Institution: Liverpool John Moores University

Unit of Assessment: 24 Anthropology and Development Studies

Title of case study:
LJMU research improves public understanding of human evolution through engagement with the creative and media sector.

1. Summary of the impact (indicative maximum 100 words)

LJMU's Research Centre in Evolutionary Anthropology and Palaeoecology actively engages with broadcasters and the creative sector, providing a significant evidence base and impacting the commissioning and content of television programming about human evolution. LJMU research is at the forefront of this activity, underpinning programmes that are an excellent vehicle to promote the public understanding of human evolution, which in turn promotes public engagement with science more generally. Television production companies and broadcasters approach LJMU to provide high-quality scientific input which drives decisions about and ultimately produces up-to-date factual programming that attracts, engages and educates large and diverse viewing audiences in the UK and worldwide.

2. Underpinning research (indicative maximum 500 words)

The LJMU research underpinning this impact [**1,2,3,4** in REF 3b, 3 below] is influential because it does not just focus on the fossil evidence per se, but relates this to the potential physiological and functional capabilities of the living hominins. Wheeler's research therefore provides a conceptual framework upon which the visual realisations required for television can be scientifically based. It is the specific nature of these research outcomes, together with the extremely high level of general public interest in human origins, which make LJMU research of such interest and utility to the broadcasting community.

Aiello & Wheeler (1995 **[2]**) proposed the Expensive Tissue Hypothesis to explain why the energetic costs of increasing brain size during human evolution have not resulted in a correspondingly elevated Basal Metabolic Rate (MBR). They showed that the additional costs of the metabolically expensive brain are balanced by a corresponding reduction in the relative size and energetic expenditure of the gut. Such a reduction in gut size required a shift to higher diet quality, which it was suggested initially resulted from the consumption of an increased proportion of animal material and later the development of cooking. Larger brain size was therefore linked to dietary change and an entire suite of social and foraging behaviours.

Other work (Wheeler 1993, 1994; Aiello & Wheeler 2003 **[1,3,4]**) focussed on the impact on human evolution of thermoregulatory pressures resulting from environmental factors. Building on previous modelling studies of the thermoregulatory significance of bipedalism and the loss of functional body hair, Wheeler (1993 **[3]**) demonstrated how observed changes in post-cranial body form further increased tolerance of high thermal loads, and reduced drinking water requirements, in hot equatorial environments. Wheeler (1994 **[4]**) quantified the extent to which thermal stress could be ameliorated by modified activity patterns, such as shade seeking during the hottest part of the day. This study also found that these advantages are substantially higher if the covering of body hair is reduced, providing further insight into the appearance and behaviours of early hominins.

3. References to the research (indicative maximum of six references)

The key outputs relevant to this impact are:

[1] Aiello LC, Wheeler P. 2003. Neanderthal thermoregulation and the glacial climate. In: van Andel T, Davies W, editors. *Neanderthals and modern humans in the European landscape during the last glaciation*. Cambridge: McDonald Institute for Archaeological Research. pp.147–166. (This output can be supplied by LJMU on request.)

[2] Aiello L, Wheeler P. 1995. The expensive tissue hypothesis: the brain and the digestive system in human and primate evolution. *Current Anthropology* 36:199–221. doi:10.1086/204350

[3] Wheeler, P. E. (1994). The thermoregulatory advantages of heat storage and shade-seeking behaviour to hominids foraging in equatorial savannah environments. *Journal of Human Evolution 26*(4), 339-350. doi:10.1006/jhev.1994.1021

[4] Wheeler, P. E. (1993). The influence of stature and body form on hominid energy and water budgets – a comparison of *Australopithecus* and early *Homo* physiques. *Journal of Human Evolution 24*(1), 13-28. doi:10.1006/jhev.1993.1003

Professor Wheeler joined LJMU in 1981 as a lecturer in physiology; following his appointment as Director of the School of Biological and Earth Sciences in 1991, he has been Dean of the Faculty of Science since 2002. His research into the constraints placed upon human evolution by basic biology and physiology has been extremely influential, catalysing hypotheses throughout palaeoanthropology and providing an evidence-based matrix for testing these. Wheeler's unique insight into this aspect of human evolution allows him to literally flesh out the bones upon which most other research focuses.

All of Wheeler's publications are highly influential and well cited. Aiello and Wheeler (1995, **[2]**) (599 WoS citations on 17/11/13) is still in the top 3 papers downloaded and viewed in *Current Anthropology* over the past 3 years, demonstrating the extent to which it has influenced the field.

Since joining LJMU in 2012, Lecturer in Biological Anthropology Dr Isabelle De Groote has been involved in this impact as an ambassador for the BBC's public engagement strategy for the 'Prehistoric Autopsy' series, broadcast in October 2012.

4. Details of the impact (indicative maximum 750 words)

LJMU research underpinned the following impacts:

- Substantially informed the content and presentation of four BBC2 TV programmes **[1,2,3,4]**
- Increased the understanding of evolutionary anthropology by engaging millions of people around the world via the medium of mainstream broadcast TV [i, ii, iii, iv] and an accompanying exhibition [iv] **[1,2,3,4]**
- Improved the performance of the creative industries by helping secure ~£1m in commissions and enabling production of programmes about topics that are not easily communicated through the medium of television [i, ii, iii, iv], **[1,2,3,4]**

The four programmes discussed in this case study and their underpinning research are:

i. BBC Horizon Did Cooking Make Us Human? First broadcast: 02 Mar 2010 **[2]**
ii. BBC Horizon What's the Problem with Nudity? First broadcast: 03 Mar 2009 **[1]**

iii. BBC Origins of Us. Guts. First broadcast 24 Oct 2011 **[2]**
iv. BBC Prehistoric Autopsy Ep 2: Homo erectus broadcast 24 Oct 2012 **[3,4]**

LJMU research substantially informed the content and presentation of four BBC2 TV programmes

LJMU's established reputation for research into human evolution, spearheaded by Professor Wheeler, has led to his being sought after as the production scientific consultant and an on-screen participant for numerous television programmes made during this REF period. These use his expertise on and behind the scenes to create and inform the content and direction of these programmes. Television producers seek to represent the evolving human form in a well-grounded yet accessible context. In this milieu, Wheeler's research reconstructing hominid behaviour, palaeobiology and palaeoecology **[1,2,3,4]** is inherently more useful than most palaeoanthropology research, which focuses upon phylogenetic reconstruction. Wheeler's interaction with the producers of television programmes allows research and current thinking in the field to be represented visually using the shorthand of physical reconstructions of the hominid body in action, with all associated constraints and capabilities.

BBC staff confirm that LJMU research underpinned these programmes **[D,E]** LJMU research led to new and better reconstructions of human form and function, which led to the making of television programmes using this new perspective. Wheeler's research was heavily drawn upon for scripting and producing these programmes **[D]**. His research was considered to be 'fantastic', and he was 'very helpful with the research into the programme' and gave a 'very informative' interview (for i, **D**).

LJMU research increased the understanding of evolutionary anthropology by engaging millions of people around the world via the medium of mainstream broadcast TV [i,ii,iii,iv] and an accompanying exhibition [iv]

Ratings for the initial broadcasts of these programmes:

Ref.	Series	Title	Original broadcast	Viewers (millions) [**A,B**]
i	*Horizon*	Did Cooking Make Us Human?	02.03.2010	2.2
ii	*Horizon*	What's the Problem with Nudity?	03.03.2009	1.9
iii	*Origins of Us*	Guts	24.10.2011	1.7
iv	*Prehistoric Autopsy*	*Homo erectus*	24.10.2012	1.2

Collectively these programmes reached 7 million UK viewers on their original broadcasts, and achieved a viewing market share between 4.7-7.6 % of all viewers, which is excellent for science broadcasts [A, B, D, E]. Programmes were rebroadcast on the BBC and more recent ones available for download from the internet via their iPlayer application (figures only available for iii = 96k downloads; iv = 111k downloads, **E**). Furthermore, these programmes are sold to broadcasters overseas and retransmitted, although viewing figure are not available. The range of countries where these programmes have been purchased and rebroadcast includes Australia (i,ii), Mexico (ii) , New Zealand (ii), New Zealand (ii), Belgium (ii), Italy (ii), Netherlands (ii), Israel (ii), Denmark (ii), Spain (ii) South Africa (SABC; ii) , USA (i, ii) and Germany (i, ii) Hungary (iii), Finland (ii, iii) Sweden (ii, iii). A DVD was released for (iv), and this programme was available for download

via iTunes, widening its reach and permanence. *Horizon* is co-produced by the Discovery Channel and rebroadcast extensively on that network (i,ii) **[E]**. These episodes have also been sold for in-flight entertainment on Emirates and other airlines **[E]**.

Programme **iv** had a public outreach strategy which included public lectures and exhibits at Birmingham Thinktank (22 - 25 October 2012); Manchester Museum (27 - 30 October 2012); Great North Museum Hancock, Newcastle (1- 4 November 2012); National Museum Cardiff (8 - 11 November 2012); Horniman Museum, London: (14 - 18 November 2012); National Museum, Scotland (23 - 25 November 2012). De Groote gave Prehistoric Autopsy Uncovered talks at Manchester Museum (29 October 2012); Great North Museum (4 November 2012); and at Horniman Museum (18 November 2012) and wrote an accompanying article for *Focus* magazine (September 2012 issue 246). The museums contacted confirmed good visitor numbers for the dates associated with the talks and exhibitions. Following one talk (London, n=35) audience volunteers completed a short survey which showed that 63% of respondents had changed their ideas about human evolution by the talk and series, and an additional 13% felt their knowledge was expanded. Crucially, of those surveyed 77% were able to recount a feature of human evolution which they had learned from the series and talk, demonstrating the efficacy of this programming and outreach in increasing the understanding of human evolution.

LJMU Research Improved the performance of the creative industries by helping secure ~£1m in commissions and enabling production of programmes about topics that are not easily communicated through the medium of television

Figures from the BBC website and from the producers consulted confirm that each of these programmes had a budget ranging from £127k - £140k to produce **[C,D,E].** Securing the participation of academic staff who will provide their research and ideas is often important in the commissioning decisions, and provides a guarantee that the production companies will make interesting, factual, and informative programmes. Often Wheeler is consulted at an early stage of the project so his expertise is essential to the programmes getting funding and being produced. Further, the success of science programmes underpinned by LJMU research helps secure commissions for other programmes within the genre, for example the success of Horizon programmes (i, ii) led to the series commission for (iii; 5 episodes) **[D].**

Another impact of our research and consultancy is providing input to production companies about what is not easily communicated through the medium of television, as was the case for an episode of *Bang Goes the Theory*; this was described as essential assistance and "one of the 'hidden' values of academic consultation." **[E,1,3]**. It is difficult to make a television programme purely about fossil bones and teeth so the fleshing-out that Wheeler's research makes possible is instrumental to the interface between the science and the general public.

5. Sources to corroborate the impact (indicative maximum of 10 references)

[A] *The Guardian,* TV viewing figures
[B] BARB viewing figures
[C] BBC commissioning information http://www.bbc.co.uk/commissioning/tv/how-we-work/business-requirements/tariff-ranges.shtml
[D] Producer, BBC
[E] Series Producer, BBC