What to believe and what not to believe

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EDITORIAL

What to believe and what not to believe

How does one arrive at a rational and responsible position when considering contentious scientific issues? The influence of human activities upon climate change is one such issue that receives substantial media coverage, and is of vital importance for policy decisions concerning the limiting of emissions of greenhouse gases. There is no shortage of interviews with scientists who dissent from the mainstream view that the human species is playing a significant role in global warming, so what are those of us who are not experts in this field to believe? Personally, I can see no sensible alternative—unless, in the absence of suitable knowledge, one is willing to devote appreciable effort to understanding the subject in some depth—to relying upon the evidence-based judgement of authoritative groups of scientists with appropriate expertise, and this is what I attempt to do, although not unquestioningly so, in arriving at an opinion on this and other controversial scientific issues. An example closer to home concerns the level of adverse health effects arising from exposure to anthropogenic radioactive material, and a paper in this issue of *Journal of Radiological Protection* provides us with an insight into recent publicity surrounding this subject.

The paper is by John Steward and his colleagues [1] from the Welsh Cancer Intelligence and Surveillance Unit (WCISU) in Cardiff, who describe the work they have done to address the claim of a pressure group (Green Audit, run by Chris Busby) that a significantly increased incidence of leukaemia exists among young children residing near the Irish Sea coast of Wales, and that this is due to exposure to man-made radionuclides (mainly discharged from Sellafield) present in the coastal environment. Steward *et al* demonstrate that this claim of a significantly raised level of leukaemia in young children living close to the Welsh coast is illusory and apparently the consequence of various mistakes. The epidemiological work that resulted in this claim was never published in the recognised peer-reviewed scientific literature, which is widely regarded by the great majority of scientists as the proper home for reports of this kind. Nevertheless, the claim received media publicity (with one media company seemingly collaborating with Green Audit on some of the research), causing public concern and involving WCISU in a substantial amount of work when (presumably) they had more important things to do than demonstrate that the research leading to the claim and the consequent publicity was seriously inadequate.

That WCISU found Green Audit's work to be severely flawed comes as no surprise to me. When I was a member of the UK Government's Committee Examining Radiation Risks of Internal Emitters (CERRIE—a subject I have addressed before in the Journal [2]) we examined a number of Chris Busby's self-published reports, including those concerned with the incidence of leukaemia among young children living along the Welsh coast. It is difficult to describe these reports as anything other than very slipshod, and falling well short of the standard required for publication in a recognised scientific journal. In one instance, the large excesses of childhood leukaemia cases that were claimed to have occurred in parts of Wales would have to have been accompanied by equally dramatic deficits of cases of all other childhood cancers, sometimes to the extent that *negative* numbers of such cases had apparently occurred—clearly there was something seriously wrong with the dataset being used, but this fundamental problem had apparently eluded the author. Anyone interested in

just how erroneous are the Green Audit reports of leukaemia among young children in Wales should go to www.cerrie.org/committee_papers and take a look at CERRIE Document Nos 61, 75, 94 and 131.

Also in this issue of the Journal, Mike Thorne [3] reviews the Final Report of the Depleted Uranium Oversight Board (DUOB), which met during 2001–2006 to oversee a urine testing programme to investigate whether UK personnel involved in recent conflicts had been significantly exposed to depleted uranium (see www.duob.org.uk). As with the CERRIE report, Chris Busby (a member of the DUOB) could not agree with the majority of the committee and, with a few like-minded individuals, presented a 'minority report', which Mike Thorne finds 'incoherent and illogical'. Once again, the dissenting views paraded in the 'minority report' run alarmingly contrary to the conclusions of mainstream professional scientists and are wholly unconvincing to an external reviewer.

As a brief aside, it is of some interest that, possibly in an effort to counter the criticism that he does not submit his work to be technically assessed for suitability for publication in the peer-reviewed scientific literature, Chris Busby has recently had a rash of papers 'published' in the 'web-journal', *European Biology and Bioelectromagnetics* (www.ebab.eu.com)—a curious entity that was launched in 2005 and claims to publish peer-reviewed papers, but which, after five issues of Volume 1, appears to have run out of steam after Issue 1 of Volume 2 in 2006. I shall let you be the judge of just what might be going on here by pointing out that Busby, a member of the Editorial Board, is an author of no fewer than eight papers in the currently existing (as of February 2008) six issues of the journal! *European Biology and Bioelectromagnetics* raises another important matter that I cannot pursue here, and that is the question of what should constitute the recognised scientific literature and how any given journal can be inferred reasonably to be a part of this literature. This is a complex question that goes to the heart of what the public might consider to be a genuine scientific (rather than, say, political) publication.

The UK Government's independent expert advisory Committee on Medical Aspects of Radiation in the Environment (COMARE) has crossed swords a number of times with Green Audit over the validity of the dramatic claims made in its reports (see www.comare.org.uk). Invariably, COMARE reaches the unsurprising conclusion that the methodologies of the studies upon which the claims are based are so deeply flawed that no credence can be attached to the startling conclusions drawn by Busby and his colleagues. This leads us to the crux of the matter: why should any attention continue to be given to these self-published Green Audit reports when they are universally condemned as scientifically worthless by experts who examine them? The problem, I believe, is rooted in both a lack of understanding and a lack of trust.

The lack of understanding, which is slowly being successfully addressed, is of the nature of scientific method and publication, especially the role of peer review. Without this appreciation, to the uninitiated a Green Audit report may look just as scientifically legitimate as a paper in *Nature*, and the media may treat them with equal evidential weight, however bizarre this may seem to professional scientists. The lack of trust stems from the nature of the issue that Green Audit chooses to address: the risk of cancer, particularly in children, posed by low-level radiation, especially that resulting from releases of radioactive material from nuclear installations. This has been fertile territory since the revelation in 1983—notably, in a television documentary—that a pronounced excess of childhood leukaemia has occurred in the village of Seascale, adjacent to the Sellafield nuclear complex in Cumbria. To the layman, the explanation would seem to be obvious: exposure to radioactive material discharged from nuclear facilities is the cause of the raised levels of childhood leukaemia that have been reported in some of their vicinities. The failure of expert bodies to find support for this interpretation is just a reflection of a worrying lack of basic scientific understanding of the effects of radiation upon

human health, and Chris Busby taps into this sentiment by not only apparently adding to the evidence for a raised risk of childhood leukaemia from exposure to man-made radionuclides, but also providing an underpinning biological mechanism that others have managed to miss—a beguiling brew for a media hungry for stories.

I'm afraid that there is no panacea for Green Audit reports and their ilk. It does appear, however, that some journalists at least are beginning to realise that the recognised scientific literature, although not perfect, does broadly achieve through peer-review a minimum standard of quality in its published papers. As a consequence, journalists are becoming more sceptical of self-published reports and are starting to question why dramatic findings are not being published in mainstream scientific journals; but a good scare-story is always going to be hard to resist. So, bodies such as WCISU and COMARE are likely to have to continue to devote substantial effort to exposing seriously deficient studies that have attracted media attention for a while yet. Nonetheless, this shouldn't be regarded as completely unproductive since it does graphically illustrate just why the scientific community has prudently established a mechanism—peer review—for identifying findings that are worthy of further attention.

Returning to the theme upon which I chose to embark in writing this editorial, the consideration of an example from a field about which I have some appreciation illustrates starkly why I attach most weight to the views of authoritative review bodies when considering scientific issues about which I don't have so much background knowledge. Maverick opinions, often flamboyantly conveyed, may make good copy for a media in search of controversy, but it is sound scientific evidence upon which policy must be based.

References

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