SCIENTIFIC RECORDS IN A "GENERAL" REPOSITORY

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Since the end of World War II, the exponential growth of scientific research and development in universities, industry, and government contract laboratories has had a tremendous impact on American life. Yet only a small fraction of the records of this activity has come under archival control.Contributing to the failure to adequately document a major phenomenon of our time has been a tendency of scientists to regard their correspondence files, laboratory notes, and manuscripts as personal property to be disposed of once its immediate purpose has been served.

Recognizing that substantial amounts of valuable material were thus being destroyed, the Society of American Archivists Committee on the Archives of Science and Technology conducted a survey between 1976 and 1979, asking members of the National Academy of Sciences about their plans for the disposition of their papers. One goal of this survey was to foster among scientists who have been nationally recognized for their achievements the awareness that their papers could provide evidence for the history of their respective disciplines and of the scientific enterprise as a whole. Each Academy member was sent a brochure on the preservation of scientific source materials prepared specifically for scientists by the American Institute of Physics' Center for History of Physics.[1]

In the course of this survey, the Committee came in contact with several scientists who were inclined to donate their papers, but had been unable to find a repository that would accept them. Their frustration underscores the point that efforts to preserve scientific records cannot succeed unless there is an increase in the number of repositories willing to acquire such records. Scientists are not the only ones who need to be convinced of the historical value of scientific records. Some of our own colleagues in the archival profession need convincing as well.

The limited resources of specialized repositories already collecting in the sciences cannot adequately carry out a task of this magnitude. General repositories—particularly university archives and manuscript repositories, but including business archives as well—must do their part to preserve scientific records if any significant body of documentation is to survive. This article will address practical ways to come to grips with some of the problems posed for the general repository by the acquisition of scientific records.

It may be that historians of science increasingly will have some training in the sciences, but archivists with such a background will probably always be rare. One of the barriers archivists face in dealing with scientific records is the idea that their appraisal, arrangement, and description requires technical knowledge that most archivists do not possess. In his article, "The Archivist: Link Between Scientist and Historian," J. Frank Cook exhorted the profession to overcome this inhibition:

> The archivist has most likely not been as energetic in accessioning, processing, and encouraging the use of scientific archives as he has been of some of his other record groups. In his defense the archivist may argue that his training did not prepare him to handle adequately the manuscripts and archives produced by the sciences. The argument has validity, but in my opinion, it will have to be overcome in the years ahead. For I believe one of the most important functions the archivist will have in the future will be to serve as a bridge between the scientist and the historian.[2]

Unfortunately the only concrete example Cook offered of how an archivist might handle scientific records, while perhaps ideal, is beyond the means of most general repositories. To process the records of the University of Wisconsin's Limnology Laboratory, the University Archives hired a professional limnologist who collaborated with an historically-trained archivist to identify the data and place it in an historical context. Since the mid-1970s, however, budgetary constraints have limited the general repository's ability to hire processors with special expertise. In the past, the specialized processor has usually been a graduate student in an appropriate discipline. The size of most archival staffs has tended to stabilize over the past decade, with some graduate students who had originally been hired for a specific project becoming members of the permanent staff. Money for

new personnel has tightened considerably. Repositories are being asked to do more with less. In the case of scientific records, it means that archivists without special expertise in science will have to appraise and process them.

Appraising and processing scientific records may require extensive self-education on the part of an archivist, but the results can be successful. Three things a generalist must bring to the task are: 1) a sense of the place of scientific records in the collecting program of a general repository, 2) knowledge of where to look for expert assistance and how to use it in appraising and processing scientific records, and 3) confidence that basic archival principles and practices can be applied to collections that include technical materials.

There are two types of scientists whose papers could be sought by a general repository. The first may seem obvious: the "stars" in the field—Nobel laureates and members of the National Academy of Sciences. These are men and women with national and international reputations. No special expertise is required to realize that virtually all of the surviving evidence related to the career of an Albert Einstein, an Enrico Fermi, or a Julian Huxley is worth preserving. Yet the SAA survey of NAS members revealed that archivists have not yet solicited the papers of many very prominent scientists.

The second type of scientist is one whose career is of importance primarily to the history of a particular institution. University archivists, for instance, should seek out the papers of science faculty members who established departments or programs or who played a significant role in university affairs through service on important committees. An example of this second type is provided by James W. Neckers, one of the founders of the department of chemistry at Southern Illinois University-Carbondale, and co-author with Abbott and Van Lente of a standard textbook, *Experimental General Chemistry*. The archival value of Neckers' papers for the history of his university is obvious.

A general repository could consider collecting a third type of scientific personal papers: those of scientists not affiliated with the institution, but whose work is related to a particular subject area in which the institution collects actively. Industrial scientists are one group whose papers often have no natural home, and general repositories could help rectify this situation. For example, a university library may be interested in building a broadly based research

collection on coal technology, and may already have some manuscript collections on coal mining. A natural extension of this collecting field would be to seek the papers of industrial chemists who have made important contributions to the advancement of coal research.

In looking for help in processing scientific records that have been collected, it is important for the archivist in a general repository to consider a wide range of possibilities. The most obvious source of help—scientists—has equally obvious limitations. Most scientists do not seem to be familiar with the kind of history of science that is currently being written, in which the social context of scientific work is emphasized as well as the history of ideas. Consequently, they lack the perspective that would enable them to appraise their papers for materials of possible long-term interest to historians. They cannot be expected to realize that their false starts and typical routines may someday prove important parts of a larger historical picture. Scientists also tend to be too preoccupied with their ongoing research to have time to interpret technical materials for archivists, even if they are interested in a particular processing project.

Archivists will also find that historians of science will not be able to help appraise scientific records outside their particular specialties. Maynard J. Brichford, in his *Scientific and Technological Documentation,* stated the problem as he saw it in 1969: "Until we have a significant research production in the history of recent science and technology, we will have problems in the archival evaluation of source material."[3] Eleven years later, the problems of evaluation of scientific records are still unsolved. The archivist's task is to preserve sources for future studies in the history of science. Archivists are likely to find that many of the present practitioners of this discipline tend, like scientists, to be too preoccupied with their current research to lend much practical assistancc.

Archivists with experience in the area of scientific research can provide excellent advice. They are at present so few in number, however, that most archivists in general repositories will have limited opportunities to consult their most knowledgeable colleagues. Since 1978, a number of archivists have been active in a Joint Committee comprised of representatives of the Society of American Archivists, the History of Science Society, and the Society for the History of Technology. This committee was specifically established to study problems posed by contemporary scientific records. Reports and

guidelines emanating from it promise to be especially useful.[4]

Until such guidelines appear, university archivists in particular should not overlook one category of experts close to home: science librarians and bibliographers. In their efforts to distinguish their profession from that of librarians, archivists do not always think of the latter as potential collaborators. Good science librarians are accustomed to dealing with all levels of research questions, and have the mental flexibility and attitude of service that enable them to respond to archivists' requests for information. Science librarians may be aware of social and political issues in various scientific disciplines which are likely to prove of historical interest. They may also know which members of the science faculty are doing the most productive research, and whose papers should be solicited for the university archives. Some are able to provide specific assistance in unexpected ways, such as translating a scientific quotation from a foreign language into English for use in an exhibit.

There is one category of expert whose services an archivist may be able to engage for processing scientific records. While fewer graduate students are available than in the past, a large pool of undergraduate students, including those majoring in various scientific disciplines, can be tapped through federal work-study funds. This resource is most readily available to university repositories, but business archives might also consider recruiting student assistants for part-time summer positions.

A final source of expertise that should be considered by the archivists is retired scientists, although experience with this group can be mixed. Some are invaluable advisors and informants, but others may prove difficult to work with or even obstructionist.

Brichford summarized the limitations of expert advice nicely:

> Consultations with specialists in subject fields have been advocated as the best means of evaluating scientic documentation. On the whole, such consultations are overrated. It is difficult to find a specialist with a- a comprehensive knowledge of the material, b- the perspective of the intellectual historian or the historian of science, and c- the archivist's knowledge of the problems involved in segregation, description, preservation and use of the materials.[5]

The situation in each general repository is, of course, different. Which category of expert will be most useful to the archivist in meeting his or

her responsibility towards scientific documentation depends on personality and other contextual variables.

While expert advice can be helpful, the ultimate responsibility for evaluation and interpretation of archival collections in the sciences will remain the archivist's. It is the archivist's own attitude which is of primary importance in dealing with scientific materials. A combination of common sense and sound archival practice will be most helpful if the archivist is willing to become engaged with the subject matter and is confident of his or her ability to do so. As with any other archival records, the best source of information on the subject they document is likely to be the scientific records and papers themselves. Particular attention should be paid to anniversary and birthday memoirs, after-dinner speeches, and obituary notices in which a scientist's colleagues may discuss scientific achievements in terms the non-specialist can understand.

To make the most of this kind of information, the archivist must make an effort to learn the common terminology of the relevant scientific discipline. There are, to be sure, formidable conceptual barriers to the non-specialist's understanding of modern science, but part of the problem is simply a matter of vocabulary. Scientific terminology is like any other language: it can be learned.

A scientist's disordered notes and drafts, just like the papers of a novelist or philosopher, can be presorted according to papers, ink, pagination, and format (holograph or typescript) and then identified by comparison with bibliographies or lists of publications. Up to 80 per cent of such materials can sometimes be identified through physical evidence alone without any knowledge of the subject matter.

Even if expert assistance is available, it is important for the archivist not to be mystified by the expert. For example, the scientifically trained processor cannot necessarily be relied on to achieve the right level of exposition in the scope and content notes that interpret a body of papers to researchers. It may, in fact, work better for the archivist to draft such notes and let the expert correct errors, rather than to edit technical descriptions to make them suit archival purposes. There is also danger in having a scientist too closely involved in processing his or her own papers. One prominent scientist who insisted that his longtime research assistant sort and identify his papers instead of the university archivist only succeeded in delaying the completion of the task.

Many of the series in a scientist's personal papers are familiar to archivists. Correspondence, administrative memoranda, notebooks, and procedures manuals pose no special problems. Currently this is the portion of a scientist's papers that is most likely to be used by historians of science. To give but one example, the unprocessed papers of physicist James Franck originally included eight boxes of unsorted notes and drafts, which Franck had apparently intended to discard. Of the twenty-four researchers who consulted the Franck papers at the University of Chicago Library between December 1974 and July 1979, only two examined the lab notebooks and drafts of scientific publications. For the majority of this collection's users, all those laboriously sorted and carefully identified drafts and notes might as well have been discarded or left in their original chaos.

Although the discipline of the history of science may evolve to utilize more technical documentation eventually, this type of evidence is not used by its current practitioners to any great extent.[6] This suggests that the archivist in the general repository, where scientific records compete for shelf space with other more traditional records and papers, must carefully consider the research potential of these types of records before deciding to retain them. In doing this, it is most productive to compare scientific records with other research files, for the desirability of preserving raw data is a question that arises in regard to the papers of researchers in all fields.

Some scholarly research files are relatively easy to appraise. For example, the field notes taken by University of Chicago anthropologist Robert Redfield on trips to Morelos, Mexico in the late 1920's and to Yucatan and Guatemala in the 1930s most likely will be used extensively. Since the societies he studied have disappeared, his notes have become primary evidence. Moreover, an increasing number of anthropologists are turning to topics that are based on library research rather than on field work as the "primitive" cultures, which formerly were their traditional objects of study, vanish. An equally clear example of discardable research notes are forty-four boxes of reading notes for books written by an historian, since his sources could be adequately determined from his footnotes.

Archivists should take the same approach to laboratory notes and other scientific data. One must ask: what kind of information is represented by the data? If the experiments or observations are readily repeatable, the "materials and methods" section of the resulting

publication will enable others to verify results. The original data will be of no further use to scientists. There are other scientific activities, however, that do produce data bases of continuing interest to scientists. Such data are in most cases retained by the research facilities which produced them. The University of Chicago's Yerkes Observatory, for example, maintains files of thousands of photographs that document stellar and planetary observations since the early years of this century. The scientific data which reaches an archival repository is most likely to be that for which working scientists have no further use. University archivists should, however, be alert to the possibility that a research facility which is scheduled for shut-down may require a repository for "reusable" data.

Data which has no current scientific interest may provide other kinds of information to historians. Manuscript drafts may document the stages of a scientist's work toward the solution of a problem. Personality and work habits can be reflected in laboratory notebooks. For example, Enrico Fermi was extremely meticulous in recording and analyzing data, as his "automatic memory" system of notebooks shows. Doodles in a 1912 laboratory notebook reveal the whimsical humor of Gustav Hertz, a German scientist, who with James Franck produced the first experimental evidence supporting the Bohr model of the atom.

The more prominent the scientist, the more likely such personal traits reflected in notebooks and drafts are going to interest scholars. The archivist can probably take a selective approach toward the lab notebooks, computer printouts, key punch cards, magnetic tapes, and lab apparatus which come with a more typical scientist's papers, for future historians of science will in most cases be interested in the interpretation of such raw data rather than in the data itself.

Modern science has created what Brichford described as a "huge volume of documentation, from which archivists must evaluate and select the small portion which will be prepared for the researchers."[7] Archivists in general repositories will have to engage in that task along with their more specialized colleagues.

Scholars sometimes imply that they would like every scrap of evidence to be saved. Archivists, however, are all familiar with the desperation of a researcher confronted with more material than can be covered in the number of days he or she has scheduled for a particular repository. The hard-pressed researcher wants well-organized

collections that make it possible to find what is of interest with little waste of time. Holding technical material in an unprocessed state so that some research scholar might sift through it at a later date is not practical. Archivists in general repositories must deal with all the records they select for preservation. They are never going to be relieved of their responsibility to select, arrange, and describe collections by scientists, historians, or any other experts. Fortunately, half the battle involves demystifying the unknown and the other half requires the application of commonly accepted archival practices. The administration of scientific collections in a general repository, like the handling of other sorts of collections, necessarily entails a mediation between what *should* be done and what *can* be done.

FOOTNOTES

1. *Scientific Source Materials: A Note on Their Preservation* (New York: American Institute of Physics, 1977). This brochure and further information on the survey of NAS members may be obtained by writing to Joan N. Warnow, Associate Director, Center for History of Physics, American Institute of Physics, 335 East 45th Street, New York, New York, 10017.
2. J. Frank Cook, "The Archivist: Link Between Scientist and Historian," *American Archivist* 34 (October 1971): 377.
3. Maynard J. Brichford, *Scientific and Technological Documentation: Archival Evaluation and Processing of University Records Relating to Science and Technology* (Champaign-Urbana: University of Illinois Press, 1969), p. 5.
4. Present membership of the Joint Committee consists of David Bearman (Survey of Sources/History of Biochemistry), Clark Elliott (Harvard University), Sharon Gibbs (National Archives and Records Service), Maynard Brichford (University of Illinois), Helen Slotkin (MIT), Joan Warnow (American Institute of Physics), Robert Friedel (Institute of Electrical and Electronics Engineers), Richard Lytle (Smithsonian Institution), and Richmond Williams (Hagley Foundation-Eleutherian Mills).
5. Brichford, *Scientific and Technological Documentation*, p. 5.
6. Clark Elliott, "A Look at Appraisal Through Citations in the Literature." Unpublished paper presented at the annual meeting of the Society of American Archivists, Chicago, September 28, 1979.
7. Brichford, *Scientific and Technological Documentation*, p. 1.

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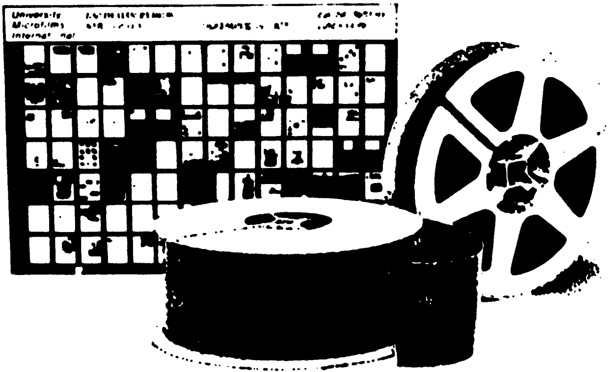

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