MODERN APPROACH FOR BIODETERIORATION ASSESSMENT AND DISINFECTION OF HISTORICAL BOOK COLLECTIONS

SMALL GRANT CO-FUNDED
BY INTERNATIONAL VISEGRAD FUND

Łódź, 29-30.06.2016

Project team

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Culture Heritage

Total in V4: **3320** museums, archives

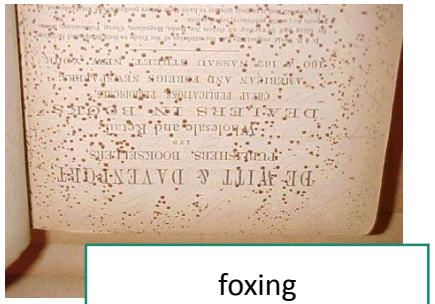
Microorganisms in archivals' biodeterioration

Alternaria
Aspergillus
Aureobasidium
Chaetomium
Cephalosporum
Cladosporium
Epicoccum
Penicillium
Stachybotrys
Trichoderma

Bacillus
Cellulomonas
Clostridium
Cytophaga

musty odour

discoloration



foxing

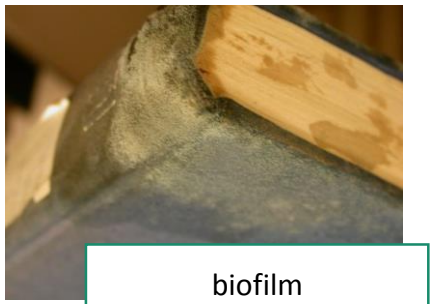
properties changes

structure losses

powdery decomposition

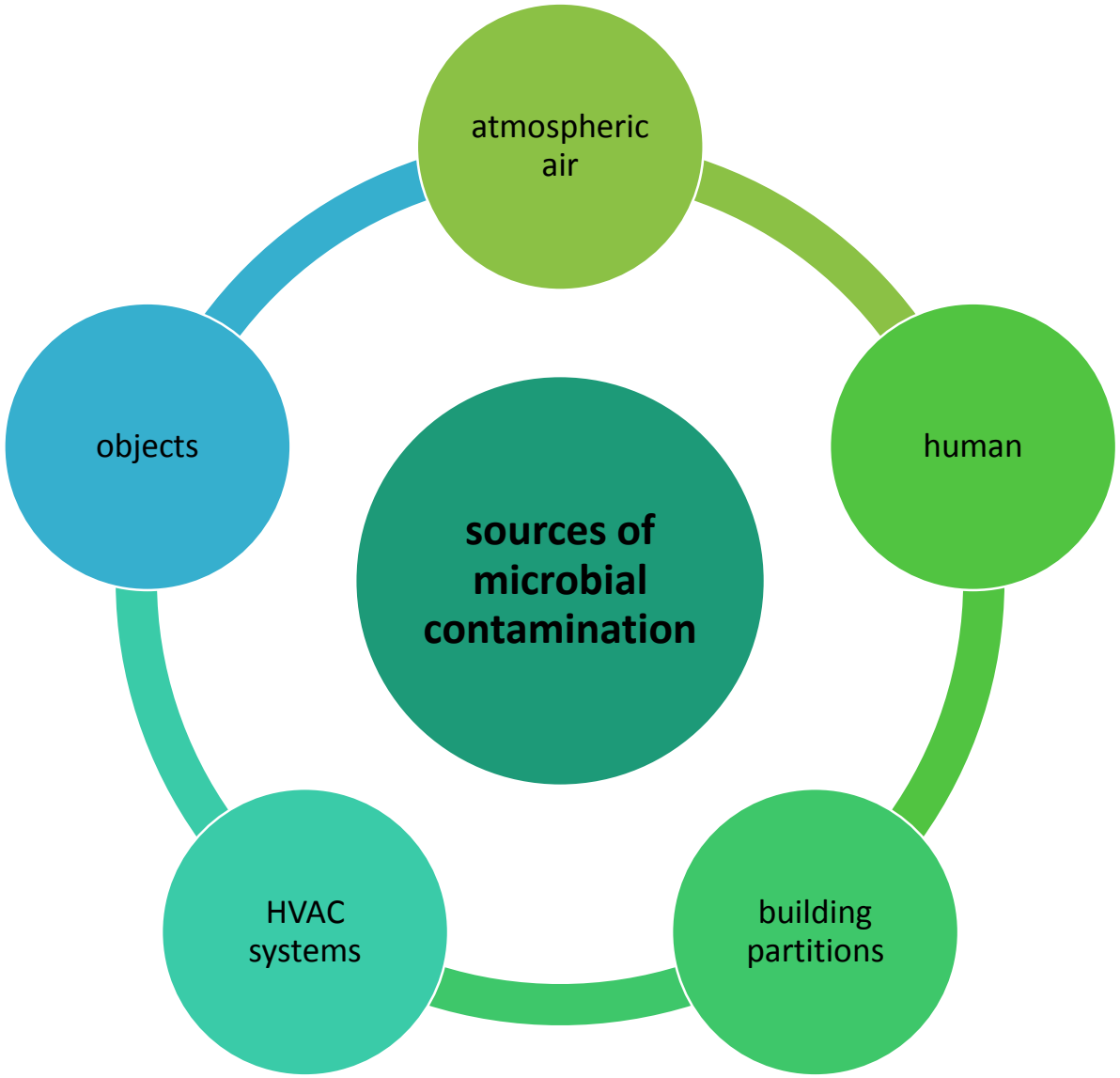
petrification

paper defects



biofilm

Biodeterioration of historical books



HVAC – Heating, Ventilation, Air Conditioning

Biodeterioration study of archivals

Mechanical

- structure (SEM, XRD, mechanical study)

Chemical

- chemical composition (FT-IR, NIR)
- ink (HPLC, SEM-EDX)

Biological

- **culture-dependent methods**
- **chemical method (MALDI-TOF)**
- molecular methods
  - clone library constructions
  - fingerprinting (DGGE, TGGE, ARDRA, T-RFLP, SSCP, ARISA)
  - **next generation sequencing**
  - RNA analysis

Disinfection methods

Physical

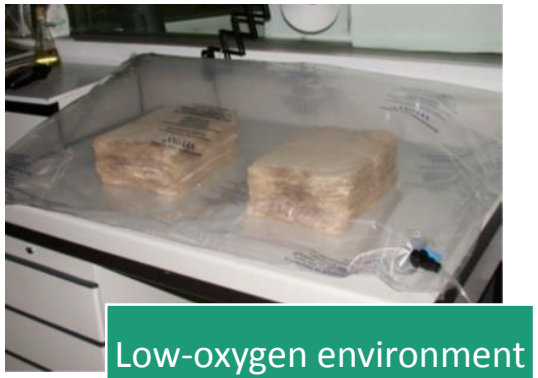
- dehydration, gamma irradiation, low-oxygen environments, freezing, refrigeration, high temperature and pressure, ultraviolet radiation, **low-temperature plasma**

Chemical

- alcohols, phenols, azoles, **essentail oils**, quaternary ammonium compounds, acids, ethylene oxide, formaldehyde, **silver nanoparticles**, titanium dioxide

Disinfection methods

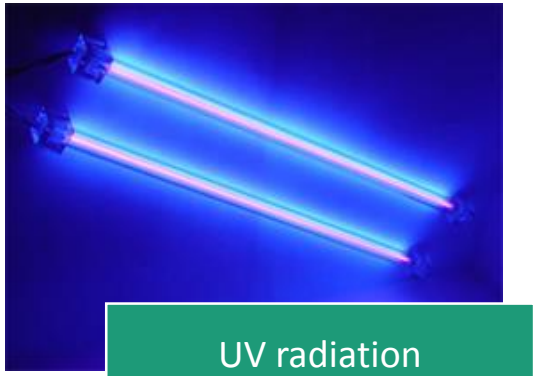
Ethylene oxide fumigation



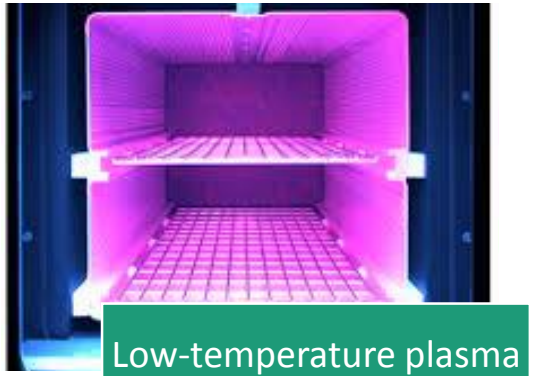
Low-oxygen environment

Gamma irradiation

AgNPs misting



UV radiation



Low-temperature plasma

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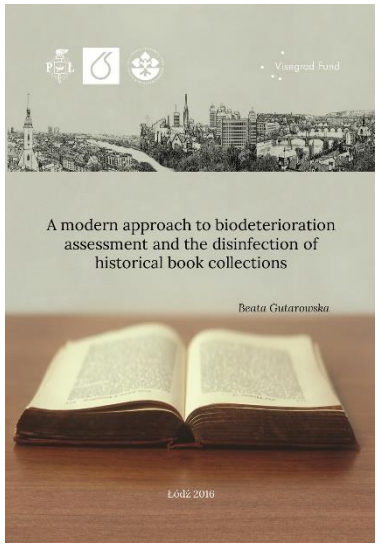

Duration: 16.11.2015 – 28.07.2016

Monograph

A modern approach to biodeterioration assessment and the disinfection of historical book collections edited by Beata Gutarowska, ISBN 978-93-63929-01-5120, Łódź 2016, Institute of Fermentation Technology and Microbiology. pp. 125, 120 copies

2 manuscripts in scientific journals

Modern approach for identification of the microflora responsible of biodeterioration of archival documents
Journal of Culture Heritage
Comparison of disinfection methods of archival documents – thyme essential oil, silver nanoparticles misting, low temperature plasma
Journal of Culture Heritage

http://v4biodeterioration.p.lodz.pl/

MODERN APPROACH FOR BIODETERIORATION ASSESSMENT AND DISINFECTION OF HISTORICAL BOOK COLLECTIONS

Duration: 16.11.2015 – 28.07.2016

Articles in bulletins, journals, local newspapers

W trosce o archiwa. Życie Uczelni. Biuletyn Informacyjny Politechniki Łódzkiej 136. Czerwiec 2016. pp.36-37. B.Gutarowska

Projekt Wyszehradzki dotyczący ochrony dziedzictwa kulturowego przed biodeterioracją. Ochrona przed Korozją. ISSN 0473-7333, e-ISSN 2449-9501 vol. 59, nr 7/2016. B.Gutarowska

International Biodeterioration and Biodegradation Society Newsletter 03.2016

http://v4biodeterioration.p.lodz.pl/

MODERN APPROACH FOR BIODETERIORATION ASSESSMENT AND DISINFECTION OF HISTORICAL BOOK COLLECTIONS

Duration: 16.11.2015 – 28.07.2016

Presentations at international and national conferences

A modern approach to biodeterioration assessment and the disinfection of historical book collections Biodeterioration and Protection of Cultural Heritage Symposium, 08-09.09. 2016 Łódź, Poland

Workshops

"*New generation sequencing method in biodeterioration of historical books collections*", Bratislava, Slovakia, 31.03-1.04.2016

"*Disinfection of historical books collections*", Prague, Czech Republic, 28.04 – 29.04.2016

Summary project meeting, Łódź, Poland, 29.06-30.0.2016

Schedule

Date	Project task
16.11.2015 – 15.12.2015	**1st task:** The inventory of historical library collections (National Library, National Museum, PL; National Archives, National Library–Klementinum, National Library of Technology, CZ; National Archive, National Library, SK) and the choice of objects with biodeterioration symptoms (SAS, UCT, LUT).
15.12.2015	Deadline to send min. 3 books with visible biodeterioration signs to LUT. Book must have full description (age, place of storage etc.) – the more information, the better.
6.01.2016	Deadline to sign Contract with IVF
15.12.2015 – 15.01.2016	**2nd task**: Assessment of the microbial contamination of all historical books at LUT (cataloguing, culture method). Selection of 3 the most microbially contaminated books for further studies. Those 3 books will be divided into 3 parts and send to partners.
15.01.2016	Deadline to send parts of books from LUT to SAS and UCT.
15.01.2016 – 31.03.2016	**3rd task**: Analysis of microbial biodiversity using high throughput sequencing (Illumina platform) (SAS), MALDI-TOF-MS (UCT) and ITS region (LUT).
31.03.2016 – 1.04.2016	Workshop: 'Methodologies to identify the microflora responsible of biodeterioration of archival documents' in Bratislava, Slovakia.
15.04.2016	Deadline to send detailed report from 1-3 tasks to LUT.

Schedule

Date	Project task
15.01.2016 – 28.04.2016	**4th task**: Determination of the effectiveness disinfection methods of historical books (non-thermal plasma at UCT; essential oils at SAS, nanosilver misting at LUT). Performing RNA analysis before and after disinfection.
28.04.2016 – 29.04.2016	Workshop 'Disinfection of historical books collections' in Prague, Czech Republic.
28.04.2016	Deadline to hand on (personally) the disinfected book parts to LUT.
13.05.2016	Deadline to send detailed report from 4th task to LUT.
31.05.2016	Deadline to write 1st publication from 1-3 tasks (SAS).
28.04.2016 – 03.06.2016	**5th task**: Determination of the influence of disinfection methods on mechanical and optical parameters of historical books at the Institute of Papermaking and Printing, LUT.
3.06.2016	Deadline to prepare detailed report from 5th task (LUT).
29.06.2016 – 30.06.2016	**Summary project meeting in Lodz, Poland.**
30.06.2016	Deadline to write 2nd publication from 4-5 tasks (UCT).
30.06.2016	Deadline to write Monograph (LUT).
1.07.2016 – 22.07.2016	Preparation of the final report (narrative, financial, audit).
28.07.2016	Deadline for final report and financial settlement

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Acknowledgment

Archives, disinfection

Eva Drašarová, Ph.D., National Archive in Prague, Czech Republic

Barbara Czajka, M.A., Józef Pilsudski Regional and Municipal Public Library, Łódź, Poland

Priest Kazimierz Dąbrowski, Ph.D., Archdiocese Archives, Łódź, Poland

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Visegrad Fund

Acknowledgment

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Acknowledgment

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Monograph, organization

Lodz University of Technology: Prof. Barbara Surma-Ślusarska, Anna Koziróg, Ph.D. Eng.; Justyna Skóra, Ph.D. Eng., Katarzyna Matusiak Ph.D. Eng., Justyna Adamiak, M.Sc. Eng. , Przemysław Otlewski, Sławomir Gutarowski ….

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Łódź, 29-30.06.2016

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