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Mel Kranzberg Receives Bernal Prize as Pioneering Historian of Technology

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In the temple of the history of science, Melvin Kranzberg, recipient of the 1991 Bernal Prize, is the principal architect of one of its central pillars—the history of technology as a field of learning. Another pillar is the sociology of science. Like Robert K. Merton—the first recipient of the Bernal award 11 years ago and master architect of that pillar—Kranzberg's vision of recording the interaction between culture and technology owes an intellectual debt to George Sarton,[1] a major early contributor to the temple's foundation.

The Bernal Prize, which the Institute for Scientific Information® (ISI®) sponsors in conjunction with the Society for Social Studies of Science (4S), is named for John Desmond Bernal.[2] I first met Bernal in 1958 at the International Conference on Scientific Information held in Washington. I remember he delivered a paper on information transmission at that conference.[3] This Renaissance man comfortably wore several hats—among them physicist, historian, futurist, sociologist, and information scientist. I recall reading his book *The Social Function of Science*[4] as a high-school student in 1939 or 1940.

Early Beginnings at Harvard

When Kranzberg arrived at Harvard in 1938 to pursue his graduate studies, as Arnold Thackray of the University of Pennsylvania and director of the Beckman Center for the History of Chemistry pointed out in the 1991 Bernal award citation,

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America was still held captive by the Great Depression. That same year, Merton's seminal thesis on "Science, Technology and Society in Seventeenth-Century England"[5] was being published in Sarton's Belgian journal *OSIRIS*, a publication devoted to printing major monographs in the field. And James Bryant Conant, then president of Harvard, though himself deeply interested in the history of science, felt that there was no long-term institutionalized future for it.

Incidentally, in 1986 Kranzberg wrote the Foreword to ISI's *Contemporary Classics in Engineering and Applied Science*,[6] one of a series of seven volumes published

by ISI Press®. Thackray acted as compiler for the volume, which contains more than 300 commentaries by authors of *Citation Classics®* published in *Current Contents®*.

Kranzberg was initially drawn to the study of European history at Amherst during his undergraduate days and pursued this field at Harvard, receiving his PhD in 1942. This led to later publications in the field—*The Siege of Paris, 1870-71*[7] (1951), and *1848: A Turning Point?*[8] (1959). The formal study of technology for Kranzberg began during World War II when he took a "crash" course in electrical engineering as part of his Army service.

Atomic Bomb Influenced Kranzberg

The development of the atom bomb and the subsequent threat of a hydrogen sequel during the Cold War of the Truman and Eisenhower eras had their effect on Kranzberg. But it was not until 1952 that his growing interest in the role of technology in Western societies found roots. He was appointed to the faculty of Case Institute of Technology (now part of Case Western Reserve University), at that time a leader in the growing field of operations research. When West Churchman and Russell Ackoff asked Kranzberg to add a course in the history of science and technology, he plunged into the task wholeheartedly and whole-mindedly. During his tenure at Case, Kranzberg established the first American graduate program in the history of technology.

If memory serves, I first met Mel at an international conference in Europe in the late 1950s. We shared a mutual interest in, and were influenced by, the work of Derek de Solla Price,[9] another early recipient of the Bernal award. As Kranzberg points out in his acceptance remarks, reprinted below, Price was one of the first to note that "applied science" was rapidly becoming "applied technology." Another major influence on Kranzberg's career was Charles W. Cole, the president of Amherst College, whose work in the history of economics made him a technology buff. Kranzberg earned his undergraduate degree in 1938 from Amherst, which later would award him an honorary doctorate.

In 1972, Kranzberg became the first Callaway Professor of the History of Technology at the Georgia Institute of Technology. Georgia Tech has been his home ever since.

Entrepreneur, Exemplar, and Evangelist

Referring to Kranzberg as a discipline-builder, Thackray called attention to his roles as entrepreneur, exemplar, and evangelist. "Medieval thinkers, not medieval tinkerers, was Sarton's cry. Other worshippers of *Isis* [the primary journal in the history of science, founded by Sarton] and guardians of the History of Science Society proved equally unfriendly to research on the history of technology: it was a particularly curt rejection by Henry Guerlac in 1957 that led a little band of scholars, energized by Kranzberg-as-entrepreneur, to create the Society for History of Technology [SHOT] and to launch [the journal] *Technology and Culture*. Quite naturally, entrepreneur Kranzberg was appointed secretary of SHOT and editor of *Technology and Culture*. Mel continued with this latter task for 20 years, until *T&C* was firmly established as the central organ of a recognized and legitimate field of scholarship....

"But Professor Kranzberg has never been simply the entrepreneur, seeking to build the organizations needed by his chosen field. He has also always been the exemplar—displaying in his teaching, editing, and writing what scholarship in the history of technology is all about.

"Consider...that Mel is the author of almost 200 publications. Quite obviously, his chosen and little-recognized field required an authoritative textbook—so Mel would edit it: the two volumes of *Technology in Western Civilization*[10] appeared in 1967, and played a vital role in defining this new field of scholarship. In 1972, this standard-

setting text was followed by an anthology of exemplary articles under the title of *Technology and Culture.*[11] Meanwhile, a continuous stream of articles flowed from Mel's pen. These publications show him as not only the *exemplar* of scholarship in his field, but also as the *evangelist....*"

In addition to being the principal founder of SHOT and its quarterly journal *Technology and Culture,* Kranzberg is a cofounder of the International Committee for the History of Technology (ICOHTEC), a scientific section of the International Union for the History of Science under UNESCO. He served as vice president of ICOHTEC from 1968 to 1989. On his retirement, he was elected honorary president of the organization.

When Kranzberg became professor emeritus in June of 1988, the Georgia Tech Foundation established the Melvin Kranzberg Professorship in the History of Technology. His many awards include the Apollo Achievement Award (1969) of the National Aeronautics and Space Administration (NASA). His experience chronicling NASA's history, includes serving on that agency's National Advisory Council from 1984 to 1987. Certainly, Mel has been a tireless worker in carefully designing and building his technology pillar. I know, too, that he takes pride in his long association with Sigma Xi, the scientific research society of which he served as national president in 1979-1980. He is truly a scholar of extraordinary vision.

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REFERENCES

1. **Garfield E.** George Sarton: the father of the history of science. Parts 1 & 2. *Current Contents* (25):3-9, 24 June 1985; (26):3-8, 1 July 1985. (Reprinted in: *Essays of an information scientist: ghostwriting and other essays.* Philadelphia: ISI Press, 1986. Vol. 8. p. 241-53.)
2. ----------. J.D. Bernal—the sage of Cambridge. 4S award memorializes his contributions to the social studies of science. *Current Contents* (19):5-17, 10 May 1982. (Reprinted in: *Ibid.*, 1983. Vol. 5. p. 511-23.)
3. **Bernal J D.** The transmission of scientific information: a user's analysis. *Proceedings of the International Conference on Scientific Information.* 16-21 November 1958, Washington, DC. Washington, DC: National Academy of Sciences, 1959. Vol. 1. p. 77-95.
4. ----------. *The social function of science.* London: Routledge & Kegan Paul, 1939. (Reprinted by MIT Press, Cambridge, MA, 1967.)
5. **Merton R K.** Science, technology and society in seventeenth-century England. In *OSIRIS: studies on the history and philosophy of science and on the history of learning and culture.* (Sarton G, ed.) Bruges, Belgium: St. Catherine Press, 1938. p. 362-632; reprinted with new preface, New York: Fertig, 1970, and Harper, 1970.
6. **Thackray A,** comp. *Contemporary classics in engineering and applied science.* Philadelphia: ISI Press, 1986. 363 p.
7. **Kranzberg M.** *The siege of Paris, 1870-71: a political history.* Ithaca, NY: Cornell University Press, 1950. 213 p.
8. ----------. *1848: a turning point?* Lexington, MA: Heath, 1959. 104 p.
9. **Garfield E.** A tribute to Derek John de Solla Price: a bold, iconoclastic historian of science. *Current Contents* (28):3-7, 9 July 1984. (Reprinted in: *Op. cit.*, 1985. Vol. 7. p. 213-7.)
10. **Kranzberg M & Pursell C W,** eds. *Technology in Western civilization.* New York: Oxford University Press, 1967. 2 vols.
11. **Kranzberg M & Davenport W H,** eds. *Technology and culture: an anthology.* New York: Schocken Books, 1972. 364 p.

Acceptance Speech of Professor Melvin Kranzberg
J.D. Bernal Prize (1991)
Society for Social Studies of Science
Cambridge, MA, Nov. 14-17, 1991

This is a very meaningful occasion for me. For one thing, the Bernal Prize is very prestigious; indeed, its previous recipients represent a pantheon of my idols and friends. Also, I have known the founder of the prize, Eugene Garfield, for many years and have long admired his vision, his creation of the Institute for Scientific Information®, and his contributions to the measurement and comprehension of the dimensions of the scientific enterprise. Last but certainly not least, this award represents a heartwarming recognition of my lifetime devotion to study of the interactions of technological with sociocultural developments.

I was urged to use this occasion to provide some autobiographical reminiscences, and I start with a question that is frequently put to me: How did you happen to get involved in the history of technology?

After all, my undergraduate and graduate studies focused on modern European history, with a smattering of social and economic history. That was a time when E.A. Freeman's 19th-century definition of history as "past politics" was being augmented by James Harvey Robinson's "new history," which enlarged the political dimension to include sociocultural parameters as well. But in the 1930s, the "new history" had not yet expanded to include science and technology in its purview.

Indeed, not until the 1950s when I was teaching at Case Institute of Technology, in Cleveland, did the history of science and technology become central to my concerns. What happened is that the ECPD [Engineers Council for Professional Development], at that time the accrediting agency for engineering schools, had determined that engineers required social knowledge and human skills in addition to their immersion in engineering formulas and technical practices. So, in order to enlarge the non-technical portion of engineering education, which had previously been quite limited, the ECPD recommended the integration of Humanities and Social Science courses into the engineering curriculum.

How It All Began

To comply with the new accreditation standards, Case Institute appointed an outside advisory committee, which included Gilbert Highet, a famous Classical scholar, Howard Mumford Jones, the "gray eminence" of American culture, and Charles Cole, president of Amherst College, where I was then teaching and who had taught me economic history when I was an undergraduate. (Not so incidentally, his course had introduced me to Lewis Mumford's *Technics and Civilization*, which made an indelible impression on me by its insights into the many and complex interactions of technology with all aspects of society.)

This advisory committee recommended that Case introduce courses in American and European civilization that would bring political, economic, social, and cultural developments together in an integrated whole. To meet this recommendation, Case expanded its Humanities Department from five English teachers, who taught courses in "English for Engineers"—as if engineers spoke a different language than ordinary people—to more than 20 faculty drawn from history, economics, political science, sociology, philosophy, literature, and the fine arts. We then proceeded to develop a two-year sequence in Western Civ that was designed to meet Thomas Carlyle's 19th-century definition of culture as "the best that man has thought, said, and done."

When the poet Robert Frost visited Case, we told him about our exciting new program designed to make the engineer into a well-rounded person. "Why?" asked Frost, "Are you going to roll him down a hill?" I gulped and replied, "No, we intend to roll

him to the top of the hill, and it's easier to do that with somebody who's well-rounded than with a square." Frost groaned at my response and changed the subject.

It was a fine course, and we faculty learned a great deal from one another while teaching it. But the students, alas, seemed profoundly disinterested—perhaps because the course did not have a figurative dollar-sign preceding its number, as did their engineering courses.

Then I remembered that John Dewey, the great American educator, had once said, "To get a student interested in something, start him with something he's already interested in."

Since ours were science and engineering students, we changed the basic question of the course to make it student-oriented, namely, how did science and engineering contribute to the development of Western civilization? Then, using developments in science and engineering to introduce each of the chronological divisions of the course, we endeavored to relate these to the political, economic, social, and cultural developments, as in the conventional Western Civ course.

While the students responded well to our new approach, now, over three decades later, there is a great hullabaloo over the need for "multi-culturalism" in our educational offerings, so some people might question the *raison d'être* of a Western Civ course, to begin with. This is not the time nor the place to get involved in that dispute which is currently rocking the halls of academia. But I must point out that the introduction of the scientific and technological parameters into our Western Civ course forced us to bring in the contributions made by African, Arabian, and Asian cultures to the development of science and technology—and hence to Western Civilization. Not only that, but it also made the Western Civ course more relevant to today's multicultural world. Let me explain.

In the old liberal arts Western Civ courses we kept telling students that the distinctive character of Western Civilization derived from Judeo-Christian theology, ancient Greek philosophy, Renaissance art, Enlightenment thought, French Revolutionary political theories, American democratic forms, and so on and on.

True, but only partially so, for the really distinctive characteristic of our Western Civilization is our science and technology. The Scientific Revolution of the 17th century and the Industrial Revolution of the 18th and 19th centuries distinguish our Western world from anything that has happened anywhere else and any time before in history. Science and technology are the hallmarks of our Western Civilization.

Hardware More Appealing Than Gospel

One test of the truth of this theorem is to ask what Western civilization means to non-Western people. They are not impressed by our art, our literature, our philosophy, our system of government, our religion. Indeed, they possess great literary, artistic, philosophic, and religious traditions of their own. They reject our form of government and are largely indifferent to our religious creeds. To them, the really different and important thing about our Western Civilization is our science and technology. That is what they admire most about us. Indeed, what they want from us is our hardware, not our gospel.

But then they run into trouble when they realize that our Western science and technology carry with them our Western sociocultural baggage, which they don't always like or want. So let me clarify one point which might seem to contradict what I just said about science and technology being the hallmarks of our Western civilization, rather than our religions, philosophy, and other elements of our political, economic, and cultural heritage. For it is precisely our Judeo-Christian theology, ancient Greek philosophy, Renaissance attitudes and business practices, French Revolutionary ideas, and so forth that helped give birth to and nurtured the development of today's scientific and technological world. And, let us remember that science and technology are no longer solely possessed by the West but are rapidly becoming global in scope.

After this long—but necessary—digression, let me return to the difficulties we

encountered when we enlarged our Western Civ course to include scientific and technological parameters. We ran into a stumbling block, namely, the lack of scholarly material to acquaint the faculty with the relationships of scientific and technological changes to political, economic, and sociocultural developments. Although Bernal's insightful *Social Function of Science* had appeared a dozen years earlier. It was tainted with the odium of a "Marxist interpretation," which was anathema at a time when "McCarthyism" prevailed and when faculties were required to sign loyalty oaths.

Although *ISIS* had long been publishing fine scholarly articles in the history of science, those pieces were strictly internalist, taking little note of the Vienna Circle's holistic view of scientific unity, which Gerry Holton rightly regards as a precursor to 4S. But what most concerned those of us teaching engineering students was that *ISIS* rarely touched on any aspect of technological history. Indeed, there was little literature at all in the history of technology—and what there was, dealt mostly with internal history or was characterized by a popularizing "gee-whiz!" approach to technical innovations.

Hence, when the American Society for Engineering Education met at Cornell in 1957, a self-appointed delegation from its Humanistic-Social Division and consisting of academicians interested in the history of technology—Tom Hughes (who received the Bernal Prize last year), John Rae, Carl Condit, and myself—arranged a visit with Henry Guerlac. Our mission was to convince this major figure in the History of Science Society that *ISIS* should publish articles in technological history as well as the history of science. Alas, ours proved to be a "mission impossible"; Guerlac turned us down, citing George Sarton's admonition that the history of science "deals with thinkers, not tinkerers."

As we dispiritedly left Guerlac's home, I said to my companions, "It looks as if we'll have to start a society and journal of our own, for the history of technology." They replied, "It's your idea, Mel, so you do it." And that's why SHOT was founded, and how I became editor of *T&C*.

From its very beginnings, the history of technology as a professional field has been both internalist *and* externalist. For one cannot comprehend technical developments without knowing something about the technical elements themselves—but these cannot be understood or properly analyzed apart from their sociocultural surroundings.

Army Training in Electrical Engineering

At this point you might well ask what I knew about technology, inasmuch as I had gone to a liberal arts college and had done my graduate work in history at Harvard. Good question! Well, it so happened that I was working in Washington shortly after America became involved in World War II, and like all those of my generation, I was eager to serve my country. Since all my friends were getting direct commissions for desk jobs in the U.S. Navy, I tried to get one too. But I was turned down because I had flat feet! Then, hearing that the Signal Corps was looking for people to train for a newfangled device called "radar," I volunteered, and the interviewing officer accepted me, saying that my Harvard doctorate proved that I was "educable." They sent me to Johns Hopkins where I took an accelerated course in Electrical Engineering—eight hours a day, six days a week, for three months—presumably the equivalent of three years of electrical engineering! I did so well that the War Department sent me to Philco Radio Labs in Philadelphia for two months of special radar training. But by the time I finished that, the Signal Corps already had enough radar specialists—so they called me to active duty for basic infantry training!

But my point is that some background in engineering theory and practice provides a direct acquaintance with technology, which, along with knowledge of the sociocultural milieu, is essential for the "contextual" approach. That approach studies technological developments and their varied and com-

plex interactions with society—both cause and effect. And this contextual approach is becoming increasingly sophisticated, as exemplified by recent studies in "social constructivism."

While the history of technology pursued contextualism, the history of science long remained bound by the internalism embodied in George Sarton's and then Alexandre Koyre's preoccupation with the thoughts and activities of the scientists themselves, without regard to any operative external forces. This internalist attitude still lingers among some leading historians of science. Thus, the Harvard Graduate School's Fall 1991 Newsletter quotes I. Bernard Cohen as saying, approvingly, that many historians of science "find it hard" to "view developments in history and the history of science as produced by external factors."

Nevertheless, in the past two decades, the younger generation of historians of science, perhaps stimulated by the insights which the contextual approach has brought to the history of technology, are increasingly employing a similar approach to scientific history. This was manifest in the joint sessions at the very successful SHOT-HSS meeting two weeks ago in Madison, which attracted a record of almost 900 registrants.

Sociopolitical Factors Recognized

Furthermore, the scientific and technological enterprises themselves have, during this past century, become more closely intertwined. Technology is no longer condescendingly viewed as "applied science." Indeed, when studying the role of technical means and instrumentation in some major scientific discoveries of this century, the late Derek Price, an early recipient of the Bernal Prize, implied that science is getting to be "applied technology."

Recognition of the linkages between science and technology is also accompanied by increasing attention to the many and complex sociopolitical factors involved in—and deriving from—the scientific and technological enterprises. Thus, even as we meet here in Cambridge, many of our colleagues are attending a forum in our nation's capital on "Global Change and the Human Prospect: Issues in Population, Science, Technology, and Equity," organized by Sigma Xi, the scientific research society, in conjunction with the American Association for the Advancement of Science, American Association of Engineering Societies, the Consortium of Social Sciences Association, and the Social Science Research Council.

That forum indicates that many of the major problems facing the world today and tomorrow involve science, technology, human values, social organization, environmental concerns, economic resources, political decisions, and a host of other factors. These interface problems (i.e., the interface between science, technology, and society) can only be solved—if they can be resolved at all—by the application of scientific knowledge, technical expertise, social understanding, and humane compassion. These interface problems have another feature in common: scientists and engineers cannot solve them alone, yet they cannot be resolved without the aid of our scientific technology and recognition of the social forces operating on them as well as other elements of society.

That explains the relevance of social studies of science and technology, as manifested by 4S, and also the proliferation of academic STS programs, as represented by our hosts of this meeting. And that is why all of us, in pursuing our own specialized fields of knowledge, must be cognizant of the many social ramifications of our academic fields so that we can teach these to our students—and the wider public—in order to build a better world in the future. That is what J.D. Bernal had in mind in his prescient analyses of the social environment and functioning of science. His pioneering studies provide a mission and goal for all of us, and that is why I am so grateful to the Society for the Social Studies of Science and the Institute for Scientific Information for presenting me with this award named in honor of that great scholar.