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ABSTRACT

Summarized in this document are the proceedings of a public hearing sponsored by the National Library of Medicine (NLM) Board of Regents in order to provide a forum in which publishers, editors, paper manufacturers and distributors, printers, biomedical researchers, librarians, and other professionals concerned with preserving the biomedical literature could share experiences with the use of permanent, acid-free paper; to increase the awareness of the need to publish on such paper; and to discuss means for encouraging its broader use. A brief introduction describes the background of the hearing, and the following hearing presentations are summarized: (1) remarks identifying the deterioration of publications as being of special concern to the health sciences; (2) the keynote address on the importance of medical information exchange and the role of the NLM; (3) a discussion of the preservation of biomedical information at NLM; (4) a discussion of the activities of the Commission on Preservation and Access; (5) remarks on the perspective of medical libraries; (6) descriptions of the making, specifying, buying, and printing of acid-free paper; (7) a presentation on the preservation of medical archives; (8) a panel discussion on the use of permanent paper and the subsequent group discussion; (9) a consideration of the formation of an NLM task force; and (10) closing remarks. The hearing agenda is also provided. (KM)

National Institutes of Health
National Library of Medicine
Bethesda MD 20894

THE USE OF PERMANENT PAPER FOR BIOMEDICAL LITERATURE

SUMMARY OF THE PROCEEDINGS OF THE NATIONAL LIBRARY OF MEDICINE BOARD OF REGENTS HEARING

January 27, 1967

TABLE OF CONTENTS

AGENDA

MORNING SESSION

Introduction

Albert E. Gunn, M.D., Chairman,
NLM Board Of Regents, Presiding

Perspective of a Scholar

James B. Wyngaarden, M.D., Director,
National Institutes of Health

Keynote Address

The Honorable William H. Natcher, Chairman,
House Subcommittee on Labor, Health and
Human Services, and Education

Preservation of Biomedical Literature at NLM

Donald A.B. Lindberg, M.D., Director, NLM

Activities of the Commission on Preservation & Access

Warren J. Haas, President,
Council on Library Resources

Perspective of Medical Libraries

Judith Messerle, President, Medical Library Association

Making, Specifying, Buying, and Printing Acid-Free Paper

Manufacturer, Distributor, and Printer Representatives:

Charles E. Hoffman
Washington-Baltimore Area Representative
S.D. Warren Co.

Anthony Liberatore
Product Manager
P.H. Glatfelter Co.

Joseph Dunton
Vice President, Publication Papers
Wilcox-Walter-Furlong Paper Corp.

Lunch

Speaker: Lois E. DeBakey, Ph.D, Prof. of Scientific
Communication, Baylor College of Medicine

Using Permanent Paper

Panel of Biomedical Journal Publishers and Editors:

Edward J. Huth, M.D., Editor
Annals of Internal Medicine, Moderator

Frederick Bowes III
Director of Publishing Operations
New England Journal of Medicine

A. Jerome Freeland
Senior Vice President, Journal Publisher
The C.V. Mosby Company

Arthur W. Hafner, Ph.D.
Director, Division of Library and Information Management
American Medical Association

Jeffrey Hillier, Ph.D.
Director of Project Development
Elsevier Science Publishing Company

Bradley Hundley
Director
Rockefeller University Press

George E. Lundberg, M.D.
Editor
Journal of the American Medical Association

Stephen Prudhomme
Assistant Manager, Research Journals
National Research Council of Canada

Norman D. Richey
Director, Publication Production and Printing Division
American Medical Association

William C. Roberts, M.D.
Editor
American Journal of Cardiology

Heinz Sarkowski
Vice President of Production
Springer-Verlag, Heidelberg, FRG

Discussion

What to Do Next

Dr. Edward J. Huth

Closing

Dr. Albert E. Gunn

BACKGROUND

A fundamental responsibility of the National Library of Medicine is to preserve permanently the content of books, periodicals, and other library materials pertinent to medicine. The Library has devoted significant resources to archival microfilming of deteriorating materials, research into electronic storage of document images, and maintenance of favorable conditions for processing, storing, and using its collection.

Deterioration of paper caused by residual acids introduced into it by papermaking processes adopted in the mid-nineteenth century represents a major threat to the survival of much of the literature published since that time. The preservation policy adopted by the Library's Board of Regents in February 1986 notes that the use of acid-free paper and other permanent, archival materials which are now available could stop much of the preservation problem at its source. It calls for the Library to actively encourage the publishing industry to use more permanent materials in the production of biomedical literature, in order to lessen the need for preservation treatment of new publications.

PURPOSE AND CONDUCT OF THE HEARING

The NLM Board of Regents sponsored a one-day public hearing at the Library's Lister Hill Center auditorium on January 27, 1987, in order to provide a forum in which publishers, editors, paper manufacturers and distributors, printers, biomedical researchers, librarians, and other professionals concerned with preserving the biomedical literature could share experiences with the use of permanent, acid-free paper, to increase the awareness of the need to publish on such paper, and to discuss means for encouraging its broader use. Dr. Albert E. Gunn, Board Chairman, conducted the hearing. Additional background for the hearing was provided by exhibits on the evolution of papermaking, on preservation alternatives such as microfilming, electronic image storage, mass deacidification and other paper stabilization methods, and duplicating on archival paper, and on standards for permanent publication materials.

MORNING SESSION

INTRODUCTION

Dr. Albert Gunn noted that the printed record will probably remain the premier vehicle for imparting knowledge now and into the future. The Library's preservation policy recognizes the need to continue to preserve the existing collection. Acquisition of library materials in archival format and encouraging the publishing industry to use more permanent materials in the production of biomedical literature are preventive measures, incorporated in the Library's long-range plan. The Library's collection is housed under optimal conditions in a facility designed to withstand any threat from without. It would be ironic if it were allowed to destroy itself from within through physical deterioration.

PERSPECTIVE OF A SCHOLAR

Dr. James B. Wyngaarden, Director of the National Institutes of Health, identified deterioration of publications as of special concern to the health sciences. More than in other professions, they are dependent for communication in research, education, and practice on the published literature. The country's system of medical publication has evolved over centuries to be an efficient method for distributing information. NLM's multifaceted activities are crucial in making this information available to professionals.

KEYNOTE ADDRESS

Mr. William Natcher, Chairman of the House Subcommittee on Labor, Human Services, Education and Related Agencies acknowledged the importance of medical information exchange and the unique role NLM plays in ensuring productive research and well spent research dollars in the health research process. Congress provides significant resources to assist the Library in preserving a priceless and treasured collection. Some one million dollars is spent annually on NLM preservation-related activities. Congress supports the focus on aggressive preservation activities in the Library's long-range plan. It is concerned with the resolution of the problem of deterioration of new publications. Simply using more permanent paper in publications can reduce it significantly - a little preventive medicine. The problem and the responsibility to solve it are not NLM's alone. NLM has gathered the key players for the hearing to offer their expertise and participate in informative, productive discussions and, hopefully, development of some solutions.

PRESERVATION OF BIOMEDICAL LITERATURE AT NLM

Dr. Donald A.B. Lindberg, Director of the National Library of Medicine, reported that some 8.8 percent of its collection is embrittled, an experience comparable to the medical collection at Yale. A preponderance of medical literature is of relatively recent origin and may have been printed on better paper to start with than the run of general literature, where embrittlement rates in excess of 25 percent for some major libraries' collections are reported. Periodical literature, much of it printed on coated paper, now appears more important in biomedicine than textbooks - 95 percent of interlibrary loan requests are for journals. It is not known to what extent, if any, coating may retard paper deterioration. Harder data about the problem are desirable.

Microfilming, research in the electronic storage of images ongoing in the Library's Lister Hill Center, duplicating on archival paper, and deacidification and other paper stabilization methods may help in preserving the existing collection. Microfilming is the leading option available now, although its cost is high and microform use is not popular with readers. Electronic storage materials are estimated at this time to have a useful life of only 20 years. Resolution capability and future availability of compatible hardware are other issues in their use.

It is crucial to consider and investigate the possibility that the problem of paper deterioration be eliminated at its source, given the additional cost and effort associated with retrospective preservation methods, so that sometime in the future the biomedical scholarly literature might be printed on permanent paper that would last through the ages.

Because only some three percent of all paper made in the U.S. is used in hardcover, textbook, and special interest magazine publishing, with biomedical literature a small proportion of that market, the leverage of publishers' buying power is low. On the other hand, a small segment of the market may be more easily amenable to change in process. Some publishers have converted to acid-free paper for other reasons than permanence, e.g., aesthetics, within usual business constraints. Feasibility of conversion may differ depending on publication volume. High volume publishers are also concerned about supply security -archival editions may be a possibility. The Library's views on the problem need to be tested from the point of view of the literature producers.

ACTIVITIES OF THE COMMISSION ON PRESERVATION AND ACCESS

Mr. Warren J. Haas, President of the Council on Library Resources, described the role of the Council as a catalyst, using foundation support, for development of programs of interest to libraries. In its 31-year history, it funded the

early work of W. J. Barrow on paper deterioration, preservation, testing standards, and permanent papermaking. It stimulated studies on the dimensions of the preservation problem and initiated a number of operating preservation projects, such as for the microfilming all newspapers published in this country since 1690, the Northeast Document Conservation Center, and a regional microfilming facility at Lehigh University. The Council has recently completed production of a one-hour film which explains the problems of document deterioration and their remedies for the broader public.

The Council created the Commission on Preservation and Access to plot a national course for dealing with the problem of book deterioration. The Commission will enlist the help of a small number of national libraries to join forces to create a new national collection of preserved materials. Microfilming is at this time the technology of choice for preserving deteriorated material. Mr. Haas believed that a smaller proportion of collections in the sciences were embrittled because they were younger than the general collections. He identified the cost of currently available methods of replication as between 10 and 12 cents a page, regardless of which is used. A number of publishers can republish small print runs at reasonable prices.

Mr. Haas observed that acid paper is the culprit in the problem of embrittlement. Publishing important material in the future on acid-free paper is a matter of great urgency. It is unacceptable and irrational to continue to manufacture and print material on paper that is destined to add to the problem that now exists; it is time for drawing the line.

PERSPECTIVE OF MEDICAL LIBRARIES

Ms. Judith Messerle, President of the Medical Library Association, observed that the heritage of biomedical literature in member libraries provides a foundation for the geometrical growth of knowledge in biomedicine. She noted that with the increased awareness of the place of preservation in the library role, the time may be coming when emphasis in the larger medical research libraries shifts from issues of access to those of preservation.

The Medical Library Association believes that the majority of books and journals will continue to be published on paper for some time to come. Electronic imaging technologies will continue to capture markets, but they have their own complex set of preservation concerns, including hardware and software compatibility over time. Information users still like the feel of serendipitous finds, the sequencing, and the control of literature in paper form.

The MLA's 5000 members, good customers for publications, urge all publishers of biomedical literature to work in partner-

ship with libraries for the preservation of the biomedical heritage for generations to come by utilizing permanent paper. They urge that materials published on permanent paper carry identifying statements to that effect, not only as a mark of commitment, but also to assist future preservationists in assessing the composition of their collection. Without participation at the point of publication, preservation efforts, however ambitious, cannot hope to succeed.

MAKING, SPECIFYING, BUYING, AND PRINTING ACID-FREE PAPER
Manufacturer, Distributor, and Printer Representatives

Mr. Charles E. Hoffman, Washington-Baltimore Area Representative, S. D. Warren Company, described how a variety of wood fibers, pigments, binders, sizing and precipitating agents, and coatings are used to produce the many kinds of printing paper. He explained how the use of alum, an acid salt used in sizing, causes paper decay. Sizing improves the paper's ability to resist water penetration. The acid reaction cuts the links of long cellulose polymer molecules of wood fibers, resulting in the paper becoming brittle.

In the 1950's, a practical alkaline sizing material was developed, not primarily to increase paper permanence, but to permit use as a filler of what up to that time was a manufacturing by-product, calcium carbonate. With no acid to attack the cellulose fiber, the longevity and the ability of paper made with the alkaline process to withstand adverse storage conditions were greatly improved.

Economic incentives for conversion to alkaline-based paper manufacture are becoming stronger. The process adapts more readily to new environmental law requirements. Because fillers are often cheaper than wood fiber for which they can partially substitute, use of fillers such as calcium carbonate is expanding and with it, the availability of alkaline paper.

Paper meeting the American National Standards Institute (ANSI) standard for uncoated permanent paper (Z39.48-1984) is available from a number of mills. Its price is generally competitive with acidic "free sheet" of similar quality, i.e., paper made with chemical, bleached pulp and containing no groundwood. A symbol-of-compliance logo, the mathematical symbol denoting infinity set inside a circle, is authorized to identify it and the publication using it. Expanding the availability of standards for permanence to coated paper is in process.

Mr. Anthony Liberatore, Product Manager, the P.H.Glatfelter Company, described his company's experience in converting to alkaline papermaking. The chemistry of the process is complex and requires tight control to achieve the benefits which are the driving forces for its growth: more efficient waste treatment, less energy consumption for fiber treatment and

paper drying, efficiencies of using alkaline sizing and other wet end additives, such as increased proportion of fillers over fiber, use of calcium carbonate as an optically more efficient filler, and cleanliness and less corrosion, with less downtime and greater productivity. With knowledge gained over an initial 8-year trial period and a total commitment to the process, a second mill was converted in six months.

Knowledge about alkaline papermaking is spreading throughout the industry, facilitating planning for conversion. Reports in recent literature suggest that 10-15% of fine paper domestically is produced by the alkaline process, compared to perhaps 50% of European papers. Some 30 mills are reported to have fully converted at least one papermaking machine and entered the fine paper market, with at least another 30 in the trial evaluation stage. The alkaline process is in use for making many kinds of paper; not all of the alkaline papermaking capacity is directed at the publishing paper market. The availability of alkaline paper for publishing is, however, clearly evident.

Mr. Liberatore reported that most paper manufactured to meet the ANSI uncoated permanent paper standard exceeds its alkaline reserve requirement which is intended to provide a buffer against acidity effects of the environment over the life of the paper. The NISO Committee to expand the standard to include coated paper was established in late 1986. It is not known at this time to what extent, if any, coatings which tend to be alkaline may affect the permanence of acid core paper. Coated papers with an alkaline process core would be expected to qualify as permanent paper.

Mr. Joseph H. Dunton, Jr., Vice President for Publication Papers, Wilcox Walter Furlong Company, Paper Merchants, explained the range of coated paper quality, starting with Premium grade, and on to number 1 through number 5 grade. Paper through grade 2 is free sheet, it contains no groundwood. Greater proportion of groundwood is progressively included in grades 3 through 5. Generally, the higher the quality of the paper, the better are its brightness and opacity properties. He estimated a 10% price increase in paper cost in converting from a 50 lb. basis-weight groundwood coated paper to a 45 lb. weight acid-free paper. On the basis of cost alone, the groundwood process would be expected inherently to have a cost advantage over any comparable weight chemical pulp, free sheet product, whether alkaline or acidic. Mr. Dunton believed that for printing, the advantages of greater strength of acid-free sheet for better runnability, smoothness of surface for superior print quality, brightness for better color reproduction, and opacity for less image show-through suggested it as generally a superior value. He noted that because there were now no problems of supply in any of the coated paper grades and no shortages or allocations, it was a good time for anyone considering a paper change.

LUNCHEON SESSION

PRESERVING OUR MEDICAL ARCHIVES : AN OUNCE OF PREVENTION

Dr. Lois E. DeBakey, Professor of Scientific Communication, Baylor College of Medicine, noted the long-standing concerns for the preservation of the written word, dating from the time of the invention of paper by the Chinese 2,000 years ago. Preservationists are in a race against time, and time is winning - a third of Yale's collection is embrittled, a quarter at Stanford and the Library of Congress, half of New York Public Library's. When it is possible to prevent the problem by use of acid-free paper, it is inefficient and illogical to continue to use acidic paper when we know its fate. Many questions of longevity, cost, and user acceptability of other than printed media remain unresolved. Dr. DeBakey was concerned with preserving access to original sources. There are examples of where a lack of awareness of their existence resulted in duplication of effort and in delaying medical advances.

Dr.DeBakey suggested that if the voices of authors, researchers, and readers as well as archivists and librarians swell sufficiently, editors and publishers will listen to their demands for acid-free paper. She noted that a governmental policy on use of permanent paper for its archival documents could serve as a model for all publishers. No national preservation policy has yet emerged. The gravity of the matter has not caught the attention of the public. There is a dearth of communication about this threat to our archives. Dr. DeBakey emphasized that the purpose of the hearing is to heighten the awareness of this problem.

AFTERNOON SESSION

USING PERMANENT PAPER
Panel of Biomedical Journal Publishers and Editors.

Dr. Edward J. Huth, the panel moderator, noted that the question of why to preserve the literature of the past could itself be the subject of an entire symposium. There would be complex questions to address, such as what is the useful life of scientific information, how much of it may merit the attention of the future, and what may be the best compromises between intellectual convictions for preservation and economic constraints.

Dr. Huth suggested several options for preservation of the biomedical periodical literature for a publisher to consider, as background for the panel's discussion: publish all copies on acid-free paper; publish a limited, library edition on acid-free paper; publish a bound version some months after a volume is finished; hand-produce a limited number of archival sets on acid-free paper from high resolution microfiche or

from film which has been used to make the printing plates for the regular journal run, or create a temporary electronic record which could be held by the Library for later manipulation, pending a decision four or five years from now of what would be a good archival format.

Mrs. Bradley Hundley reported that all Rockefeller University Press journals have been published on acid-free paper for a long time. They are very short run, and some 85% of subscribers are libraries. She believed there was little or no cost premium in using alkaline sheet, and so very little impetus to use other than acid-free paper.

Dr. George Lundberg observed that the ten AMA scientific journals use more paper than anyone else in biomedical publishing. JAMA publishes 375,000 copies weekly in English and 250,000 copies, mostly monthly, in seven other languages. He was sure not all of them needed to last, but was not sure how many should. Because of postage costs, the weight of the paper matters immensely. Although the AMA strongly supports the preservation of high quality scientific information, the paper it uses is lightweight, cheap, and acidic. The Editorial Board considers the question of paper quality and will review it again in May. Noting the proliferation of scientific literature, Dr. Lundberg suggested that fewer, better publications lasting a long time were preferable to more publications lasting forever. He believed that change in the way paper is used must happen to some extent, with different answers to the problem for different publishers.

Mr. Norman Richey added that the AMA used over 11,000 tons of paper annually to produce 40 million copies of publications. Paper is the largest single publication cost item. Conversion to 45 lb. or 50 lb. paper from the 38 lb. paper used for JAMA would mean purchasing from 18% to 30% more paper in a higher price category. A library edition of JAMA was produced, incidentally on acid-free paper, in 1972, but was discontinued because of lack of demand. Mr. Richey noted that there were questions to be resolved about the need to retain advertising material in limited editions. (Dr. Huth observed in that connection that what is now seen as ephemera may be a valuable source for the medical historians of the future).

Dr. Arthur W. Hafner reported that the AMA purchased over 900 medical journal titles on microform because a large number of its valuable publications are becoming unserviceable. There is user resistance to microform. He was concerned that when the master negatives are not owned by an entity committed to their preservation, microform titles may cease to be available when they cease to be profitable to the microform publisher. The focus of the hearing on this critical problem is welcome.

Dr. Jeffrey Hillier reported that Elsevier Science Publishing Company has been using acid-free paper for more than 90% of

its publications for a number of years. Permanence has not originally been the primary criterion for the selection. Elsevier is now alerted to that question. Paper available from European manufacturers tends to be neutral, guaranteed for 80 to 100 years, rather than acid-free and lasting 300 years in the strict sense of the published specification. Much of the paper used by its New York organization is of a similar nature. Most of the paper used is in the 50 to 60 lb. range and coated, and therefor the current standards available for uncoated paper are not that helpful.

Elsevier offers its own microforms and provides more expensive bound library editions on neutral paper of its "Trends" newspaper-style series. Elsevier would not be interested in producing a limited number of archival copies, because that option is not effective for a publisher if the print run is small in the first place. Tape preservation is not viable because of limited tape reproduction capability. CD-ROM would be interesting were its permanence to improve: the experimental joint Adonis controlled document delivery project with other publishers in Europe may be expanded, if successful, to cover the bulk of biomedical literature.

Dr. Hillier suspected that many publishers were not aware of the nature and size of the problem, but that, with a better definition of the problem by libraries and more specific requests for solving it, the publishing community would have no difficulty in addressing it.

Mr. Heinz Sarkowski reported that of the 14 grades of paper Springer-Verlag uses in Europe, the pH of two is between 7.0 and 7.2. It is between 7.5 and 10.8 for the other 12. Suppliers guarantee product longevity of 80 years. For some papers, used for more quickly outdated publications, five percent groundwood content is allowed. Reproduction quality, availability, and price are the requirements for choosing paper, in that order. For a publisher with mostly small print runs, like Springer, fixed costs are high. Variable costs, which include paper, are proportionately lower. Special editions are not practical for short-run publications. A special price would have to be asked, and they would have to be identified as a separate publication. The philosophy of using permanent paper for high quality journals is also followed by the New York office.

Mr. Sarkowski noted that there are no German standards which publishers are obliged to observe, and that it was difficult to establish standards in the European Common Market because high standards established by one country could be viewed as discriminatory if another nation's industry could not meet them. Ms. Patricia Harris, Executive Director of the National Information Standards Organization (NISO), noted from the audience that the NISO standard for uncoated permanent paper will be on the agenda of the International Standards Organization (ISO) this Spring for consideration of fast-track

introduction.

Mr. Frederick Bowes, III, was concerned with a potential annual cost increase of half a million dollars were the New England Journal of Medicine to shift from 45 lb. coated groundwood to 50 lb. free sheet for its 180,000 copies domestic print run, with the dependence on one vendor, and that increases for the sake of permanence would not be received well by subscribers. He was interested in the option of limited editions as a public service and in the possibility of using the 50,000 - copy NEJM international edition, printed in England on 27 lb. uncoated sheet, for archival copies. The Journal could perhaps use acid-free paper on lower volume collections, reprints, and books. There is now no control over how advertisements which are supplied pre-printed are made. There is a question whether, even given the need to preserve the culture, all material needs to be saved in all forms when not doing so could provide more flexibility for preserving it. Fast emerging technologies may make electronic storage of images more attractive in a few years.

Mr. A. Jerome Freeland estimated that converting all copies of the some 3000 journals in the Index Medicus would represent a tremendous challenge and significant impact on paper cost, perhaps $100 million for the American journals included. It would therefore be important for libraries to quantify the need for special editions - is it for 20, 200, 2000 copies? -in order for the publishing community to come up with some viable options.

Dr. William C. Roberts believed education to be the big problem in the area of paper permanence. He has not heard it mentioned until 1986 and has not seen any of the major medical journals address it. He suspected that there would be a movement for permanence among their readers if they were aware of the fragility of their published work. Binding reprints when they are on better paper than the journal itself may be an option. Advertisements already tend to be on finer paper than the editorial content. In the computer age, the wishes of subscribers who would be willing to pay a higher price for permanent copies could be readily identified and honored. Big journals with their greater impact are going to have to provide the leadership in this area .

Mr. Stephen Prudhomme (unable to be present) wrote of the importance of paper as original material from an archival perspective. The practical consideration in selecting acid-free paper in Canada is its limited supply and range of specifications from domestic suppliers and limited availability from other countries because of currency fluctuations. Publishers use it for scholarly and art books, but not yet for journals. The government - funded National Research Council of Canada (NRC) would be encouraged to use a Canadian product. It would consider using it at a reasonable cost - Canadian librarians are reported to be willing to pay a premium

for permanence. Special editions for the NRC journals would not be economical because the press runs are small. The NRC Research Journals, as trend setters in standards for Canadian publishers, plan to include the topic for discussion at the next (1988) biannual workshop for scientific editors, hosted jointly with the NRC Advisory Board on Scientific Publications.

DISCUSSION

Dr. Michael Bowen, Director of the American Chemical Society Books and Journals Division, noted that no acid-free grades of paper comparable to the 38 lb. coated groundwood used in the Society's 21 journals were available several years ago when the Society last looked at the question, a situation which appears to continue to obtain. He observed that the discussion suggested the cost of using acid-free paper may not be large for a number of the many journals which have short print runs. Microform editions of the Society's journals actually contain material beyond that included in the printed version, and in that regard should represent a viable archival alternative.

Dr. Lindberg observed that microform documentation did not appeal to readers, and that printing on acid-free paper at the same or close to the same cost seemed desirable rather than thinking around an obvious problem. Mr. Bowes noted that the increasingly prevalent color material presentations may not be duplicated in microform. Dr. Huth reported on an earlier use of color microforms by the Journal of Wildlife Disease, but no information was available on the continuation of the practice or the permanence of the color image.

Dr. Huth calculated a 3% increase, or $180,000 in a six-million dollar annual budget, as the cost of converting the 100,000 print run of his journal to acid-free paper. Mr. Freeland of C. V. Mosby estimated the cost of converting 23 journals with 280,000 subscribers to 50 lb. acid-free paper as between $400,000 and $500,000. Mr. Richey identified a cost of $4 million, not including postage, for conversion of AMA scientific publications to 50 lb. acid-free sheet as a substantial amount for that option, without necessarily suggesting that it was large compared to the total AMA budget. Dr. Roberts and Mr. Bowes commented on what appeared to be a misplaced emphasis on the use of high-quality paper in many throw-away journals and pre-printed advertisements.

Dr. Hillier observed that in the hearing it emerged that of the two main groups of publishers, the short-run publishers who consider libraries a significant market and the publishers of mass circulation journals, the latter seem to have a problem with permanent paper, the former do not. In solving the problem gradually, it may be easier to start with the short-run publishers. Good public relations will be impor-

tant. Use of the infinity logo should be publicized. By letting scientists as well as publishers know what the concerns are, there should ultimately be acceptance of price increases that might be necessary in conversion to acid-free paper. A 10% increase spread over three or four years should not be found difficult to accept by a world which has experienced substantially higher inflation rates. Dr. Lindberg agreed that gradual progress in diminution of the problem would be gratifying. He was concerned that libraries receive publications they do not know are on acid-free paper on which preservation resources may be expended in the future when they would not have to be.

Mr. Bowes raised the option of producing archival copies by deacidification. Dr. Lindberg observed that of the options considered at the hearing, the technologies, costs, standards, and compliance testing were the least resolved for mass deacidification. Deacidification may be necessary for the existing collection, but it would not be satisfactory to plan on it as a general solution for the coming centuries.

Mr. Dunton and Mr. Hoffman clarified that 45 lb. gloss and 40 lb. matte finish were the lowest basis-weight grades of acid-free paper available. Those weights represent the limit of current free sheet technology, whether acid-free or acidic, in providing a core strong enough to support the required coating. Dr. Hillier and Mr. Sarkowski reported that although so-called museum grade paper quaranteed to last for over 300 years is available in Europe, it is scarce and very expensive, and the 80-year guarantee paper has therefore become more or less the standard. Mr. Hoffman observed that in his experience, many medical publishers are not aware of the problem and have not been asking for acid-free paper. Mr. Richey commented on the absence of information and concern about permanence on the part of papermaker representatives, on the other hand, and the need for their education.

WHAT TO DO NEXT

Dr. Huth concluded that comments expressed at the hearing made it evident that there is a conviction of a real problem to be solved but as yet no consensus on how to solve it. In trying to find a solution, the National Library of Medicine should organize a task force representative of all concerned parties, to consider the issues raised in the hearing and to develop an action plan for increasing the use of permanent paper in biomedical publications. Strategies would include identifying a set of principles for utilization of permanent paper, suggesting mechanisms for effective integration of the use of permanent paper into biomedical publications, proposing ways to educate biomedical publishers about the problem as well as to educate the paper and printing industry about biomedical publishers' requirements, and to identify need for and encourage development and application of permanent paper

standards in the U.S. and worldwide. A number of participants at the hearing have expressed their interest in the activities of such a task force.

CLOSING

The Board of Regents members present at the hearing, Dr. Albert E. Gunn, Mr. John K. Lopez, Ms. Nina W. Matheson, Dr. Grant V. Rodkey, and Ms. Karen Renninger reiterated the need to eliminate the problem of deterioration of biomedical literature at its source through cooperative action supported by all involved and knowledgeable parties. They identified need for more awareness of the problem and for continued research on accessible permanent record media, including efforts in development of lighter-weight acid-free coated paper. The status and objectives of electronic storage of document images may be the subject of a future hearing.