

4S REVIEW

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EDITORIALS**COOPERATING WITH GOLIATH IN GOTHAM**

The Society for the Social Studies of Science is an international and interdisciplinary society of scholars interested in the study of science. Our diversity and breadth is our strength. There are a number of other societies more limited by subject matter (Society for the History of Technology - SHOT) or geographic region (European Association for the Study of Science and Technology - EASST) with which we share parts of our area of interest. We are bounded by strong disciplinary associations in the social sciences, history, philosophy, and massive interdisciplinary societies such as the AAAS.

Our interests, diversity, and size have brought us to work together with a number of societies over time. We have held joint meetings with the Philosophy of Science Association, the History of Science Association and SHOT in Toronto and Philadelphia. We will plan to meet with them again in 1986, probably in Washington, D.C. The 1984 annual meeting will be held jointly with EASST and Cognition and Communication in Ghent, Belgium.

On May 24 through 29 in New York, we will experiment with another variety of cooperation by sponsoring 4 sessions and a cash bar party at the AAAS meeting. The 4S is one of 236 affiliated societies of the AAAS. We have recently activated our affiliation with section L (History and Philosophy of Science) and are currently considering affiliation with section K (Social and Economic Sciences). Our four sessions are on Sunday May 27th and Monday May 28th and the cash bar will be at 6:30 PM on Monday the 28th. We hope that members will take in our sessions as well as some of the rest of the incredible richness of a AAAS meeting, and then join us on Monday night, before dinner to discuss what we have heard and seen. Please check elsewhere in the review for a list of sessions and plan to attend.

Nicholas Mullins
President, 4S

CALL FOR PAPERS

As Editor for Bibliography and Literature of the 4S REVIEW, I have been asked to develop a new section of the journal that would provide useful, coherent surveys of the voluminous literature in the social studies of science. For several years, the 4S Newsletter has reproduced selected "tables of contents" from journals indexed by the weekly publication Current Contents. This is a redundant waste of scarce and expensive pages: Current Contents is available by subscription through the Institute for Scientific Information, and it is also available at many university libraries. Moreover, tables of contents do not indicate the quality or substantive relevance of papers, an acute problem in our specialty where titles are often poor descriptions of the research within.

Some have proposed that 4S REVIEW establish a comprehensive, subject indexed "cumulative bibliography" similar to that provided by Isis for the history of science. This bibliography would include abstracts of papers along with referencing information. This may be a desirable goal for the future, but resources available to me now (both personal resources such as time, and institutional resources such as graduate assistantships for library runners) are too scarce to make such an effort feasible. Moreover, the interdisciplinary and international nature of social studies of science, surely a key to our intellectual vitality, raises nightmares for a thorough bibliographer. Imagine the frightening length of a cumulative bibliography that would soon dwarf the Isis list by including not only the history of science, but also sociology of science, philosophy of science, science policy, technology and culture, etc. The scholarly interests of 4S members are so diverse that a professional reference librarian (to say nothing about a mere library-user) would find it challenging to devise a subject categorization that is logically coherent yet intellectually useful to all. Of course, we could settle for less-than-comprehensive coverage of the social studies of science, but then I would hear the protesting howls from sectors of the specialty whose precious literature had been forgotten.

Given these considerations, I propose a new, regular feature of the 4S REVIEW to be called "CRITICAL SYNTHESIS." These papers would--in the scope of the literature they review--steer between the too-narrow book review and the too-wide "review article." Larry Stern continues to do a superb job in organizing and editing conventional book reviews for the journal. To avoid duplication of effort, a "Critical Synthesis" will not take the form of short reviews of recent titles. Neither will it achieve the comprehensiveness of "review articles" of the specialty taken nearly as a whole. Such encompassing review articles are becoming more common in other journals, and recent examples would include: Michael Mulkay, "Sociology of Science in the West" Current Sociology, 28 (Winter 1980), 1-184; Steven Shapin, "History of Science and its Sociological Reconstruction" History of Science, 20 (1982), 157-211; Henrika Kuklick, "The Sociology of Knowledge: Retrospect and Prospect" Annual Review of Sociology, 9 (1983), 287-310; H. M. Collins, "The Sociology of Scientific Knowledge: Studies of Contemporary Science" Annual Review of Sociology, 9 (1983), 265-85.

My goal is to publish topical surveys of coalescing literatures in the hottest pockets of research in the specialty. We all spend time "reviewing the literature" as a necessary part of research. Sometimes the literature search turns up long-forgotten precursors that anticipate our newest ideas. Usually, we

create idiosyncratic combinations of books and articles whose mutual relevance seems low except in terms of our unique research agendas. At the very least, literature reviews force us to impose an order on the mass of potentially relevant works, old and new: what are the enduring themes and persisting debates?

- However, by the time we "write up" the final version of a paper, our literature searches are often collapsed to brief mentions of the few essential references. The review tries only to establish a context for the reported empirical research that follows. In my opinion, this familiar gloss on a literature review forces omission of much useful information. Perhaps a number of you would be willing to share the largely private world of your literature searches, by writing them up in the kind of detail not ordinarily allowed by space-constrained articles in journals reporting primary research.

Some ground rules: the surveys should be 10-15 pages in length, double-spaced. The scope of the reviewed literature should be roughly equivalent to session topics at recent 4S Annual Meetings, for example: Rhetoric of Science, Social Stratification and Scientific Careers, Science and Technology Indicators, Political Economy of Science, Science Policy, Style of Scientific Papers, Scientific Innovation, Science and Public Controversies, Public Attitudes Toward Science, Scientific Instrumentation, Funding of Science, Bibliometric Studies of Scientific Literatures, Scientific Practice in Laboratories, Theories of Scientific Change, Science and War, Science in Developing Countries, Scientists in Industry, and Professional and Political Interests of Scientists. (This list is intended to be suggestive, not restrictive.) The surveys should be critically selective: authors should assess the relevance of books and articles, as well as their quality and utility for future inquiry. Scholarly controversy would be a welcomed result. The surveys should not be restricted to recently published works. The "novelty" will come from resuscitations of old writings long-assumed to be uninteresting, or from the establishment of unappreciated connections among bodies of research. References should be listed alphabetically at the end of the text (no footnotes); in the text, a reference should list only the cited author's name, date of publication and page number, e.g. Price (1963:45). The surveys will be selected and edited by me, perhaps in consultation with other members of the 4S REVIEW Editorial Board.

Success depends on the willingness of some of you to take on this task. If you have an idea for a CRITICAL SYNTHESIS, or better still, if you have already started to write the inaugural edition, please contact:

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BOOK REVIEWS

Evelyn Fox Keller. **A Feeling for the Organism: The Life and Work of Barbara McClintock.** San Francisco: W. H. Freeman and Company, 1983.

In **A Feeling for the Organism**, Evelyn Fox Keller does not confine herself to the life and work of Barbara McClintock, as the sub-title suggests. The book is not merely a scientific biography. It is certainly not one of the increasingly popular soap operatic sagas of the women scientist struggling alone and friendless against a hostile, male world. It is a documentary within the history of science which chronicles the dialectical interaction of persons and ideas and circumstances. It amplifies the context of discovery of ideas and of their dissemination, and it shows that their reception and spread are not independent of the persons who advance them and are not wholly a matter of pure logic or experimental evidence. Who such persons are affects the reception of ideas, and the ultimate fate of the ideas retrospectively alters the image of the persons involved in their discovery. In the case of Barbara McClintock, we are already beginning to observe her transformation into a legend since, (shortly after the publication of Keller's book) her receipt of the Nobel Prize for medicine vindicated her work and validated her isolated life of commitment. Had she not been so rewarded, few would know her ideas even within the scientific community, though they would have the same importance, and fewer yet would regard her as a model to be emulated.

Keller announces in her preface that the book is the story of a relationship. "The person and the field (of cytogenetics) are contemporaries, born in the first years of this century." But their two careers have not invariably

coincided; and their divergences are as dramatic as their convergences. As Keller points out, even though McClintock's theory of genetic transposition has been vindicated, she remains outside the mainstream. Her recent and belated celebration, however merited, is largely honorific. It cannot undo the fact that it was not McClintock's findings that paved the way to the current affirmation of genetic transposition. McClintock herself was well aware of the differences between her own research and that of the molecular geneticists, who were largely ignorant of her maize studies and who continue not to understand the complexity of her arguments.

Keller has chosen to study one woman's career in science as an exemplification of the importance of the individual and the idiosyncratic even in so collective a field as science. It is no accident that she has selected a woman; for while the dynamics of science is Keller's topic, McClintock's eccentricity is due in no small part to the fact that she is a woman. Independent by choice, McClintock's autonomy was reinforced and indeed imposed upon her by the exclusivity of the scientific community. From Keller's perspective this isolation is of interest both in the particular instance and in the light of what it tells us about the momentum of science.

That McClintock did eventually achieve the recognition of the scientific community is a sign, as Keller sees it, of the underlying good health of the scientific enterprise, which is forced by its own methodology to "reencounter phenomena even (their) best theories cannot accommodate." (p. 197) But McClintock's isolation should not be confused with the long lamented isolation of the intellectual. This

is no ordinary tale of misunderstood genius. McClintock's freedom to be eccentric is due precisely to the complicity of her scientific colleagues in a conspiracy that consigns her, as a woman, to invisibility. Invisible persons can perform the routine function of science without notice. Invisible persons can engender and explore extravagant new ideas without consequence. They can work with dedication without evoking interest. But if, by some historical accident their ideas should become realized and confirmed, then invisible persons become suddenly visible, and the scientific community cannot disavow them. McClintock's place in the history of science would have been very different had she contended only against the skepticism and disbelief that attends novel thinking. But the novelty of her thinking was accentuated by the special ostracism accorded to the invisible. In the void of non-expectation there is enormous freedom.

It is therefore important to this study in the history of science that its subject is a woman, not just because she suffered from prejudice, although she did, but because the nature of this prejudice affected her ability to work within science and it affected the attitude of others toward her scientific work. This is in no way an argument in favor of a unique and distinctive woman's science; but it affirms the existential fact that as a woman, the scientist is and has been subject to a context of beliefs that define her attitudes and those of others toward her in a manner that is normally unacknowledged by the scientific community. Therefore, while this book is not about feminism or about women in science as such, the gender issue is of central concern, despite the insistence of its main protagonist,

Barbara McClintock, upon the essentially gender-less nature of science.

Keller too treats the issue of gender as only one stream in a current of factors that shaped the life and work of Barbara McClintock. Of equal importance is the rise of molecular biology, itself a dramatic adventure, which radically altered the classic tradition of biology. Having received her early education and done most of her work in this field, McClintock could hardly remain unaffected. A third strand of McClintock's story to which Keller draws attention is the uniquely empathetic and individualistic style of McClintock's research. As the title of the book suggests, this approach to science distinguishes McClintock from the mainstream. It marks her, Keller claims, almost as an "endangered species" which is being left behind by a more impatient breed of scientist and a more rapid technology. Keller is supportive of McClintock's belief that in the rush the wholeness of things, as well as their hidden complexities, are being overlooked.

McClintock's significant work in cytogenetics was begun at Cornell in the 1920's, when she herself was a young Ph.D. in her '20's. Her colleagues in the field of maize genetics were mostly studying the results of plant breeding experiments. She extended these experiments to include the microscopic examination of the chromosome structure of individual plants and to relate that structure to genetic theory. Comparable studies had been made with *Drosophila*, which can be rapidly bred and successive generations analyzed; but they had not been done with maize which is slow to grow and cultivate, yielding at most two crops a year. McClintock had found

a way to distinguish and study the identity of each chromosome and she was eager to make the genetic linkage. In those days, the gene was a hypothetical construct. McClintock called it a "symbol", and many scientists doubted that it corresponded to any physical reality.

The discipline of maize cytogenetics was never large, but in it McClintock enjoyed the respect of its leading members. She had the intellectual support and companionship of Marcus Rhoades and George Beadle, brilliant young contemporaries, who were to achieve subsequent fame, and who never belittled or forgot the "spectacular" work of their partner in the Cornell cornfields. They, however, went on to brilliant academic and research careers, an option that was not open to Barbara McClintock.

McClintock fared reasonably well after leaving Cornell in 1931. She moved from one prestigious fellowship to another, staying in the homes of her illustrious friends and often formulating and solving problems that others were only beginning to see--the formation and behavior of ring chromosomes, the role of the nucleolar organizer region, and more. No one seemed to find her nomadic life odd--until at some point in the (and her) mid-thirties, McClintock had to face up to the realization that she was stigmatized: She was a spinster and a career woman. It did not matter that she too was brilliant and that she had a worldwide reputation. She could not aspire to a man's career.

Although her well-placed friends, T. H. Morgan, Rollins Emerson and others did not forsake her, no one found it remarkable that this woman "with brains enough to realize that

she is much more able than most of the men with whom she comes in contact" (p. 74) should find it impossible to find a job worthy of her abilities. McClintock refused to play the game of lady scientist (well documented by Margaret Rossiter)--eternally a research associate, untenured, by-passed by inferiors, and consigned to routine and repetitive tasks. Indeed, she refused even to be grateful for the efforts made on her behalf by her friends. She resented the fact that such efforts needed to be made at all. Knowing her own quality, she knew that such interventions should not have been required, and would not have been, were she a man. This is the point which the male club seems yet to fail to understand, and it is why the gender issue persists among us. No doubt these gentlemen put themselves out for McClintock's sake and genuinely acknowledged her ability. But they should not have had to indulge in such exertions, and this should have outraged them. Instead, they considered the need normal and acceptable and regarded their own activity as supererogatory. They expected gratitude and congratulations since they believed they had exceeded the limits of duty; but their sense of duty was defined by an exclusive male establishment. The problem was not McClintock's "prickly" and "difficult" personality, but her supporters' obtuseness in failing to understand how demeaning it is that what comes to them in the normal and natural course of events (even to the mediocrities among them) should be a matter of special dispensation requiring privileged interventions for a woman. They failed, furthermore, to understand that institutional marginality tends to be coupled with a lack of respect for institutional conventions. Outsiders do not display the same loyalties as insiders, and this immunity seems to magnify their

eccentricity. Barbara McClintock was not a follower of rules which seemed irrelevant to her. Her commitment was to her work, from which she received her greatest intellectual and emotional reward. This passionate commitment to one's work is often adulterated among insiders by institutional claims. Outsiders have less to lose and can give more fully of themselves. Sometimes this very intensity of commitment is frightening to insiders--especially to those who have made their peace with conventional restraints and do not wish to be disturbed. Women are often outsiders. After the 1930's and an abortive interlude as assistant professor at the University of Missouri, Barbara McClintock's style became increasingly idiosyncratic, and she herself more withdrawn.

Her idiosyncrasy was, of course, relative to and in part defined by the normality recognized in her field. Genetics in the 1930's and '40's was becoming more and more quantitative. Orthodox neo-Darwinism was population genetics. McClintock, however, persisted in "see(ing) one kernel (of corn) that was different, and mak(ing) that understandable." She was interested in precise mechanical detail, but she rejected the wholesale fascination with numbers and the reductionism of modern genetics.

Having found a safe haven to work at Cold Spring Harbor, she withdrew into isolation. Her research, which was to be vindicated thirty years later, reflected her unfashionable conviction that it is not the genes per se; "it is organized systems that function as units at any one time in development." (p. 106) With few exceptions, her colleagues reacted with deaf ears. She continued to collect and analyze her

data alone. Now the habit of being alone, cultivated since early childhood, came to her support. It lent personal strength, but it also magnified her isolation; for it rendered socially endurable a separation from the scientific community which was a fundamentally epistemological estrangement.

Keller stresses two factors which reinforced the alienation that McClintock underwent in the 1950's. One was McClintock's uniquely experiential and visual way of doing science (her "feeling for the organism"). Her personal attunement to the evidence requires but did not engender shared subjectivity nor even a sympathetic resonance. The second exclusionary factor was a series of contemporary historic events of major importance that collectively comprised the revolution in molecular biology. Ironically, the center of this shift in biological attention to the mechanisms of hereditary transmission was McClintock's own safe haven, Cold Spring Harbor, where annual pilgrimages were made to attend Max Delbruck's summer bacteriophage course. Sometimes in the evenings the students would play baseball next to Barbara McClintock's cornfield; but that seems to have been as close as they ever got to her.

Despite the excitement over the discovery that DNA is the genetic transmitter, it was evident to everyone that DNA transfer does not tell the whole story of heredity. In particular, it was clear that something must be responsible for the differences in the way that cells express the uniform gene code they contain. But the rush to reduction was on. A new generation of biologists, schooled in the physicists' dogma of simplification, had little patience with the old fashioned individualism and

reverence for the complexity of the organism that McClintock's findings represented. And so she worked on in solitude.

As McClintock continued her work on genetic transposition in maize, other researchers began to conclude independently that similar transpositions occur in bacteria and bacteriophage. Genetic rearrangements were discovered to occur even in higher organisms such as yeasts and drosophila. Furthermore, they appeared to play regulatory and developmental roles very much like those that McClintock had found in maize. Some attention was even paid to her speculation that transposition is related to more general restructuring genetic mechanisms which have evolutionary implications. But on the whole biologists disregarded her work as "unscientific", and preferred to go on believing in the linear dominance of DNA and the randomness of mutation.

Surely her unconventional reverence for nature and her capacity for intimate unity with it mark McClintock off as much as anything from her fellow scientists. Like them, she believes in the lawfulness of nature and the human capacity to discover and articulate those laws. In that respect she is no mystic. But McClintock denies that these laws are to be discovered by conventional rationality. For her, fidelity to experience includes the intuitive and non-rational dimensions that western science obdurately excludes. Unafraid of being labelled a mystic, she exults in the confidence of direct acquaintance with her object of study and oneness with it. Had her work not been recently vindicated, she would undoubtedly have been swept aside as just another visionary. Indeed this deviation from the so-called rigor of

contemporary science, more than her gender, could well have disqualified her from participation in the scientific community. Her recent re-absorption and acclamation by that community cannot be understood as an endorsement of her methods any more than it is of her sex. It is, rather, a concession to the verifiable correctness of her results. And while McClintock evidently enjoys the personal validation of that success, neither she nor Keller perceive it as demarcating a revolutionary shift in the tenor of modern science. Nevertheless, both share sufficient optimism and generosity to see in McClintock's re-affirmation by the establishment a sign of the inherent valor and integrity of science--a tradition that grows through the confrontation of its own errors.

Keller's book, *A Feeling for the Organism*, can be read as a deeply moving tribute to a committed scientist; but it is more significantly read as a statement about science. Some current sociological theories describe science as the product of a community which defines it and governs its modifications. These may be violent, but they are also adaptive, and they serve the interests of the community of insiders. Keller does not dispute this characterization of science, but she concentrates her attention upon the nomads at the periphery who sometimes infiltrate and infect the perceptions of the community. Her focus, in other words, is on the agency of change; and she sees it operative in those individuals, especially the eccentric and unconventional ones, who nevertheless do gain entry, albeit marginally, into the science community.

Barbara McClintock is a deviant first by virtue of her gender,

secondly because of her personal style of doing science, and thirdly as a consequence of the historic accidents that placed her research first in the mainstream, then in the margin, and finally in a place of honor where she is now redeemed and celebrated. These streams of identity are inseparably linked. Keller's fascinating account places each in balanced perspective and reveals their interactiveness. We can enjoy the book as a history of modern genetic theory or as the drama of a successful woman scientist or as a defense of a uniquely qualitative and personal manner of doing science. But to treat any of these facets as central and primary would be to miss the complexity and integrity of the book as a whole.

Hilde Hein
Holy Cross College
Department of Philosophy

BE SURE TO SEE PAGE 23 FOR SENDING IN YOUR

MEMBERSHIP DUES

George Weisz. *The Emergence of Modern Universities in France, 1863-1914*. Princeton, N.J.: Princeton University Press, 1983.

This very fine book on the evolution of modern universities in France is valuable not only to those interested in French institutional history and the history of education, but to historians and sociologists of science as well. Like Fritz Ringer in *Education and Society in Modern Europe*,¹ George Weisz deals with student populations, curriculum changes, and structural reforms. Like Ringer, too, Weisz argues that trends and developments in educational institutions often appear surprisingly autonomous and insulated from general social and economic circumstances. But Weisz also clearly demonstrates for the French universities, as does Antoine Prost more generally for primary, secondary and higher education in modern France,² the close alliance of educational policy in the French Ministry of Public Instruction with ideological and political aims. The effects of these aims on the structure and practice of scientific education and research insure Weisz's work an important place alongside other recent books on institutions of modern French science and technology.³ Weisz's discussions of medical faculties and medical students are particularly valuable in this regard, giving insights into relationships between academic faculties and hospital teaching faculties. He further provides much useful information about organization, funding, and enrollments at faculties of science and schools of pharmacy in France.

The principal focus of Weisz's monograph is the gradual, piecemeal evolution into modern universities of the Napoleonic system of individual and dispersed faculties,

called the "Université." Whereas many historians and sociologists have argued that very little changed in France's allegedly "stalemate society,"⁴ Weisz argues that gradually and incrementally, from 1878-1914, French institutions of higher education adopted functions different from those of the Napoleonic "Université." These included 1) the training of research-oriented scientists; 2) the introduction of engineering, technical, and commercial education; 3) the revamping of traditional instruction of doctors, lawyers, and teachers; and 4) the reorganization of the faculties and affiliated institutions for greater coordination and autonomy. The faculties of letters and sciences came to distinguish their functions clearly from those of secondary education, although university professors still continued to exercise the duty and power of grading post-secondary baccalaureate examinations.

Concrete results of gradual reform were the emergence of four or five vigorous provincial universities among the sixteen universities legally established in 1896, the creation of many high-level engineering and technical institutes, and the provision of university credentials to members of the rising commercial and industrial classes who had professional or elite aspirations. As well, universities were instrumental in the popularization of scientific values as a unifying secular ideology for the Third Republic.

Weisz's monograph is particularly strong in demonstrating how Republican ministers, most notably Jules Ferry and Louis Liard, used educational reform as an arm of political action. Secular education, particularly scientific education, was to provide the

cementing ideology for the Third Republic, which emerged after the War of 1870. The greatest percentage annual increase in funding in the history of French higher education occurred in 1877, following the Republican takeover of the Chamber of Deputies. Determination to provide a strong state university system, which could successfully compete with Catholic universities newly founded in 1875, acted as a spur for much of this funding. Indeed, Weisz plays down competition with the Germans in comparison to Republican policy matters regarding Catholicism and the monarchist right. As Republicanism became secure, higher education became more and more a matter of indifference, Weisz argues. The role of the universities as an arm of Republican and secular ideology is particularly well demonstrated in Weisz's discussion of events in the Latin Quarter in the decade before the First World War. Right-wing critics, many of them identified with Action Française, organized street protests against higher education, shutting down the Medical Faculty, partly on the grounds that the Republic was creating a dangerous intellectual proletariat as a result of egalitarian educational policy.

According to Weisz, it was pluralist and gradualist Republican politics that dictated the incremental nature of reforms in the structure of higher education. Local pressures upon elected representatives in the Chamber of Deputies necessitated the establishment of universities at all sixteen cities already housing three of four faculties; thus the more radical plan for establishing only a few universities failed. Debates on creation of universities often focused on "decentralization" from Paris, but as Weisz nicely argues, two traditions of decentralizing

reformism existed in tension with one another. On the one side were political and economic liberals who argued for laissez-faire education and competition among professors and universities. On the other side, and in the majority, were professors who wanted to protect corporate autonomy against administrative, especially Parisian, despotism. They sought a romanticized corporate university solidarity. The incremental Republican strategy was a flexible combination of the two reformisms, protecting traditional hierarchy, while giving faculties and the new universities greater financial autonomy through encouragement of local economic support for university education and research. Correspondingly, and to its advantage, the state supplied progressively smaller percentages of university revenues after 1885. This process Weisz calls "déconcentration," in contrast to "decentralization."

Sociologists like Joseph Ben-David⁵ have attributed deleterious effects to perennial institutional centralization in France. Weisz's statistics on decentralization give us ambiguous results for the reformers. In 1876, half of all university-level students studied in Paris, and three-quarters of doctors of medicine, sciences, and letters were trained in Paris. From 1876 to 1914, the percentage of students in Paris declined from 55% to 43%, if only the faculties and higher schools of pharmacy are considered. While the proportion of law students in Paris remained stable (45%) and the proportion of letters students in Paris increased from 13% to 46%, the number of medical students in Paris dropped from 74% in 1876 to 52% in 1914, and only 23% of all science students were then in Paris. By 1914, the four science faculties at Lyon, Grenoble, Nancy, and Toulouse shared 40% of science

students in France. As Weisz notes, substantial proportions of the provincial students were foreign, including foreign women students, and many were enrolled in new engineering programs, not traditional teaching and doctoral programs. Some measure of decentralization was achieved, but more needs to be said about the maintenance of the domination of Parisian institutions in traditional degree programs.

Weisz is right to point out that centralization was not so clearly an evil in France as its detractors often have argued. The Parisian administration played a predominant role in encouraging the role of research in faculties which traditionally had emphasized teaching and the grading of baccalaureate examinations as their primary duties. Weisz notes that factors other than centralization hampered university research. Especially debilitating was the diffusion of energy and resources among the various functions of professional training, technical education, administrative bureaucracy, and public diffusion of knowledge. Still, these functions are characteristic of most modern universities. Perhaps Weisz should have emphasized more fully in this connection the French practice of cumul, or multiple teaching positions, a practice traditionally endemic to Parisian academics and more common at the turn of the century among provincial academics, after the proliferation of technical and municipal institutions. How effective can one be while holding down three posts simultaneously?

Weisz incorrectly suggests that Parisian research laboratories were superior to provincial ones at the turn of the century, whereas contemporary testimony indicates this was not always the case.

Research facilities were even envied by Parisians familiar with the provincial universities which Weisz identifies as the most vigorous: Lyon, Grenoble, Toulouse, Nancy, and Lille. But the dominance of Parisian institutions remains clear in one very essential respect. The Republican reforms hardly touched at all the prestige and influence of the grandes écoles.

Weisz's account is thorough and detailed, and his text and bibliography are invaluable interpretations and guides to the structure and reforms of French universities in the post-Napoleonic period. His materials might have been enlivened by a few anecdotes and by some vivid personalities motivated by ambition, curiosity, and ideas. The political context of educational reform also might have been strengthened by fuller use of materials like the parliamentary debates recorded in the Journal Officiel de la République Française, which is cited among his sources. But these caveats aside, the book is of fundamental value for the history of French universities, including the institutional history of university science and medicine.

Notes

1. Fritz Ringer, Education and Society in Modern Europe (Bloomington, Indiana: Indiana University Press, 1979).
2. Antoine Prost, Histoire de l'enseignement en France 1800-1967 (Paris: Armand Colin, 1968).
3. Some of this literature is discussed in my essay review, "Recent Sources and Problems in the History of French Science," Historical Studies in the Physical Sciences, 13 (1983), 401-415.
4. See especially Stanley Hoffman, "Paradoxes of the French

Political Community," pp. 1-117 in In Search of France by Stanley Hoffman et al. (New York: Harper and Row, 1965) and Michel Crozier, La Société bloquée (Paris: Editions du Seuil, 1970).

5. Joseph Ben-David, The Scientist's Role in Society: A Comparative Study (Englewood Cliffs, N.J.: Prentice-Hall, 1971)

Mary Jo Nye
University of Oklahoma
Department of the
History of Science

BE SURE TO SEE PAGE 21 FOR REQUESTS
from

FUTURE MEETINGS COMMITTEE

ABOUT POSSIBLE SITES FOR 1985 & 1987

Robert W. Smith. **The Expanding Universe. Astronomy's 'Great Debate' 1900-1931.** Cambridge: Cambridge University Press, 1982.

"Never in all the history of science has there been a period when new theories and hypotheses arose, flourished, and were abandoned in so quick succession as in the last fifteen or twenty years." So reminisced the Dutch astronomer Willem de Sitter in 1931, looking back on a period of turmoil during which astronomers had resolved the centuries-old debate over whether some nebulae are composed of stars, had shown that the spiral nebulae are stellar systems or "island universes" independent of our Galaxy, and had discovered the entirely unexpected expansion of the universe. The expansion was yet to be understood and additional amazing phenomena would be discovered, but by 1931 astronomers developing new instruments and making new observations had created a new and revolutionary view of the universe.

Our understanding of this major scientific revolution still in progress is even newer, and equally incomplete. Only in the past decade have historians of astronomy focused on this exciting field, and their attention generally has been restricted to the opening phase, to 1931 and the demonstration of the expansion of the universe. Smith's book, the most recent study, does not alter the general outlines that have begun to appear, but it does add significantly to the emerging history. The new depth of detail he furnishes and the new questions raised make it clear that the cooperative and complimentary efforts of historians, philosophers, and sociologists of science are required for an understanding of this complex scientific revolution.

Nebulae had become in the nineteenth

century a focus of attention of observational cosmology. Opinion oscillated about whether they were gaseous or composed of stars, often changing after a major innovation in observational equipment was introduced. Only slowly did astronomers come to realize that not all nebulae are alike, either all gaseous or all stellar. Spiral nebulae became the strongest candidate for galactic status, especially after one of the most significant and unexpected observations of modern cosmology: the detection beginning around 1912 of the extraordinarily, very nearly unbelievably high velocities of spiral nebulae. The discovery in 1917 of faint novae in spiral nebulae further strengthened the island universe theory.

It is important to know not only what observations were made when, but also how the observations were received or rejected by other astronomers. Although this story has been told before in general outline, Smith has uncovered substantial new information. Published reminiscences tell of the excitement or doubt over the initial presentation of a new observation. Published scientific papers also are occasionally revealing, especially when the author ignores contrary contemporary evidence. Archive materials, such as letters and drafts of papers, penetrate even further behind the mask of public science transmitted in published papers. The more one has read in this field before coming to Smith's book, the better one can appreciate how much of his evidence is new.

Coincident with the revival of the island universe theory was the development of a new model of our Galaxy. With startling suddenness and definiteness, at least in his own judgment, Harlow Shapley in 1917 elucidated a sidereal structure ten

to a hundred times larger than previously believed. Smith shows that the reception of this novel result was initially less favorable than Shapley might have wished. Smith also brings new insight to the so-called great debate between Shapley and H.D. Curtis before the National Academy of Sciences in 1920. He begins with the excellent account by Michael Hoskin, his dissertation advisor, which interprets Shapley's debate strategy within the context of his quest for the directorship of the Harvard College Observatory, and carries the account further.

The main evidence in the early 1920s against the island universe theory was the alleged observation by Adriaan van Maanen beginning in 1916 of internal motions in spiral nebulae. The nebulae could not be as large as our Galaxy and beyond its newly-extended boundaries if they were rotating as fast as van Maanen reported them to be. The response to the import of van Maanen's claimed measurements is fascinating and complex. Smith shows that many believers in the island universe theory remained believers during the early 1920s.

Their faith was vindicated in 1924 by Edwin Hubble's discovery of Cepheid variable stars in spiral nebulae and the resulting distance determination that placed the spirals for outside our Galaxy. Here again Smith examines the response to a new discovery. He also asks why astronomers had not earlier actively searched for Cepheids in spiral nebulae. And Smith tackles the response of individuals and institutions to the evident incompatibility of Hubble's and van Maanen's observations. Both men were at the Mount Wilson Observatory, so there does not exist correspondence between them. Smith reviews their correspondence with

colleagues elsewhere and unpublished manuscripts by Hubble, much of which has been discussed by other historians, as Smith generously acknowledges. Significantly new here is Smith's discovery of letters to the then-absent director of Mount Wilson from another official regarding the institution's response to the controversy and an effort to settle the dispute in private.

Hubble's distance determinations for spiral nebulae when combined with measurements of their velocities established what many regard as the outstanding discovery of twentieth-century astronomy: the now famous velocity-distance relation. The greater the distance from us, the faster the galaxy is moving away from us. Thus the universe is not static, but is expanding.

The conclusive demonstration of a velocity-distance relation led to a crisis in astronomy resolved only by a revolutionary new understanding of the universe. There were two static solutions satisfying Einstein's general theory of relativity. One had no systematic motion, and thus was rendered untenable by Hubble's proof of a systematic recessional motion. Nearly simultaneously, the other static model was also shown to be equally incompatible with fact, in this case by new estimates of a higher density for the universe. At the January 10, 1930 meeting of the Royal Astronomical Society, Arthur Eddington wondered aloud why there should be only two solutions; the trouble was that astronomers looked only for static solutions. In fact, a few mathematicians previously had toyed with non-static models of the universe, and in the climate of crisis in 1930 new astronomical interest in such a possibility quickly led to the recovery of earlier work initially ignored. This story has been told before; in

the concluding chapter of his book Smith retells it with additional evidence and significant new details. Here, as throughout his book, Smith has mastered previous research and extended it with impressive new research of his own into archival sources not previously mined.

Although Smith's central concern is with intellectual factors, he recognizes that sociological analyses of group loyalties and institutional patterns are essential for a full understanding of intellectual shifts. In this book he suggests many fruitful areas for future sociological studies of a great and complex scientific revolution.

Hubble's demonstration of an empirical relationship between distance and velocity - or, more strictly, between distance and redshift in spectral lines, which could be interpreted as a Doppler velocity shift - brought to completion one phase of the revolution in astronomy and launched another: that of interpreting the observed redshift and developing a new, expanding model of the universe. This subject is just beginning to attract the attention of historians, and deserves the level of effort culminating in Smith's book which has been expended on the early phases of the revolution.

Norriss S. Hetherington
University of California
Office for the History of
Science and Technology

BE SURE TO SEE

PAGE 21 ABOUT

ABSTRACTS

FOR

9TH ANNUAL MEETING

Victor J. Danilov. **Science and Technology Centers.** Cambridge, Mass.: MIT Press, 1982.

What are science and technology centers? They are usually called museums, but they differ from traditional museums in their orientation, displays, and even in their audiences. Although they share with museums the aim of furthering public understanding and appreciation of their subject matter, in this case the sciences and technology, most do not specialize in the collection of historical artifacts; instead, they concentrate on contemporary matters, endeavoring to show the principles and practice of science and technology as carried on today. Their appeal to the public is largely through participatory exhibit techniques, "hands-on" exhibits which allow for visitor interaction with the exhibit. Furthermore, they are not, for the most part, research-oriented, having fewer curators than traditional museums in relation to their size.

Victor Danilov sums up the differences as follows: "Unlike many (traditional) museums that are quiet and elitist, science and technology centers are lively and populous." Furthermore, "they seek to further public understanding of science and technology in an enlightening and entertaining manner and do not require any special interest or background to be understood or appreciated by the average person" (p. 2). And because these institutions are "experience-oriented rather than object-oriented," their exhibits are primarily aimed at getting the visitor to learn through participating in an actual "learning experience."

Does the approach work? Well, if measured in attendance, it certainly

does. According to Danilov, "In 1981, there were about 30 comprehensive science and technology centers with an annual attendance of approximately 25 million. In addition, at least 70 other museums with an attendance of fifteen million were at least partially science centers or were moving in that direction." Although but a fraction of the 5,500 total American museums, a 1979 survey (Institute of Museum Services) showed that 45% of all museum visits were to science museums, 24% to history museums, and only 12% to art museums (p. 5).

But does it work in terms of the professed aim of these centers--to provide public understanding of science and technology--rather than in terms of numerical attendance? Although Danilov devotes his final chapter to "Evaluation," he admits that few science and technology centers have "made a serious effort to measure their effectiveness...from a learning standpoint" (p. 294). One can measure just how many visitors view a particular exhibit, how long they stay in front of specific items, and how many actually participate in the "hands-on" experiments--but that does not always indicate just how much learning has been acquired, how much the learning "experience" has affected their thinking, nor just exactly what they have learned. Danilov thus opens up questions which he cannot completely resolve--and which perhaps can never be.

Most of the book, however, does not deal with such questions, but rather attempts to give answers to problems involved in organizing, staffing, and operating a science-technology center. In brief, this is largely a "how-to" manual, with chapters devoted to organizing a museum, its administration and management, financing and fund-raising

activities, accounting practices, security problems, public relations, community services, educational programming, publications, membership, exhibit design, and other very practical matters. As director of one of the largest such centers, the Chicago Museum of Science and Industry (with some 4 million visitors per year), and as former president of the Association of Science-Technology Centers, Danilov is familiar with all the aspects of running a museum. Most of the advice he gives is commonsense and commonplace. One would hope that museum personnel would already be familiar with these various elements, but the non-professional would be impressed by the many complexities involved in creating, managing, and developing such large-scale operations. Along the way, Danilov also gives a thumbnail sketch of the development of the concept of science-technology centers and brief histories of the major centers.

Certainly no one can fault the objective of imparting some knowledge of scientific and technical principles, and certainly one must applaud the growing popularity of these museums, especially when one sees busloads of school children avidly participating in exhibits designed to acquaint them with why and how things work. Furthermore, academicians could not fail but be impressed by the attempt to combine entertainment with education, to get the museum visitor to enjoy while learning. Similarly, given the decline in the number of secondary-school students taking science courses, everyone approved of the attempt to make up for the failure of traditional educational methods to attract students by the new and informal approach to learning exemplified by the science-technology centers.

Nevertheless, some troubling questions come to mind. First is an understanding of current scientific principles and contemporary technical devices all there is to the public understanding of science? Would not true understanding require some comprehension of the historical and societal aspects of the development of these principles and gadgets? Yet Danilov stresses the contemporary emphasis and at times seems almost disdainful of those museums which include historical artifacts in their exhibits. He fails to discuss the question of weaving these historical artifacts into a story which might make more meaningful the contemporary science and technology which these centers attempt to explain.

There are other questions, too, to which Danilov gives only passing mention. The museums tend to present only a positive and progressive view of science and technology, but while this "Gee Whiz!" approach might be exciting to young visitors, does it provide them with a realization of the difficulties, problems, and limitations of scientific and technical development?

Another question is whether corporate support of exhibits skews the impression which they convey to viewers. Although Danilov points out that a museum must show integrity in dealing with exhibits sponsored by industrial corporations, he glosses over the fact that his Chicago Museum and some others which rely heavily upon corporate sponsorship of exhibits are viewed with suspicion by museum "purists," who claim that their exhibits tend to be largely publicity puffs for their sponsors. (In justice to Danilov, it should be pointed out that while his museum has many corporate-sponsored exhibits, this reviewer did not get

the impression that these exhibits are "advertisements" for the companies involved; instead, the exhibits do their job of illustrating principles of "know-why" and the practices of "know-how" without any evidence of even a soft sell, let alone a hard one.)

Most important, however, is the question of whether one can truly "understand" science-technology without some comprehension of the problems to which they have given rise, the sociocultural milieu which interacts with scientific-technological endeavors, and matters of public policy and individual choice which might affect future developments. The exhibits do give the public some understanding, but it is a very limited understanding, inasmuch as they give no understanding of science policy issues and the multifarious social, environmental, and human consequences of different scientific-technical applications.

Omission of considerations of this nature from Danilov's book is difficult to comprehend, especially in light of the fact that his Chicago Museum of Science and Industry, to mark its 50th Anniversary in 1983, created a new permanent exhibit, "Technology: Chance or Choice?" that emphasizes the human interactions with technology. (See David A. Ucko, "Technology: Chance or Choice?" -- A Museum Exhibit on the Impact of Technology," in Science, Technology, and Human Values, Vol. 8, No. 3, Sept. 1983: 46-50.) In brief, Dr. Danilov's museum is endeavoring to do something about this question, even though his book ignores it.

However, the "good news" is that these science-technology centers are evolving. After all, they are fairly new to the museum world,

compared to historical collections of art and artifacts which have long been a feature of the cultural scene. Perhaps now that these centers have appealed successfully to a growing public by using participatory methods to teach basic principles and practices, they can begin moving on to more complex problems of historical interpretation, sociocultural impact, policy choices, and the like. New aspects of science-technology are emerging--as evidenced by the formation of specialized historical, philosophical, and sociological organizations dealing with the larger range of science-technology-society interactions. Danilov explains the whys and wherefores of what is already the "old-fashioned" science-technology center. Next he should devote himself to dealing with the museum questions posed by the newer aspect of the social understanding of science-technology.

Melvin Kranzberg
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SOCIETY NEWS**9TH ANNUAL MEETING**

REMINDER--Abstracts are due now for papers to be presented at the 9th Annual Meeting of the Society for Social Studies of Science, to be held jointly with the European Association for the Study of Science and Technology, and Communication and Cognition--in Ghent, Belgium, November 14-17, 1984.

Send papers or abstracts to: Susan E. Cozzens
 4S Program Coordinator
 Room 1229
 National Science Foundation
 Washington, D. C. 20550

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Professor J. M. Ziman, FRS
 Department of Social and Economic Studies
 Imperial College of Science and Technology
 53 Prince's Gate
 London SW7 2PG

REQUEST FOR SITE SUGGESTIONS FOR FUTURE MEETINGS

The Future Meetings Committee requests preliminary statements of interest by 4S members to host a future meeting of 4S. Because 1986 is expected to be a joint meeting with other societies, suggestions are requested now for 1985 and 1987.

Proposals about either 1985 or 1987 should be sent to the Chair of the Committee, or contact other members (Ron Calinger, Tom Gieryn, Tom Nickles):

Future Meetings Committee
 Alan E. Bayer, Chair
 Department of Sociology, VPI&SU
 Blacksburg, Virginia 24061

**4S CO-SPONSORED SESSIONS
AAAS MEETINGS
24-29 May 1984**

4S is co-sponsoring four sessions at the AAAS meetings in New York, 24-29 May. Listed below are the titles and organizers of the sessions:

27 May 1984--9:00 am: New York Hilton

Biotechnology: Its Impact on Genetic Sciences

Organizers: Gerald E. Markle and Stanley S. Robin

27 May 1984--2:30 pm: New York Hilton

Funding and Knowledge Growth

Organizer: Susan E. Cozzens

28 May 1984--9:00 am: New York Hilton

Peer Review and Public Policy

Organizers: Daryl Chubin and Sheila S. Jasanoff

28 May 1984--2:30 pm: New York Hilton

The Ethnography of the Laboratory: What Scientists Really Do

Organizer: Ron Westrum

Please note that 4S will host a RECEPTION (with Cash Bar) as follows:

28 MAY 1984

6:30 pm

BEEKMAN ROOM

New York Hilton

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REPORT FROM THE SECRETARY-TREASURER--FUNDS AND MEMBERSHIP

Final 1982 Budget Report and Financial Condition

	Budgeted	Realized	Balance
<u>INCOME:</u>			
Membership Renewals	\$ 5,100	\$ 4,485.00	\$ -615.00
New Members	1,500	2,210.00	710.00
Advance Dues Payments	-0-	830.00	830.00
1982 Annual Meeting	-0-	1,040.52	1,040.52
1983 Annual Meeting	2,000	3,362.03	1,362.03
Bernal Prize	1,000	1,000.00	-0-
Mailing Labels	-0-	115.00	115.00
TOTALS	\$ 9,600	\$ 13,042.55	\$ 3,442.55

EXPENSES:

4S Review	\$ 5,200	\$ 7,788.79	\$ -2,588.79
Duplicating/Postage	1,000	945.61	54.39
Secretarial	700	700.00	-0-
Telephone	200	252.38	-52.38
1983 Annual Meeting	2,000	1,736.37	263.63
Bernal Prize	1,200	1,200.00	-0-
COSSA	500	500.00	-0-
Miscellaneous	350	386.59	-36.59
TOTALS	\$ 11,150	\$ 13,509.74	\$ -2,359.74

Financial Condition on 31 December 1983

Balance on 1 January 1983	\$ 8,753.56
Income for 1983	+ 13,042.55
Expenses for 1983	- 13,509.74
Balance on 31 December 1983	\$ 8,286.37

Membership Data as of 12/31

	<u>1981</u>	<u>1982</u>	<u>1983</u>
United States:			
Professional	235	249	287
Student	26	40	46
Institutional	13	16	18
International:			
Professional	73	85	86
Student	3	10	9
Institutional	13	16	15

ANNOUNCEMENTS: CALLS FOR PAPERS

MICHIGAN QUARTERLY REVIEW

Michigan Quarterly Review, the cultural and literary journal of The University of Michigan, invites manuscripts for its fifth special issue, to be titled Science and the Human Image.

This collection will consider recent developments in the sciences which influence Homo sapiens' perception of himself as a creature, and as a participant in society and the cosmos. The future of 'human nature' as an entity will be addressed.

Deadline for submissions is September 1, 1984. Send essays, interviews, memoirs, fiction, poetry to: Editor, Science and the Human Image, Michigan Quarterly Review, 3032 Rackham Building, Ann Arbor MI 48109.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Technology and Society Division is requesting papers on the following topics for presentation at the Winter Annual Meeting in New Orleans, Louisiana, December 9-13, 1984. Two copies of completed manuscripts of the papers may be submitted to: Professor A. M. Dhanak, Department of Mechanical Engineering, Michigan State University, East Lansing, MI 48824. The deadline for the submission of manuscripts: May 30, 1984.

Papers on the following topics will be considered to be especially suitable: (1) Technology assessment - analysis, forecasting, social impacts, methodologies; (2) Energy and environmental assessments; (3) Assessment of solar energy or other alternate energy sources; (4) Analysis and/or proposed models of engineering ethics; (5) Appropriate technology for developing and developed nations; (6) Socio-technical programs and ethics courses in engineering education; (7) Emerging technologies; (8) Legislative and legal problems relating to the role of technology; (9) Specific aspects dealing with interactions between technology and society.

Submitted papers will be reviewed as to their appropriateness for the planned sessions and the authors will be notified of the acceptance of the papers for preprint publications and presentations before June 15, 1984.

SOCIOLOGY OF SCIENCE STUDY GROUP--BSA

The British Sociological Association, Sociology Science Study Group plans to hold several one-day meetings during 1984 and 1985. The study group provides a forum for presentation of papers and discussion on topics in the sociology of science and technology. We would greatly welcome participation from visiting US scholars. If you plan to be in Britain over the next two years and would like to make a presentation to the study group please contact the convenor:

Trevor Pinch
Department of Sociology
University of York
Heslington, York YO1 5DD
England

ANNOUNCEMENTS: FUTURE CONFERENCES**XVIIth INTERNATIONAL CONGRESS OF HISTORY OF SCIENCE**

The XVIIth International Congress of History of Science will take place at the University of California, Berkeley, from 31 July to 8 August 1985 inclusive. The Congress is held under the auspices of the International Union of History and Philosophy of Science (an affiliate of UNESCO), the United States National Academy of Sciences, and the University of California. The first circular describing the Congress was sent by surface mail around March 30, 1984, to members of various national and specialist societies in the history of science and technology.

A second circular, containing forms for registration, room reservations, and submission of abstracts, as well as information about local accomodation, travel to Berkeley, and visas, will be mailed during September 1984, to persons who return the application provided in the first circular. Anyone requiring additional copies of the first circular, or who has not received one through society affiliations by the end of May 1984, should apply to the Congress Secretariat, Office for History of Science and Technology, 470 Stephens Hall, University of California, Berkeley, CA 94720 USA.

HISTORY OF SCIENCE SOCIETY

The History of Science Society annual meeting for 1984 will be held in Chicago, Illinois, 27-30 December 1984, at the Palmer House. This will be a joint meeting with the American Historical Association, and it is anticipated that all program sessions and job exchange facilities will be open to those registered for either meeting. The year 1984 marks the hundredth anniversary of the birth of George Sarton, the sixtieth anniversary of the History of Science Society, and the hundredth anniversary of the American Historical Association.

Local arrangements co-chairs are Professor Joe D. Burchfield, Department of History, Northern Illinois University, De Kalb, IL 60115 (telephone 815/753-0131); and Professors Allen G. Debus and Robert J. Richards, Morris Fishbein Center for the Study of History of Science and Medicine, 1126 East 59th Street, University of Chicago, Chicago, IL 60637 (telephone 312/962-8391).

WOMEN, HEALTH, AND HEALING

A summer institute on "Women, Health, and Healing: Social and Behavioral Issues" is to be held in Berkeley, California in July 1984. For information, contact Patricia Anderson, Project Coordinator, Women, Health, and Healing Project, Department of Social and Behavioral Sciences, School of Nursing, University of California, San Francisco, CA 94143.

ANNOUNCEMENTS: UK SCIENCE STUDIES COMMITTEE PUBLICATION**SCIENCE STUDIES COMMITTEE REPORT**

The Science Studies Committee (set up in March 1982 "to foster education and research on the economic, historical, philosophical, political and sociological aspects of science, technology and medicine") has issued a general statement on the significance of science studies as a medium of education and scholarship, as a guide to academic authorities responsible for these studies in British universities and polytechnics." Copies of this 10 page booklet, The Significance of Science Studies, have been published by the Council for Science and Society and are available from Gabi Klinger at Science Studies Committee, c/o Council for Science and Society, 3/4 St. Andrews Hill, London EC4V 5BY, England.

ANNOUNCEMENTS: COSSA**CONSORTIUM OF SOCIAL SCIENCE ASSOCIATIONS NEWSLETTER**

The COSSA Washington Update, the bi-weekly newsletter of the Consortium of Social Science Associations, is now available on a subscription basis to individual social and behavioral scientists.

The newsletter keeps readers informed of the latest developments in Congress that affect funding for social and behavioral science research. COSSA closely follows and reports on appropriation and authorization legislation for research programs in many federal agencies including the National Science Foundation, the National Institute of Mental Health, the National Institute of Education, the National Endowment for the Humanities, and the National Institutes of Health.

In addition, COSSA Washington Update reports on current issues of federal science policy such as the issuance of regulations affecting research, the composition of research agency advisory boards in the social and behavioral sciences, and the policies and practices of federal research agencies.

In order to cover the cost of reproducing and mailing the newsletter, COSSA is asking for a contribution of \$25.00 for each subscription. For those who cannot afford this amount, a subscription will be sent for whatever amount can be afforded. Write to Consortium of Social Science Associations, 1755 Massachusetts Avenue, NW, Suite 300, Washington, DC 20036.

ANNOUNCEMENTS: BIBLIOGRAPHIES REQUESTED**HISTORY OF SCIENCE SOCIETY--COMMITTEE ON WOMEN**

The History of Science Society's Committee on Women is compiling a guide to bibliographies on the history of women in science, technology, and medicine. Anyone with references to published bibliographies or private bibliographies available for circulation is requested to send the references and, if possible, copies of the bibliographies to Helena Pycior, History Department, University of Wisconsin-Milwaukee, Milwaukee, WI 53201.

ANNOUNCEMENTS: J. S. Huxley Papers

WOODSON RESEARCH CENTER

The Woodson Research Center of Fondren Library, Rice University, Houston, Texas, is pleased to announce the opening of the papers of Julian Sorell Huxley (1887-1975), the eminent British biologist and public figure.

The collection includes Sir Julian's voluminous correspondence, manuscripts, and reprints and clippings of published work as well as materials relating to professional organizations, conferences and symposia in which he participated. The papers also include reprints and manuscripts of the work of others.

Some of the subjects covered by the contents of the collections are ethology, taxonomy and relative growth; eugenics, population control and conservation; evolutionary biology; and the philosophy and politics of science.

A guide to the collection will be available as of March 23, 1984. Inquiries may be directed to:

**Woodson Research Center
Fondren Library
Rice University
Box 1892
Houston, TX 77251-1892
(713) 527-8101 ext. 2586**

ANNOUNCEMENTS: FELLOWSHIPS AVAILABLE

EAST-WEST CENTER, HONOLULU, HAWAII

Scholars of the science of science are invited to inquire about opportunities to spend a semester as a Fellow in the Open Grants Program of the East-West Center. Inquiries are welcome from scholars working in such areas as: philosophy of science, history of science/technology, sociology of science, psychology of science, science management, and science and public policy. Fellows will be offered round-trip airfare, housing in the Center's on-campus residence hall for Fellows and their spouses, office space, secretarial support, and editorial assistance. In exchange, Fellows will be asked to conduct an informal weekly seminar in their respective areas of interest for the East-West Center graduate students in the sciences, most of whom come from Asian/Pacific countries.

To apply, please submit your curriculum vitae, a brief proposal for your research or writing project while on sabbatical, and a general description of the seminar you would conduct at the Center. Send your applications to:

**Dr. Glenn Shive
Assistant to the Dean
East-West Center
1777 East-West Road
Honolulu, Hawaii 96848**

ANNOUNCEMENTS: NEW JOURNAL ANNOUNCED**ISSUES IN SCIENCE AND TECHNOLOGY**

A new quarterly journal on science, technology, and health policy is being launched by the National Academy of Sciences, National Academy of Engineering, and Institute of Medicine.

The journal, to be called Issues in Science and Technology, will begin publication this fall. The decision to publish was approved by the governing councils of all three organizations, which will share sponsorship of the journal.

Designed to be editorially independent of its three parent organizations, Issues will feature commissioned articles by well-known authorities. Its articles will include opinion and policy analyses on all aspects of science, technology, and health policy.

Recognizing that it must deal with controversial ideas and issues, the journal's charter calls upon it to refrain from endorsing particular points of view, but also requires that "its pages must be open to a wide range of responsible views." The charter also states that the journal is "intended to enhance the quality of the debate on . . . policy matters and . . . contribute to enlightened public and private decision-making."

Editorial responsibility for the magazine will rest with an editor, appointed by and reporting to the presidents of the three sponsoring organizations. Allen Hammond, editor of Science 84 magazine, will serve as the journal's founding editor on loan from the American Association for the Advancement of Science. A 12-member advisory board also will be appointed by the three presidents to assist the editor in identifying possible articles and authors.

A circulation of 20,000 is expected the first year. The cost of an annual subscription will be \$24. (Source: NewsReport 34 (April, 1984):32-33.)

ANNOUNCEMENTS: ERRATUM

In Volume 1, Number 4, of 4S REVIEW, David Oldroyd's report of a research symposium on critical or radical theories of science (page 10), we printed a serious error as follows: ". . . The outstanding paper was that of A/Prof. Arie Brand, speaking without wondrous lucidity on Habermas's latest work." The correct sentence as submitted was: ". . . The outstanding paper was that of A/Prof. Arie Brand, speaking with wondrous lucidity on Habermas's latest work." We apologize to both Oldroyd and Habermas--Ed.

DEADLINE FOR MATERIALS TO BE PUBLISHED IN 4S REVIEW

Volume 2:#2-----1 June 1984

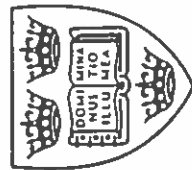
Volume 2:#3-----1 September 1984

Volume 2:#4-----1 December 1984

Volume 3:#1-----1 March 1985

University of Oxford Department for External Studies

Oxford Science Studies Summer Seminar



at
The Queen's College, Oxford
July 14 - 28, 1984

THE REPUBLIC OF SCIENCE : IMAGES AND INTERPRETATIONS

"Science Studies" embraces a wide range of inquiries into the nature, origins and social, economic and political relations of science, medicine and technology. The Oxford Science Studies Summer Seminar is intended to act as an international forum for discussions between scientists, scholars, policy-makers, teachers and others with professional or lay interest in these fields. Drawing on some of the best current research, it will explore topical issues by means of lectures, short papers and seminar sessions. The seminar will take the form of two linked weeks which may be attended either separately or in combination.

July 14 - 21 : The Study of Science

What is science, and what makes it different from other forms of intellectual activity? The seminar will consider the wide range of answers these questions receive in the work of philosophers, historians and sociologists of science, focusing on the prospects for synthesis in an area dominated by competing images and interpretations. Guest lecturers will include: Barry Barnes, Margaret Gowing, Rom Harré, Eman McMullin, Robert Young and John Ziman

July 21 - 28 : Science in Public

What does it mean to live in a scientific culture, and how are lay people to understand and respond to the esoteric products of scientific research? In exploring these questions, the seminar will consider the formation of public attitudes to science, the popularization of science and public controversies involving science and technology. Guest lecturers will include: Walter Bodmer, David Dickson, Peter Goodchild, Sir Edmund Leach, Dorothy Nelkin and Brian Wynne

University of Oxford Department for External Studies
Oxford Science Studies Summer Seminar 1984
July 14 - 21 and July 21 - 28, 1984

Academic Programme

The seminar will comprise two separate but related courses of study. Applicants may register for either or both weeks. In each week the programme will include: twice-daily lectures, daily seminar sessions, involving small-group discussions around specific projects, and short contributed papers by conference participants.

Week 1: Guest lecturers will include: Dr. Barry Barnes, University of Edinburgh, Professor Margaret Gowing, University of Oxford, Mr. Rom Harré, University of Oxford, Dr. Robert Young, Free Association Books, London, and Professor John Ziman, Imperial College, London.

Week 2: Guest lecturers will include: Dr. Walter Bodmer, Chairman of the Public Understanding of Science Group, Royal Society; Dr. David Dickson, European Correspondent of Science; Mr. Peter Goodchild, Head of Science and Features, BBC Television; Professor Sir Edmund Leach, University of Cambridge; Professor Dorothy Nelkin, Cornell University; and Dr. Brian Wynne, University of Lancaster.

Social Programme

During each week there will be a Reception and Seminar Dinner at The Queen's College. There will also be opportunities for optional visits to places of interest in and around Oxford, for which a charge will be made.

Accommodation

The Queen's College was founded in 1341, and it is located in the heart of Oxford. It counts amongst its distinguished former members Edmund Halley, Jeremy Bentham and Howard Florey. Participants paying the accommodation fee will reside in single study-bedrooms in the College; all rooms are equipped with hand wash-basins. All meals will be taken in the College Dining Hall.

For applicants wishing to register on a non-residential basis, a limited amount of self-catering accommodation outside the College is available at a cost of £25.00 per week. Further information will be provided on request (please see application form).

Fees

The seminar fee and accommodation charges are listed on the attached application form. The seminar fee covers the Academic Programme, a Reception and a Seminar Dinner per week. The accommodation fee includes all meals.

Bursaries

A limited number of Bursaries are available to U.K. residents who are unable to secure other financial support to attend. Applicants for these bursaries, which effectively reduce the seminar fee by £25.00, should attach a statement to their application attesting that no other financial support is available to them.

Contributed Papers

A number of sessions in each week will be devoted to short presentations (15 minutes) by participants on topics directly related to the theme for the week (please see application form).

Note:

While the Department for External Studies makes every effort to adhere to the arrangements described in the brochure, it can accept no responsibility for changes in the programme necessitated by factors outside its control.

PLEASE NOTE APPLICATION FORM ON REVERSE OF THIS PAGE

University of Oxford Department for External Studies

Oxford Science Studies Summer Seminar 1984

Application form: (To be returned to Dr. J.R. Durant, Department for External Studies, Rewley House,
3-7 Wellington Square, OXFORD OX1 2JA, U.K.)

Title (Dr / Mr / Ms) Forenames Surname

Address for correspondence

Position held (Institution, title of post)

Please complete as appropriate:

Week 1 : July 14 - 21, 1984

	Please Tick	Enter Amount
Seminar fee (Residents of U.K. / E.E.C countries £50.00)		
(Residents of other countries £100.00)		
Accommodation fee £100.00		
Please send me further information covering self-catering accommodation		

Week 2 : July 21 - 28, 1984

Seminar fee (Residents of U.K. / E.E.C countries £50.00)		
(Residents of other countries £100.00)		
Accommodation fee £100.00		
Please send me further information covering self-catering accommodation		

Total fee:

Please delete as necessary:

U.K. Residents only: I wish / do not wish to apply for a bursary, by way of reduction of the Seminar fee, and attach a statement in support of my application. If my application for a bursary is unsuccessful, I wish / do not wish my application for the Seminar to stand.

I wish / do not wish to offer a short paper, an abstract of which is enclosed, on in Week 1 / Week 2

If this application is accepted I undertake to pay the total fee on request, and no later than 1 July 1984.
(Send no money at this stage.)

Signed Date

CUT & MAIL TO APPROPRIATE ADDRESS

4S REVIEW

ISSN: 0738-0526

Journal of the Society for Social Studies of Science

The 4S REVIEW is published four times each year, beginning in the spring of 1983 with Volume 1, Number 1. The 4S REVIEW succeeds the 4S Newsletter which concluded with Volume 7, Number 4.

4S REVIEW is sent to all members of the Society for Social Studies of Science; membership is on a calendar year basis. There are three categories of membership: Professional, \$15; Students, \$5; Institutional (including libraries), \$25.

Correspondence concerning membership and subscriptions should be sent to:

J. Scott Long
4S Secretary
Department of Sociology
Washington State University
Pullman, Washington 99164

Correspondence concerning manuscripts for publication, reviews, opinions, and news should be sent to the appropriate editor:

Jerry Gaston, Department of Sociology, Texas A&M University,
College Station, Texas 77843

Lawrence Stern, (Book Reviews), Department of Sociology, Texas A&M University,
College Station, Texas 77843

Steve Woolgar, (News), Department of Sociology, Brunel University,
Uxbridge Middlesex, UB8 3PH, United Kingdom

Terry Shinn, (News), Groupe d'Étude des Méthodes de L'Analyse,
Maison des Sciences de L'Homme, 54 Boulevard Raspail,
75270 Paris, France

David Miller, (News), School of History and Philosophy of Science, University of
New South Wales, Kensington, N.S.W., 2033 Australia

Richard Gillespie, (News), Department of History and Sociology of Science,
University of Pennsylvania, Philadelphia, Pennsylvania 19104

Thomas Gieryn, (Bibliography and Literature), Department of Sociology,
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