy, adolescence, *etc.* At what stage of development do you think archaeology is now, with respect to incorporating scientific approaches?

I think it's just about reached middle childhood. I think there isn't a philosophy of archaeological science yet to any degree, and one would hope that eventually aspects of archaeological science will become more integrated together, rather like the current philosophy of physics or philosophy of chemistry. I suppose that the difference is that we are drawing on sciences from so many different academic disciplines, and we are trying to use them as tools to resolve problems in human evolution, both social and biological. In the end, surely we must move towards a more integrated overall view which must be incorporated as the core part of archaeology as a whole.

Do you feel that enough of this scientific approach is taught in archaeology departments in the UK today?

I suspect – although I haven't sat in on all lectures in all departments – that a majority of archaeologists still see their subject as very much an arts subject, and they see the archaeological sciences still as very marginal to the main core of archaeology. It is disappointing to still see general introductory texts in archaeology that tend to marginalise the literature in archaeological science. I find this very unsatisfactory.

You have regularly promoted new sub-disciplines and techniques before they have become mainstream. If you were only starting out on your career today, what aspect do you think you would be most interested in?

It wouldn't be old human bones. There are two things that really do concern me and one is the human brain and its evolution. I do think this whole question of the neurosciences in relation to archaeology is a totally unexplored field, together with social psychology and social pathology; I would like to spend many more years thinking about the possible links which will eventually occur between these sciences and archaeology.

The other thing that interests me more and more – and I have been interested in this field since the early 1980s – is the veterinary side of studying animal remains. I think that there is still a very considerable amount of work to be done there. We are still at a very elementary stage of even understanding the bone pathology that we find in animal remains. There are also intriguing questions when you look at animal pathology in terms of interpreting levels of husbandry. Some of these pathologies suggest that animals were pretty seriously manhandled and neglected by early farmers. We may naïvely think of these early farmers as deeply caring for their livestock, but at times they brutalised their animals I'm sure, and this is coming out in the levels of pathology.

What is clearly occupying all of us more and more are growing fears about zoonoses; how animal diseases are jumping again and again to human populations. If they're doing it now, they've done it in the past. Perhaps in time – the cleverer we become with DNA analysis – the more we'll be able to check out past human remains to see to what extent they were picking up these zoonoses in early agricultural times; not just tuberculosis, which has been perhaps one of the earliest of the zoonoses, but other conditions too; anthrax and so on, which may not even leave marks on bones, but which we could perhaps pursue through DNA studies in the future.

Although you formally retired in 1999, it is clear that you have not taken leave from the profession. What are you working on these days? Are there any long-standing goals you are working towards or any projects of interest that you have going?

I am still concerned about my old love of vitrification. In particular, there are Iron Age forts in Scotland where you get massive areas of vitrification. They constructed walling and somehow devised a technique whereby they could actually melt together the stones assembled as walling, so you get this solid mass of wall. There have been various experiments related to this back in time. The first were, I think, by Gordon Childe back in the 30s, but the earlier experiments never really got good meltdown. I've been experimenting, and I confess that I haven't got extensive meltdown yet. I have got melted rock, so I have actually managed to vitrify, but what I still haven't done is to actually vitrify large areas. There is some technique which these clever Iron Age people had which I don't understand, and as yet no one else does, so that's something that I want to carry on doing experimental work on.

I'm also concerned to write, with Terry O'Connor, on archaeological birds. I think we have a vast amount of information on bird remains and there are aspects of it – not just domesticated forms, which are a rather limited number of species, but also the relationship between earlier human communities and birds – which I would like to explore in more detail.

I also want to do further work on veterinary pathology and I'm even toying with the idea of producing a book on comparative palaeopathology. It is interesting that the vets consider pathology on mammals in general but exclude humans, and the medics work

on human pathology and generally exclude other mammals. There are interesting differences in how they classify joint disease and so on. There is even a name given – in both veterinary studies and human medical studies – osteopetrosis, and it's an entirely different disease in both birds and humans. So it would be rather nice to attempt an integration of vertebrate pathology but, of course, in relation to past diseases. I've been talking to veterinary colleagues about the possibility of maybe getting a grant to work just on this book about comparative palaeopathology.

I'm still interested in well-preserved bodies because I do think that they deserve special detailed study, and of course we haven't yet got to the stage where we have a methodology that takes into consideration all aspects of getting data on these well-preserved bodies, so we need more work on them including experimental work. We are working on two Egyptian bodies at the moment, and both of them appear to have been maliciously hacked about by some form of weaponry, which poses the question of what kind of weapon? The damage indicates to me that this was not the result of just plundering damage from grave robbers but that somebody was maliciously damaging them before they were actually mummified and wrapped in linen. We have been undertaking a certain amount of experimental work on pigs both wrapped in linen and unwrapped, to see to what extent we can try to resolve this question of the nature of the weaponry and at what time they were used; how dried out were the bodies for instance? I think one of the bodies, the boy of about 11 or 12, was actually hacked into with an axe five times before the flesh was fully dried out and mummified. The reason I say that is because part of the chest wall has been dragged back in a way that wouldn't have been possible had it been fragile, dry tissue. So there are still plenty of interesting problems out there to investigate, or even just contemplate.

*Please note: "Institute" refers to the Institute of Archaeology, UCL unless otherwise specified.

References

Barker, G. 2002. Bones and (the) Man: Afterthoughts on Don Brothwell's Science in Archaeology, in Dobney, K. and O'Connor, T. (eds.) *Bones and the Man: Studies in Honour of Don Brothwell.* Oxford: Oxbow Books, 110-113.

Biek, L. 1963. *Archaeology and the Microscope.* London: Lutterworth.

Brothwell, D. 1963. *Digging Up Bones: The Excavation, Treatment, and Study of Human Skeletal Remains*. London: British Museum (Natural History).

Brothwell, D. R. 1969. *Food in Antiquity: A Survey of the Diet of Early Peoples*. London: Thames and Hudson.

Brothwell, D. 2001. But What is Archaeological Science, and Where is it Going?, in Millard, A. M. (ed.) *Archaeological Sciences '97: Proceedings of the Conference Held at the University of Durham, 2nd-4th September 1997.* BAR (International Series) 939. Oxford: Archaeopress, 5-9.

Brothwell, D. and Higgs, E. (eds.) 1963. *Science and Archaeology.* London: Thames and Hudson.

Brothwell, D. and Pollard, A. M. (eds.) 2001. *Handbook of Archaeological Sciences.* Chichester: John Wiley.

Pyddoke, E. (ed.) 1963. *The Scientist and Archaeology.* London: Phoenix House.