Managing Prometheus

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Prometheus Bound: Science in a Dynamic Steady State. By John Ziman. *Cambridge University Press: 1994. Pp. 289. £16.95, $24.95.*

PROMETHEUS, who displeased the Gods by bringing the secret of fire to Earth, has seldom been more active. The frontiers of human understanding have expanded further and more rapidly in this century than in any earlier period, while the applications of modern science and technology are dramatically transforming the ways in which we live and work, and treat disease. As the possibilities grow almost explosively, the aspirations of scientists and engineers wishing to follow new opportunities for discovery, and the expectations of society looking for the benefits, rise to levels threatening to exceed the resources available.

The theme of John Ziman's thesis is that Prometheus has exhausted his lines of supply: he is now effectively on a tight leash. All the present trials and tribulations of the scientists — and here he really means academic scientists and engineers — stem from the abrupt need to adjust to level, or almost level, funding for research rather than continuing to enjoy the doubling of resources every 15 or so years, a trend that was typical before the 1970s.

It must be a truism that having through their efforts in the pursuit of knowledge wrought such manifestly great changes in the nature of society, scientists cannot expect to remain immune to new stresses. Much has been happening to bring radical change to university life, and inadequate funding has been accompanied by additional demands. Ziman does not, for example, consider structural changes in the United Kingdom such as the doubling of the number of universities, the projected doubling of the number of students entering higher education with no corresponding increase in staff, and the uniquely British reduction in government finance for research in other sectors that increases the pressure on the science base.

The UK government's 1993 White Paper (policy document) on science and technology policy, the first for more than 20 years, stresses the role of the science base in wealth creation. The emphasis on "management" of the research base and particularly the proposition that this is best overseen by industry — as the end-users of the 'product' — is for many scientists a worrying development. Gradually but surely, the weight of support may, it is feared, move away from research determined by scientific criteria towards providing a short-term, problem-solving service. Instead of Prometheus, whose name means 'forethought', we risk being led by his brother Epimetheus.

For those inside academic science, the past decade has certainly been "dynamic" — indeed, reminiscent of suffering under the ancient Chinese curse: "May you live in interesting times". Ziman comments that, faced with a situation in which the 'goal posts' seem to be continuously moving, "the responsible authorities at every level have been improvising wildly". This is all very far from a "steady state", the phrase he uses, rather misleadingly given the context, to characterize level funding — a situation he regards as permanent, indeed axiomatic. Others will take issue with this position, arguing that an investment so fundamental to growth in the economy should at least keep pace with that growth. This would not satisfy all the pressure from scientists, but would better enable change to be managed and allow adaptation to new challenges and demands with less of the damaging waste and turmoil typical of recent years.

Writing from the vantage point of a former departmental head of physics at the University of Bristol, who then spent six years as director of the Science Policy Support Group until retiring at the end of 1992, Ziman succeeds very well in his purpose of describing the structures of academic science and the motivations of scientists driven by the intense competition of research at the frontiers. He gives an excellent analysis of the many dangers that threaten the future success of the enterprise and are the causes of much anguish in the laboratories.

In the midst of radical change it is essential to ensure that those aspects of past practice that have been the secrets of success are retained. Ziman offers a translation of the new buzz-words of management, eloquently demolishing the fallacies and warning of the dangers of clumsy, uncomprehending application. He deplores the way "selectivity" frequently leads to "arbitrary decisions to close down small, but beautiful, research operations [and] stifle novel developments". Academic freedom must be protected, its essence being "to leave openings for untypical people with untypical talents".

Although cast in a UK context, Ziman's analysis will strike echoes everywhere. This is a book for all who wish to understand the concerns of those working at the frontiers of science to set Prometheus free. □

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"THE Twelve Apostles", one of Australia's most famous coastal localities, situated in western Victoria. The stacks of Tertiary-age limestone rise up to 46 metres above the sea surface. This photograph is taken from the cover of *The Evolving Coast* by Richard A. Davis, a gloriously illustrated volume in the Scientific American Library series that introduces the general reader to the "science behind the natural drama of coasts". Scientific American Library/W. H. Freeman, £19.95.