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ARTICLE

Science in the Developing Countries: An Unexplored and Fruitful Area for Research in Science Studies

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I. INTRODUCTION

What we know about the context of science and about the scientific activity as a human endeavor comes almost exclusively from two sources: The investigation of the contemporary status of science in the scientifically advanced countries, and the study of the history of science in the Western civilization. Yet even today, the scientifically advanced countries comprise only about one-quarter of the world's population. What about contemporary science among the remaining three quarters of humanity? Information on this score is extremely fragmentary. There are, of course, exceptions but so few in number that they just tend to strengthen the rule. Research by the late Francis Dart¹ into the concept of nature in non-Western societies stands out as pioneer classic. Some of the work of Derek de Solla Price² includes quantitative indicators for developing countries also. More recent work by Davidson Frame and others³ provides insight into distribution and patterns of scientific disciplines in those countries. Research by the late Olga Gasparini⁴ on the Venezuelan scientific community offers a most valuable source not only for "facts" but also for the self-image of scientists in a developing country. Then we have the study of the Useems.⁵ Though these efforts do

not exhaust the list,⁶ the total body of such research is very tiny compared to the fast growing literature dealing with science in the scientifically active countries.

I want, therefore, to present a case for undertaking much more research in science studies which pertain to developing countries. I will first give some reasons why such research would be attractive and valuable, and how one can arrive at a list of research topics that would be fruitful and interesting. I will then proceed to offer a partial list of such topics. Finally, I will discuss some of the methodological and logistic problems connected with such research. This is frankly a note about the future, about things to be done, rather than about results already obtained and conclusions drawn. I am quite certain, however, that at least some of you will be impressed by the vast potential and great promise of the work that awaits us in this domain.

II. WHY DO SCIENCE STUDIES ON THE DEVELOPING COUNTRIES?

There are basically two kinds of motivation for learning about science in the developing countries, just as there are similarly two aspects of science studies in general. First, the developing countries offer a domain for research in the science of science which is basically different from

what is available to us otherwise. We can say in effect that the developing countries offer a contemporary opportunity to study the history of science. I am fully aware that by putting the matter in those terms I imply a basic assumption, namely that there is only one kind of science⁷ in which some countries have progressed to a larger extent, and others to a lesser extent. This assumption itself is testable through research on developing countries. If true, these countries give us an opportunity to view the development of science at stages which in the Western civilization lie in the past and hence are accessible only by historical methods. Furthermore, since many developing countries building their science are fairly isolated from each other, one can even explore several variants of the same development, something that is impossible when we deal with one fixed and concentrated history. In other words, the study of science in developing countries promises an independent method to test our ideas about the science of science and to deepen our understanding of the processes that take place when science is practiced.

The second motivation is a more pragmatic or functional one. Most of the developing countries around the world are in the process of building their scientific infrastructure, with skill and intensity that may vary greatly from country to country. At the same time, there are many international and national organizations and agencies engaged in international assistance in the areas of science or related fields. In order to build science successfully or to assist effectively in this process, we need factual information on the problems and circumstances that exist in this regard in the developing countries. Considering

the magnitude of the effort around the world, and the great stakes involved, even a minor amount of improvement in science development would have a large impact.

In this respect it is particularly regrettable that expertise, interest, and activity in science studies in the developing countries themselves are even more sporadic than expertise, interest, and activity in the sciences. It has been stated⁸ that while about 92% of the world's scientists are in the scientifically advanced countries, 96% of the historians of science are there, and the percentage is probably even higher if we consider everybody working in science studies. Thus it is likely that, for a long time to come, the developing countries will not be in the position to do the necessary research in science studies to supply the facts and understanding needed to analyze their own problems in science building. It is, therefore, (or should be) part of international scientific assistance to carry out research work in the scientifically advanced countries on topics that pertain specifically to the developing countries.

II. HOW TO MAKE UP AN AGENDA FOR RESEARCH?

Apart from the very sporadic instances of solid research mentioned earlier, information on science in the developing countries comes from two sources.

The first of these consists of governmental or international statistics and reports. On the whole, these suffer from several deficiencies. First, the statistical information is often unreliable because of ambiguities in definition, because of faults in the methodology of collecting it, and because of the constraints imposed by national pride, political

compromises, and other irrelevant factors. Second, the content of the statistics and the reports often tends to be formalistic, concentrating on logistic and bureaucratic questions which are of no great interest either to the scholar in science studies or to the practical science policy maker. This is not to say that this source is entirely without value, but it certainly covers only a small corner of the whole domain we wish to explore.

The second source of information on science in the developing countries contains empirical, anecdotal, personal accounts by various indigenous and visiting observers, and some generalizations drawn on the basis of these observations. This source is much more colorful, interesting, and functional than the first, but even so, opinions and individual views are not the same as systematic research of well delineated aspects of the overall problem. Thus much work remains to be done.

Nevertheless, these personal accounts can very well serve, at the initial stages, to compose a list of topics that appear to be particularly worthwhile for research in the context of the developing countries. The credibility of such a list is strengthened by the fact that there appears to be a great amount of unanimity among observers who have had a substantial amount of personal experience with science in the developing countries concerning what the characteristics are and what the problems tend to be.

I would like, therefore, to set myself up as a representative of this observer group, and offer you a shopping list for research topics. I have have been involved in science in the developing countries on a part time basis but to a significant

extent for about 25 years, and have had the good fortune to be able to observe, first hand, science in a large number of developing countries spread over all continents. To be sure, perception and insight are not acquired like seniority in the civil service system, and hence the mere fact of a prolonged and extensive exposure does not guarantee the wisdom of what I have to say. Since, however, very few of the above mentioned observer groups are simultaneously also active in our Society, my note can be construed as one of the first steps in establishing a link between the concerns of our society and the arena of developing countries.

IV. WHAT TO RESEARCH IN DEVELOPING COUNTRIES

As an introductory note, let me stress again that it appears to many observers that the science development problems in developing countries are, to a remarkable extent, the same the world over, and independent of the historical, cultural, racial, religious, economic, ideological, and social characteristics of the individual countries. What differences exist between countries can be interpreted more as different stages of the same development than altogether different directions of development.

This statement itself needs further research and verification. For the moment, however, I will assume that it holds, and hence from now on I will not mention the possibility that all the topics to be listed may need to be researched in various environments separately, thus expanding the list by a large factor.

In offering the areas of research, I will use a set of subheadings that I have found useful before in discussing science in developing countries.⁹

1. Motivation and justification of science

There are three groups whose attitudes toward science play an important role in science policy: The scientists themselves, the people who make decisions about science policy (that is, about providing for science), and the population as a whole. The questions below therefore can be asked about each of these three groups.

What is the prevailing concept of nature, laws of nature, and the way events in the world occur?

What is the prevailing concept of what scientific activity is, that is, of what the objectives, methods, and needs of this activity are?

What are the individual motivations for scientists to engage in scientific work?

What are the societal justifications for the support and development of scientific activity?

What are the expectations with respect to the outcome of such scientific activities?

In researching these questions, care must be used to distinguish between conspicuous rhetoric on the one hand, and actual attitudes on the other.

These questions might appear academic and abstract, but in practice they are of crucial importance in science development. Ignorance about the nature of science, confusion about motivations and justification, misconceptions about the requirements for productive scientific work are among the primary retardants of the establishment of indigenous science in many countries. Measures to correct these deficiencies have not

been effective and numerous partly because there has been no systematic diagnosis of the nature and extent of the malady.

2. Science education

How do prevailing concepts of nature and of laws of nature reflect in the type of science education offered?

To what extent are scientists in developing countries effective in influencing the population as a whole in the direction of "scientific thinking"? In other words, is indigenous scientific activity helpful in bringing the conceptual scientific revolution to the masses of the country?

What brings students in developing countries into science? What part does the existing scientific community play in stimulating the next potential generation of scientists into choosing science as a profession?

It is said that in many developing countries abstract and theoretical considerations of science are preferred by scientists to empirical and experimental work. Is this claim true, and if so, what are its causes?

It is said that scientists of breadth and versatility are, even relatively speaking, in shorter supply in the developing countries than in the scientifically advanced countries. Is this claim true, and if so, what are its causes?

What are the origins of the two major defects of science education in many developing countries, namely rote learning and premature specialization?

It is said that the concept of lifelong, continuous education for a scientist is disregarded in

developing countries, as compared to scientifically advanced countries. Is this claim correct, and if so, what are its causes?

What are the advantages and handicaps of having been educated abroad as compared to indigenous education, from the point of view of a working scientist, his productivity, his role and influence in the indigenous scientific community, his choice of research problems, and his ability to participate in organizational activities?

To what extent does foreign education produce schizophrenia in cultural affiliation, in aspirations and motivations, and in scientific affiliations?

In retrospect (that is, after having returned home from abroad with an advanced degree and having worked at home as a scientist for 2-3 years), what are in the opinion of foreign-educated scientists, the most beneficial and the most detrimental elements of advanced scientific education at American graduate schools from the point of view of somebody whose scientific career will take place in a developing country?

It would appear that some of these questions could be relegated to specialists in education and would not have to be researched by people well versed in broad areas of science studies. This is, however, not so. In order to have the power criteria for gauging scientific performance and attitude, experience in general science studies is most desirable.

3. Manpower

The development and maintenance of scientific manpower is the pivotal element in science development which determines the rate at which the

country can build its indigenous scientific infrastructure. Research pertaining to it, therefore, is of special importance.

Is the productivity distribution of scientists in developing countries the same as in the scientifically advanced countries? Is Lotka's law valid in any country?

Is there a correlation between the productivity of scientific communities and the prevalent language of the country?

Is the productive lifetime of scientists in developing countries different from those in the scientifically advanced countries?

Is the attrition of scientific manpower with time due to switching into nonscientific professions different in developing countries, and if so, what are the patterns?

Is the extent to which scientists fall victims of administrative and bureaucratic duties and hence cease to be scientifically productive greater in developing countries than in the scientifically advanced ones?

What to do with "aging" scientists is a worldwide problem. With scientific productivity often peaking relatively early in life, finding adequate outlets and gratification for older scientists is a challenge. Is this more or less severe in developing countries and what are the options used there to cope with the problem?

Some countries intentionally over produce scientific manpower with the aim of letting the surplus be "stored" abroad for a time, to be "recalled" later when the country's opportunities and requirements demand it. Does such a procedure work in practice, and how do such scientists who resided abroad for a

long time integrate into the indigenous scientific community?

How large is a "critical mass" of scientists that can be productive in a developing country? Is the size different from the one in scientifically advanced countries? What parameters influence the size?

Are scientists in developing countries more or less "competitive" than scientists in the scientifically advanced countries? Is the scientific community there more divisive, more strife ridden?

What is the status of social studies of science among the scientific communities of developing countries?

4. Communication among scientists

As we know, the communication patterns within the worldwide scientific community are determined primarily by the scientists themselves. The system that thus evolved is based on the desire of maximizing scientific research output in the very near future. A consequence of this principle is that in scientific communications, the rich is getting constantly richer, and the poor constantly poorer. The documentation of the inequitability of scientific communication patterns handicapping the developing countries, and the search for ways to remedy the situation are therefore very important objectives in which research in social studies of science can play a very substantial role. There is, consequently, a long list of interesting research topics available in this area, both with respect to the internal scientific communication within a given country, and the international communication that links the scientists of that country with the rest of the world.

How do the internal scientific communication patterns within a given developing country differ from those in a scientifically advanced country? What function do the communication media (domestic journals, scientific meetings, seminars, exchange visits, letters, telephone calls, etc.) play?

We know something about the relative importance of the various scientific communication modes (journals, preprints, letters, meetings, seminars, informal travel, telephone, etc.) for scientists in the scientifically advanced countries. Is this hierarchy different for scientists in developing countries?

In what way are domestic journals in developing countries different from international journals, in terms of standards, subject matter, readership, prestige, worldwide citability, and social functions?

In what way are professional societies different in developing countries from their counterparts in the scientifically advanced countries?

What are the patterns of communication between universities and governmental research laboratories in developing countries, and how do these differ from similar patterns in scientifically advanced countries?

What is the communicative structure in developing countries between scientists and technologists? Between science based industry and universities?

What is the intensity and pattern of communication of scientists in developing countries with those who make national decisions for science policy, that is, with politicians, bureaucrats, civil service

personnel, etc.?

Given a fixed amount of money to be spent on improving domestic communication patterns within the scientific community of a developing country, which mode or modes of communication provide optimal investment of these funds?

In what way and to what extent does isolation (i.e. lack of adequate communication with the worldwide scientific community) influence the choice of research topics, the standards of research, the pace of research work, and the utilization of the research results in developing countries?

Is there a correlation between the scientific productivity of scientists in developing countries and the strength of their communication ties with the domestic and/or international scientific communities?

In what way and to what extent are scientists in developing countries handicapped in publishing their papers in international journals, due to the page charge requirements, refereeing systems, and editorial policies of these journals?

What are the citation patterns of and by scientists in developing countries, and can possible differences between these patterns and those of scientists in the scientifically advanced countries be attributed to particular causes?

Is science in the developing countries underrepresented at international scientific conferences?

Are scientists in the developing countries underrepresented among the speakers at international scientific conferences?

Are scientists in the developing countries underrepresented in decision making bodies of the international scientific community, such as editorial boards of international journals, executive councils of international scientific organizations, organizing committees of scientific conferences, etc.?

To what extent have scientists in the developing countries communicated their special problems to the members of the worldwide scientific community?

5. Scientific research

Is there, in any sense, a special type of science for the developing countries, different from that of "Western" science, and if so, what are its characteristics?

In what way is the choice of research problems and the balance among various scientific fields different in developing countries from the problems researched in the scientifically advanced countries?

There is frequent discussion about, and statistical information on, "basic" vs. "applied" scientific research in developing countries. There are also some international guidelines for composing such statistics. What is the de facto status of the definitions and distinctions made between "basic" and "applied" scientific research in developing countries?

Is there a difference between the research patterns and research productivity of scientists from a given developing country who work in that country, as compared to nationals of the same country working in a scientifically advanced country?

Many official policy documents in developing countries call for scientific research "relevant to the

needs of the country." What is meant by this in principle, and in practice, what criteria are used to judge the relevance of research, and how successful is this objective in terms of the country's development?

While the predominant fraction of resources devoted to scientific research in developing countries go to governmental research institutions and only a small fraction to universities, scientific productivity in the universities appears to be much higher than in the research institutions. Can this impression be documented, and if so, what are the causes of this discrepancy?

What are the patterns of research cooperation between university and governmental research in the developing countries, and how does this compare with such cooperation in the scientifically advanced countries?

What is the relationship, if any, of technological research and development and scientific research within a given developing country?

What is the success rate of "applied" scientific research in developing countries, measured in terms of successful transfer to and use in technological development?

How successful is the scientist in a developing country in serving as a conveyor of scientific information generated abroad to the technological developmental activities in the country?

Is there a correlation in the developing countries between the involvement of a scientist in research and his effectiveness and impact in indigenous science education?

What is the impact of research

performed by international research institutions located in certain developing countries (e.g. IITA in Ibadan, IRRI in Los Banos, ICIPE in Nairobi, etc.) on the research activities of indigenous institutions in the same country?

6. Scientific organization

In most developing countries the participation of scientists in decisions pertaining to providing for science is minimal. Thus there are two distinct groups, the scientists and the administrators, who often have only tenuous communications with each other, and whose background and framework of thinking are far apart.¹⁰ The result tends to be a psychological environment for science which is discouraging from the very start, and which continually demands a sizable fraction of the scientists' physical and mental energies for the purpose of assuring the protection of even the minimal elements necessary for the productive pursuance of scientific activities. It is against this backdrop that the questions listed below emerge as relevant ones.

What is the educational and professional background of science policy decision makers in developing countries?

What is the attitude toward science of high level governmental officials in developing countries? What are their expectations with respect to scientific activities?

In many countries' development plans there are sections pertaining to science development. What is the relationship between these plans and the actual scientific activities that take place in the country during the time period planned for?

What is the extent of the influence of indigenous scientific

communities in developing countries on science policy in those countries, and in what respects is it most effective?

To what extent are scientific communities in developing countries knowledgeable about matters of social studies of science and of science policy, and to what extent are problems of national science policy discussed within these scientific communities?

What are the scientific productivity patterns of governmental research institutions in developing countries as a function of size, time since establishment, area of research, and location?

What are the characteristics of academic institutions which are most productive in scientific research?

What is the specific cost of research in developing countries, by area of science, institution of the researcher, and other parameters, and how do these figures compare with analogous figures in the scientifically developed countries?

What is the de facto method used in developing countries to decide the allocation of resources for various scientific projects? De facto here refers to what actually takes place in decision making bodies, in contrast to what the formal rules and procedures may be.

What evaluation procedures if any, are used to assess the success or failure of completed scientific research projects?

7. International aspects

Some of the questions of international scope were listed in earlier sections. There are, however, some additional aspects also, mainly connected with

international assistance and cooperation.

What has been the impact, if any, of the UN agencies (UNESCO, IAEA, FAO, WHO, UNDP, etc.) on the building of scientific infrastructures in developing countries? To what extent do such UN programs affect the work of a research scientist in those countries?

What has been the impact, if any, of specific national foreign aid agencies (AID in the US, CIDA in Canada, SIDA in Sweden, etc.) on the building of scientific infrastructures in developing countries? To what extent do such programs affect the work of a research scientist in those countries?

To what extent have regional scientific cooperative schemes been successful in stimulating the indigenous scientific communities?

To what extent are bilateral links between a group of scientists in a developing country and a counterpart group in a scientifically advanced country successful? What are the characteristics of the successful links as compared to the less successful ones?

What is the attitude of professional scientific societies in the United States toward cooperation in science with developing countries? How is this evident in the membership, in the leadership, and in the administrative staff of these societies?

What are the areas in which the scientific communities of the developing countries would be most interested in seeing action by international agencies in science and technology?

8. General remarks

The above questions, intended only as samples of the type of problems which appear to be of interest in science development, could all be answered in terms of opinions offered by people with extensive personal experience in this field. In fact, it is likely that asking any of these questions will prompt such an "expert" to launch into an extensive discussion of his theory and view on science in the developing countries. Such opinions, however, have neither the scholarly standing nor the practical persuasive power that systematic and extensive studies would possess. Governmental officials, international servants, science administrators can be impressed by statistics, quantitative assessments, and analytical studies, especially if those studies are sufficiently well circulated so as to have an effect on the external image of the country or community they describe.

It should also be mentioned that in addition to studies pertaining to the questions listed above, there is also a great need for an integrated study of science in a given country, since this would also reveal something about the interrelationship of the many factors appearing in the previous list. To the best of my knowledge, there has been no extensive study of a whole country's scientific life which goes beyond giving statistics and listing formal organizations. Such a case study would be most revealing in that it would clearly exhibit the nature of the science gap that exists today in the world and would definitely point at particular measures to help closing this gap.

V. HOW TO DO SUCH RESEARCH?

There are several special difficulties in pursuing research in

the social studies of science in developing countries.

First, almost all such research would involve travel to and fairly extensive stay in one or several developing countries. To be sure, some research could be done through questionnaires, or through the use of the Citation Index or similar statistical data bases. Most research, however, would require some on-the-spot investigation. This raises the problems of acquiring travel funds (for foreign travel, which is difficult), and adjusting to a different environment over a short enough time so that effective research can be done.

Second, and related to the first, there are relatively few organizations ready to support such research. There are obvious candidates for the source of such support, such as AID, UNESCO, etc., but, for a variety of reasons, in practice one cannot count on these organizations to any substantial extent. They are either interested only in technology and not in science, or, for political reasons, shy away from "controversial" subjects. NSF appears to be an ideal source for research, and indeed, NSF does sponsor some research in science policy and in the science of science, but the focus there is overwhelmingly on domestic science, or on science in the other scientifically well developed countries.

Another source is' private foundations, though they have not been overly interested in supporting projects connected with science, and are often more action than research oriented.

All in all, it is clear, however, that new opportunities for research support are needed. In this respect, I think it would be most

appropriate and perhaps even effective if our Society created a well-argued and well-documented policy statement urging more research opportunities in this field, and then transmitted this statement, coupled with person-to-person discussions, to the appropriate key people in national, regional, and international organizations active in world-wide scientific cooperation, and to private foundations with an interest in international science.

Finally, such research should also make some contribution toward building the local infrastructure of social studies of science, and hence should, if at all possible, be carried out in cooperation with some local people who are active in such social studies, or at least have an incipient interest in such studies. In the long run, special problems of developing countries should be researched, analyzed, and remedied by these countries themselves, even though international cooperation in such studies will remain a desirable objective at all times.

Appendix about the bibliography of this field

The literature on science in the developing countries is very diffuse, appearing in a multitude of journals, reports, and conference proceedings. An attempt was made to offer an extensive though not necessarily comprehensive bibliography in reference 8. That book covers the literature only up to about 1972. A supplement of that bibliography, with a closing date of Summer 1977, is given in M.J. Moravcsik, *Indigenous Science-A Kingpin in Selfpropelled Development*, a report prepared for the Policy Research Analysis Division of the National Science Foundation in September, 1977. It is high time for a more up-to-date bibliography of the field to appear.

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references, many of them by authors from developing countries, see S. Arunachalam and K.C. Garg, "A Small Country in a World of Big Science: A Preliminary Bibliometric Study of Science in Singapore," Scientometrics 8, 301 (1985); Thomas O. Eisemon, The Science Profession in the Third World, Praeger Special Studies, New York, (1982); Larissa Lomnitz, "Hierarchy and Peripherality: The Organization of a Mexican Research Institute," Minerva 17, 627 (1979); Lewis Pyenson, "The Incomplete Transmission of a European Image: Physics at Greater Buenos Aires and Montreal, 1890-1920," Proc. Amer. Philos. Soc. 122, 92 (1978); A.B. Zahlan, Science and Science Policy in the Arab World. St. Martin's Press, New York (1980).

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SOCIETY NEWS

PUBLICATIONS COMMITTEE REPORT

New Editors and New Name Announced for 4S Publication

Professor James L. McCartney, Chair of 4S Publications Committee, has issued the following announcement:

THE COUNCIL OF 4S HAS APPOINTED SUSAN COZZENS AND DARYL CHUBIN AS CO-EDITORS OF THE SOCIETY'S JOURNAL, WHICH HAS BEEN RENAMED

SCIENCE AND TECHNOLOGY STUDIES.

THE NEW CO-EDITORS TAKE RESPONSIBILITY FOR THE APRIL, 1986 ISSUE OF THE JOURNAL. THEY ENCOURAGE CONTRIBUTORS OF ARTICLES, REVIEWS, AND NEWS ITEMS TO CONTACT EITHER ONE OF THEM AT THE FOLLOWING ADDRESSES.

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11TH ANNUAL MEETING OF SOCIETY FOR SOCIAL STUDIES OF SCIENCE

Program Committee Announces Plans

The Society for Social Studies of Science (4S) will meet in Pittsburgh, Pennsylvania, October 23-26, 1986, in conjunction with the History of Science Society, the Philosophy of Science Association, and the Society for the History of Technology. The Program Committee (chaired by Professors Stephen Cole, Elizabeth Garber and Ruth Schwartz Cowan--all of the State University of New York at Stony Brook) welcomes paper proposals from social scientists and humanists of all disciplines and persuasions. We plan to schedule **works-in-progress** sessions, **thematic sessions**, and joint **plenary sessions**.

The deadline for proposals is 1 March 1986. Proposals must include a 150-word abstract of the paper and a one page curriculum vita. PLEASE SEND THREE COPIES OF EACH PROPOSAL TO:

Ruth Schwartz Cowan
Department of History
State University of New York
Stony Brook, New York 11794

If you would like to organize a session for the meeting, please do us the favor of proceeding as follows: Send us a letter stating the proposed topic and the proposed participants, but ask the participants to send us their paper proposals and vita separately (Commentators need only indicate the session inwhich they propose to comment).

ANNOUNCEMENTS: FUTURE MEETINGS

Planning History Group

The Fifth Annual Luncheon of the Planning History Group will be held on Saturday, April 12, 1986, at Noon in the Cornell Room at the New York Penta Hotel. The luncheon is being held in conjunction with the meeting of the Organization of American Historians. Joel A. Tarr, Carnegie Mellon University, will present a paper entitled, "The City as a Pollution Generator." Raymond A. Mohl, Florida Atlantic University, will chair the session. Tickets will be available as part of the pre-registration package for the OAH meeting or at the OAH Registration. As the number of tickets is limited, purchase through pre-registration is encouraged. For additional information, contact:

Blaine A. Brownell
College of Social and Behavioral Sciences
University of Alabama at Birmingham
Birmingham, AL 35294
205-934-5643

or

Mark H. Rose
The Program in Science, Technology, and Society
Michigan Technological University
Houghton, MI 49931
906-487-2115

AAAS/IIT Workshop on Professional Societies and Professional Ethics

The American Association for the Advancement of Science, in collaboration with the Illinois Institute of Technology's Center for the Study of Ethics in the Professions will sponsor a two-day workshop on professional ethics, coinciding with the AAAS Annual Meeting in Philadelphia over Memorial Day week-end in 1986. The workshop speakers will present examples of professional society ethics programs, report on legal standards affecting professional behavior, and review educational programs which clarify ethical principles and problems within science, engineering, and the health professions. Workshop participants will be encouraged through small group sessions and case discussions to assess ethical issues and to exchange experiences and resources in developing professional ethics materials and programs.

The workshop will be held on May 24 and 25th, 1986 at the Hershey-Philadelphia Hotel. The registration fee is \$125.00 for each participant. Discount rates are available for multiple representatives from the same organization.

Further information is available from:

Office of the AAAS Committee on
Scientific Freedom and Responsibility
1333 H Street, N.W.
Washington, D.C. 20005

**Center for the Study of Ethics in the Professions/IIT
Symposium on National Security and the First Amendment**

A symposium on "National Security and First Amendment Protection of Scientific and Technical Information" has been scheduled at the annual meeting of the American Association for the Advancement of Science in Philadelphia. The session will take place:

May 27, 1986
8:30-11:30 a.m.
Hershey-Philadelphia Hotel

The symposium will examine the scope of first amendment protection for scientific speech in the light of case law and first amendment theory.

James Ferguson, an Assistant United States Attorney at the U. S. Department of Justice, will discuss the constitutional status of technological knowledge. Robert Ladenson, Professor of Philosophy at Illinois Institute of Technology and author of a study of free expression, will offer a philosophical analysis of first amendment protection of scientific speech. Benjamin Duval, Jr., Research Attorney at the American Bar Foundation, will speak about enforcing security at the source by restrictions on government employees, grantees, and contractees. Harold Relyea, Specialist in American National Government at the Congressional Research Service, Library of Congress, will describe the development of the notion of national security. Mark Lynch, Staff Counsel for the American Civil Liberties Union Project on National Security, will talk on the role of litigation in resolving conflicts.

Vivian Weil organized the symposium and will serve as moderator.

**University of Edinburgh--Institute for Advanced Studies in the Humanities
Conference on "Science and the Enlightenment in Europe"**

Sponsored by the IUHPS, and held under the
auspices of the Institute Project Scottish
Enlightenment (IPSE), Institute for Advanced
Studies in the Humanities, University of
Edinburgh

Venue: Pollock Halls of Residence, Edinburgh
Dates: Thursday, 28th August to Sunday, 31st August 1986

Further details can be obtained from:

Dr. David Edge
Organising Secretary
c/o Institute for Advanced Studies in the Humanities
University of Edinburgh
17 Buccleuch Place
Edinburgh EH8 9LN

Those wishing to register should send a deposit of
£25, made out to IPSE, by 1st February 1986.

BOSTON COLLOQUIUM FOR THE PHILOSOPHY OF SCIENCE 1985-1986 **

**Boston
University**

**[Remaining program for academic
year at press time.-Ed.]

**26th
ANNUAL PROGRAM**

**CARTESIAN PSYCHOLOGY AND HANDELIAN OPERA:
A MEETING OF SCIENCE AND MUSIC**

For the tricentenary of George Frederick Handel

PETER KIVY, *Philosophy*, Rutgers University

Commentator: VERNON HOWARD, *Philosophy of Art*, Harvard University

Chair: MORDECAI FEINGOLD

Tuesday, February 11
Terrace Lounge, G.S.U.*

SYMPOSIUM: AFRICAN CONCEPTIONS OF TECHNOLOGY AND NATURE

Chair: KENNETH MANNING

AFRICAN CONCEPTS OF SELF: A GHANAIAN EXAMPLE

LEITH MULLINGS, *Anthropology*, CUNY Medical School

AN AFRICAN CONCEPT OF NATURE

KWASI WIREDU, *Philosophy*, National Humanities Center, North Carolina, and University of Ghana

Commentator: LUCIUS OUTLAW, *Philosophy*, Haverford College

[In association with the African Studies Center]

Tuesday, February 18
Terrace Lounge, GSU*

**ARE THERE SCIENTIFIC REVOLUTIONS IN MEDICINE?
THE EXAMPLE OF IMMUNOLOGY**

ANNE-MARIE MOULIN, *History of Science*, C.N.R.S., Paris

Commentator: GUIDO MAJNO, *Pathology and History of Medicine*,

University of Massachusetts Medical Center, Worcester

Chair: RICHARD SENS

Tuesday, February 25
Terrace Lounge, G.S.U.*

A CENTENARY SYMPOSIUM: IN MEMORY OF NIELS BOHR

Tuesday, March 11
Room 352, Science Center*
3 p.m.

I. Chair: KENNETH BRECHER

IS THE THOUGHT OF NIELS BOHR PHILOSOPHICALLY COHERENT?

ABNER SHIMONY, *Physics and Philosophy*, Boston University

THE ROLE OF CLASSICAL CONCEPTS IN BOHR'S PHILOSOPHY OF NATURE

DON HOWARD, *Philosophy of Science*, University of Kentucky and Boston University

THE PHILOSOPHICAL RECEPTION OF COMPLEMENTARITY

ROBERT S. COHEN, *Physics and Philosophy*, Boston University

II. Chair: JOAN BROMBERG

8 p.m.

BOHR AND THE PHOTON

JOHN STACHEL, *Physics*, Boston University and the Einstein Papers

**THE MEASUREMENT OF THE ELECTROMAGNETIC FIELD AND THE
DEVELOPMENT OF QUANTUM FIELD THEORY**

SYLVAN S. SCHWEBER, *Physics*, Brandeis University

[In association with the Department of Physics]

CHINA ROUNDTABLE: OBSERVATIONS ON THE PHILOSOPHY AND HISTORY OF SCIENCE AND TECHNOLOGY IN THE PEOPLE'S REPUBLIC OF CHINA

Tuesday, March 25
Terrace Lounge, G.S.U.*

Chair: JAMES C. THOMSON, JR.

Panel:

ROBERT S. COHEN, *Physics and Philosophy*, Boston University
GERALD HOLTON, *Physics and History of Science*, Harvard University
MELVIN KRANZBERG, *History of Technology*, Georgia Institute of Technology
AMELIE O. RORTY, *Philosophy*, Rutgers University and Boston University
NATHAN SIVIN, *History of Science*, University of Pennsylvania

SYMPOSIUM: THE PHILOSOPHY OF ECONOMICS

Tuesday, April 1
Terrace Lounge, G.S.U.*
2 p.m.

I. Chair: ARJO KLAMER

ECONOMICS AND MORAL PHILOSOPHY: AN ECONOMIST'S VIEW

MICHAEL MCPHERSON, *Economics*, Williams College and the Brookings Institution

PHILOSOPHY AND ECONOMIC METHODOLOGY: A PHILOSOPHER'S VIEW

DANIEL HAUSMAN, *Philosophy*, Carnegie-Mellon University

MAKING A CASE WHEN THEORY IS UNTESTABLE: FRIEDMAN'S MONETARY HISTORY

NEIL DEMARCHI, *Economics*, Duke University

[In collaboration with Abraham Hirsch]

Commentator: ROBERT PAUL WOLFF, *Philosophy*, University of Massachusetts, Amherst

II. Chair: SANDRA BAUM

8 p.m.

LAKATOSIAN CONSOLATIONS FOR ECONOMICS

ALEXANDER ROSENBERG, *Philosophy*, Syracuse University

Commentator: E. ROY WEINTRAUB, *Economics*, Duke University

THE PARADOXES OF ALLAIS AND ELLSBERG

ISAAC LEVI, *Philosophy*, Columbia University

Commentator: RICHARD ZECKHAUSER, *Economics and Political Science*, Harvard University

[In association with *Economics and Philosophy*]

SYMPOSIUM: PROBABILITY AND INFERENCE IN THE LAW OF EVIDENCE

Friday-Sunday, April 4-6
School of Law Auditorium*

Chairs: PETER TILLERS and ERIC D. GREEN

Speakers: CHARLES NESSON, Harvard Law School; RONALD J. ALLEN, Northwestern University Law School; L. JONATHAN COHEN, Queen's College, Oxford; STEPHEN E. FIENBERG, Carnegie-Mellon University; RICHARD D. FRIEDMAN, Cardozo School of Law, Yeshiva University; R. LEA BRILMAYER, Yale Law School; GLENN SHAFER, University of Kansas Business School; WILLIAM L. TWINING, University College, London; DAVID SCHUM, George Mason University; ADRIAN S. ZUCKERMAN, University College, Oxford; PETER TILLERS, New England School of Law, [In association with the Boston University School of Law. For detailed program call Eric D. Green, 353-2807.]

**ANTIFORMALISM AND ARATIONALITY:
TOWARD AN ANTHROPOLOGY OF PHILOSOPHIES**

JOANNA OVERING *Anthropology*, London School of Economics
Commentator: DAVID WONG, *Philosophy*, Brandeis University
Chair: AMÉLIE O. RORTY

**Tuesday, April 8
Room 525, School of Theology***

COSMOLOGY: SCIENCE, DOXA, PHILOSOPHY?

JACQUES MERLEAU-PONTY, *Philosophy*, University of Paris, Nanterre
Commentators: SO-YOUNG PI, *Physics*, Boston University
KENNETH BRECHER, *Physics and Astronomy*, Boston University
Chair: JOHN STACHEL

**Tuesday, April 22
Room 525, School of Theology***

SYMPOSIUM: PERCEPTION AND THE EMOTIONS

Chair: MICHAEL MARTIN

Speakers:

LAWRENCE BLUM, *Philosophy*, University of Massachusetts, Boston

RONALD DESOUSA, *Philosophy*, University of Toronto

AMÉLIE O. RORTY, *Philosophy*, Rutgers University and Boston University

**Tuesday, April 29
Terrace Lounge, GSU***

**MEANING AND CONTEXT: 'IN MEDIAS RES' AS A
SEMIOTIC PROBLEM**

KRZYSTYNA POMORSKA, *Literature*, Massachusetts Institute of Technology

Chair: THOMAS WINNER

[In association with the Program in Semiotic Studies]

**Thursday, May 8
Room 525, School of Theology***

*The School of Education is at 605 Commonwealth Avenue; the Conference Auditorium and the Terrace Lounge are on the second floor of the George Sherman Union (GSU) at 775 Commonwealth Avenue; the School of Theology is at 745 Commonwealth Avenue; the College of Liberal Arts is at 725 Commonwealth Avenue; the Science Center is at 590 Commonwealth Avenue; the School of Law is at 765 Commonwealth Avenue. Unless otherwise noted, the sessions will begin at 8 p.m.

For further information, contact Robert S. Cohen or Katie Platt, Department of Philosophy, Boston University, 617/353-2604.

Oxford Science Studies Summer Seminar



UNIVERSITY
OF OXFORD
Department for
External Studies

at
The Queen's College, Oxford

12-19 July 1986 FUTURES FOR SCIENCE
19-26 July 1986 SCIENCE AND BELIEF

The Oxford Science Studies Seminar is an international forum for discussions between researchers, teachers, policy makers and others with professional or lay interest in science studies. The seminar takes the form of two linked weeks which may be attended either separately or in combination.

12-19 July: FUTURES FOR SCIENCE

The Seminar will consider some of the hardest scientific choices facing Western industrial society today. There will be discussion of science and government, research funding, technological decision-making, the ethics of animal experimentation, scientists and the international arms race, and alternative political agendas for science and technology. Speakers will include: Dr Frank Barnaby, Dr Philip Gummatt, Dr Benjamin Martin, Professor Sir David Phillips, and Professor Roger Williams.

19-26 July: SCIENCE AND BELIEF

The Seminar will consider new perspectives on the relationship between science and religious belief. In addition to a number of historical case-studies, there will be discussion of "scientific" religions and "religious" sciences, science and belief in the Eastern World, the religious implications of the new physics, and the science and theology of creation. Speakers will include: Dr John Hedley Brooke, The Revd Dr Don Cupitt, Mrs Mary Midgley, Dr Arthur Peacocke, Dr Roy Porter, and Dr Ziauddin Sardar.

FEES: The Seminar Fee, inclusive of a reception and Seminar Dinner in The Queen's College, is £55 (U.K./E.E.C. countries)/£175 (residents of all other countries). The accommodation fee, inclusive of full board in The Queen's College is £140 (residents of all countries).

FURTHER INFORMATION: write to: Dr J.R. Durant, Department for External Studies, University of Oxford, 1 Wellington Square, Oxford OX1 2JA, England; telephone 0865 52901.

ANNOUNCEMENTS: CALL FOR PAPERS

Society for the History of Technology

1986 Annual Meeting

Call for Papers

The SHOT Program Committee calls for session and paper proposals for the 1986 Annual Meeting, which will take place in Pittsburgh, Pennsylvania from 23-26 October 1986. This year's meeting will be held jointly with the History of Science Society, the Philosophy of Science Association, and the Society for the Social Studies of Science (4S).

We seek a diverse and well-balanced program and we encourage participants to address subjects which have received relatively little attention at recent meetings. In particular, we would welcome contributions on non-Western technology, computers and electronics, ancient and medieval technology, and the development and transfer of technology in the Third World. We are especially interested in receiving session proposals on topics such as: the organizational context of innovation; technology and the labor process; recent science and technology policy; feminist perspectives on technological change; patterns of consumption and diffusion; the development of engineering disciplines; visual thinking in technology; and techniques for analyzing technological artifacts. In keeping with tradition, we plan to schedule sessions for both works-in-progress and SHOT's special interest groups (Jovians, Pelicans, Albatrosses, TEMSIG, TS&E, and WITH). Special consideration will be given to sessions which can be sponsored by one or more societies.

The deadline for proposals is 1 May 1986. Individual paper proposals must include a 150 word abstract of the paper and a one page curriculum vita. Session proposals should include a statement of the general theme as well as an abstract and vita for each participant. Please send FOUR copies of each proposal to: W. Bernard Carlson, Program in Science, Technology, and Society, Michigan Technological University, Houghton, MI 49931. Telephone: (906) 487-2116.

Both non-historians of technology and minority scholars are especially encouraged to submit proposals. Because the committee receives far more proposals than can be included on the program, we can only consider those proposals which are complete by the 1 May deadline. To broaden participation in SHOT, we shall follow the usual practice of giving preference to individuals who have not participated at the previous meeting.

1986 SHOT Program Committee:

W. Bernard Carlson (Michigan Technological University)
Susan J. Douglas (Hampshire College)
Pamela E. Mack (Clemson University)

CALL FOR PAPERS

Testing Theories of Scientific Change

20-22 October 1986
Virginia Tech

Papers are solicited for presentation at a conference organized by the Science Studies Center at Virginia Tech. The conference will be held 20-22 October 1986 on the Virginia Tech campus in Blacksburg, Virginia.

This conference is the second phase of a project designed to refocus and revitalize the dialogue in the interdisciplinary study of science. In the first phase of the project the writings of the major theorists of change (Kuhn, Lakatos, Laudan, etc.) were searched for detailed empirical claims. These claims were then arranged thematically so as to facilitate comparison and testing of their key elements. The second phase involves determining the extent to which subsets of these theses are supported by the historical record and by contemporary scientific practice. Papers on this topic are invited.

The deadline for submission of abstracts of proposed papers is 15 March 1986; completed papers will be due no later than 1 September 1986. All papers will be considered for publication in a collection of essays on the theme of the conference.

Transportation from Blacksburg to Pittsburgh on Thursday 23rd October will be provided for those who will be attending the joint meetings of the HSS, PSA, SHOT and 4S. Some financial support for participants will be available.

Those interested in participating in this conference should contact the organizers as soon as possible for further information before preparing their abstracts. Please contact Arthur Donovan or Rachel Laudan at the Science Studies Center, Price House, Virginia Tech, Blacksburg, Virginia 24061 or at (703) 961-7687.

ANNOUNCEMENTS: CALL FOR MATERIALS

A CALL FOR COURSE SYLLABI IN THE HISTORY OF TECHNOLOGY AND
TECHNOLOGY STUDIES

and

A CALL FOR DESCRIPTIONS OF UNIQUE/USEFUL TEACHING TECHNIQUES IN
THE HISTORY OF TECHNOLOGY AND TECHNOLOGY STUDIES

The Technology Studies and Education Division (TS&E) of the Society for the History of Technology is collecting materials for two publication projects:

(1) A New or Updated Collection of Course Syllabi: The collection of representative course syllabi in the field published by TS&E in 1983 (The Machine in the University) is now almost out-of-print and some of the materials published there are out-of-date. TS&E seeks new and updated submissions of course syllabi.

Course materials submitted for consideration should include: a statement of the course's goals, a list of topics covered on a daily or weekly basis, and readings assigned or recommended for each topic. Study and exam questions or paper topics would also be welcomed. All bibliographical materials should include complete citations.

(2) A Collection of Useful Teaching Techniques for Technology Studies: TS&E seeks short descriptions of teaching techniques which faculty in the areas of history of technology or technology studies have found useful in the classroom.

Submissions should be processed on a letter-quality printer or typewritten using 8.5x11-inch paper (one side only) and should be double-spaced.

Submissions under both categories will be reviewed and selections for inclusion made by the Steering Committee of TS&E. Those wishing to submit materials for consideration should send eight (8) copies. Screening of submissions will begin on April 30, 1986.

Please forward all materials to:

Dr. Terry S. Reynolds
Director: Program in Science, Technology, & Society
Department of Social Sciences
Michigan Technological University
Houghton, MI 49931

ANNOUNCEMENTS: POSITIONS AVAILABLE**University of Pennsylvania**

The University of Pennsylvania invites applications for a tenured associate or full professorship in History and Sociology of Science. Candidates must have research and teaching interests in the natural sciences in continental Europe post-1750. The position is available 30 July 1986 or 1 January 1987, subject to funding. Letters of application, including a curriculum vitae and three letters of reference, should be sent to the chairman of the search committee, Professor Nathan Sivin, Department of History and Sociology of Science, University of Pennsylvania, Philadelphia, Pa. 19104. The deadline for application is February 15, 1986.

Brunel University (UK)

Visiting Fulbright Scholar in the Impact of Science and Technology on Society 1986/87. The C.I.E.S. (Council for International Exchange of Scholars) has announced its provision of a Fulbright Scholar to spend the academic year 1986/87 at Brunel University.

We would like to attract someone working in the general area of the sociology of scientific knowledge and technology who could contribute to research on the SOCIAL EFFECTS OF NEW TECHNOLOGY. The scholar will be based in the Department of Human Sciences where current work includes research on the design, construction, evaluation and impact of new technology, with special reference to information technology and expert systems. It is also hoped to explore the different experiences of funding and reception of new technologies in the U. S. and the U. K.

As a technological university with a strong Social Sciences Faculty, Brunel is committed to the development of Social Science/Science and Technology cross-faculty teaching and research. Particular efforts are being made to foster further research in Information Technology (including social and legal implications and applications) and Science and Society (science and technology policy, the sociology and philosophy of science, and the management of innovation).

The Fulbright Award provides costs of travel and maintenance costs which are comparable with British academic salaries. In addition, the C.I.E.S. provides Grants-in-Aid of up to £5,000. There is an additional possibility of research funds being available within the U. K. The C.I.E.S. have indicated their willingness to relax the September deadline announced earlier, but candidates are urged to apply as soon as possible.

For further information on the award, interested parties should contact: Canice Biwer or Alan Campbell (Council for International Exchange of Scholars, Washington. Telephone 202-939-5411). For further information about the research, please contact: Steve Woolgar, Department of Human Sciences, Brunel University, Uxbridge, Middlesex UB8 3PH, United Kingdom (Telephone: 011-44-895-56461).

ANNOUNCEMENTS: NEW PROGRAM IN S&T STUDIES

SCIENCE AND TECHNOLOGY STUDIES AT VIRGINIA TECH

A unified approach to science and technology
through history, philosophy, and sociology

The Virginia Tech graduate program in Science and Technology Studies (STS) will accept its first students for the fall of 1986. This innovative program offers an interdisciplinary perspective on science and its social impact. The program is primarily supported by the Center for the Study of Science in Society and the Departments of History, Philosophy, and Sociology. Faculty members drawn from--but not limited to--these units will offer opportunities for concentrated studies in a wide range of areas of science and technology studies. Current areas of faculty research interest include the following:

SCIENTIFIC CHANGE: Empirical testing of philosophical models of science; social and intellectual sources of agreement and disagreement in science; the rise and fall of scientific disciplines; case studies of selected disciplines, e.g., chemistry, physics, geology, and biology; scientific explanation; experimentation and statistical testing.

TECHNOLOGICAL CHANGE: Philosophical models of technological change; influence of community structure on technological development; nature of public controversies about nuclear technology and ecology; 20th century power technology; technology in relation to scientific research.

FOUNDATIONS OF BIOLOGY: The gene concept; evolutionary theory; relations among biological disciplines; social and ethical impact of biotechnology; ethics of human and animal experimentation; natural and wildlife policy.

KEY PERIODS IN THE HISTORY OF SCIENCE: The chemical revolution; the geological revolution; the Darwinian revolution; astronomy, physics and scientific method in the 16th and 17th centuries; scientific institutions during the 16th, 17th, and 18th centuries; physics in the late 19th and early 20th centuries; 20th century genetics.

20th CENTURY SCIENCE AND TECHNOLOGY: Institutions in 20th century science and technology; the public impact of science and technology; policy formation; diffusion of scientific and technological knowledge; scientific communication patterns, including bibliometric analysis; reward systems in science; computers and society.

DEGREE PROGRAMS

Students admitted to the M.S. degree program are expected to complete core sequences of specially designed courses in each of the main areas of history, philosophy, and sociology of science, plus three additional courses in related fields. Students may elect to write a thesis or to complete three additional advanced courses in the STS curriculum.

Students enrolled in the Ph.D. program will be required to complete the courses in the M.S. program or their equivalent. They will also be required to complete three courses in each of two major STS fields, and four additional seminar courses in the student's selected area of concentration. A dissertation and other requirements of the graduate school must also be satisfied.

THE UNIVERSITY

Virginia Tech is a major scientific university. It is situated in Blacksburg, a rural community in the scenic Appalachian Mountains. It combines natural beauty with the excitement and challenge of a dynamic academic environment.

Tuition and fees in 1985-86 are \$777 per quarter for Virginia residents and \$858 per quarter for nonresidents. A limited number of graduate assistantships will be available on a competitive basis.

FACULTY

Center for the Study of Science in Society

Barker, P.
Donovan, A.L.
Downey, G.L.
Laudan, L.
Laudan, R.

Department of History

Baumgartner, F.J.
Dunlap, T.R.
Hirsh, R.F.
Livesay, H.C.
Lux, D.S.
Moyer, A.E.

Department of Philosophy

Ariew, R.
Burian, R.M.
Mayo, D.G.
McMichael, A.F.
Miller, H.B.
Pitt, J.C.
Stump, E.
Williams, W.H.

Department of Sociology

Bayer, A.E.
Dudley, C.J.
Fuhrman, E.R.
Mullins, N.
Snizek, W.E.

Additional Participants

Bauer, H.H. (Dean, Arts & Sciences)
Blecher, M. (Physics)
Gilinsky, N.L. (Geology)
Glanville, J. (Chemistry)
Good, I.J. (Statistics)
Grover, N.L. (Religion)
Hammond, G.B. (Religion)
Paterson, R.A. (Biology)
Porter, D. (Biology)
Quinn, F.S. (Mathematics)
Siegel, P.B. (Poultry Science)
Ventre, F.T. (Architecture)
Wallace, B. (Biology)
Zallen, D.T. (Humanities)

For additional information please contact:

Director, Science and Technology Studies
Price House
Virginia Tech
Blacksburg, VA. 24061

ANNOUNCEMENTS: NEW FACULTY

Rensselaer Polytechnic Institute

Three new faculty members have joined the Department of Science and Technology Studies at Rensselaer Polytechnic Institute: They are:

James S. Boster (PhD, UCB, 1981) who is a cognitive anthropologist and ethnobotanist.

Linda M. Strauss (UCSD) whose specialty is European history; she is working on the history of automata from 1730-1918.

Langdon Winner (PhD, UCB, 1973) whose speciality is political theory of technology. He is author of *Autonomous Technology* (1977), and *The Whale and the Reactor: A Search for Limits in an Age of High Technology*.

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), \$30.

Correspondence concerning membership and subscriptions should be sent to:

Society for Social Studies of Science
P.O. Box 487
Canton, MA 02021
U. S. A.

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), Group 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,
Indiana University, Bloomington, Indiana 47405

4S REVIEW

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College Station, Texas 77843

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