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Meetings and conferences

Where Science Meets Technology

understand the reasons for the shape of subsequent world history (starting with World War I). For historians of chemistry this is a challenge to unite, to research, and especially to proclaim—even to popularize—the results of their work. May they rise to the challenge! ✪

This article is based on a paper given at the Joint BSHS/CSHPS/HSS (British Society of History of Science; Canadian Society of History and Philosophy of Science; History of Science Society) Conference at St. Louis, August 2000, a meeting whose original title was "What Is to Be Done? History of Science in the New Millennium."

For Further Reading

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Colin A. Russell. "Aristocracy and Alkali." *Chemistry in Britain* 35:12 (Dec. 1999), 30–1. On Lord Dundonald.

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The Many Facets of Wilhelm Ostwald

When Wilhelm Ostwald (1853–1932) received the Nobel Prize in chemistry in 1909 for his work on catalysis, chemical equilibrium, and reaction velocities, he had already been retired for three years from his chair in physical chemistry at the University of Leipzig. How did this influential cofounder of the new physical chemistry spend his final 26 years at his private estate near Leipzig, after having educated some 100 professors of physical chemistry worldwide; and why did he end his successful university career at all?

An international workshop, "Wilhelm Ostwald at the Crossroads of Chemistry, Philosophy, and Media Culture" (2–4 November 2000), organized by philosopher of chemistry Nikos Psarros and historian of chemistry Britta Görs and held at the University of Leipzig, shed new light on many lesser-known facets of the great chemist's career. Sixteen papers were presented in all, but even these did not suffice to cover the full breadth of his activities. Besides the Ostwald we know—the physical, analytical, and technical chemist; the founder and editor of chemistry journals and book series; the tireless chemistry textbook writer and historian of chemistry—he was also a quick-witted philosopher, an ardent reformer and leader of various international movements, an enthusiastic popularizer of science, and a painter and poet who tried to apply the aesthetic theories on which he worked so hard during the last 20 years of his life.

Did all these activities spring up from his chemistry? Not directly. Rather, they emerged from philosophical reflections on chemistry (an endeavor that is now an established field with two journals, *Hyle* and *Foundations of Chemistry,* dedicated to its growth). Ostwald was quick to elaborate his abundant and complex philosophy of nature—his *Naturphilosophie*—incorporating sociology, psychology, ethics, and aesthetics. Though he received harsh criticism from many of his scientific colleagues, his philosophy comprised an all-embracing scientific worldview, largely based on three principles: an experimentalist epistemology, the metaphysical priority of energy over matter, and a strong belief in societal progress by means of science, technology, and social organization.

Wilhelm Ostwald. Courtesy E. F. Smith Collection, Rare Book and Manuscript Library.

Since for Ostwald progress meant working against the consequences of the second law of thermodynamics, his imperative became: "Do not waste energy—ennoble it!" As a direct consequence, he retired from the university in order to engage in more efficient "energy flows and transformations" for societal progress, such as educational reforms and international information and documentation management. The latter included efforts at standardization of "media," from standard paper sizes to an artificial international language (he created his own, Ido) to a universal currency. Moreover, Ostwald considered both war and traditional religion "unscientific" wastes of energy, to the extent that he became a leading figure in both the international peace movement and the German Monist League (Deutsche Monistenbund), an atheistic, science-based, quasi-religious civic society founded by Ernst Haeckel.

With each presentation of a new and puzzling aspect of Ostwald's life, his personality became more and more difficult to comprehend. Anders Lundgren of Uppsala University pointed to

Ostwald's deeply rooted pursuit of unity and harmony as a common thread running through his endeavors, from his earlier attempts at unifying chemistry and physics to his final theoretical and experimental work on color theory and aesthetics. Other papers revealed ambiguities, even contradictions, in Ostwald's views, such as between modernism and antimodernism, internationalism and nationalism, antimetaphysics and metaphysics. All seemed to agree that Ostwald took up many ideas from others and changed his topic and mind too frequently to allow a consistent reading of his entire work. While this has given rise to many misunderstandings, he was, intellectually speaking, probably the most influential chemist of the 20th century.

Other than his autobiography and the memoir of his daughter Grete, only an early Russian biography of Ostwald, by N. I. Rodnyi and Ju. I. Solowjew (1969; translated into German, 1977), is worth mentioning for further reading. Recent attempts at the Ostwald archive in Berlin to edit his 10,000 letters as well as the proceedings of this workshop will make a long overdue new biography both easier and more difficult to write.

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For Further Reading

Wilhelm Ostwald. *Lebenslinien: Eine Selbstbiographie*, 3 vols. Berlin: Klasing, 1926–1927.

Grete Ostwald. *Wilhelm Ostwald, mein Vater*, Stuttgart: Berliner Union, 1953.

Chemical and Historical Practice at HSS/PSA Meeting 2000

Talks on chemical topics could be heard throughout the combined meeting of the History of Science Society and the Philosophy of Science Association (2–5 November 2000,Vancouver, British Columbia), both in sessions concerned with broad themes in the history of science and in those devoted particularly to chemistry and alchemy. Moreover, two of the annual meeting's most prestigious events, the HSS Distinguished Lecture and the awarding of the Sarton Medal, celebrated practitioners of chemical history. A dedicated participant in the meeting could come away with a good sense of *the practice of the chemical sciences* through time as well as an up-to-date appreciation for *the practice of the history of these sciences.*

Mary Jo Nye's Distinguished Lecture on the origins of the study of science as social practice stood out among the chemical highlights. Nye is Horning Professor of the Humanities and professor of history at Oregon State University and a longtime member of CHF's Advisory Board. Focusing on the contributions of the chemist-philosopher Michael Polanyi, she showed how the shift from treating science as a purely intellectual and rational endeavor to examining its social dimensions began in the early 20th century in the milieu of German chemical culture.

Polanyi's early and highly enjoyable experiences at the Kaiser Wilhelm Institutes for Fiber Chemistry and for Physical Chemistry, 1920–33, shaped his view, exposited in his later philosophical works, that the roots of scientific knowledge lie in scientific *practice.* Practice for him encompassed an intellectual tradition as well as a social tradition based on a community of peers who share experience and authority. He realized that the pursuit of science is a very human endeavor in which the individual scientist balances the demands of the university, the state, and industry—as he himself had done in Berlin and Dahlem. Yet he felt that science could meanwhile establish "contact with a hidden reality."

If few in Nye's audience had read Polanyi, they could respond to her evocation of Thomas S. Kuhn, whose pathbreaking work in the study of science as social practice, *The Structure of Scientific Revolutions* (1962), continues to inspire historians of science today. Kuhn knew Polanyi personally and acknowledged several intellectual debts to him. Among them was the concept of "tacit knowledge"—unwritten learning acquired from mentors and comrades in the laboratory on how to *do* virtually everything in science—from using apparatus to applying for grants.

Another high point of the meeting for the chemically engaged was the award of the Sarton Medal for a lifetime of scholarly achievement to Frederic L. Holmes, Avalon Professor of History of Medicine at Yale University. Three of his books—*Claude Bernard and Animal Chemistry* (1974), *Lavoisier and the Chemistry of Life* (1985), and *Hans Krebs* (vol. 1, 1991; vol. 2, 1993) —while concentrating on the work of a few geniuses, have shed new light on whole areas of the practice of the chemical and biological sciences. The same can be expected of *Meselson, Stahl, and the Replication of DNA: A History of the "Most Beautiful Experiment in Biology"* (forthcoming 2001). The Sarton Medal is only the latest of the tokens of esteem that the society has presented this shy, quiet scholar (he was its president, 1981–83). Holmes's gentle passion for learning inspired several now-prominent members of the history of science community to pursue their studies when seemingly more lucrative, secure, or socially relevant callings beckoned.

Talks on the history of the chemical sciences ranged back in time from quantum chemistry and the Human Genome Project to alchemy. Jeremiah James (CHF Edelstein Student; Harvard University) led off the session "The Values of Interdisciplinarity," tracing the paths that led Linus Pauling, Robert Mulliken, and John Slater to their various quantum mechanical accounts of chemical bonding. To an audience mainly of philosophers, Eric Scerri (UCLA) presented a philosophical analysis of whether atomic orbitals were indeed directly imaged for the first time in September 1999. On the basis of the content and the history of atomic orbital theory, Scerri denied the claim.

Two sessions on biomedical science dealt with the circumstances surrounding some of the most crucial and controversial science of the last few