

M. Norton Wise

Gesellschaft und Physik



Geboren 1940 in Tacoma, Washington. Studium der Physik an der Washington State University; lehrte Kernphysik an der Auburn University und der Oregon State University. Studium der Geschichte an der Princeton University; gegenwärtig Professor of History an der University of California, Los Angeles. Arbeitsgebiet: Geschichte der Naturwissenschaften im neunzehnten und zwanzigsten Jahrhundert. Adresse: Department of History, University of California, Los Angeles, CA 90024, USA.

On arrival at the Kolleg I anticipated spending the year working on the history and philosophy of quantum mechanics with a small group assembled for that purpose. Since the group did not materialize, I transferred my community activity to an alternative "Schwerpunkt" on the culture of science. Throughout the year, with varying degrees of intensity, this group provided stimulation for methodological reflections on precisely how, and the degree to which, societal factors — social, cultural, political, economic — are expressed in the doing of science and in its results. Controversy, often productive, naturally attended our discussions. Always rewarding were detailed case studies on the one hand and sharp, thoughtful critiques on the other. Most memorable in the long run will be the discussions among an informal subgroup of fellows and spouses on the subject of the cultural interpretation of objects: artistic, technological, and scientific. We plan to develop a larger project along these lines in the future.

Immersed in an environment of work and debate, I completed (with Crosbie Smith, University of Kent) a biographical study of William Thomson, Lord Kelvin, entitled *Energy and Empire* (Cambridge Univ. Pr., 1988) and wrote four papers. Two of these papers discuss science in nineteenth century Britain and develop issues that arose from the Thomson book. "Mediating machines" (*Science in Context*, 2 (1988), 81-117) aims at a focused, concrete analysis of how material systems — here the steam engine and electric telegraph — can project societal concerns into the esoteric domain of theoretical physics, both conceptually and methodologically. The steam engine served as a conceptual mediator

in the reformulation of classical mechanics on energy principles from about 1840-1870. The telegraph provided methodological mediation in the construction of electromagnetic field theory throughout the second halfcentury. Both cases show how societal context provides productive, and fundamental, resources for the doing of physics. "Work and Waste: Political Economy and Natural Philosophy in 19th C. Britain" (*History of Science*, forthcoming) is a monograph which takes up similar themes on a much broader basis. In the 1830s and 40s a pervasive transformation of models of natural systems occurred within British scientific culture, from static atemporal models to fully dynamical temporal models. The paper interrelates movements in a variety of subject areas (geology, biology, mathematics, natural philosophy and political economy) with each other and with the social and economic transformation of British society in the so-called Reform Era. It concludes with an account of how the concept of work in physics was identified with the concept of labour value in political economy and of how that identification was involved in the development of independent laws for work (energy) and waste (entropy) in the emergence of thermodynamics.

The remaining two papers develop subjects in quantum mechanics. "Forman Reformed" is a methodological critique of a seminal paper in the history of physics, usually referred to as "the Forman thesis", which argued that quantum mechanics — with its claims of acausality in the micro-world — originally represented a capitulation of German physicists to a hostile intellectual environment in the Weimar period. I am critical of views of the culture-science interaction that employ an external force model, whereby culture acts on a particular discipline as an external force pushing on an isolated body. I advocate instead a participation model involving a nondeterministic concept of cultural causation. The causes in the model are constraints, resources, and motivations. Niels Bohr provides illustrations for a revised version of the Forman thesis. Finally, "Pascual Jordan: From Quantum Mechanics to Biology, Psychology, and National Socialism" shows how the mathematical formalism of quantum mechanics, in the hands of one of its most skilled analysts, could be employed as a support base for a unified, holistic reinterpretation of the natural and social worlds. Jordan's politically conservative rendering contrasts interestingly, by subtle shifts of viewpoint, with the superficially similar liberal-socialist stance of Niels Bohr. These two papers display some of the groundwork for a book on the cultural foundations of quantum mechanics in central Europe, which I have planned and partly executed.