A "Simple Metallurgist" at MIT

Samuel M Allen

From beginning to end I have been a simple metallurgist using metals and their structure as a kind of inverted touchstone to assay all things.

– Cyril Stanley Smith, A Search for Structure

Cyril Smith came to MIT in 1961 with joint appointments as Institute Professor, Professor of History of Science and Technology, and Professor of Metallurgy after serving the University of Chicago as Professor of Metallurgy for fifteen years. He relocated at age 57, at a time when the Institute's mandatory retirement age was 65. Correspondence from the archives of MIT's Department of Materials Science and Engineering, formerly the Department of Metallurgy, from the mid-1950s through 1961 provides a good perspective on Professor Smith's prior connections with MIT's Department of Metallurgy, MIT's efforts to recruit him, his aspirations for the final years leading up to formal retirement, and his personal perspective on the import of his MIT work.

John Chipman, Chairman of MIT's Department of Metallurgy from 1946–62, was a frequent correspondent with Cyril Smith and well aware of his broad interests. Smith wrote to Chipman,

As you know, I have had more or less as a hobby an interest in the history of metallurgy. I find myself becoming more and more interested in this field and am thinking of possibly requesting a year's leave of absence from the University to indulge exclusively in this field, or possibly combining six months of such activity with six months' professional metallurgical activity in England. (14 October 1954)

Chipman replied, "I am very interested to learn of your proposal to work on the history of metallurgy. This should be a very interesting task, and your results will be of very great value to the metallurgical profession. I shall be only too glad to do anything

Samuel M Allen's research programs involve a combination of theoretical modeling and experimental studies relating to solid-solid phase transformations and the evolution of microstructure in materials. Much of his work has been devoted to the study of order-disorder transformations and structure-property relations of alloys, including studies of deformation of intermetallic compounds, the structure and properties of interfaces, and the use of computer-calculated phase equilibria for solving practical alloy design problems. He is also interested in the art and craft of blacksmithing which he co-taught in a freshman advising seminar, from 1989 to 2000.

Keywords
MIT, history of metallurgy.

On his move from Chicago to Boston:

I thought it was time for a change in emphasis and aim. Leo Szilard has put it well in his Ten commandments: "Do your work for six years; but in the seventh, go into solitude or among strangers so that the recollection of your friends does not hinder you from being what you have become"
C S Smith

I can to help you with this plan" (18 October 1954). Smith and Chipman corresponded in subsequent years about the history of metallurgy but there is no record of Chipman's direct role in obtaining an MIT faculty appointment for Smith. Nevertheless, given a professional relationship that dated back to the Manhattan Project, plus Chipman's obvious appreciation of Smith's interest and expertise in the history of metallurgy, it is highly likely that Chipman was instrumental in the offer made to Smith in July 1960 by MIT President J A Stratton (Merton C Flemings, personal communication to Heather Lechtman, March 2006).

Smith's offer letter states, "It gives me great pleasure to extend to you an invitation to accept appointment at MIT as an Institute Professor with tenure... effective on a date to meet your convenience." Stratton continued, "An Institute Professor is free to roam about as he desires, but for administrative purposes I suggest that your base be in the School of Humanities and Social Science. John Chipman's support has been most cordial, and he will be delighted to have you spend as much time with the Metallurgy Department as you see fit" (8 July 1960).

Smith was clearly attached to his position at the University of Chicago, as he replied,

I am highly honored by the offer and am strongly tempted but I wish to delay the decision a little longer. Chicago has absorbed a fair fraction of my mind and heart for several years, and I am keenly conscious of the special qualities of this University. My decision will be made almost entirely on the basis of which place seems most likely to provide a stimulating and sympathetic atmosphere for the research and writing that I intend to do in the last decade or so of my professional life.

He goes on to state his aspirations for the position:

I would expect to participate in the development of a program of teaching the history of technology and science at MIT, though I am not by nature an educator and I could not usefully contribute to elementary or broad survey courses. I would welcome the opportunity to participate in metallurgy seminars, and would enjoy contact with graduate stu-

dents' research in both historical and metallurgical fields. I would expect to contribute to the program of advanced study and research in the Humanities School and, if necessary, to play a reasonable role in trying to attract financial support for this area of activity. Mostly though – and this you can easily understand from my past history – I want to do research, to explore new combinations of knowledge, and to write with the aim both of broadening science and of providing a small fragment of the bridge between science and the humanities. My activity will on the one hand be aimed at understanding the basis of structure in inorganic matter (particularly exploring the features common to metallurgy, ceramics, and geology) and on the other, to explore some areas of interaction in the history of science and technology. Also I want to work at the interface between history, metallurgy, and archeology – to try to elucidate the beginnings of the hardening of steel, which was perhaps more important than the introduction of iron itself – and may get into some studies of the properties of the metals that have been used in art. (9 August 1960)

Smith and Stratton spent the next three months negotiating those timeless potential sticking points in academe – salary, titles, and space – and MIT's offer was finally accepted on 1 November 1960. The Executive Committee of the Corporation formally approved Smith's appointment in January 1961, and his appointment as Institute Professor commenced 1 June 1961. Smith's view of his accomplishments in the first year of his MIT appointment was understated and self-effacing. In a letter to John Chipman, he states,

Your request of April 24 for information on activities during the year is embarrassing. Research on the history of metallurgy has continued with no outstanding discoveries and no outstanding publications. My book, The History of Metallography was awarded the Pfizer Prize of the History of Science Society as the best book of the year in the Society's field; and the ASM gave me its Gold Medal. I attended the International Conference on "The Impact of Physical Metallurgy on Technology" held in Argentina, April 1–7, 1962. Otherwise, I'm damned if I know what I have done in the last year except write a number of quite trivial articles. (27 April 1962)

Cyril Smith's scholarly achievements in subsequent years are documented in Heather Lechtman's article "Cyril Stanley Smith and the Prehistory of the Solid State" published in this volume. In a letter to MIT Provost Jerome Wiesner, Smith foresaw his formal retirement,

I passed my sixty-fifth birthday on October 4, 1968 and my appointment as Institute Professor accordingly ends on June 31st next. However, I do not in any way feel like ceasing activity, and at the time of my appointment President Stratton told me that I could look forward to a continuing half-time appointment. (This was indeed one of the attractive features of MIT, for such an arrangement was not possible at Chicago at that time.) (12 February 1969)

Cyril remained active for more than two decades after "retirement."

Toward the end of his life, Smith was asked to write a short biography for MIT's Department of Materials Science and Engineering. It includes this perspective on his study of the history of materials:

Quite early I became interested in the history of materials which, despite their basic role in enabling social change, had been ignored by historians, even those dealing with the history of science who had much to say about the philosophy of idealized matter. It's a wonderfully international intercultural field of study. I started with the written sources, few of which were available in English and, being a rather poor linguist, I collaborated with others to produce English translations of many of the classics of metallurgy, originally in German, Latin, Italian, French, Polish and Japanese, which are now frequently cited in historical literature. However, after studying the principle [sic] published works on practical and scientific metallurgy I came to see that the best records were in things, not words. Objects in art museums make it very clear that intuitive understanding of the diverse nature of metals and their modification by alloying and mechanical or thermal treatment far preceded the records of conventional history and that curious individuals seeking pleasant effects, which only later were

turned to "practical" use and eventually later came to the attention of the philosopher and theorist. I also saw that the superb development of mathematical physics that has dominated science since the 17th century has been accompanied by a blindness to the granular assymmetrical [sic] substructure of real materials with their imperfect elasticity. The explosive growth of new materials in the 1970s and '80s is the first fruit of the new structure-sensitive science that is only now being incorporated in the text-books and, I suspect, will soon cause major changes in the framework of philosophical thought." (17 April 1989)

Cyril Smith was more than a "Simple Metallurgist." His inquisitive intellect and his nature to interrelate diverse fields – to study the "connections" and the "interfaces," he would say – have inspired countless colleagues and scholars to stretch their understanding of their own work.

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Description of the Cover Page:

Leonhard Euler formulated his law applying to the surface of a polyhedron as P – E + C = 2, where P, E, C stand for polygons, edges and corners. "There are no limitations on this, beyond the requirement of simple connectivity. Even more than Euclid, hath Euler gazed on beauty bare" – C S Smith. Euler was a blind mathematician! Smith himself was color blind and hence was attracted to the textures in visual images, paintings and metallic artefacts.

In the cover, Euler's law is applied to a regular hexagonal tiling like the bees' honeycomb, an irregular soap froth and the complicated network from a Picasso painting. Art, science and metallurgy are all obeying the topological dictates of Euler's law!