neither the Soviet Union nor the United States would permit each other's vulnerable weapons to survive; nor should they.

The subject of *A Shield in Space?* is complicated, as is the organization of the book. The book pleases by the inclusion of a heading at the top of each of the 30 pages of notes, citing the corresponding page range of the text. Its 11 pages of bibliography, 11 pages of index, and 5 pages of acronyms and abbreviations are also well done. But the authors miss the mark in not including a single cartoon of a candidate layered defence system, and in citing the initial proposal for $26 thousand million for the first five years of a ten-year research programme without the accompanying tab of $70 thousand million for the full ten-year programme.

In a fascinating portion of the book, the authors quote Robert C. McFarlane, key national security advisor to Reagan at the time of the 1983 "Star Wars" speech and the person responsible for developing and concealing the SDI programme until its announcement. In his testimony to Congress in 1988, McFarlane recounted how Reagan personally changed McFarlane's and the Joint Chief of Staff's SDI concept from one of protecting missiles to an essentially perfect defence of the US public. McFarlane, as a government official, had argued for the SDI programme in background interviews and discussions with individuals inside government and out as "the greatest sting operation in history", rather than as an effective system. And in his testimony, he noted how profoundly antidemocratic government has become in pursuit of support for its policies. "I am not sure how it would come out, but I do know that we have never had the integrity to explain it in those terms." *A Shield in Space?* weighs in on the side of that missing integrity. □

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■ In *New Strategy Through Space*, just published by Leicester University Press, Neville Brown discusses the future of space research. He argues that, since the announcement of SDI in 1983, the debate has focused too narrowly on military issues, and that space-based defence is a destabilizing influence on world politics. He puts forward a scheme of planetary management using space-based surveillance and telecommunications. Price is £35.

■ *Ways Out of the Arms Race*, edited by J. Hassard *et al.*, subtitled *From the Nuclear Threat to Mutual Security*, reports the proceedings of the Second International Scientists' Congress (1988). Published by World Scientific, price £23, $36.

■ W.A. Schwartz and C. Derber's *The Nuclear Seduction* considers conventional wisdom about nuclear war to be profoundly misleading while the main forces endangering the world remain largely invisible. Published by the University of California Press, price $25.

Ignorant genes

J. Bruce Walsh

The Wisdom of the Genes: New Pathways In Evolution. By Christopher Wills. *Basic Books: 1989. Pp. 351. $19.95.*

THE flood of molecular data has drenched evolutionary biology as much as any field, and has initiated often heated debates as to the function (if any) of particular aspects of genome organization. Although there is no doubt that features such as mobile genetic elements and the intron/exon structures of many genes have important evolutionary consequences, the nature of the evolutionary forces responsible for the origin and subsequent maintenance of these structures is contentious. One school argues that these features are maintained because they facilitate the evolutionary process. Proponents of this view generally, implicitly or explicitly, invoke species selection (the differential formation and extinction of species), a notion that makes many evolutionary biologists uneasy. The alternative school holds that the potential for evolutionary facilitation has little bearing on origin and maintenance. For example, although some claim that the ability of mobile elements to generate mutations is sufficient to account for their ubiquity, these elements can spread through a population even if deleterious. So even though the insertion or deletion of a particular element can result in a favourable new mutant, mobile elements would still be expected to be widespread even if no such mutants were ever generated.

Wills has written an engaging popular book examining these issues, arguing that previous evolution has structured the genome in such a way as to expedite future evolution. As an introduction into modern evolutionary biology for the general reader, his book is a success, capturing the excitement and breadth of the subject. The main strength of the book is its wealth of amusing personal and historical anecdotes that make for enjoyable reading. Its scope is also fascinating, ranging over such seemly random topics as the similarity between the way a tuxedo shop operates and the organization of antibody genes, müllerian mimicry rings in tropical butterflies, the Stanley Steamer versus Henry Ford assembly lines, and mobile genetic elements.

Wills is less successful in arguing that evolution indeed does "work better" now than in the past. Acknowledging the problems in invoking species selection, Wills suggests that structures facilitating evolution can be maintained by selection on individuals. His strongest case is for mimicry in butterflies, in which there are probably selection pressures constantly to change wing patterns over short intervals of evolutionary time. A genetic organization facilitating rapid changing in wing patterns, Wills argues, will be favoured by individual selection. That certain characters have been selected to be developmentally liable is reasonable. What is unclear is how widespread such characters are and how this developmental flexibility is achieved. Wills seems to be arguing that fairly large-scale changes are required, along the lines of constructing a new gene as opposed to making a few changes within an existing gene. In my opinion, Wills does not make a compelling case for this idea. It seems that genes are neither wise nor stupid with respect to their future evolution, just ignorant. □

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Dangerous stuff

Alastair Hay

Halogenated Biphenyls, Terphenyls, Naphthalenes, Dibenzodioxins and Related Products, 2nd edn. Edited by R. D. Kimbrough and A. A. Jensen. *Elsevier: 1989. Pp.518. Dfl. 375, $192.50, £120.*

SHIPS bringing hazardous waste to Britain for disposal were welcome a year ago. They are not greeted so rapturously now, particularly when they feature as the lead story in national news bulletins. Last summer, Britain's traffic in hazardous waste almost ground to a halt. Ships with a cargo of waste for disposal in the United Kingdom were prevented from docking both by the harrying activities of environmentalists and by the dockers themselves, who refused to unload the cargo.

The principal target of the protesters was consignments of polychlorinated biphenyls (PCBs) which were to be destroyed by burning in an incinerator in Wales. Despite reassurances from the government that incineration of the waste presented no risk, local residents argued to the contrary, winning the support of the dockers.

With no chance of offloading their cargo, the shippers had to return it to the sender, in this case the Canadian state government of Ontario. The British Government also had egg on its face over the episode. What it had seen as a highly profitable trade — an environmental service, so to speak — was viewed by many others as yet more evidence that Britain was becoming the dustbin of Europe. Fewer cargoes of waste are likely to come to Britain in future.

This campaign against PCBs, spearheaded by the environmental group