An Official Program

Guide to China's Science and Technology Policy, 1986. State Science and Technology Commission of the People's Republic of China. China Academic Publishers, Beijing, 1987 (U.S. distributor, Pergamon, Elmsford, NY). viii, 434 pp., illus. $130. White Paper on Science and Technology, no. 1.

China's White Paper on Science and Technology, issued by the State Science and Technology Commission, is a broad overview of the role of science and technology in China's ongoing modernization program. As might be expected in a document of this type, the approach is very much top-down—an examination of science and technology policy from the point of view of China's national-level Party and government organs. A large share of the space in the volume is given over to explaining the 15-year development program for science and technology covering the years 1986 to 2000. That plan, in turn, is the successor to three earlier long-term science and technology development programs drawn up and approved by the Party in 1956, 1963, and 1978.

What is surprising, however, is the almost complete disjuncture between this top-down approach to planning for science and technology and the rather far-reaching decentralization of decision-making currently under way in many critical sectors of the economy. The science plan not only identifies high-priority fields such as microelectronics, information technology, biotechnology, and new materials technology (discussed in general terms in the volume under review) but in a separate internal 27-volume study identifies hundreds of specific scientific and technological projects that will be undertaken in these priority areas as well as in important traditional industries. In short, while economic reforms are altering the production sector of the economy in China far more profoundly than in any other reforming socialist system, science and technology planning appears to be blithely proceeding very much in the centrally planned style borrowed from the Soviet Union in the 1950s.

The volume also reflects little movement away from the traditional view that scientific and technological improvements in some sense can serve as a substitute for even more far-reaching institutional changes in the economy. Thus the burden placed on science and technology is enormous. Technology policy is assigned the responsibility for increasing productivity in manufacturing, for raising the production of primary energy sources, for increasing the energy utilization rate, for improving the efficiency of air, water, and surface transport, for upgrading the quality and efficiency of the communications networks, for raising farm yields, for increasing the efficiency of land use in urban areas, for preventing water and air pollution, and so forth. Though the replacement of inefficient industrial boilers, water pumps, fans, and electric motors may provide a one-time saving in energy, it may not be as effective a mechanism for stimulating conservation as raising the price paid by industrial users of energy to something approaching its real cost. Similarly, as long as urban land is very substantially underpriced and allocated bureaucratically the prospects for utilizing it more efficiently through more scientific urban planning seem dim.

In essence the White Paper advances policy for science and technology in something of an institutional vacuum. It considers neither how the top-down approach is no longer appropriate to a more decentralized production structure nor how further institutional changes, for example in the price formation process, in the long run may be essential to achieving some of the goals of the science and technology plan.

The White Paper explicitly acknowledges the shortcomings of traditional policies but also reveals how much remains to be done to reform the institutional arrangements and approaches borrowed from the Soviets in the 1950s. The effective utilization of scarce scientific and technical manpower, for example, continues to be constrained by limitations on the mobility of personnel. Scientists and engineers are assigned to research institutes when they complete their formal academic training and seldom change jobs subsequently. The research institutes regard these personnel as their own property, and in the absence of labor markets individual mobility is extremely limited. The White Paper discusses reforms that have been under way for several years to increase the opportunities for individuals to move to more appropriate or preferred jobs, but the results have been disappointing. Only 3 percent of scientific and engineering staff are now able to change jobs annually, a comparatively low rate. International experience suggests that labor mobility is one of the main means of diffusing new technology. Much technical knowledge is embodied in human capital, so the development of a labor market for scientific and engineering manpower would improve the diffusion of technology throughout the economy, an area where China is particularly weak.

Similarly the White Paper describes an elaborate new system of certificates and cash prizes that the state is now awarding to inventors and scientific innovators. But it is silent on the major crisis that threatens further to alienate China's intellectual community from the State and Party. That is not the persecution of individual scientists who have called for reform of the Chinese Communist Party but the steady erosion of real living standards that stems from the combination of a rigid fixed wage structure for scientists and engineers and the more inflationary environment of the mid-1980s. The decline in the incomes of scientists and engineers relative to that of workers in other sectors of the economy, where the opportunities for commercial and entrepreneurial activities have widened steadily and real incomes have grown explosively, has been particularly corrosive.

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Institutions Transformed

The Care of Strangers. The Rise of America's Hospital System. CHARLES E. ROSENBERG. Basic Books, New York, 1987. x, 437 pp. + plates. $22.95.

The history of the American hospital was once portrayed as the story of a backward institution radically changed through medical and scientific advance. In recent years, this historiographic tradition has been augmented by histories that emphasize the role of communities, economics, politics, workers, and patients in the development of the institution. Charles E. Rosenberg has been instrumental in spawning the new history. His 1962 book *The Cholera Years* has served as a model of the social-history approach to medical subjects, and his subsequent articles on the American hospital have been critical in defining the issues that had to be addressed by historians of this central institution. Yet Rosenberg has always managed to integrate scientific change into his history, continuously illustrating the interrelationship of science and society, technology and social values, technical innovation and popular attitudes. *The Care of Strangers* continues in this vein.

Rosenberg begins by examining the internal order and administration of the antebel-

lum hospital, for within this seemingly alien institution lay the origins of many of the relationships, attitudes, and organizational patterns that characterize our modern facilities. Before the Civil War, hospitals were few in number and concentrated in the major cities of the East Coast. As charity institutions providing care for the indigent or the homeless, they often addressed issues that were only tangentially related to health and illness. The hospital was an institution that served the "worthy" poor or those who became dependent upon the larger community for a variety of reasons, including indigence, old age, abandonment, and unemployment. Illness was necessary for admission, but it was not sufficient. Generally organized by elite lay persons, hospitals were "shaped as much by dependence and traditional notions of class, deference, and social responsibility as they were by the categories and capacities of medicine" (p. 71). The institution was class-bound; the relationships between medical personnel, administrators, trustees, workers, and patients formed around the hierarchical and paternalist mores of antebellum American society.

Every aspect of the antebellum hospital reflected class relationships. Trustees who saw themselves as guardians of the community controlled the hospitals tightly and showed younger house staff little more respect than they might any other hired hands. Doctors who sought closely guarded hospital privileges often saw the institution as a training ground and a stepping-stone toward a profitable private practice. Nurses, often drawn from the patient population or from lower-class groups, found their aspirations circumscribed by the ideology that associated nursing with femininity and service. Indigent patients were treated with a combination of condescension, contempt, and concern by trustees, physicians, or others who visited them at home before admission to evaluate their medical condition and moral environment.

Rosenberg's critical point is that the hospital was a reflection of the society that created it. Its medical care, nursing, administration, and even architecture reflected the moral underpinnings of the larger community. For example, in his chapter "Ventilation, contagion, and germs" Rosenberg presents a finely textured and penetrating analysis of the social origins of modern antiseptic and aseptic techniques. Unlike more traditional accounts that emphasize the role of science in these innovations, Rosenberg's shows that their origins lay in the moral codes of the community. In his discussion of the introduction of statistical thinking and hygiene in the mid-19th-century institution, he points out that even Florence Nightingale, often credited with introducing order and hygiene, worked from a basically social understanding of the relationship of morality, cleanliness, and disease: "Her ideas of pathology and therapeutics were rooted in a more fundamental vision of society, a way of organizing and controlling the world that transcended the specifically medical form in which that vision was projected" (p. 129). The views of Nightingale and the hospital reformers in the United States who adopted many of her ideas "didactically underlined the connection between behavior, environment, and health—and thus constituted a systematic program for hospital reform" (p. 130).

The Civil War, with its vast expansion of the hospital experience to patients from a wide variety of social classes, proved central in reshaping American attitudes; the introduction of the germ theory reshaped medical thinking; the development of a paying-patient financial base redirected trustee and administrative interests. By the early 1920s, the fundamental relationships between trustees, physicians, medical schools, nurses, workers, and patients that characterize present-day hospitals had largely been established and the basic medical orientation of the institution had been worked out. The hospital was on the way to altering an earlier social mission that required it to look outward to the larger community. It increasingly turned inward, seeking its legitimation from its own medical and in-patient concerns. Rosenberg sees the tangential role that the hospital out-patient and social service departments play today as stemming from this movement away from more traditional social functions. By the early 20th century, the paternalist awareness of the patient and his or her place in the larger community became a peripheral motivation at best. "Outpatient and dispensary care (like social service) were never to escape the stigma of poverty medicine; never a part of the economic structure of medical practice and generally occupying an area of minor technical interest, they remained a marginal concern" (p. 335). Social service, once the bedrock upon which the institution was founded, became "a mere glance outward of little significance in comparison to the compulsion exerted by the forces that shaped the hospital in its inward vision" (p. 335).

Rosenberg's book is a powerful and elegant discussion of the origins of modern hospital practice. He finds meaning in hospital annual reports, newspapers, trustee minute books, diaries, medical and administration journals, and doctors' daybooks that might easily be missed by a less skilled historian. He sees the hospital as a microcosm of the changing beliefs, values, and ideals of American society and through the hospital provides us with a clearer picture of our own attitudes toward medicine, poverty, and dependence.

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Gravity: Foundational Questions

Quantum Concepts in Space and Time. R. PENROSE and C. J. ISHAM, Eds. Clarendon (Oxford University Press), New York, 1986. x, 358 pp., illus. \$80. Oxford Science Publications. Based on a conference, Oxford, U.K., March 1984.

This book is a collection of 27 papers that were presented at the last in a triad of meetings, the previous two having been devoted to quantum gravity. As the editors state in their preface, they did not feel the time was ripe to treat that subject again: "Instead, it seemed more opportune to re-examine certain foundational questions relevant to quantum gravity; in particular we wished to explore the possibility that the rules of quantum theory itself might need to be modified before a successful union with general relativity can be achieved. . . . There was however one overriding and unifying theme: the conceptual problems of quantum physics in relation to space and time." This statement of purpose provides a standpoint from which to judge the success of the endeavor. Does a group of physicists with a strong interest in relativity, the accepted theory of space and time, possess wisdom about the conceptual foundations of quantum mechanics that escapes the rest of the physics community?

In broad terms, relativity is an heir of the Cartesian tradition of regarding physical reality as reducible to matter moving in space and interacting by contact. As years went by, matter was replaced by fields, and space-time itself was turned into a dynamical entity. Still, in general relativity theory matter (or fields) is supposed to respect the underlying space-time structure in a contact manner. It is thus natural that relativists should find especially disconcerting the fact that quantum matter does not play the game strictly according to the rules.

First of all, there is a strange element of nonseparability in the behavior of systems