Book Reviews

An Inside View of Big Science

The Education of a College President. A Memoir. JAMES R. KILLIAN, JR. MIT Press, Cambridge, Mass., 1985. xxiv, 481 pp. + plates. $19.95.

James R. Killian, Jr., opens for his readers a window on the New Society Americans have built for themselves in the 20th century. The particular acreage that can be seen is situated, roughly, where the systems of higher education, the scientific and technological professions, corporate enterprise, and the federal government overlap. Since the author of this engaging memoir has spent a lifetime plowing and planting those fields, he is uniquely qualified to help the rest of us appreciate their bounty. His readers will not, I think, be disappointed with the vista à la Killian.

Even if they take a narrow view of this important terrain, they will enjoy following the author's trail to the presidency of the Massachusetts Institute of Technology and thence to the White House, where he served as science adviser to President Eisenhower and to President Kennedy as well. Killian's career was tightly meshed with the rise of big science in the 1940's and 1950's. Such wartime successes as MIT's Radiation Laboratory and the lab for servomechanisms convinced men of purpose and power—into whose ranks Killian marched—that neither higher education nor the United States government could afford to let their close ties be severed after the war. The Cold War and effective leadership by a generation of science administrators ensured that military contracts and federal grants would continue to flow to MIT and other leading educational institutions. Killian, who headed MIT from 1949 to 1959, exalts in this transition to heavily funded research in a private-public setting. He takes note of the critics, men who talk about sin and science, but his feet are firmly planted in the positivism of the 1950's; he is as sure today of his nation as he is of the university to which he devoted most of his life and of the great corporations whose leaders he wooed and won for MIT.

What other qualities of this man are revealed by his memoir? For one thing, the building blocks of his life were personal relationships, many of which are described in rich (sometimes overpowering) detail. Unlike many science administrators, Killian did not first build a reputation in science; he was a writer, editor, administrative assistant (all at MIT). He was armed with good taste in people and professional concepts, a strong sense of purpose, and a healthy but not overwhelming ego: thus he can reprint the encomiums he received, but he can, with even greater enthusiasm, delve into the careers of his predecessors and peers. He worked with great skill in the old-boy network and then learned how to operate in the complex maze of modern corporate and governmental relationships that emerged in America after World War II. He seems to have been as effective in the traditional network as he was in the new corporate setting; he is today uncertain why others—in the '60's for instance—began to question the way decisions were made in his corner of the New Society.

There are of course many reputable scholars who are less certain than Killian is that the golden threads linking the military and the universities were in their early years "benign" or "nonintrusive" (p. 49). Critical of the Cold War amalgam, they suspect that the "Faustian bargains" (p. 137) that tempted educational institutions were more the rule than (as Killian would have it) the exception.

To Killian, however, certainly one of the leading science administrators of the postwar era, the proper path to scientific, technological, and economic success is as clear today as it was when Ike was president. The genius of the university, the entrepreneurship and efficiency of the corporate system, and the national purpose of the world's most powerful democracy were, he tells us, the essential ingredients of American success in the postwar years. They could be again today. The nation and its institutions should rebuild the consensus of the '50's and clear the path toward "a better society" (p. 411). Though it seems to me doubtful that this will happen and that Killian's particular vision will reign as it did before the experiences of the '60's and '70's, it is bracing to have that message reasserted in its pristine form by a man who heard the call to duty and served his university and the nation so admirably during the crucial early decades of the postwar era.

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Lessons of a Controversy

Beyond Velikovsky. The History of a Public Controversy. HENRY H. BAUER. University of Illinois Press, Urbana, 1985. xiv, 354 pp., illus. $21.95.

Fame for the late Immanuel Velikovsky began in 1950 when his book *Worlds in Collision* broke onto the scene and became a best-seller. In it Velikovsky contrived incredible interplanetary scenarios, including the eruption of Venus from Jupiter followed by several near collisions among Venus, Mars, and Earth in order to "explain" certain biblical events. In this way he made it seem as though Joshua's long day, Noah's cataclysmic flood, and other religious myths from antiquity had a solid basis in historical fact—at least much more so than the experts had led one to believe. Droves of book buyers became enchanted.

Learned scholars and scientists were not so enchanted. Many of them saw in Velikovsky a rather arrogant crank and a pseudoscientist of the first order. Others saw worse than that, and some mounted a vigorous campaign of criticism against Velikovsky, against his works, and against his publishers. The publicity from these attacks did more to help sales and to marshal support for Velikovsky than it did to deter them, and he remained popular even beyond his death, which came almost three decades later.

Since the 1950's much has been said about this affair, not only by Velikovsky's supporters but also by his critics, some of whom have openly expressed reservations over the treatment of Velikovsky by certain scientists. With so much already written, both pro and con, one might wonder why Bauer—a chemist and now dean of science and

humanities at Virginia Polytechnic Institute—would undertake a book on the subject at this late date.

Scientists and scholars generally take one of two attitudes toward pseudoscience controversies. Some want to dismiss such episodes as quickly and quietly as possible so as to minimize the visibility they get. Others seek to recount and analyze the details, hoping that we may learn from the mistakes and avoid similar ones in the future. Bauer is definitely in the latter camp, and his book is not merely "the history of a public controversy." It is a thoughtful and penetrating analysis one of whose purposes is "to make plain what scientists must do, and what they must not do, if they are to be effective in public controversies."

Bauer has divided his book into three parts. Part 1 tells the story of the Velikovsky affair in five chapters, part 2 analyzes what happened, also in five chapters, and the remaining six chapters, part 3, extrapolate beyond. This is not a kindly book, but it is balanced in that Bauer is as critical of the scientists involved as he is of the pseudoscientists, though for somewhat different reasons.

Velikovsky's understanding, particularly of the physical sciences on which his theoretical arguments depend, is shown to be abysmal. Bauer demonstrates this point by discussing at length a rarely cited earlier book by Velikovsky entitled *Cosmos Without Gravity*. Bauer believes the point is crucial because, to him, earlier critics simply missed it, resorting instead to more tawdry tactics that backfired in some respects. He then goes on to level perhaps the most devastating criticism of all, namely that Velikovsky's seemingly bold initiatives were not even original. Despite all the claims for Velikovsky's originality, not to mention genius, it is clear that his main ideas had been developed in considerable detail by earlier authors. Moreover, Velikovsky must have read these works because he references them for lesser details, while crediting the "spectacular stuff" only to himself.

Many of the inept arguments used by the scientific critics of Velikovsky are also exposed, and in a most candid and direct way. These exposés will be of vital interest to those who, like myself, get involved in debunking present-day pseudoscience.

I kept hoping—especially given that he holds his present deanship at the same university where the "dean" of creationism, Henry Morris, once headed the civil engineering department—that Bauer would draw more parallels between the Velikovsky affair and the recent history of "creation science." That too is an example of biblically inspired pseudoscience over which heated debates continue to rage. Certainly there was ample opportunity to explore such parallels, and it might have lent the book a more contemporary air. But it was not to be, and Bauer intends that his next book will be about the Loch Ness monster.

In conclusion, I found Bauer's book very worthwhile. His scientific background as a chemist provides valuable insights, which he conveys in a very clear and understandable way. I think he is somewhat too harsh with some of Velikovsky's critics, but the viewpoints are well argued and the book is rich in educational value, particularly as regards the nature of scientific thinking and inference. I recommend it not only for the lessons that scientist debunkers can learn from it but also for the way it contrasts the strategies of scientists with those of the pseudoscientists and pseudoscholars.

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Ecogenetics

Genetic Variability in Responses to Chemical Exposure. GILBERT S. OMENN and HARRY V. GELBOIN, Eds. Cold Spring Harbor Laboratory, Cold Spring Harbor, N.Y., 1984. xii, 421 pp., illus. $55. Banbury Report 16. From a conference, Oct. 1983.

This book comprises the proceedings of a conference organized by the Banbury Center. It begins with an introductory section that contains interesting and insightful historical overviews of the field by Omenn and Kalow. It is pointed out that there is a conflict between the methods that are usually used to identify a chemical or drug as a potential hazard, which usually involve studies in a small sample of people or animals, and the basic implications of pharmacogenetics and ecogenetics, which are that some small groups are at special risk because of their genes. The section also contains a nice discussion of the transition over time from interest in the narrower subject of pharmacogenetics to interest in ecogenetics, which is concerned with special risks to certain genotypes from all kinds of chemical, physical, and biological agents in the environment, as well as from drugs. Following the introduction, there are 28 papers distributed into six sections, on the P-450 systems, drug and carcinogen metabolism, polymorphisms of metabolizing enzyme systems, oncogene activation and gene markers, immunological and molecular genetic approaches, and population correlations.

Properly, much of the emphasis of the conference was on the cytochrome P-450's, a family of proteins with vast substrate specificity. A highlight of the book is a paper by Gelboin and colleagues that describes the development of specific monoclonal antibodies to individual P-450's, with each antibody inhibiting the activity of a particular P-450. This technique promises to avoid a major problem in the study of P-450's, which is that the overlapping specificities of P-450's have led to difficulty in identifying the contribution of a specific P-450 to the total metabolism of a carcinogen or drug. By the use of the new technique it was found that 90 percent of a certain P-450, placental aryl hydrocarbon hydroxylase (AHH), from women who smoke is inhibited by a certain antibody, whereas monocyte activity is not inhibited at all, indicating that a different P-450 is induced in the two tissues. This kind of analysis may have the potential to unravel the controversy about the nature of the relationship between the induction of AHH and lung cancer. In this connection, a paper by Kouri and colleagues reexamines the question of AHH activity in the lymphocytes of patients with lung cancer and reports higher AHH activity in 14 of 23 patients with lung cancer than in hospitalized patients without lung cancer. The question of causality, however, is far from settled. Papers by several groups summarize excellent progress in understanding the debrisoquine polymorphism, which involves a specific P-450 that hydroxylates not only debrisoquine but several other drugs as well.

The section on oncogene activity and gene markers includes four papers that report work in which the very latest technology was used to explore the fascinating happenings related to oncogene activation and cell transformation. Though the reports present no breakthroughs, they illustrate for the interested reader the kinds of approaches that are being taken to understand the cellular events that may lead to cancer. A paper by Cartwright in the section on population correlations deals with bladder cancer patients and the possible roles of the acetylation and debrisoquine P-450 polymorphisms. Cartwright shows that if one looks at chemical workers as opposed to nonchemical workers the data offer more support for the hypothesis that the slow acetylator phenotype is