BOOK REVIEWS

Images and Interdependencies

National Military Establishments and the Advancement of Science and Technology. Studies in 20th Century History. PAUL FORMAN and JOSÉ M. SÁNCHEZ-RON, Eds. Kluwer, Norwell, MA, 1996. xiv, 340 pp. $164 or Dfl.245 or £105. ISBN 0-7923-3541-4. Boston Studies in the Philosophy of Science, vol. 180.

In the past decade many books and articles have been written on the birth of a military-industrial-academic complex in the United States after World War II. We have been told how scientists gladly worked on state-of-the-art, war-related devices and techniques, what led them to adapt their practices and volunteer to help the military elaborate their new systems, and how the military as an institution came to be a decisive source of funds (and of inspiration) for academic science. These rather descriptive studies were a major step in our understanding of the post-war situation and led to reappraisals of what it meant to be a scientist in post-war America, and to be a physicist in particular.

In the picture that gradually emerged from these studies the practice of physics is seen as having been drastically redefined between the pre-war period and the Cold War, so that, for example, instrumentation and "gadgets" took a place they never had before. Because the analysis was focused on late-20th-century America, however, we got a distorted picture of what had happened at world level over the centuries, overestimating the most recent changes, for example, and tending to forget the long-standing embrace of science with state management and the military; and because we wanted first to have the "facts" straight we avoided posing broader questions, avoided seriously considering the meanings of these links as far as the scientific enterprise was concerned.

The present book is important precisely because it tackles such issues, reminding us of long-term and worldwide perspectives on the one hand and posing major interpretative questions on the other. The first paper, by David E. H. Edgerton, confronts us with such a question. It contrasts the "mythical" and "repetitive" discourses of British scientific intellectuals in the 20th century—who mainly "invoked images and arguments which distanced science from war" and presented scientists as "internationalist, universal, moral, civil, peaceful and peace-serving"—with the pictures historians can build (at least when they are not repeating scientists' own accounts) that reveal the multifaceted relations that existed between scientists and the military over the century in Britain. Edgerton's point is to show that scientists "were very much of their time and place" in their discourses, that they very much reflected (and followed) the dominant political ideologies. This was the case whatever the effective links they had with the military and with political power, and even as they devised the high technologies essential to a country that remained, throughout the century, one of the major military powers in the world.

Since British scientific intellectuals worked for a liberal democracy, indiscreet questions about their practices have not frequently been asked. The case is obviously different for Germany, discussed by Herbert Mehrtens. In consonance with Edgerton, Mehrtens starts by recognizing a ubiquitous "rhetoric of transcendental legitimation" among 20th-century German mathematicians, a rhetoric that relates "mathematics, pure and applied, to some higher, transcendental order: the miraculous life of mathematical ideas transcending all borders and military confrontations." Contrasting this with the "sober realities of scientific research and science politics tightly integrated into militarized, belligerent societies," Mehrtens concludes that this rhetoric "serves to sanctify the mathematician and his scientific and political activities," to "veil the individual and collective efforts to establish and expand the scientific enterprise and to market its products." Providing a detailed analysis, Mehrtens shows that if "mathematics can be a game, the playful exploration of a 'paradise,'" it can also become "the very opposite of a game." Largely because mathematicians succeeded in demonstrating their usefulness to industry and the state in war as in peace (and in Nazi Germany as in Britain or the United States), mathematics in "the modern technoscientific enterprise" became "deeply involved in the business of control and domination," just as it did in the business of war. In both these essays, as well as in a superb paper by Paul Forman on the maser and Columbia University physicists, the question of the false consciousness of scientists, of their "mental compartmentalization," is put center stage.

Further explorations of the historic linkage of scientists with the military and the state apparatus, as well as its repeated denial by scientists, are offered in the other contributions in the book. They deal with France (L. Pyenson), Spain (J. Ordoñez and J. M. Sánchez-Ron on nuclear energy), Argentina (E. L. Ortiz on the period 1850–1950), Germany (H. Kragh on telephony, M. Eckert on theoretical physicists), and the United States (B. Hevly on naval research, D. H. DeVorkin on rocketry). The case of France could be taken to illustrate the long-standing link between scientists on the one hand and royal and state engineers and the military on the other—a link, by the way, nicely demonstrated in the exhibition currently on display at the Museum of the History of Science in Oxford and dedicated to Geometry and War from the 16th to the 18th centuries. Lewis Pyenson shows the conjoint birth of modern warfare and modern science. Stressing that "engineering (the Dutch uncle of physics) was, until scarcely six generations ago, the province of military and naval garrisons" and that "permanent military institutions dispensed knowledge and radiated power," Pyenson analyzes the role of French military engineers and officers in navigation, geography, topography, geophysics, telegraphy, meteorology, and astronomy (which are intertwined territories of knowledge and power) and stresses the constant encounter with "civilian" scientists, notably through the Académie des Sciences. This profound mixing of "savants," military engineers, and officers can be explained by the role the military institutions played in the making of the French civil (including the scientific) elites, by the role played by the "corps polytechniciens" (civil and military) in state management, and by the "civilizing mission" given to the French armies in building the French colonial empire—a mission to which scientists contributed as often as possible.

This brief account hardly does the book justice. It poses fundamental questions not only for natural scientists but for all intellectuals, historians as well as social scientists.

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