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The SPNHC Guidelines

Introduction

The SPNHC *Guidelines for the Care of Natural History Collections* were endorsed by the SPNHC Council in May 1994 and were published in *Collection Forum* 10(1): 32-40. They are reprinted, with permission, in full here.

The purpose of the SPNHC Guidelines is to advocate an institutional framework that advances professional standards of management and care of collections. The basis of the framework is **preventive** conservation and recognition of primary institutional responsibilities for use, management and care of specimens. The *raison d'être* for producing the Guidelines was the transformation of the management of collections given the high profile that museums enjoy, the frequency and diversity of collections use, and the sophistication of information technology and conservation research. SPNHC felt that it is vital to balance the wise use of collections with sound conservation practice and produced the Guidelines to help enable this. The Guidelines cover collections in the fields of anthropology, earth sciences and life sciences as well as associated library and archival materials.

Comparing the Guidelines with documents produced in the UK suggests they are probably akin to the MGC Registration documents and the Museums Association's *Codes of Practice*. The Guidelines, like these documents, are based on a broadly accepted philosophy of the responsibilities of caring for collections, both for the institution and the individual. This type of document is a compliment to the *Standards* documents produced by the MGC for Biological and Geological Collections (MGC, 1992 & 1993). The *Standards* represent a consensus of the current professional opinion of **best practice** and are practical documents with specific targets rather than policy statements. Both subject-specific documents (the Guidelines and the *Standards* documents) cover similar areas although some differences were noted. In particular the Guidelines do not have any mention of disposal policies (presumably an active decision) which are dealt with fully by all MGC documents. The SPNHC document does emphasize that the guidelines *must take into consideration the reality of large*

quantities of specimens. This consideration is hinted at but never really discussed in the *Standards* documents, and is a reality which natural history curators cannot ignore.

Jane Pickering

Museums & Galleries Commission (MGC) 1992.
Standards in the Museum Care of Biological Collections,
Museums & Galleries Commission, London, U.K. 55pp.

Museums & Galleries Commission (MGC) 1993.
Standard in the Museum Care of Geological Collections,
Museums & Galleries Commission, London, U.K. 57pp.

[Editors: If you have any comments please contact John Simmons E-mail jsimmons@KUHUB.CC.UKANS.EDU]

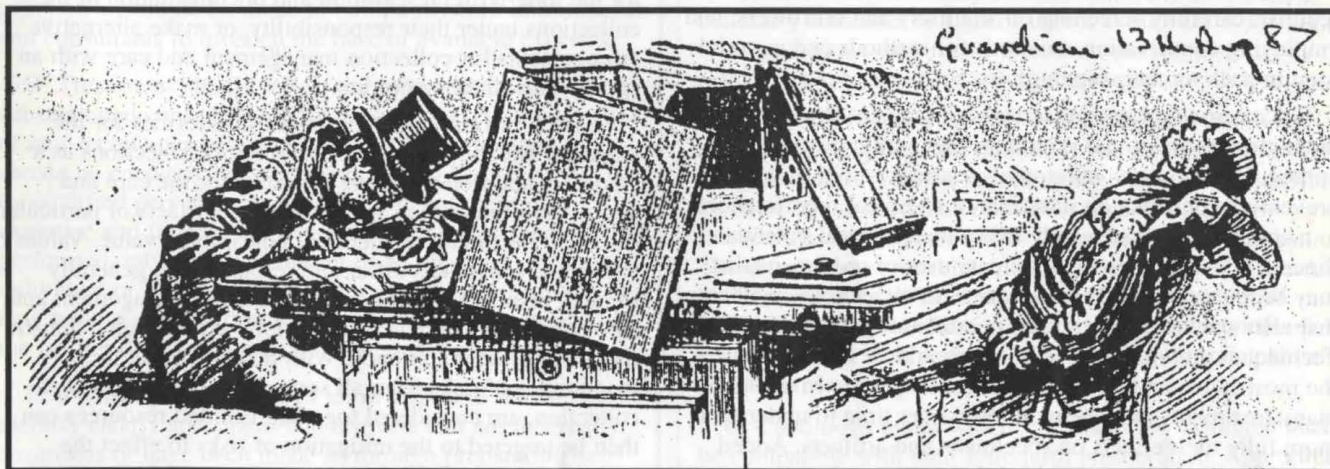
GUIDELINES FOR THE CARE OF NATURAL HISTORY COLLECTIONS

Society For The Preservation Of Natural History Collections (SPNHC)

I. Premise

A. Inherent value of specimens: Specimens in natural history collections are preserved to document presence in given localities at a given time, to validate past research, and to be available for research and other educational purposes. Specimens are collected as a sample of a region's natural and cultural environment (past and present), then are often prepared in some fashion so as to make them useful for research, exhibition, or educational purposes. Subsequent preparation, sampling, or destructive analysis may be necessary to fulfill the goals of research or legitimate educational uses. Research enhances the value of specimens.

B. Balance between use and preservation: Associated with the responsibility of ongoing research and educational use is the obligation of the institution to maximize the value of each specimen for future use. This applies not only to the data associated with each specimen, but also to the physical and chemical integrity of the specimen. Thus, it is critical that the demands placed on natural history specimens for current research and educational uses are balanced with the need for preservation of the specimens for future uses.



Victorian view: two ways of working at the museum. Mary Evans Picture Library

C. Caring for collections of specimens: Most natural history collections contain thousands, if not hundreds of thousands, of individual pieces that require care. An individual specimen may contain hundreds of related pieces. Thus guidelines for collection management and care must take into consideration the reality of large quantities of specimens and numerous pieces per specimen.

D. Inherent value of documentation and archival records: Evidence of the identification, condition, history, or scientific value of a specimen, artifact, or collection when recorded in a permanent manner enhances the value of the specimen. These records may actually have to substitute for the specimen or artifact should the specimens themselves deteriorate or be destroyed.

E. Context of the institutional mission and resources: An institution's program for managing and caring for collections exists within the context of the institution's mission and resources.

II. Objectives

A. Management and care of collections of natural history materials should be governed by respect for the scientific, historic, physical, cultural, and aesthetic integrity of the specimen or artifact and its associated data. Concern for its future should include protection against unnecessary damage, loss, or alteration that might affect its future research, educational, or exhibition potential.

B. Collection management and care should meet the highest professional standards; it must be compatible with and enhance access to collections for the intended scientific and educational uses of the specimens or artifacts.

C. All processes for collecting, preparing, and sampling, as well as the maintenance and curation of specimens or artifacts, should be analyzed relative to the goals of use and preservation to insure that techniques and materials are thoroughly documented, follow sound preservation practices, and fulfill the desired objectives for the specimen's intended use.

D. Every effort must be made to minimize the level of risk facing specimens and artifacts as a result of storage and use (e.g., by using appropriate storage units, providing adequate security, carefully screening on-site users and borrowers, and employing conservation standards for methods and materials used in packing and shipping).

E. Conservation and preservation treatment should meet the highest professional standards. Generally, the preferred approach for research specimens or artifacts will involve preventive conservation. Physical or chemical modifications to a specimen may adversely affect its analytical potential. Since it is not possible to anticipate uses of specimens that may become possible with advances in technology, methods that alter specimens as little as possible are preferred. Techniques and materials selected should be those that are the most stable and have the greatest longevity. In addition, many treatments must be monitored over time to understand more fully their effects on specimens and artifacts. Added materials should be removable whenever possible. Exceptions must be fully justified and documented.

F. Documentation should meet the highest professional standards and follow recommendations of relevant professional societies (e.g., Fitzgerald, 1988; Garrett, 1989). Media used for documentation should be preserved according to professional archival standards.

G. It is unethical to modify or to conceal the true nature of a specimen or artifact through restoration. The presence and extent of restoration should be detectable, although it need not be conspicuous. Methods and materials used must be fully documented.

H. Destructive sampling of specimens or artifacts must be justified by the quality and quantity of the information to be gained, evidence that the information is available only through the proposed sampling, and evidence that the investigator has the necessary expertise to extract that information. Procedures should be established to prevent unnecessary sampling. Sampling must be fully documented and approved in advance by individuals delegated with such authority (Cato, 1993).

III. Responsibilities for the institution

A. A museum has the ethical and legal responsibility to ensure that collections in its custody are protected, secure, unencumbered, cared for, and preserved" (American Association of Museums, 1992). Any institution holding collections of value to the scientific community has an obligation to endorse this code. To fulfill this responsibility, it is essential that institutions take steps to mitigate the use of scientifically unsound preparation and other treatment techniques, poor environmental conditions, and negligent handling in order to protect the physical and chemical integrity of specimens and artifacts for present and future needs. Guidelines for professional management and care should be applied not only to research collections, but also to education and exhibit collections. Institutions should implement systems that ensure preservation both of documentation and of specimens and artifacts.

B. Each institution should develop collections policies and procedures that provide a written framework for collection management, care, and use. It is essential that each institution also provide the resources (e.g., time, money, qualified personnel, appropriate space, and facilities) needed for the long-term preservation and documentation of the collections under their responsibility, or make alternative arrangements for collection management and care with an appropriate allied institution.

C. Each institution should establish priorities for the management and care of the institution's collections as a whole, in addition to setting priorities for the care and treatment of individual specimens and artifacts of particular research, historical, aesthetic, or educational value. Values of individual specimens differ and resources are generally limited, resulting in the need to prioritize management and care activities. This can be accomplished through a holistic risk management approach. With this approach, the magnitudes of risks from all sources, as they affect each collection, are considered together. Limited resources can then be targeted to the mitigation of risks to effect the greatest possible reduction in overall rate of damage to the institution's collections.

D. Collection care is an institutional responsibility that is shared by all staff. The governing authority retains the ultimate responsibility for collection care, but the director and staff must have sufficient authority and resources to implement appropriate measures. The assignment of direct individual authority and responsibility for various components of collection care is dependent on an institution's infrastructure, but these assignments must be clearly stated in the institution's collections policy and appropriate job descriptions. It is the institution's responsibility to provide sufficient resources to pursue actively continuing education opportunities for collection staff and adequate training for volunteers.

IV. Staff Responsibilities

A. Collection care is principally the responsibility of staff members (regardless of job titles) directly involved with specimens and artifacts: curators, collection managers, curatorial assistants, conservators, registrars, preparators, and technical assistants in these areas. Many collections care activities do not require professional conservators for implementation (Duckworth et al., 1993). Other departments (e.g., education and exhibit) are also responsible for the care of specimens and artifacts that are used for education or exhibition purposes. Preventive conservation is the responsibility of all staff including, for example, building and grounds, security, and those responsible for receptions and development functions.

B. Collection care personnel should have appropriate training to understand fully all aspects of collection work (e.g., legal, ethical, environmental conditions, management, security, health and safety), the limitations of their own expertise and authority, and the consequences of any decisions and/or actions they may take or recommend. Every effort must be made to consult with appropriate specialists to ensure that all aspects of management, preservation, and use are considered before authorization for actions is given.

C. There should be a cooperative dialogue among curators, collection managers, registrars, conservators, and collection users concerning all aspects of collection care. If only one individual is responsible for all collection care activities, every effort should be made to build a network of associates and consultants to broaden the base of available expertise.

D. Treatments should reflect the most recent, scientifically substantiated conservation information, and the development of new techniques based on sound scientific methodology should be encouraged. Treatments should be undertaken only by qualified personnel, within the limits of their area of expertise and facilities. Interventive treatments should be performed only with the consent of an objective, informed individual or individuals so authorized by the institution, and may require consultation with conservation experts outside the institution. Conflicts of interest must be avoided.

E. It is the responsibility of knowledgeable staff to identify clearly specimens and artifacts that are inherently hazardous or have been made so through preparation or fumigation practices. Staff should implement appropriate safety precautions.

F. Documentation is the responsibility of all individuals who use, prepare, manage, or care for specimens or artifacts. All techniques and materials used in collection management, care, and conservation must be fully documented. Training to develop expertise in the development and management of documentation and archival records promotes a better collection management and care system.

G. Curation is the responsibility of individuals with sufficient disciplinary expertise and knowledge of recent scientific literature to provide reliable identifications and information.

H. Collection management is the responsibility of individuals trained in museum philosophy, theory and practices, including those processes defined within these guidelines: collection, preparation, sampling, preventive conservation, maintenance, and documentation. Responsible staff should have training in a relevant disciplinary specialty but are not necessarily taxonomic or subject specialists. Training to develop expertise in the management of personnel, facilities, records and information systems promotes better collection management.

I. Conservation is the responsibility of trained conservators. Conservation and preservation personnel should have appropriate training and experience to undertake conservation and preservation procedures. Conservators should meet professional training requirements and should adhere to professional ethics and guidelines such as those defined by International Institute for Conservation-Canadian Group and Canadian Association of Professional Conservators (1989) and American Institute for Conservation (1993, draft).

J. All collection staff should keep abreast of the most recent literature and upgrade their skills in their areas of responsibility according to the highest professional standards for collection management and care.

V. Use of collections

A. Use of collections should be carried out in ways that are compatible with preservation objectives and concerns held by indigenous peoples, whenever possible. Certain specimens or artifacts may be considered too rare, fragile, culturally sensitive, or significant for exhibition or loan (e.g., type specimens, specimens of extinct species, historically significant specimens, or specimens in poor condition).

B. Research objectives may necessitate intervention or destructive sampling, but this should be allowed only when the potential for gaining knowledge by such means justifies sacrifice of the specimen or artifact, and when the knowledge will be shared with the scientific community. These procedures must be undertaken in a controlled manner with approval by an authorized, qualified individual or individuals. Original data, documentation, and records of specimens that have undergone destructive sampling should also be preserved.

C. Conditions under which specimens are exhibited must be compatible with their long-term preservation. Appropriate collection care staff must be active members of exhibit planning and production teams.

D. Educational programming that uses specimens and artifacts should convey to the general public the need for managing and caring for the items according to professional standards.

E. Some specimens and artifacts in natural history collections are inherently toxic or have been made hazardous through preparation or fumigation techniques. Specimens and artifacts should be used in a manner that protects the health and safety of staff, researchers, volunteers, and visitors.

VI. Definitions

A. Accessioning - formal process used to accept legally and to record a specimen or artifact as a collection item (Malaro, 1979); involves the creation of an immediate, brief and permanent record utilizing a control number or unique identifier for objects added to the collection from the same source at the same time, and for which the institution accepts custody, right, or title.

B. Archives - non-current records of an organization or institution preserved because of their continuing value.

C. Artifact (human) - a human-made item, often manufactured or created from naturally-occurring materials and made for use in a cultural context.

D. Cataloging - creation of a full record of information about a specimen or artifact, cross-referenced to other records and files; includes the process of identifying and documenting these objects in detail.

E. Collecting - the process of sampling the natural and cultural world using a variety of techniques that are dependent on (1) the organism or material being obtained and (2) the intended use for the sample or the research methods likely to be applied.

F. Collection - (1) a group of specimens or artifacts with like characteristics or a common base of association (e.g., geographic, donor, cultural); (2) an organizational unit within a larger institutional structure (e.g., a collection within a university biology department).

G. Collection Care - the responsibility and function of an institution with collections that involves developing and implementing policies and procedures to protect the long-term integrity of specimens and artifacts, as well as their associated data and documentation, for use in research, education and exhibits.

H. Collection Management - the responsibility and function of an institution that fosters the preservation,

accessibility, and utility of their collections and associated data. The management process involves responsibilities for recommending and implementing policy with respect to: specimen acquisition, collection growth, and deaccessioning; planning and establishing collection priorities; obtaining, allocating, and managing resources; and coordinating collection processes with the needs of curation, preservation, and specimen use. These responsibilities may be shared by collection managers, subject specialists, curators, and other institutional administrators.

I. Conservation - the application of science to the examination and treatment of museum objects and to the study of the environments in which they are placed (Duckworth et al. 1993). This involves activities such as preventive conservation, examination, documentation, treatment, research, and education (American Institute for Conservation, 1993 draft).

J. Curation - the process whereby specimens or artifacts are identified and organized according to discipline-specific recommendations using the most recently available scientific literature and expertise; a primary objective of this process is to verify or add to the existing documentation for these objects, and to add to knowledge.

K. Deaccession - the formal process used to remove a specimen permanently from the collection, with appropriate transfer of title (Malaro, 1979).

L. Deterioration - change in an object's physical or chemical state. "Damage, on the other hand, is the consequent loss of attributes or value: aesthetic, scientific, historic, symbolic, monetary, etc." (Michalski, 1992).

M. Documentation - supporting evidence, recorded in a permanent manner using a variety of media (paper, photographic, etc.), of the identification, condition, history, or scientific value of a specimen, artifact, or collection. This encompasses information that is inherent to the individual specimen and its associations in its natural environment as well as that which reflects processes and transactions affecting the specimen (e.g., accessioning, cataloging, loaning, sampling, analysis, treatment, etc.). Documentation is an integral aspect of the use, management, and preservation of a specimen, artifact, or collection.

N. Maintenance - routine actions that support the goals of preservation of and access to the collection such as monitoring, general housekeeping, providing appropriate storage and exhibition conditions, and organizing a collection.

O. Object - a material, tangible item of any kind; an inclusive, non-specific term for specimen, artifact, etc.

P. Preparation - the procedures used in the field or in the institution to enhance the utility of an organism, object, or inorganic material for a specified use. The resulting specimen may represent only a portion of the original organism or material or may be otherwise altered from its original state. Procedures should be compatible with intended uses and conservation objectives, and should be documented.

Q. Preservation - those aspects of conservation that involve preventive measures, such as maintenance procedures and correcting adverse environmental conditions;

HELP WANTED!

MA Conference 1997

As soon as the main Conference theme is known put your thinking caps on and come up with topics for the BCG contribution.

Any ideas welcome and the sooner the better to allow the committee to organise something special for 1997.

Suggestions to Steve Thompson please.

in natural science conservation, preservation also includes treatments carried out initially to prepare specimens.

R. Preventive conservation - actions taken to minimize or slow the rate of deterioration and to prevent damage to collections; includes activities such as risk assessment, development and implementation of guidelines for continuing use and care, appropriate environmental conditions for storage and exhibition, and proper procedures for handling, packing, transport and use. These responsibilities may be shared by collection managers, conservators, subject specialists, curators, and other institutional administrators.

S. Registration - (1) the process of assigning an immediate and permanent means of identifying a specimen or artifact for which the institution has permanently or temporarily assumed responsibility; one facet of documentation; (2) as an institutional function, includes the logical organization of documentation and maintaining access to that information.

T. Repository - a collection administered by a non-profit public or private institution, that adheres to professional standards for collection management and care (e.g., Alberta Museums Association, 1990; Lee et al., 1982; American Society of Mammalogists, 1974) to ensure that specimens acquired will be professionally maintained and remain accessible for future use.

U. Sampling - selecting a portion as a representative of the whole; in natural science collections, sampling refers more specifically to the process of removing a portion of a specimen or artifact for analysis. The analysis may be destructive to the sample.

V. Specimen - an organism, part of an organism, or naturally-occurring material that has been collected, that may or may not have undergone some preparation treatment. It may exist in its original state, in an altered form, or some combination of the two. A specimen may be comprised of one element or many related pieces. It may be composed of one physical or chemical component or represent a composite of materials.

W. Stabilization - treatment of an object or its environment in a manner intended to reduce the probability or rate of deterioration and probability of damage.

X. Treatment - actions taken, physically or chemically, to stabilize or make accessible a specimen or artifact; includes, for example, techniques such as preparation, cleaning, mending, supporting, pest eradication, and consolidation.

Y. Voucher - a specimen and its associated data that physically document the existence of that organism or object at a given place and time. This definition is more broadly based than that put forth by Lee et al. (1982) in recognition of the potential for specimens held in a collection for use as substantiating evidence.

BIBLIOGRAPHY AND REFERENCES CITED

American Institute for Conservation of Historic and Artistic Works Committee on Ethics and Standards. 1985. Code of Ethics and Standards of Practice. American Institute for Conservation and Historic and Artistic Works, Washington, D.C., 7 pp.

- . 1993. Code of Ethics and Guidelines for Practice (draft). American Institute for Conservation and Historic and Artistic Works, Washington, D.C., 4 pp.
- . 1991, 1992. Ethics and Standards Committee Supplements, 1-5. AIC Newsletter [supplements that provide background and discussion relative to revision of AIC Code of Ethics; Sept., 1991; Nov., 1991; Jan., 1992; March, 1992; May, 1992].
- Alberta Museums Association. 1990. Standard Practices Handbook for Museums. Alberta Museums Association, Edmonton, 333 pp.
- American Association of Museums. 1992. Code of Ethics. American Association of Museums, Washington, D.C., 4 pp.
- American Association of Museums Curators Committee. 1983. Code of ethics for curators. Museum News, 61:38-40.
- American Association of Museums Registrars Committee. 1985. Code of ethics for registrars. Museum News, 63:42-46.
- American Society of Mammalogists. 1974. Revised minimal standards for systematic collections of mammals. Journal of Mammalogy, 59:911-914.
- Brunton, C. H. C., T. P. Besterman and J. A. Cooper. 1985. Guidelines for the Curation of Geological Materials. Misc. Paper No.17, Geological Society, London.
- Burcaw, G. E. 1983. Introduction to Museum Work. American Association for State and Local History, Nashville, 202 pp.
- Case, M. (ed.). 1988. Registrars on Record. American Association of Museums, Washington, D.C. 257 pp.
- Cato, P.S. 1993. Institution-wide policies for sampling. Collection Forum, 9(1): 27-39.
- Duckworth, W. D., H. H. Genoways, and C. L. Rose. 1993. Preserving Natural Science Collections: Chronicle of Our Environmental Heritage. National Institute for the Conservation of Cultural Property, Washington, D.C., 140 pp.
- Dudley, D. H., I. B. Wilkinson and others. 1979. Museum Registration Methods (third edition revised). American Association of Museums, Washington, D.C. 437 pp.
- Fitzgerald, G. R. 1988. Documentation guidelines for the preparation and conservation of paleontological and geological specimens. Collection Forum, 4:38-45.
- Garrett, K. L. 1989. Documentation guidelines for the preparation and conservation of biological specimens. Collection Forum, 5:47-51.
- International Council of Museums. 1990. Code of Professional Ethics. International Council of Museums, Paris, 35 pp.
- International Institute for Conservation - Canadian Group and Canadian Association of Professional Conservators. 1989. Code of Ethics and Guidance for Practice for Those Involved in the Conservation of Cultural Property in Canada (second edition). International Institute for Conservation - Canadian Group and Canadian Association of Professional Conservators, Ottawa, 20 pp.
- Lee, W. L., B. M. Bell, and J. F. Sutton (eds.). 1982. Guidelines for Acquisition and Management of Biological Specimens. Association of Systematics Collections, Lawrence, 42 pp.

- Malaro, M. C. 1979. Collections management policies. *Museum News*, 58(2):57-61.
- Michalski, S. 1992. A Systematic Approach to the Conservation (Care) of Museum Collections. Canadian Conservation Institute, Ottawa, 15 pp.
- Museums & Galleries Commission. 1992. Standards in the Museum Care of Archeological Collections. Museums & Galleries Commission, London, 59 pp.
- . 1992. Standards in the Museum Care of Biological Collections. Museums & Galleries Commission, London, 55 pp.
- . 1992. Standards in the Museum Care of Geological Collections (draft). Museums & Galleries Commission, London.

ACKNOWLEDGEMENTS

These guidelines were endorsed by the SPNHC Council, May 15, 1994, and reflect the result of input by numerous professionals over a three year period. It has been particularly gratifying that the review and comments have involved individuals from all of the professions associated with the use and care of natural history collections: collection managers, curators, conservators, administrators, research scientists, registrars, archivists, etc. This document is meant to serve as a tool for institutions and their staffs to continue to elevate the standards of managing and caring for natural history collections.

Thanks are extended to everyone who has read and commented on any of the numerous versions that led to the development of this product. The efforts of the following individuals are especially appreciated: B. Webb (Co-Chair), D. Duckworth, G. Fitzgerald, C. Hawks, J. Klein, C. Leckie, B. Moore, C. Patterson, C. Rose, J. Simmons, R. Waller, and S. Williams. Funding for reproduction and mailing of drafts for comments was provided by the Virginia Museum of Natural History. — Paisley S. Cato, Co-Chair, Sessional Committee on Common Philosophies and Objectives.

Paper, Glue and Print, a one-day conference at the Natural History Museum, London, 31st October, 1995

About 80 delegates gathered for this meeting at the Natural History Museum in South Kensington including 44 NHM staff and 14 from the Victoria and Albert Museum. The day was sponsored by Arjo-Wiggins, represented by Simon Stanyer, and was organised by Jenny Moore and Janet Margerison Knight. The morning session, chaired by Robert Huxley, comprised four talks.

The first speaker was Annemarie Wierda who is a freelance botany and paper conservator based in the Netherlands. She illustrated, with slides, the results of artificial ageing tests carried out on papers and glues with specific reference to PVA for adhering plant material. The accelerated ageing consisted of a twelve day exposure at 90°C and 50% relative humidity and was carried out at the Royal Library at the Hague. Twenty three papers and tapes were tested including many used at the NHM. Most papers survived well with slight browning in BM boards 3 and

HELP WANTED!

Specialist meetings wanted!

BCG wishes to maintain a programme of small meetings on quite specialised subjects. If anyone can offer such a meeting, please contact Steve Thompson with details. These could be based around a new storage system or a special sort of collection. It may only attract ten or twenty members, but should enable knowledge to be disseminated. If non-BCG meetings are being organised, the Editors will be happy to publicise them through *The Biology Curator*.

Mesdiox labels showing brown spots. Deterioration occurred with plastic envelopes probably due to the high temperature of the test. There was some variation between the "same" materials from different suppliers. Eighteen glues and three hotmelt glues were also tested using her own childhood herbarium specimens as test samples. Browning occurred with latexes, dextrin MC and cellulose Gripfix or carbohydrate glues both when used as an adhesive and on the surfaces of linen tapes. Latexes, seccotine and Cow Gum remained sticky long after application and so were not considered suitable for plant preservation. The Polyvinyl family of glues; PV Acetate, PV Alcohol and PV Acrylate, all performed equally well and were considered the best, although too liquid or too thick a mixture caused difficulties in application. Annemarie recommended that the pH of a glue or paper should always be neutral.

The effect of deep-freezing on herbarium specimens and old glues was also studied. She concluded that this can be used as a treatment against insect and fungal attack so long as the bound volumes or sheets are sealed within polyethylene bags to avoid further desiccation although condensation might be a problem. Also, freezing should be rapid to avoid expansion and contraction tearing.

She concluded by describing and discussing the conservation measures which she applied to the Boerhaave Herbarium volume at the Rijks Herbarium, Leiden. After initial photography, she used a minimalist approach by collecting loose fragments into small acid-free envelopes and dry-cleaning soot and dust deposits with gum powder, Wishab sponge and Staedler eraser. Holes and gaps were repaired with "Japanese paper" which was also used as flaps over delicate specimens. Loose plants were reattached with Japanese paper strips and Methylcellulose in 10% solution which was considered to cause minimal damp cockling of the paper.

Brian Pitkin of the NHM talked next of "From Keyboard to Specimen — labelling insects using computers" and covers much of what has been published in his paper in *The Biology Curator* 4: 24-27 (1995). Many curators now use computers to register and database specimens, and labels can be generated at the same time for the specimens. Brian described his multi-user registration and labelling programme for the Entomology Department (NHM) in Paradox for DOS.