

(how good statistics can be misunderstood or misrepresented, knowingly or otherwise) and problems in comparisons (across time, space, groups). The narrative flows easily, and all the points are driven home with engaging examples from real life.

The book starts by examining the opening line of a recent PhD proposal: “every year since 1950, the number of American children gunned down has doubled.” Starting with one death in 1950, this implies that more than the current world population would have been dead by the early 1980s. Best tracks the reference down to a colourful mutation of a 1994 report that “the number of American children killed each year by guns has doubled since 1950”.

I often cite the well-known statistic that two per cent of Americans believe they have been abducted by aliens and returned to Earth. Sadly, Best explains the source: the researchers thought a direct question about abduction might be off-putting, so instead they devised five indicative symptoms. One was: “Have you experienced waking up paralyzed with a sense of a strange person or presence or something else in the room?” Scoring four out of five positive responses apparently equated to affirming abduction.

In a more constructive vein, Best shows how we can test for racial bias in police arrests. Suppose we find that among 100 white and 100 black youths, 10 and 17, respectively, have experienced arrest. This may look plainly discriminatory. But suppose we then find that of the 80 middle-class white youths 4 have been arrested, and of the 50 middle-class black youths 2 arrested, whereas the corresponding numbers of lower-class white and black youths arrested are, respectively, 6 of 20 and 15 of 50. These arrest rates correspond to 5 per 100 for white and 4 per 100 for black middle-class youths, and 30 per 100 for both white and black lower-class youths. Now, better analysed, the data suggest effects of social class, not race as such. I also especially liked Best’s lucid and comprehensive analysis of the heated dispute between the Muslim leader Louis Farrakhan and the Washington Park police over how many actually marched in the Nation of Islam Million Man March in 1995.

In summary, both books address contemporary issues of science in society. I found Best’s book a delight. Always engaging, it is accessible to a lay reader, yet will reward the expert; the examples it gives could enrich both a primary schoolroom and a university lecture hall. Baker’s book is, according to your taste, comprehensive or long-winded, but it contains a great deal of information and opinion, and some readers will relish the polemics. ■

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Jewels on the wing

Unique to the Americas, the 300 or so species of hummingbird range in their habitats from the snow line of the Andes down to the lowland rainforest and coastal mangrove swamps. The long-tailed hermit (*Phaethornis superciliosus*), shown here visiting a *Heliconia* flower, is just 15

centimetres in length and can consume amounts of nectar equivalent to its own body weight. *The World of the Hummingbird* by Robert Burton (Firefly, \$40, £27.95) tracks the natural history and lifestyle of the diverse species of these “flying jewels”, with their unique flight mechanism.

Science and war

Le scientifique et le guerrier

by Jean-Jacques Salomon
Éditions Belin: 2001. 160 pp. 12.2 euros

John Ziman

How is it that such a good thing as science is so closely involved with such an evil as war? Recent horrifying events might seem to make this faustian question particularly ‘timely’, but surely no more so than for the past 50 years. Why have there been so few systematic attempts to answer this question? With robust eloquence, Jean-Jacques Salomon at last slashes open the shroud of our denial. Here is a book that should be taken to heart by all who take pride in our calling.

There is no denying the evil of war. But its rank against other evils has long been debated. The concept of a ‘just war’ has an honourable tradition. Some ways of killing people have always been considered peculiarly ‘dirty’ — especially when they were first invented. As a prime source of military innovation, science is thus deeply implicated. But as Salomon points out, such debates invoke ethical concerns that are impossible

to consider in ‘scientific’ terms. Scientists developing new weapons often claim that they are not competent to evaluate ‘non-technical’ considerations. So do mercenaries and prostitutes.

The innate goodness of science cannot be demonstrated ‘scientifically’. Indeed, one of the firmest beliefs of scientists is that the knowledge they produce has no moral attributes. Not unreasonably, they refuse to take responsibility for the way their findings are ultimately used. So they have to balance the manifest benefits of science — for example, in medicine — against its equally manifest disbenefits — for example, the intensification of war. The empirical test is unconvincing.

The last resort is an overriding faith in the virtue of ‘the truth’. Unfortunately, this is a metaphysical principle that cuts no ice in practice. So ‘the truth’ is transformed into a holy aura surrounding the most distinguished scientific truth-finders — think of Albert Einstein. It is not obvious, however, that his sincere, strongly avowed personal pacifism flavours the entire scientific endeavour. Salomon rightly scorns the ‘schizophrenia’ of other scientists, such as the eminent physicist Freeman Dyson, who are just as committed to seeking fundamental truths and yet participate actively in military research. I would add

that their subordination to such devious interests seriously compromises their credibility as 'public' scientists.

Whatever its moral attributes, science requires a strong rational intelligence. So scientists imagine that science could be used to build a 'planet without frontiers', modelled perhaps on the scientific community. Communists, for example, believed theirs was a 'scientific' political system that would produce a frontierless world. Well, that conceit collapsed unobtrusively during the cold war. More modestly, scientists hold that the 'scientific attitude' fits them uniquely for peacemaking. Certainly, the Pugwash movement played an important mediating role during the cold war. But as Salomon makes clear, the scientists on both sides who took part in these unofficial discussions about nuclear arms control were always kept on a leash by their political masters. This period may also have been unusual, in that rational dialogue was made possible by the 'part-time' engagement of many of them in nuclear-weapon development and their shared understanding of the technical parameters of deterrence. Again, the apparently 'scientific' problem of detecting violations of the nuclear-test-ban treaty was really hedged around with 'non-scientific' considerations of political acceptability. Anyway, these conditions no longer hold, especially for states where scientific institutions and élites carry little political weight.

The universality of science brings scientists together on an international level. They thus have unusual opportunities to initiate confidential negotiations, or publicly exemplify improved relationships, between competing nation states. Cross-border institutions such as CERN, the European particle physics laboratory near Geneva, pioneered the path to the economic and political unification of Europe. But the virtual 'internationale of the savants' — the republic of learning — never seriously competes with real national allegiances. Nor does it seem that scientists are uniquely qualified to perform quasi-diplomatic roles in preventing war: in present-day conditions, theologians, bankers or lawyers may be just as effective.

In sum, the Faustian question falls apart. Science is not peculiarly good in any of the ways that war is peculiarly evil. Salomon doubts whether the scientific community is any more homogeneous or unified on such matters than any other profession. Most scientists find nothing wrong with the fact that a considerable proportion of them — Salomon doesn't give a figure, but my guess is about 20% — are now linked directly or indirectly to the military-industrial complex. Only a small minority peer over the edges of their specialist niches at the political ecology of their work. So the promotion of peace by organizations such as Pugwash is not some sort of atonement for our nuclear sins. It

bears witness to the fading ideal, "if not of a community, at least of individuals who care for the ends served by works of the mind". ■

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The American dream personified?

Smithsonian Institution Secretary, Charles Doolittle Walcott

by Ellis Leon Yochelson

Kent State University Press: 2001. 832 pp. \$55

Richard A. Fortey

Charles Doolittle Walcott had his fingers in so many pies it is astonishing that he was able to find any available with which to write his monographs. At about the time of the First World War he managed to be secretary of the Smithsonian Institution in Washington, president of the National Academy of Sciences, chairman of the National Aviation Board, and Carnegie Institution of Washington regent, as well as being on intimate terms with all the politicians of his day — to say nothing of trying to set up a national art collection in the United States and guiding government policy in matters of aviation and forestry. I have probably forgotten one or two others.

Walcott also managed to churn out huge volumes of basic science on the Cambrian rocks of North America. He is probably best known today for his discovery of the Burgess Shale — that remarkable assemblage of 'soft-bodied' fossils that allows us unprecedented insight into the marine life of the Cambrian. To describe Walcott as energetic is inadequate. Those of us who try to square the

necessities of administration with the demands of research can only feel abashed. Mind you, we do tend to take Christmas Day as a holiday.

Much of Walcott's research is still regarded as fundamental to geology today, and most of it was carried out with the aid of packhorses and pemmican. And if you add that during this period of his life he tragically lost a wife and two sons, you begin to wonder of what kind of steel he was constructed.

Walcott's is an important life, not least in the history of civil science, and it is high time it was documented. The first volume of Ellis Yochelson's account took us through the 'rags-to-riches' story of Walcott's early days: he was a self-educated farm boy, and came up the hard way through diligence and intelligence. The second volume reviewed here sees him as an established, not to say Establishment, scientist. By the end of his life he had so many honours that he scarcely bothered to record a new one in his diary. In some ways, the early days were more intriguing. He had to negotiate some particularly difficult characters — for example, the father of North American palaeontology, James Hall — on the way up. But in later life he had the ear of presidents to smooth out difficulties (can you imagine today's director of the British Museum making a New Year's Day call on the UK prime minister, Tony Blair?). Yochelson's account is almost bruisingly detailed — we find out what Walcott did on virtually every day of his life, stopping only at the lavatory door.

Many of those days followed a closely similar mould: a.m., called on important people and did some fixing on executive committee; p.m., found time for research; evening, made speech. As an account of a compulsively busy man it has a fascination



Moment of repose: but Walcott, best known today for discovering the Burgess Shale, drove himself hard.

SMITHSONIAN INSTITUTION ARCHIVES