

THE STATUS OF RESEARCH AND TECHNIQUES IN ARCHIVAL CONSERVATION

CAROLYN CLARK

In a paper prepared for the 1977 Society of American Archivists/ National Endowment for the Humanities Conference on Funding Priorities for the Preservation and Use of Historical Records, Frazer Poole, Assistant Director for Preservation at the Library of Congress, outlined the conservation/preservation problem as it relates to archives.¹ Poole listed four recommendations for action in order of priority: 1) establishment of an educational program for paper conservators; 2) expansion of research facilities; 3) a national survey to determine the condition of important archival collections; and 4) additional research into the permanence of microforms. At the same conference, George Cunha, Director of the New England Document Conservation Center,² emphasized the "regional approach" and suggested that archivists and curators cannot afford to wait for national direction and all the answers before instituting local and regional preservation programs.³

In these papers and in the literature it is repeatedly evident that the status of the physical preservation/conservation efforts in archival repositories exists on a number of levels. The push towards national efforts to provide research, training, and standards occurs simultaneously with efforts to provide specific answers to specific problems and to "get the job done". What these efforts have in common is that no one knows exactly what or how much to do and there is no funding to do it anyway.

A survey of the recent literature of conservation reveals several common concerns including: the quality and kind of research being conducted (recent emphasis is on applied rather than pure research); the implication for preservation caused by the increased use of plastic-base materials as archival documents; confusion over the plethora of

deacidification/lamination/encapsulation techniques; the dearth of training programs and standards for paper conservators; and the merits of cooperative conservation efforts.⁴ Looming over all of these major concerns is the realization that it is unlikely that the massive funding needed to find the solutions and implement the programs will ever be forthcoming. Funding agencies have successfully supported research that attempted to define the problem; this was, of course, a necessary and logical first step — but only a first step. A review of the current situation will show that despite research and funding efforts, the physical preservation of documents is the archival profession's recurring nightmare.

Paper Permanence/Paper Deterioration

The problem of preserving documents is not unique to the twentieth century. The ancient Mesopotamians were plagued by earth-worms eating through the soft clay writing tablets hardening in the sun. There are references in Egyptian papyri and Roman scrolls to the damage wrought upon records by vermin, weather, and invading armies. Although few present-day archivists have to worry about worms burrowing in their papyri or hordes of attacking vandals burning their scrolls or parchments, the problems involved with preserving modern documents involve deteriorating agents just as various and uncontrollable.

The invention of wood-pulp paper in 1840 greatly compounded the problem of preserving paper artifacts. The process produced a soft, short-fibered paper that could be easily printed on but was structurally weak. Previously, paper had been made from new linen or cotton fibers — long fibers that produced strong paper. Also, little or no acid was used in the paper-making process. About 1850, however, rosin was introduced into paper as a sizing agent to prevent feathering of the ink. Before that time gelatin or animal sizes had been used, and for over 200 years papermakers had used alum to set the size. The new combination of alum and rosin created, as a by-product, free sulfuric acid which resulted in papers that were destined to deteriorate rapidly, even if made with rag fibers.

In addition to the inherent vice present in modern paper, external factors contribute to its deterioration. Air pollutants such as sulfur dioxide, hydrogen sulfide, and nitrogen dioxide combine with at-

mospheric moisture to form acids and embrittle paper. Dirt and dust particles in the air carry absorbed pollutants and also exert an abrasive action on books and paper. When exposed to the ultraviolet ray present in sunlight or fluorescent light, paper bleaches and its inks fade, the residual lignins remaining from the paper-making process react with other compounds to yellow the paper, and eventually the cellulose fibers in the paper weaken and break. The higher the temperature at which paper is stored, the faster the chemical reactions leading to deterioration occur. Too little humidity in the air will increase the brittleness of paper, while too much humidity promotes chemical reactions and thus deterioration, and can encourage the growth of mold and mildew.

The first extensive research into the causes of paper deterioration was conducted at the William J. Barrow Laboratory in Richmond, Virginia with funds made available by the Council on Library Resources, 1957-1976. Barrow's research included studies of the characteristics of book papers, the effects of temperature and humidity on paper permanence, and investigations into methods of deacidification. This research resulted in the development of testing methods, the invention of the Barrow laminator, and the establishment of specifications for permanent/durable wood pulp paper. Reports published by the laboratory have had considerable influence on the direction of research conducted at other institutions.

Other Council on Library Resources grants to aid in solving the problems of paper deterioration have included: funding of research conducted at the University of Chicago by Richard Smith to design and develop a deacidification technique as a basis for the mass treatment of deteriorating books and documents; funding of the American Library Association's Library Technology Program for the testing and standardization of supplies, equipment, and systems; grants to the Imperial College of Science and Technology, London, for research on the scientific aspects of conservation and refinement of techniques, materials, and equipment arising out of the experiences during restoration efforts following the Florence flood of 1966; initial funding of the New England Document Conservation Center to serve as a model for regional book and document treatment facilities; and a start-up grant to provide equipment for the Preservation Research and Testing Laboratory at the Library of Congress.⁵

The Institute for Paper Chemistry in Appleton, Wisconsin, com-

missioned by the Cotton Fiber Paper Manufacturers, has been conducting research since 1963 on the permanence and durability of paper. The studies are an attempt to standardize tests for paper tearing strength, folding endurance, and tensile strength.

The Society of American Archivists, in cooperation with the National Archives, sponsored research (1970-1976) conducted by the National Bureau of Standards concerning variables associated with the stability of archival record materials. The purpose of the initial studies involving paper was to develop specifications for permanent records and to perfect methods of paper testing. Further research is planned for photocopies, ink, typewriter ribbons, carbon paper, laminating film, mending tape, and binding materials.

Since 1972, the Preservation Research and Testing Laboratory of the Library of Congress has conducted pure research into fundamental aspects of preservation, applied research into preservation techniques, and testing and quality control of preservation materials. Ongoing research includes: evaluation of existing methods of deacidification; investigation of gaseous and nonaqueous deacidification studies of graft polymerization to strengthen paper; analysis of stains and discoloration in paper; determination of the safest and most effective microfilm storage box; and studies of substitutes for cellulose acetate lamination.

Research into the causes of paper deterioration has resulted in specifications for permanent/durable paper but, as yet, the archival and library professions have been unable to persuade paper manufacturers, publishers, or records managers to use it — even when costs have been shown to be comparable. Elaborate tests for measuring the properties of paper have been devised, but the archivist faced with tons of brittle, crumbling paper does not need them. The effects of air pollution, heat, light, and humidity on paper are well known, but most institutions cannot afford air conditioning and ventilation systems, or even safe exhibit cases. Archivists worried about paper deterioration can take no solace in the adage “knowledge is power” until increased funding and a rearrangement of administrative priorities insure adequate conditions for the physical creation and maintenance of archival collections.

Deacidification/Lamination/Encapsulation

Treatment of the omnipresent brittle document is the major problem confronting archivists concerned with the care of their collections. As yet, no inexpensive, mass treatment exists for strengthening fragile documents and few collections warrant expensive, time-consuming item-by-item treatment. Twentieth-century carbon copies constitute large segments of many archival collections and, short of low temperature storage, microfilming to preserve the intellectual content is the only preservation alternative.

For treatment of the individual fragile document that must be retained in its original format, the alternatives are to: 1) do nothing, 2) deacidify and laminate, and 3) deacidify and encapsulate. The first alternative is in many cases the most viable. Many documents thought to be strengthened by silking or mounting on cardboard have actually been irreparably damaged; the bulk of every paper conservator's work is undoing previous well-meant repairs. The second alternative — deacidify and laminate — requires careful screening to determine the suitability of this method for each individual document. Many documents in acceptable condition have been laminated automatically because the institution owned a laminator. To further obfuscate the issue, the Barrow two-step deacidification followed by lamination with cellulose acetate film and tissue was for years considered suitable for documents that needed to be kept indefinitely. Experts now affirm that: deacidification and alkaline buffering is rarely carried out in a consistent manner in restoration workshops; heat applied during the lamination process accelerates aging of the paper; commercial materials used do not always conform to specification; and the technique is **no longer considered reversible**. Consequently, the Library of Congress advises that lamination be administered to only those documents that will be kept fifty years or less.⁶

The third alternative — deacidify and encapsulate — is receiving considerable popular attention. The document is sandwiched between two sheets of transparent polyester film, static electricity keeps the document from shifting, and the envelope is sealed on four sides with double-sided tape. If the document is properly deacidified and buffered prior to encapsulation, this method offers physical protection and is completely reversible. Drawbacks are that the technique increases bulk in collections and the document is difficult to examine behind

the shiny film. Additionally, just as lamination is pointless without prior deacidification, encapsulation with deacidification leads to more rapid embrittlement of the document than if it has not been encapsulated.⁷

There are numerous deacidification processes, both aqueous and non-aqueous; the problem is selection of the most suitable technique for each individual document. Deacidification is a chemical process requiring, for the most part, a laboratory with trained technicians to: test documents before and after treatment, monitor chemical levels in the solutions, and efficiently carry out procedures. Until inexpensive, mass treatment methods for deacidification, buffering, and strengthening of documents become available and the mechanisms for establishing cooperative treatment centers are found, archivists faced with tons of brittle documents might best spend their time and energy agitating for proper environmental controls.

Preservation of Plastic-Base Materials and Photographs

Although efforts for the preservation of archival materials emphasize paper problems there are other emerging concerns. The increase in creation of microforms and machine-readable records, the practise of preservation microfilming of deteriorated paper collections, the appearance of magnetic reels and oral history tapes, and a recognition of the importance of photographs have each produced additional and equally complicated preservation problems. Commonly known as audio-visual or non-book materials, these documents all have a plastic base, thus their preservation problems are similar. Plastic-based materials require a strictly controlled storage environment, use of inert storage containers, regular inspection, and assurance that there are no residual chemicals remaining from processing. Handling of the original document or master copy should be minimized through the production of additional copies.

The preservation of photographic materials is extremely complicated due to their diversity. Daguerreotypes, tintypes, albumen prints, colodian prints, gelatin prints, Kalvar film, and Diazo film are all capable of different reactions, with the result that what may be safe treatment for one may not be at all safe for another. Also photographic materials and techniques are constantly being developed which increase the number of potential problems.

Comfortingly enough, as with paper, the single most important

aspect of preservation of plastic-based materials and photographs is a consistently good storage environment including the use of inert containers; protection from disasters; control of humidity, temperature, light, and air; and a minimum of handling.

Cooperative Approaches to Conservation/Preservation

Many archivists, curators, and librarians see cooperation as the key to the problem of limited funds and lack of trained personnel for conservation. Cooperation can exist on several levels: training and internship programs for paper conservators; research into paper permanence and restoration; cooperative treatment facilities; and a national network to disseminate information, aid in funding, and establish standards and priorities.

The National Conservation Advisory Council (NCAC) was established in 1973 (through a grant from the National Museum Act administered by the Smithsonian Institution) to provide a "forum for cooperation and planning among institutions and programs concerned with the conservation of cultural property in museums, historic properties, libraries, archives, and related collections in the United States."⁸ Institutional members include the American Association for State and Local History, the Library of Congress, the National Archives and Records Service, the National Bureau of Standards, and other institutions and associations concerned with the preservation of historic and artistic works. NCAC's Committee on Regional Centers has prepared a detailed report;⁹ the Committee on Libraries and Archives will issue a report by mid-1978.¹⁰ Five major areas of national concentration in conservation have been identified by NCAC: 1) the need to increase the number of fully qualified conservators, technicians, and other conservation personnel through formal professional training; 2) the need to expand awareness and understanding of conservation problems among those administratively or curatorially responsible for the care of cultural property; 3) the need for more numerous and more adequate treatment facilities; 4) the need to increase scientific support for conservation and for the study of artifact materials; and 5) the need to establish recognized standards of training and practice in conservation work.¹¹

NCAC's recommendations for cooperative action include establishment of a permanent advisory and coordinating council for long-range

planning, development of regional treatment centers, and establishment of a national institute for conservation. The institute would function as an information clearing-house, coordinate education and training, educate the users of conservation services, and provide a research laboratory for basic and developmental research and testing and analysis of materials.

Cooperative regional conservation centers provide three categories of services: consultation and advisory services, treatment of materials, and education and training. Services impractical or unavailable to the individual archival repository or library may be made available through a pooling of resources. Specialized services needed infrequently can be offered to members on a shared basis. Institutions can join together to solve problems that to the individual institution appear too complex or massive. Consolidation also helps avoid duplication of effort. Additionally, the special problems posed by conservation make it an area well suited to cooperative ventures: conservation is expensive, there are a limited number of qualified paper conservators and conservation administrators, and conservation treatment requires special equipment and facilities.

Efforts on the regional level are presently minimal. In 1972, the New England Document Conservation Center was authorized by agreement of the New England Interstate Library Compact — a political subdivision of the six New England states. Originally funded by a grant of \$70,300 from the Council on Library Resources, the Center is now largely self-supporting, serving public libraries, state and local archival agencies, and non-profit historical, educational, and cultural institutions. Membership is voluntary and, after an initial membership fee, work is charged "at cost". In addition to actual treatment, the Center provides field inspection and consultation services; mobile disaster recovery units; microfilm, facsimile, and duplication services; and conducts an annual seminar on library and archives conservation.¹² The intention of the Council on Library Resources was that the Center would serve as a model for other regional centers.

Cooperative ventures are being seriously discussed by the University of California Library System and the Western State Libraries Agencies. Many other library, archival, and historical agency groups have reached the place-on-the-meeting-agenda stage for consideration of regional conservation efforts.

Although the experts seem to agree on the suitability of regional conservation centers, there is disagreement over the speed with which such centers should be developed. NCAC warns that "there are not sufficient numbers of trained and experienced conservators at the present time to properly staff and manage many regional centers."¹³ Paul Banks, Conservator at the Newberry Library, writes, "just any kind of restoration treatment is not necessarily better than no treatment at all..." and questions the "advisability of establishing cooperative or regional treatment centers...in light of limited knowledge, skills, and ethical framework thus far available."¹⁴ On the other hand, George Cunha feels that to wait for a large number of "fully trained conservators" is to wait too long. He comments that it is "erroneous to say that it is not possible to establish regional treatment centers which are capable of maintaining adequate standards of quality... archivists are highly competent professionals who can seek out and use the information and guidance available to them in conservation matters, as they utilize the information and expertise available to them in other matters."¹⁵

Even if regional conservation centers were fully staffed and developed, they would most likely focus on the treatment of the individual rare or unique document. Such treatment does nothing for the great mass of deteriorating historical and research materials. In part to combat this and in part because no other organization is doing anything about it, the Library of Congress is developing plans for a National Preservation Program. Although the program will focus on preservation problems in libraries, Frazer Poole writes that "recommendations for action are equally applicable to archives and libraries [because] problems and solutions in [the] respective institutions differ only in degree."¹⁶ The proposed program will address three major problems: 1) preservation of the intellectual content of materials so embrittled that they cannot be used without damage, but not of sufficient intrinsic value to justify preservation in the original format; 2) preservation of rare and intrinsically valuable materials which require the attention of expert paper conservators; and 3) preservation of present and future publications which are being printed on paper with a life expectancy of fifty years or less.¹⁷

Education/Training for Paper Conservators/Conservation Administrators

No formal training programs exist specifically for conservators or conservation technicians for libraries and archives. Practitioners in the past have been trained by apprenticeship and although this still happens to some extent through in-house training in institutions such as the Library of Congress or the National Archives, these programs are not adequate to train the number of personnel needed to cope with the preservation problem.

Existing programs for training paper conservators are designed for conservators of works of art on paper. In graduate programs at the Conservation Center of New York University, the University of Delaware-Winterthur, and Cooperstown, New York, students learn to treat works of acknowledged aesthetic and monetary value, but the library or archives conservator must learn to deal not only with rare and valuable materials, but also with a great mass of materials of moderate individual value.

Theoretically, the training of conservation personnel should take place on several levels: the conservation administrator who administers all aspects of a conservation program; the conservator needing both theoretical and technical training in the physical treatment of materials; the conservation technician who executes various types of treatment under the direction of the conservator; and the director, curator, archivist, or librarian responsible for setting priorities and assigning funds.

The National Conservation Advisory Council has listed "training of conservation personnel" and "educating the users of conservation services" as two of five designated "fundamental problems".¹⁸ Paul Banks, addressing the Planning Conference for a National Preservation Program, assigned first priority to the "development of a cadre of trained conservators".¹⁹

The only training currently available is offered sporadically as short-term seminars conducted by institutions such as the New England Document Conservation Center and the Newberry Library, or sponsored by library schools or professional organizations, such as the seminar on paper conservation recently offered by the American Association for State and Local History. These seminars are fre-

quently limited to practicing archivists or librarians and do nothing to increase the number of trained conservators. Their purpose is to "raise the consciousness" of those in a position to affect conservation policy at their institutions. Unfortunately, those who need their consciousness raised are not the people who attend. Workshops in conservation techniques are sometimes run concurrently with professional meetings to dispense limited information — and hopefully not misinformation.

The training of more conservators cannot, in itself, solve the inadequacies of the present state of conservation/preservation. The need for conservation services must be broadly recognized and adequate funding obtained for conservation programs. A gradual development of trained personnel will, however, result in greater resources of manpower and energy available to agitate for, plan, and direct programs aimed at meeting conservation needs that manage to elude institutional budget cuts.

FOOTNOTES

- ¹Frazer Poole, "Some Aspects of the Conservation Problem in Archives," *American Archivist* 40 (April, 1977) 163-71.
- ²Both Frazer Poole and George Cunha have since retired. Thus, as will be further emphasized in this paper, one problem in conservation is the scarcity of knowledgeable people.
- ³The papers are summarized with discussion in *American Archivist* 40 (July, 1977) 321-4.
- ⁴In 1976 the American Institute for Conservation of Historic and Artistic Works developed certification standards, but they are for conservators of works of art on paper.
- ⁵Council on Library Resources. *Annual Reports* (Washington, D.C.:CLR, 1967-76).
- ⁶Frazer Poole, "Current Lamination Policies at the Library of Congress," *American Archivist* 36 (April, 1976) 157.
- ⁷Letter from Frazer Poole to Maynard Brichford, March 25, 1977. Conservation File, University Archives, University of Illinois at Urbana-Champaign.
- ⁸National Conservation Advisory Council. *Conservation of Cultural Property in the United States* (Washington, D.C.: Smithsonian Institution, 1976) p. 33.
- ⁹National Conservation Advisory Council. *Report from the Regional Centers Study Committee to NCAC* (Washington, D.C.: NCAC, 1976).
- ¹⁰Statement by Paul Banks, Chairman, NCAC Library and Archives Committee, at a meeting of the ALA/RTSD Preservation Discussion Group, January 24, 1978.
- ¹¹National Conservation Advisory Council. *Conservation of Cultural Property in the United States*. p.5.
- ¹²New England Document Conservation Center. Promotional Brochure, ca. 1976.
- ¹³National Conservation Advisory Council. *Conservation of Cultural Property in the United States*. p.16.
- ¹⁴Paul Banks, "Cooperative Approaches to Conservation," *Library Journal* 101 (November 15, 1976) 23-49.
- ¹⁵George Cunha, "Conservation and Preservation of Archives." Paper given at the SAA/NEH Conference on Funding Priorities for the Preservation and Use of Historical Records, Chicago, January 6-8, 1977.
- ¹⁶Frazer Poole, "Aspects of the Conservation Problem in Archives." Paper given at the SAA/NEH Conference.
- ¹⁷"Report on a Planning Conference for a National Preservation Program," *LC Information Bulletin* (February 18, 1977) 129-31.
- ¹⁸National Conservation Advisory Council. *Conservation of Cultural Property in the United States*. pp. 6-14.
- ¹⁹"Report on a planning conference for a national preservation program." p. 130.