

THE CONTRIBUTION OF UNIVERSITY EDUCATION TO PRESERVATION OF ARCHIVES AND LIBRARY MATERIALS

Jozef HANUS*, Emília HANUSOVÁ#, Svetozár KATUŠČÁK^Δ, Vladimír BUKOVSKÝ[◦]

HANUS, Jozef – HANUSOVÁ, Emília – KATUŠČÁK, Svetozár – BUKOVSKÝ, Vladimír, THE CONTRIBUTION OF UNIVERSITY EDUCATION TO PRESERVATION OF ARCHIVES AND LIBRARY MATERIALS. *Atlanti*, Vol. 15, No. 1-2/2005, Trieste 2005.

Original in English, abstract in English, summary in English.

Specialized studies of archival science and auxiliary historical sciences have been running at the Comenius University in Bratislava for 55 years. Since 1989 also the course "Preservation of Archives" has become a part of regular compulsory education. Very close cooperation between the Slovak National Archives and Faculty of Chemical and Food Technology of the Slovak Technical University in Bratislava also brings many bachelor and master degree works aimed in preservation of archives and participation in the common projects in this field.

Descriptors (ATLANTI)

Environmental problems, general (2.2.1.), site, general (2.4.1.), type of building and construction, general (2.5.1.), storage, general (3.1.1.), conservation (3.2.4.), user facilities, general (3.3.1.), storage equipment and other furniture, general (3.5.1.)

Archives and libraries all over the world contain a rich and irreplaceable source of information. They also represent a unique part of the cultural heritage of human society. The preservation and management of those precious resources and making them accessible for public are the main responsibilities and tasks of all these institutions. In order to fulfil successfully this mission, well-educated and experienced experts from different fields of science are needed; however, most of all archivists/librarians and paper chemists and conservators/restorers.

Specialised study of archival science and auxiliary historical sciences has been running at the Faculty of Philosophy of the Comenius University in Bratislava within the

* *Dipl. Ing. Jozef Hanus, PhD., Slovak National Archives, Drotárska cesta 42, 817 01 Bratislava, Slovak Republic, hanus.jozef@sna.vs.sk.*

Dipl. Ing. Emília Hanusová, University Library Bratislava, Slovak Republic.

^Δ *Assoc. Prof., Dipl. Ing. Svetozár Katuščák, PhD., Faculty of Chemical and Food Technology, Slovak University of Technology, Bratislava, Slovak Republic.*

[◦] *Dipl. Ing. Vladimír Bukovský, PhD., Slovak National Library, Martin, Slovak Republic.*

framework of the Department of Czechoslovak History, Slovak History and Archival Science since 1950; since January 1, 2000 at the self-reliant Department of Archival Science and Auxiliary Historical Sciences¹.

The first level – bachelor degree in archival science – full-time study course lasts four years and ends after completing the 8th semester by the state bachelor exams (bachelor diploma work and oral examination).

The second level – master degree in archival science – full-time study course lasts one year (after bachelor degree) and ends after completing the 2nd semester by the state master exams (master diploma work and oral examination).

The third level – doctor degree in auxiliary historical sciences – full-time study course lasts three year (external part-time study five years) and ends by submitting the doctor thesis and dissertation exam².

Since 1989 also the course “Preservation of Archives” has become a part of regular compulsory education at this Department. It is a one semester course (two hours of lectures per week) carried out during the fourth year (8th semester) of the studies. The structure of the course is as follows:

1. INTRODUCTION to problems and significance of archives preservation.
2. Legal provisions, preservation of archives in the new Slovak archival legislation, international standards in the field.
3. Types of archival documents from material point of view and their preservation
 - 3.1. Papyrus, parchment, paper – production, properties, ageing resistance, influence on lifetime of archival documents;
 - 3.1.1. Hand-made and machine-made paper; production, the main difference in properties, problems of acidity and degradation of acidic paper;
 - 3.1.2. Permanent and durable paper – standards, properties and use;
 - 3.2. Writing materials – different types of inks, their production and properties; iron-gall inks, problems of their degradation influence on writing support;
 - 3.3. Photographic and film documents;
 - 3.4. Audio-visual documents
 - 3.4.1. Magnetic media
 - 3.4.2. Optical media
 - 3.5. Electronic records
4. The main causes of damage of archival documents
 - 4.1. External and internal degradation factors – their identification and impact on archives;

¹ SOKOLOVSKÝ, L. ed.: Universitas Comeniana, Historica XLV, Pamätnica k 50. výročiu študijného odboru archívniectvo a pomocné vedy historické FiF UK v Bratislave. Univerzita Komenského Bratislava 2002.

² Študijný program Archívniectvo a pomocné vedy historické. Katedra archívniectva a pomocných vied historických, Filozofická fakulta Univerzity Komenského, Bratislava 2005.

- 4.2. Biological degradation factors – micro-organisms, moulds, insects, rodents and their influence on archives; prevention and methods of preservation;
 - 4.3. Physical degradation factors – light, heat, humidity, dust, other impurities; definitions and explanation of harmful influence on archives; measurements of light, temperature, relative humidity – equipments; cumulative influence of light; types of lighting sources; protection against their influence, preservation and optimal storage conditions for different types of archival documents;
 - 4.4. Chemical degradation factors – influence of materials from which documents are made from (support, inks); influence of polluted environment and prevention against its harmful effect; metal clips on paper and their corrosive effect;
 - 4.5. Unsuitable human activities –archivists, users; protection against burglary and thievery
5. Risk analysis, disasters
 - 5.1. Fire – fire detection systems, fire protection systems;
 - 5.2. Water – leaking, floods; protection precautions;
 - 5.3. Disaster preparedness and recovery planning; the role of archivist in the situation; coordination of rescue activities;
 - 5.4. Blue Shield – role and activities.
 6. Principles of preventive protection of archives
 - 6.1. Archival buildings and premises as basic condition for preservation of archives
 - 6.1.1. Principles for building new archives purpose buildings – importance of preservation point of view; safe workflow of archival documents;
 - 6.1.2. Principles of reconstruction of buildings for archival purposes.
 - 6.2. Proper storage conditions
 - 6.2.1. Temperature, relative humidity, dust, chemical pollutants – keeping within optimal range; heating, humidification, dehumidification – methods and equipment.
 - 6.3. Storage of archival documents
 - 6.3.1. Types of shelving – fixed shelves and mobile/compact shelves, requirements, loading;
 - 6.3.2. Archival boxes, folders, envelopes, book cases – archival quality, requirements for alkaline cardboard, horizontal and vertical storage of archival documents;
 - 6.3.3. Storage conditions and requirements for modern documents – audio-visual documents, magnetic media, optical discs.
 - 6.4. Handling of archives
 - 6.4.1. Possible mishandling by archivists and users;
 - 6.4.2. Exhibition of archival documents – requirements for cases, lighting levels, permissible level of ultraviolet content of illumination; administrative precautions, owner/lender – borrower agreement; insurance conditions.
 - 6.5. Reprography of archival documents

- 6.5.1. Microfilm, microfiche – preparation of archival documents for microfilming, safety / conservation and study copies; requirement for safety micrographic media;
 - 6.5.2. Lifetime of microfilms, specificity of storage conditions;
 - 6.5.3. Advantages and drawbacks of microfilm;
 - 6.5.4. Reproduction of archival documents for users (Xerox copies); possible danger of damage – mishandling, repeated lighting of the same documents, etc.
 - 6.5.5. Digitization of archival documents – principles of digitization, advantages in communication and information dissemination; drawbacks.
7. Preservation/conservation and restoration of archival documents
 - 7.1. General principles;
 - 7.2. Dry and wet cleaning, simple treatments and repairs;
 - 7.3. Basic principles for preservation/conservation of single paper sheet documents, books and parchment charters;
 - 7.4. Some conservation and restoration methods – leaf casting, lamination
 - 7.5. Mass treatment methods for conservation of acidic paper archival documents – deacidification and strengthening – improvement of mechanical properties of paper.
 8. International organizations - ICA, IFLA, ICOM-CC - their structure and role in preservation of archives and library materials.
 9. Research activities in the field of preservation and European projects connected with the problems of degradation and preservation of archives and library materials.

From the above mentioned syllabus and the study programme it can be seen that during their study course the students of the Department of Archival Science and Auxiliary Historical Sciences at the Faculty of Philosophy, Comenius University in Bratislava are very well acquainted with basic principles of preservation of archives and library materials. Of course, the study is not intended for professional restorers or chemists working in the conservation laboratories and workshops and it is not deeply focused on chemistry and physics covering this field interdisciplinary science. However, for archivists and librarians provides an excellent background in this field and awareness that preservation of archives and library materials belongs to the main tasks of these cultural institution in order to preserve our cultural heritage. The principal tasks of archives and libraries – as keepers of irreplaceable source of cultural and information values - is to make accessible these materials for users and also to preserve this heritage for future generations.

As paper is a principal information carrier and its degradation can cause the loss of “memory of mankind” only an integrated effort of paper education, research, science, conservation and paper industry will be able to preserve this cultural heritage³.

³ HANUS, J.: *Integration of paper education, research and industry for cultural heritage preservation*. In: WPP Chemical Technology of Wood, Pulp and Paper. Editors: Baudin, G., Fellegi, J., Gellerstedt,

The biggest problems in archives and libraries are caused – paradoxically – by modern papers produced from the 2nd half of the 19th up to the recent years. The new technology of paper-making introduced in 1850, involved paper formation in an acidic environment. This was a crucial milestone from the point of permanence and durability of paper, its degradation and preservation in archives and libraries. It is a self-degradation effect of acidic paper; “time bomb”, as it is often called the limited lifetime of machine-made paper with acidic rosin sizing with addition of alum has been threatening the great part of the cultural paper heritage. The present state of knowledge confirms that paper degradation in the course of its ageing is the result of hydrolysis (acidic, alkaline) and oxidation of cellulose by internal agents presented in paper in close co-influence of contaminated atmosphere, humidity and light on one hand and cross-linking and fibres embrittlement on the other hand. Thermal, biological and mechanical destruction can occur as well. In most cases, however, a combination of all above mentioned effects causes degradation of cellulose macromolecule, hemicelluloses and lignin which result in decrease of fibres strength, mechanical properties, creation of brittleness, fragility and colour changes (yellowing, darkening) of paper.

Problem holders

47 state archives in the Slovak Republic keep altogether 22 345 archival fonds and collections representing total scope of 157700 running meters of material. In archives custody there are 44236 middle-age charters dating back before year 1526, 945269 office books, about 138000 maps, plans and drawings; documents are stored in more than 1 million covers and boxes, etc.⁴. It is estimated that about 80-85% of total holdings are documents created on paper from the period 1850 – 1970, i.e. on acidic paper with very low ageing resistance and thus potentially liable to self-degradation processes⁵.

Situation in Slovak libraries can be illustrated on an example of the Slovak National Library in Martin. The total number of book volumes until year 1900 is 1.2 million, of which 684 000 are on acidic paper. Of 900000 volumes produced on hand-made paper 470 000 ones are acidic – 117 500 volumes of them are in acute jeopardy. 300 000 volumes are produced on wooden paper; 214 000 volumes are on acidic paper – 107 000 volumes are in acute jeopardy. Much worse is situation concerning books after year 1900. The Slovak National Library keeps 2.4 millions of book titles of which 228 0000 are made of acidic paper. 1 140 000 book volumes are in acute jeopardy.⁶ In other Slovak libraries - scientific, public, special and academic - is kept about 43.6 millions of library units. On the basis of statistical data it can be stated that the situa-

G., Katuscak, S., Pikulik, I., Paris, J.: Proceedings of the International Conference, September 17 - 19, 2003, Bratislava, p. 91-95.

⁴ Informatívny sprievodca štátnych archívov Slovenskej republiky I. Ministerstvo vnútra SR, OA SS, Bratislava (2000).

⁵ HANUS, J., MINÁRIKOVÁ, J., HANUSOVÁ, E.: *Deacidification without equipment and money - dream or reality?* ICOM-CC 13th Triennial Meeting, Rio de Janeiro 22 - 28 September 2002, Preprints (Volume II), ed. Roy Vontobel, James & James London, p. 603 - 608.

⁶ BUKOVSKÝ, V.: *Nevyhnutnosť masovej deacidifikácie papiera vo fondoch knižníc a archívov*, Buničina a papier – technológie, vlastnosti, životné prostredie. Zborník z medzinárodnej konferencie. Bratislava (2001) p. 183 - 188.

tion in these libraries is even worse because most of their collections are books, journals, newspaper and other units produced after 1850 and 1900 on wooden and acidic paper. It means that the distribution of library units compared to the Slovak National Library is shifted more to the period of "acidic paper production".

From this brief review it is obvious that the situation in cultural heritage preservation – of which archives and libraries represent very significant and irreplaceable part – is really very grave. It has to bear in mind that preservation of such heritage requires also considerable financial costs.

On the other hand it must be realised that preservation of enormous quantity of acidic papers and preservation of cultural heritage in general can be solved only by thorough research as an interdisciplinary complex problem in which the role of chemists, physicists, paper scientists and their co-operation with experts from other fields of science and technology and practical end-users, conservators and restorers, supported by adequate financial background is an inevitable and the only solution. Thus one of the most important factors in preservation of cultural heritage in archives and libraries all over the world is integrated effort and activities of paper education, research, science and conservation. University education can and must significantly contribute to successful solution of this world-wide problem.

The International Conference of Chemical Technology of Wood, Pulp and Paper, which was held in 2003 in Bratislava – commemorated 60th anniversary of the beginning of education and preparation of specialists for wood processing and pulp and paper production in Slovakia. Since 1943 - when the Institute of Chemical Technology of Wood was created by its founder Prof. Ing. František Kozmál, DrSc., within the framework of the Slovak Technical University⁷ - rich activities in education, research and publication field can be followed until nowadays.^{8, 9, 10}

The Department of Chemical Technology of Wood, Pulp and Paper covers in its educational background also problems of paper ageing and preservation. Research activities in paper permanence and durability started at the Department already in 1980.^{11 12} During the last years several diploma works - completed at this Department

⁷ MOZOLEOVÁ, L., "História Katedry chemickej technológie dreva, celulózy a papiera ChtF STU v Bratislave", *Chemická technológia dreva, celulózy a papiera. Zborník z konferencie*. Bratislava (1998) p. 11.

⁸ KOZMÁL, F., "Dvadsať rokov rozvoja vedy a výskumu na Katedre chemickej technológie dreva a chemických vlákien", *In: Zborník prác Chemickej fakulty, SVŠT*. Bratislava (1963), s. 121-133.

⁹ LUŽÁKOVÁ, V., ŠUTÝ, L., KOŠÍK, M., KRKOŠKA, P., "Hlavné smery vedecko-výskumnej činnosti Katedry chemickej technológie dreva, celulózy a papiera v rokoch 1988-1993, *In: Zborník prednášok odborného seminára Environmentálne programy v chemickej technológii dreva, celulózy a papiera*. Bratislava 1993, p.3-28.

¹⁰ KRKOŠKA, P., ŠUTÝ, L., ŠURINA, I., LUŽÁKOVÁ, V., "Prehľad vedeckovýskumnej činnosti Katedry chemickej technológie dreva, celulózy a papiera za roky 1993-1998, *Chemická technológia dreva, celulózy a papiera. Zborník z konferencie*. Bratislava (1998) p. 13-29.

¹¹ KRKOŠKA, P., VIZÁROVÁ, K., "Stálosť a trvanlivosť niektorých buničín a papierov," *Buničina a papier – technológia, vlastnosti, životné prostredie. Zborník z medzinárodnej konferencie*. Bratislava (2001) p. 171-178.

and also at the Department of Graphic Arts and Applied Photochemistry - are devoted to problems of preservation of cultural heritage – permanence and ageing behaviour of some pulps and papers, deacidification of acidic paper, interaction of paper and printing inks, their permanence and ageing resistance, etc. At present also several doctor degree students have focused their studies to problems of paper degradation, deacidification and strengthening of acidic paper documents. All these activities are results of good co-operation among the Faculty of Food and Chemical Technology, the Slovak National Archives, the Slovak National Library, University Library, Polymer Institute of the Slovak Academy of Science and some other institutes and organisations.

The systematic effort started already in 1989¹³ and later on of the organizations namely the Slovak National Archives and the Slovak National Library for preservation of archives and library paper cultural heritage together with activities of the Department of Chemical Technology of Wood, Pulp and Paper, STU Bratislava and the Slovak Academy of Science resulted in the national programme and one particular project “Program of preservation, stabilisation and conservation of classical information carriers in the Slovak Republic – KNIHA SK”^{14 15}.

The basic aims of the project can be summarized as follows:

- increasing quality of university and continuing education of professionals for the field, including engagement of graduate and postgraduate students of chemical technology into projects on stabilisation of LC carriers of information;
- concentration of the scientific capacity in the field of technology of preservation, stabilization and conservation of ligno-cellulosic (LC) macromolecular materials in the Slovak Republic;
- creation of specialised shared national virtual library and inter-active shared knowledge space on the problems of preservation of LC materials of the Slovak Republic for all project participants;
- improvement and verification of method for qualitative classification of endangered library & archives materials according to historical and technological criteria from the point of searching the possibilities for increasing of capacity and decreasing of risks during their machinery treatment;

¹² HANUS, J., „Štúdium starnutia papiera z hľadiska ochrany archívnych dokumentov,“ (*Study of paper ageing from the point of archives preservation*). PhD. Thesis (in Slovak), CHTF SVŠT Bratislava (1987).

¹³ KATUŠČÁK S., HANUS J. a kol.: *Vel'kokapacitná stabilizácia a konzervácia klasických nosičov informácií. (Increasing Capacity of Stabilisation and Conservation of Traditional Carriers of Information)*. In Slovak, Res.Report State Forest Products Res. Institute. SDVÚ 26/89, Bratislava 1989.

¹⁴ KATUŠČÁK S.: *Chemical Technology of Wood, Pulp and Paper in Culture, Education and Industry*. In: Baudin G., Fellegi J., Gellerstedt G., Katuscak S., Pikulik I., and Paris J. (Editors): WPP – Chemical Technology of Wood, Pulp and Paper. 490 pages. ISBN 80-227.1942-0. STU Bratislava 2003.

¹⁵ BUKOVSKÝ, V., KATUŠČÁK, D., HANUS, J.: *Program ochrany papierových nosičov informácií v SR. Buničina a papier – technológie, vlastnosti, životné prostredie. Zborník z medzinárodnej konferencie. Bratislava (2001) p. 179-182.*

- new knowledge and new methods proposal for preservation of library & archives materials;
- new information on indoor quality environment for long-term storage of library & archives materials.

Qualified restorers of archives and library materials are also inevitable and integrated parts of the system for preservation of archives and library materials. The Academy of Fine Arts in Bratislava includes also the Department of Restoration of Works of Art. Within this Department there exists specialised course for restoration of graphic arts and other paper artworks which provides university education focused on artistic restoration of this part of cultural heritage.

Conclusion

It must be realised that preservation of cultural heritage in general can be solved only as an interdisciplinary complex problem in which the role of chemists, physicists, paper scientists and their co-operation with experts from other fields of science and technology and practical end-users, conservators and restorers, supported by adequate financial background is an inevitable and the only solution. Thus one of the most important factors in preservation of cultural heritage in archives and libraries all over the world is integrated effort and activities of education, research, science and conservation. University education can and must significantly contribute to successful solution of this world-wide problem.

SUMMARY

Since 1989 the course "Preservation of Archives" has become a part of regular compulsory education at the Department of Archival Science and Auxiliary Historical Sciences, Faculty of Philosophy, Comenius University in Bratislava. It is a one semester course (two hours of lectures per week) carried out during the fourth year (summer semester) of the five year master degree studies. The structure of the course is as follows:

1. INTRODUCTION to problems and significance of archives preservation.
2. Legal provisions, preservation of archives in the new Slovak archival legislation, international standards in the field.
3. Types of archival documents from material point of view and their preservation
 - 3.1. Papyrus, parchment, paper
 - 3.2. Writing materials
 - 3.3. Photographic and film documents;
 - 3.4. Audio-visual documents
 - 3.5. Electronic records
4. The main causes of damage of archival documents
 - 4.1. External and internal degradation factors
 - 4.2. Biological degradation
 - 4.3. Physical degradation
 - 4.4. Chemical degradation
 - 4.5. Unsuitable human activities

5. Risk analysis, disasters
6. Principles of preventive protection of archives
 - 6.1. Archival buildings and premises as basic condition for preservation of archives
 - 6.2. Proper storage conditions
 - 6.3. Storage of archival documents
 - 6.4. Handling of archives
 - 6.5. Reprography of archival documents
7. Preservation/conservation and restoration of archival documents
 - 7.1. General principles;
 - 7.2. Dry and wet cleaning, simple treatments and repairs;
 - 7.3. Basic principles for preservation/conservation of single paper sheet documents, books and parchment charters;
 - 7.4. Some conservation and restoration methods – leaf casting, lamination
 - 7.5. Mass treatment methods for conservation of acidic paper archival documents – deacidification and strengthening – improvement of mechanical properties of paper.
8. International organizations - ICA, IFLA, ICOM-CC - and their structure and role in preservation of archives.
9. Research activities in the field of preservation and European projects connected with the problems of degradation and preservation of archives.

From the above mentioned syllabus and the study programme it can be seen that during their study course the students of the Department of Archival Science and Auxiliary Historical Sciences at the Philosophical faculty, Comenius University in Bratislava are very well acquainted with basic principles of preservation of archives.

As paper is a principal information carrier and its degradation can cause the loss of “memory of mankind” only an integrated effort of paper education, research, science, conservation and paper industry will be able to preserve this cultural heritage.

The biggest problems in archives and libraries are caused – paradoxically – by modern papers produced from the 2nd half of the 19th up to the recent years. The new technology of paper-making introduced in 1850, involved paper formation in an acidic environment. This was a crucial milestone from the point of permanence and durability of paper, its degradation and preservation in archives and libraries. It is a self-degradation effect of acidic paper; “time bomb”, as it is often called the limited lifetime of machine-made paper with acidic rosin sizing with addition of alum has been threatening the great part of the cultural paper heritage.

It must be realised that preservation of enormous quantity of acidic papers and preservation of cultural heritage in general can be solved only by thorough research as an interdisciplinary complex problem in which the role of chemists, physicists, paper scientists and their co-operation with experts from other fields of science and technology and practical end-users, conservators and restorers, supported by adequate financial background is an inevitable and the only solution.

The Department of Chemical Technology of Wood, Pulp and Paper covers in its educational background also problems of paper ageing and preservation. Research ac-

tivities in paper permanence and durability started at the Department already in 1980. During the last years several diploma works - completed at this Department and also at the Department of Graphic Arts and Applied Photochemistry - are devoted to problems of preservation of cultural heritage – permanence and ageing behaviour of some pulps and papers, deacidification of acidic paper, interaction of paper and printing inks, their permanence and ageing resistance, etc. At present also several doctor degree students have focused their studies to problems of paper degradation, deacidification and strengthening of acidic paper documents.