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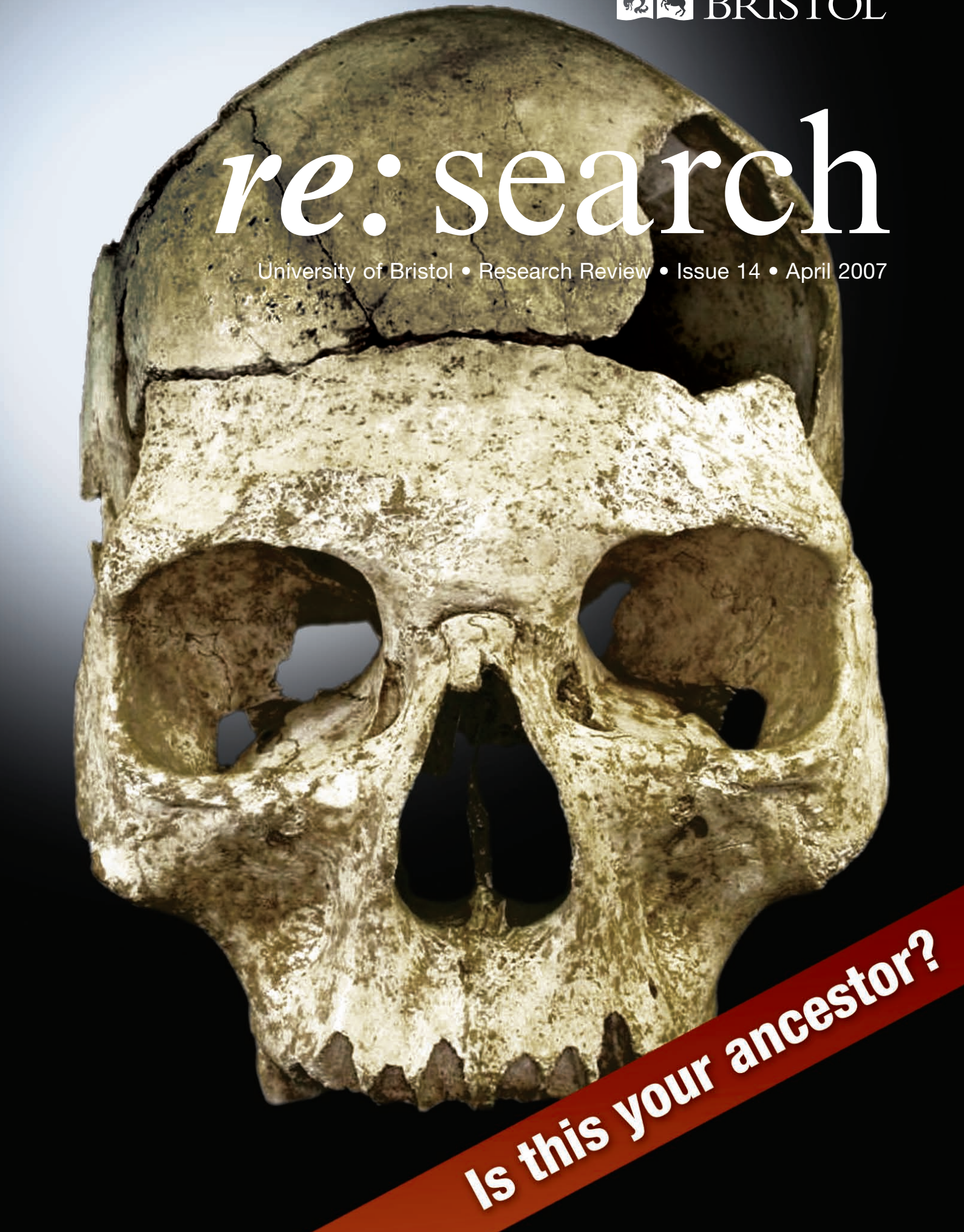
University of Bristol • Research Review • Issue 14 • April 2007



Is this your ancestor?

re: search editorial

I do like a good controversy

As one of my heroes, Arthur Holmes, used to say, good science progresses by erecting 'wickets to be bowled at'. If they haven't been knocked down within 50 years then they are pretty robust, although could still fall if someone throws a really good googly.

We have two wickets in this issue that have had a few googlies thrown at them recently. The first questions who our distant ancestors were. The latest evidence suggests that when early modern humans moved out of Africa and arrived in Europe, they interbred with the Neanderthals. This is a shock to our cultural values, given that it was previously believed we were descended from a superior race who out-competed the Neanderthals in all ways – can we really be descended from those brutes? Or is it, perhaps, that we need to re-evaluate our understanding of this sophisticated, technically advanced and much-maligned race?

The second wicket to be fending off a lot of fast balls lately is global warming. *The Great Global Warming Swindle* and *An Inconvenient Truth* demonstrated two ends of the spectrum of our understanding about climate change – the former implying we are all being conned into believing that a change in the climate is occurring at all, and the latter supporting what most scientists seem to believe, but sensationalising it.

The *Swindle*, in particular, incensed our climatolgiststs. It implied that in our secular world 'global warming' has become the new religion, and cutting CO_2 emissions the new stick with which to flagellate ourselves. It also claimed that because the global warming band-wagon is now rolling so fast and so many jobs depend on it, views of dissenters who contributed to the IPCC's report on climate change were suppressed. Interestingly, though, an article in *New Scientist* claims the opposite – ie, that references to 'feedback mechanisms' which could point to even faster warming than predicted, were also suppressed.

What is the public to believe? Well, to help inform the debate, I asked some of our climatolgiststs to give their views on what they think are the undisputed facts. You can read their opinions on page 14, and all about our Neanderthal ancestors on page eight. Which wickets do you think are toppling?

Cherry Lewis
Editor

*re:*search is produced termly by the Public Relations Office, Communications and Marketing Services.

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*re:*search No 14, April 2007
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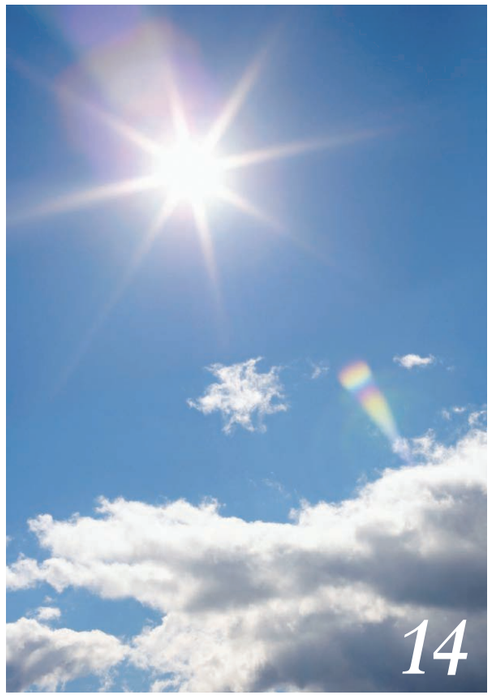


pre: view

02 Brain waves make a splash
What rats can tell us about how our brains function.

04 A taste of depression
The ability to recognise which tastes are most affected in someone with depression might give us some idea of the neurochemical basis for their disease.

05 Translating research into saving lives
A new centre for investigating the cause of disease.

06 Are we facing a poverty-stricken old age?
Will the Government's proposals for reforms avert a pensions crisis?

08 The Neanderthals: human ancestors or aliens from outer time?
Just who were our real ancestors?

11 Back to sleep during the day
New advice for when babies are asleep during the day.

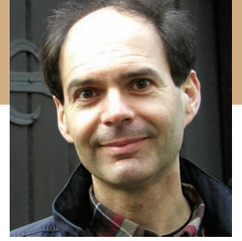
12 Building Antarctica in central Bristol
The search for life on other planets is going on right here in central Bristol.

13 Turning off cancer
Helping cells commit suicide.

14 In our opinion… Science in the public spotlight
Just what do we really know about global warming?

15 15 minutes of football?
Small changes in a child's daily exercise routine can have huge benefits.

16 New insights into the brain
Some exciting new developments in our understanding of how the brain works.



The Neanderthals: human ancestors or aliens from outer time?

The first humans appeared in Africa some two million years ago and, soon after, dispersed into Asia and Europe. Subsequent geographic and genetic isolation eventually led to the differentiation of two lineages: Homo sapiens in Africa, and Neanderthals in western Eurasia. ***João Zilhão***, Professor in Palaeolithic Archaeology, from the Department of Archaeology and Anthropology, puts the case for our badly misunderstood cousins.

Above: Pierced and grooved pendants from Châtelperronian level X of the Grotte du Renne, France, which also yielded skeletal remains of their Neanderthal makers.

Opposite page: The Oase 2 cranium (top) and the Oase 1 mandible (below), Europe's earliest modern human fossils, feature diagnostic Neanderthal traits.

Almost since their discovery in 1856 Neanderthals have suffered from a bad press, especially in the English-speaking world, where the term entered daily language as a widely used deprecating adjective. Nowadays, such views of Neanderthals as the archetypal cavemen are no longer found in academia; nevertheless, the predominant view still is that they should be construed as a side branch of humanity, a dead-end of evolution, both distinct from and somewhat inferior to *sapiens* people. Such a prevalence largely arose from the fact that mitochondrial (mt)DNA studies of present populations, coupled with mtDNA data extracted from Neanderthal fossils, have provided much support for the notion that today's humans descended entirely from a second out-of-Africa dispersal of evolved *Homo sapiens* that took place some time after 60,000 years ago. Upon arriving in Europe, where their earliest fossil represent-atives are now dated to between 40,000 and 42,000 years ago, the theory continues, these modern humans would have out-competed local populations as a result of being superior in cognition, culture and adaptation; for the Neanderthals extinction would have been swift, leaving no descendants.

The out-of-Africa expansion of modern humans involved interbreeding with Neanderthals

Thanks to new insights and new finds during the past decade, this notion of the Neanderthals' fundamental 'otherness' is on the wane. Where the fossil record is concerned, it is now clear that all early European modern humans feature a diverse mix of skeletal features that are either diagnostic of Neanderthals, or that correspond to generically primitive traits that had been lost in the African lineage prior to dispersal into Eurasia. A case in point is the fossils from the Oase cave (Romania), which I ➜

➜ excavated and study in collaboration with Erik Trinkaus (Washington University, St. Louis). A skull found there had the same proportions as modern human crania and shared a number of modern human features. However, there were some important differences, which included frontal flattening of the face, a large bone protuberance at the base of the skull and exceptionally large upper molars, all features found principally among Neanderthals.

This evidence suggests that the out-of-Africa expansion of modern humans involved interbreeding with the Neanderthals. Once closer and more intensive contact was established, the small, peripheral gene pool – Neanderthals – underwent assimilation, not extinction. Further support for this theory is found in the fact that in the many lineages of mammals for which fossil or molecular data are available, the minimum amount of time required for complete reproductive separation is some 350,000 generations or, in humans, seven million years. This is at least ten times more than is estimated for the Neanderthal/*sapiens* split (500,000 years, or 25,000 generations ago) and carries the implication that, at the time of contact in Europe, some 42,000 years ago, interbreeding would have resulted in viable, fertile offspring.

Data provided by important genetic studies published in November 2006 are also consistent with this suggestion of interbreeding. One study concluded that a variant of a gene involved in the control of brain size (*microcephalin*), and now found in 70% of today's humans, was introduced some 37,000 years ago into the *sapiens* lineage from an archaic lineage – most probably Neanderthals. The second study, from the Max Planck Institute in Germany, announced preliminary results from the Neanderthal genome project, which aims to sequence the entire nuclear DNA from extracts of a Neanderthal bone. Looking at sites in the DNA molecule where we can investigate how often the Neanderthal had the ancestral (that is, the chimpanzee) or the derived (that is, the human) variant, they found the derived one in 30% of cases. Given the estimated time of divergence between Neanderthals and modern humans, the team concluded that such a high percentage implied gene flux between the two lineages, due to interbreeding.

This conclusion is of great significance because the Neanderthal individual sequenced by the German team *predates* by many millennia the actual dispersal of modern humans into the European continent. The inescapable implication is that, despite geographical isolation and ensuing morphological differentiation, gene flux between Europe and Africa was never completely interrupted and, therefore, biologically, Neanderthals and modern humans must be construed as different populations of a *single* species, not as different species.

This new fossil and genetic evidence dovetails nicely with the rapidly increasing body of archaeological data showing that, at the time of contact between late European Neanderthals and immigrating modern humans, both lineages had attained comparable levels of cultural achievement. Over the past ten years, working in close partnership with Francesco d'Errico, in Bordeaux, and other French colleagues, I have been able to demonstrate that the Châtelperronian – an archaeological culture with sites extending from the Paris basin in the north to the Spanish Basque country in the south – is an independent Neanderthal development. The significance of this finding resides in the fact that, with its objects of personal ornamentation and decorated bone tools, the Châtelperronian has ➜

Neanderthals and immigrating modern humans attained comparable levels of cultural achievement

Oase skull in situ.

➜ been widely recognised since the 1960s as the first stage of the artistic and symbolic 'revolution' of the European Upper Palaeolithic period.

At the same time, German colleagues were producing evidence for the sophisticated cognitive and intellectual capabilities of the Neanderthals derived from artefacts related to more mundane subsistence activities. Analysis of two fragments of birch bark pitch used for stone tool hafting recovered at the site of Königsaue, on the margins of the Aschersleben paleolake, in Saxony-Anhalt, and directly dated to more than 50,000 years ago, showed that they had been produced through a smouldering process several hours long, that required a strict manufacture protocol: under exclusion of oxygen, and at tightly controlled temperatures (between 340 and 400°C). These items document the manufacture by Neanderthals of the first artificial raw material known in human history, a feat of chemistry that experimental archaeologists have so far been unable to replicate using Palaeolithic technology alone. Last year, the same kind of pitch was reported from a site in Italy dating to more than 120,000 years ago, giving extended time-depth to the evidence for advanced cognition in the Neanderthal lineage.

If one were to form an opinion on the basis of how Neanderthal-related scientific discoveries are reported to the public, one would hardly guess that this much-revised view of Neanderthals as a cognitively sophisticated, fully human part of our ancestry has already been endorsed by a significant number (if not a clear majority) of archaeologists and palaeoanthropologists directly involved with the research. Thus one of the most fascinating features of contemporary studies of the origins of modern humans lies in the continued popularity, particularly in the media and more conservative quarters of the academic world, of traditional views of the Neanderthals as aliens – not from outer space but from outer time. Although there are reasons to be found strictly in the domain of the scientific history of the subject, the particular role played by Neanderthals in late 19th-century debates over evolution goes a long way to explain such current attitudes.

> The first artificial materials known in human history were manufactured by Neanderthals

At that time, Neanderthals were used as supporting ancillary evidence in mainstream ethnological views of the racial ladder, to which they added a temporal dimension. Today, ranking human races is no longer acceptable but, in western culture, the philosophical or religious need to place 'us' at the top of the ladder of life is still very prevalent and explains the continued search for images of what 'we' are *not* (or *not anymore*) that, by contrast, enhance the basics of what 'we' *are*. Thus, depending on different perceptions of the fundamental basis for the triumphant status of civilized society and industrial capitalism, so the tendency arose for Neanderthals to be represented as lacking in the corresponding behavioural features. For instance, to give but a few examples, the Enlightenment emphasised the power of reason, Adam Smith stressed the importance of the division of labour, and David Ricardo explained the role of international trade and comparative advantage. And, sure enough, explanations for the demise of the Neanderthals have variously postulated competitive inferiority caused by their lack of symbolic cognition, labour specialisation and long-distance circulation of raw materials.

The fact that such propositions are demonstrably in complete contradiction with the empirical record does not seem to deter their uninterrupted flow. This suggests that the Victorians were not completely wrong, Neanderthal studies do have the potential to bring progress not only to the understanding of past humans as *they* were in the past but also to the understanding, through philosophy, sociology and the historiography of science, of present humans as we are in the present. Put another way, despite the apparent cacophony, the field of Neanderthal studies has at least one uncontroversial conclusion to offer: that Neanderthals should not be left to archaeologists and palaeoanthropologists alone. ■

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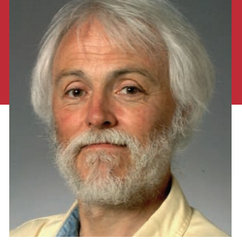

Professor Peter Fleming (left)
Dr Peter Blair (right)

Back to sleep during the day

In the mid-1980s it was recognised that the number of babies dying from Sudden Infant Death Syndrome (SIDS, commonly referred to as cot death) had increased in many countries, but no-one knew quite why.

Peter Fleming, Professor of Infant Health and Developmental Physiology, was just starting the Avon Cot Death Study when he read a Dutch report which suggested that putting babies to sleep on their fronts led to a high risk of cot death. Fleming immediately analysed the Avon data and found that indeed, 93 per cent of the babies who had died had been put to sleep lying on their fronts.

Initially researchers refused to believe that something as simple as this could have such a profound effect and it wasn't until a follow-up study in 1991 that Fleming felt confident enough to approach the government's health advisers with his findings. Following a high profile campaign on the issue by TV presenter Anne Diamond – who lost her own child through SIDS – the Government gave its official support to the study and launched the highly successful *Back to Sleep* campaign. As a direct result, cot deaths across the country fell by 70% – the equivalent of saving 12 babies a week.

Since then, much work has been done on this distressing syndrome, by Fleming and others, and parents have further been advised that for the first six months the safest place for a baby to sleep is in a cot by the parents' bedside. But new research by Dr ***Peter Blair***, a Senior Research Fellow working alongside Fleming, reveals that this advice is just as important for an infant's day-time naps as it is for their night-time sleep.

> Day or night, the advice is the same

The new study found that the babies who died during the day were more likely to have been placed on their side than on their back for their day-time naps; they were more likely to be found with their heads covered by the bedclothes than the babies who didn't die; and, in particular, 75 per cent of the babies who died in the day-time were sleeping in a room where there was no adult present.

One important aspect of the study looked at the time that had elapsed since the baby was last seen alive. Three quarters of the infants who died during the night were observed alive after midnight; a fifth were still alive within two hours of death. Of those who died during the day, over a third were alive 30 minutes prior to death and nine per cent were alive within 10 minutes of death. The fact that most parents described their infants as seeming to be well the last time they saw them alive suggests that for some of these deaths the onset of the final event was very quick. The protective effect of having an adult in the same room as the sleeping infant is therefore important as it may reduce the risk of young infants rolling onto their front, or bedclothes covering their head.

In summary, most of the risks associated with SIDS were significant for both night-time and day-time deaths, although the fact that the father smoked was only significant for night-time deaths, and placing infants on their side to sleep was more marked amongst the day-time deaths. So fundamentally the advice remains the same – put your baby to sleep on its back – whether it's at night or during the day. ■

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