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INTEGRATED INFORMATION

International Conference on Integrated Information

Kos, Greece September, 29 – October, 3 2011

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Preface: Proceedings of the International Conference on Integrated Information (IC-ININFO 2011)

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Aims and Scope of the Conference

The International Conference on Integrated Information 2011 took place in Kos Island, Greece, between September, 29 and October, 3, 2011. IC-ININFO is an international interdisciplinary conference covering research and development in the field of information management and integration.

The conference aims at creating a forum for further discussion for an Integrated Information Field incorporating a series of issues and/or related organizations that manage information in their everyday operations. Therefore, the call for papers is addressed to scholars and/ or professionals of the fields of Library and Archives Science (including digital libraries and electronic archives), Museum and Gallery Studies, Information Science, Documentation, Information Management, Records Management, Knowledge Management, Data management and Copyright experts the latter with an emphasis on Electronic Publications. Furthermore, papers focusing on issues of Cultural Heritage Management and Conservation Management are also be welcomed along with papers regarding the Management of Nonprofit Organizations such as libraries, archives and museums.

One of the primary objectives of the IC-ININFO will be the investigation of information-based managerial change in organizations. Driven by the fast-paced advances in the Information field, this change is characterized in terms of its impact on organizations that manage information in their everyday operations.

Grouping emerging technologies in the Information field together in a close examination of practices, problems and trends, IC-ININFO and its emphases on integration and management will present the state of the art in the field. Addressed jointly to the academic and practitioner, it will provide a forum for a number of perspectives based on either theoretical analyses or empirical case studies that will foster dialogue and exchange of ideas.

Topics of general Interest

Library Science, Archives Science, Museum and Gallery Studies, Information Science, Documentation, Digital Libraries, Electronic Archives, Information Management, Records / Document Management, Knowledge Management, Data Management, Copyright, Electronic Publications, Cultural Heritage Management, Conservation Management, Management of Nonprofit Organizations, History of Information, History of Collections, Health Information

Symposia

The Conference offered a number of sessions under its patronage, providing a concise overview of the most current issues and hands-on experience in information-related fields.

- Symposium on Integrated information: Theory, Policies, Tools
- 4th Symposium on Business and Management and Dynamic Simulation Models supporting management strategies

- Session on Open Access Rrepositories: Self-archiving, Metadata, Content policies, Usage
- Session on Evidence-Based Information in Clinical Practice
- Session on Business Management and Communication Strategies supporting Decision Making Process in Tourism Sector
- Session on Electronic Publishing: A Developing Landscape
- Session on Information and Knowledge Management
- Session on Information Content Preservation as Outcome of Conservation of Cultural Heritage: Ethics, Methodology and Tools
- Session on Advances Information for Strategic Management
- Session on Information History: Perspectives, Methods and Current Topics
- Session on Divergence and Convergence: Information Work in Digital Cultural Memory Institutions
- Session on Contemporary issues in Management: Organisational Behaviour, Information Technology, Education & Hospital leadership.

The wide range of aspects that the sessions covered, highlighted future trends in the Information Science.

Paper Peer Review

More than 300 papers had been submitted for consideration in IC-ININFO 2011. From them, 91 were selected for presentation, after peer review in a double blind review process. The accepted papers were presented at IC-ININFO 2011.

Thanks

We would like to thank all members that participated in any way in the IC-ININFO 2011 Conference and especially:

- The famous publishing house Emerald for its communication sponsorship.
- The co-organizing Universities and Institutes for their support and development of a high-quality Conference scientific level and profile.
- The members of the Scientific Committee that honored the Conference with their presence and provided a significant contribution to the review of papers as well as for their indications for the improvement of the Conference.
- All members of the Organizing Committee for their help, support and spirit participation before, during and after the Conference.
- The Session Organizers for their willing to organize sessions of high importance and for their editorial work, contributing in the development of valued services to the Conference.
- PhDc Marina Terzi for her excellent editorial work, contributing in the production of the Conference proceedings.

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KEYNOTE SPEAKER

Professor Amanda Spink

Professor Amanda Spink has published over 340 scholarly journal articles, refereed conference papers and book chapters, and 6 books. Many of her journal articles are published in the Journal of the American Society for Information Science and Technology, Information Processing and Management, and the Journal of Documentation. She is Editor of the Emerald journal Aslib Proceedings. Amanda's research has been published at many conferences including ASIST, IEEE ITCC, CAIS, Internet Computing, ACM SIGIR, and ISIC Conferences. Her recent books include Information Behavior: An Evolutionary Instinct and Web Search: Multidisciplinary Perspectives, both published by Springer. Amanda's research focuses on theoretical and empirical studies of information behavior, including the evolutionary and developmental foundations. The National Science Foundation, the American Library Association, Andrew R. Mellon Foundation, Amazon.com, Vivisimo. Com, Infospace.com, NEC, IBM, Excite.com, AlltheWeb.com, AltaVista.com, FAST, and Lockheed Martin have sponsored her research. In 2008 Professor Spink had the second highest H-index citation score in her field from 1998 to 2008 [Norris, M. (2008)]. Ranking Fellow Scholars and their H-Index: Preliminary Survey Results. Loughborough University, Dept of Information Science Report].

From Macro to Micro and from Micro to Nano: The Evolution of the Information Content Preservation of Biological Wet Specimen Collections.

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Abstract: *The technological and scientific improvements of the past decades, such as the discovery and the possibility of DNA extraction, have upgraded the role of biological collections towards the social and scientific development. As result of that, the need for preservation of these collections has been a priority. Present work investigates the corrosion mechanism of fluid – preserved specimens by a comparative observation of samples that have been preserved in three different solutions (ethanol, neutral formalin and acetic acids-ethanol solution) followed by artificial corrosive environmental conditions of high temperature (50oC) and ultraviolet radiation, similar to those of a museum environment. The investigation of deterioration mechanisms, undertaken by observations and evaluation of nine criteria that describe the preservation status of the samples. The results of this research project can constitute a basic tool for the understanding of interaction mechanisms between the museum environmental conditions and the specimens, as well as a start for further investigation of subject.*

Keywords:C*onservation, Wet specimen, bio-molecules, biological collections*

I. INTRODUCTION

Biological collections are a subcategory of natural history collections. Their particular characteristic is that their specimens used ones to be leaving organisms. In general terms, biological collections could be categorised in the following groups, based on the specimens they collect (NPS Museum Handbook, Part I, 1999):

- Botanological collections
- Entomological collections
- Collections of other invertebrate specimens.
- Vertebrates specimens collections.

Museums and academic institutions are preserving important biological collections. It is estimated that worldwide at least 2.500.000.000 preparations and specimens of natural history are kept in around 6.500 (John E. Simmons & Yaneth Munoz-Saba, 2003). 1,500,000,000 of these, are fluid-preserved specimens and they maintain an impressive growth rate of about 50 million per year (David W. Von Endt, 1994).

Present paper is mainly focuses on the collections of vertebrate organisms. Such collections consist of specimens of amphibians, birds, fish, mammals and reptiles. Collections include preservation of whole organisms (or parts of them) preserved in preservative fluid solution.

The preservation of these specimens requires a special preparation, necessary to protect them from the natural process of decay, in order to fasilitate further long term exhibitional and/or laboratorial use. The NPS Museum Handbook (Part I, 1999) refers a broad list of preparation methods of vertebrate organisms. From this comprehensive reference, present work deals with specimens of fluid-preserved collections. Such collections include preservation of whole organisms (or parts of them) preserved in preservative fluid solution.

Main concern of the Conservator's work is the safeguarding of the aesthetic, historical, structural and material integrity of the objects he/she conserves (E.C.C.O., 2002). According to this, conservation treatment of wet specimens' collections has been evolved aiming to support the research objectives of biological sciences.

II. HISTORY OF PRESERVATIVES

History of efforts to preserve dead organisms, in a life-like status, is much older then the history of museums. Such cases are the mummies of Peru (7.800 years old) and the Egyptian mummies (5.000 years old) (John E. Simmons & Yaneth Munoz-Saba, 2003). But efforts to find a possible ideal method for long-term preservation of anatomical preparations in order to facilitate further observations are inherent to the beginnings of biology as a science. Both Aristotle (384 to 332 BC) and Galen (131 to 210 AD) had used preparations for their anatomical studies, which are consindered the basis of biology science (Rosina Down, 1989). Hippocrates in 400 BC had report the preservation properties of mercury and alcohol (Mythily Shrinivasan et. al., 2002). Unfortunately no much is known regarding the materials and methods used. From the death of Galen to the 11th century biology hasn't evolve much. For centuries researchers where contacting macroscopic observations of the specimens that had to be completed within four (4) days, as no sufficient preservation technique was available. Rosina Down (1989) has present a comprehensive history of the methodologies followed, since Leonardo da Vinci (1452-1519) restored investigation practice of biological specimens. He was the first to indroduce new methods to anatomical

observation. His methods included wax replicas, investigations on eyes that he had been boiled in albumen (eggs white), as well as glass replica of heard in order to observe blood circulation.

The practice of fluid preserved specimens firstly introduced in the middle of 17th century AD., by Croone who presented two embryos of puppies to the Royal Society (England, 28th May 1662) preserved in wine alcohol solution. In the same year Robert Boyle used wine alcohol in a solution with ammonium salt and brine (Simon Moore, 2002, David W. Von Endt, 1994).

Till the introduction of methyl alcohol, in 1855, researchers had also tried out a number of spirits such as gin, rum, whisky as well as mercury nitrate in wine alcohol solution. At the same period, a number of other new materials where introduced including glycerol, ether, chloroform, camphor peroxide solutions of zinc sulfate, acetate salt of aluminum, arsenic, etc. as potential replacements of alcohol.

The inability of alcohol to maintain the color of preparations and the changes in size (shrinkage) that it is causing, led to the use of formaldehyde by the German Blum (Rosina Down, 1989, Simon Moore, 2002). The typical aflexia of formaldehyde in combination with the relatively low cost, changed the whole process of fixation and stabilization of specimen preparations. Blum also was the first who succeeded in maintaining the color of specimens by preserving in alchohol solution the formaldehyde-fixed preperations (Rosina Down, 1989).

During the first half of the 20th century a large number of specialised fixatives and stabilisation solutions appeared to maintain the cellular content and color retention. The main techniques developed in the mid 1920's by Kaiserling and later by Wentworth. By the mid-'50s as Owen and Stedman were investigating the use of phenoxetol as a stabilizing solvent. This work has been furthered by Steedman in 1976 to work on the conservation of marine zooplankton (Simon Moore, 2002).

III. INTEGRATED INFORMATION OF BIOLOGICAL SPECIMENS

It is easily understood from the above that the main concern of the researchers, all these centuries, was to preserve the macroscopic appearance of the specimens for further study. Investigation of their size, colour and macrostructure was providing the necessary information content and scientific data that biological science was needed. However, scientific and technology advantages of recent decades have allowed biologists to investigate beyond the macrostructure of specimens. Modern analytical technology can extract useful information content from micro nor nano structure of biological specimens, supporting the scientific and social disciplines of National Security, Public Health, Environmental Change research and traditional taxonomy, etc.

Museum biological collections can be used to trace the historical evolution of viruses and identification of the origin and spread. Collections of known viruses and bacteria are established and maintained for comparison with emerging infections. For example, archived tissue preparations from the late 19th century virus sooty magabeys (Cercocebus torquatus) which were kept at the Smithsonian Institution, used to determine that the virus SIVsm (an antibody deficiency virus outbreak in monkeys and a close relative to HIV-2 virus manifested in humans) was existing in Africa since at least since 1896 (Andrew V. Suarez & Neil D. Tsutsui, 2004). In addition, many scientific studies in the field of ecology, evolution, pollution and climate change make use of museum collections. The use of museum collections supports the collection of numerous data in short time. Brakefield (1987) used a collection of 1905 to demonstrate that small changes in temperature during development may regulate the form of the adult butterfly Melanitis leda (Charles Pettitt, 1997).

The “hidden” information content carried by museum collection it can have unexpected use at the time of specimen collection. Its use could be reviled many years later, as for example at the case of public concern followed the nuclear tests undertaken in the Pacific Ocean. Public health concerns related to nuclear environmental pollution had to be investigated, but radioactivity levels prior to the trials had to be identified. Museum specimen collections were the only possible way to do that (Charles Pettitt,1997). Moreover, the technology developments of DNA extraction methodology could allow DNA extraction of rare organisms that have been extinct decades or millennia ago (Charles Pettitt, 1997, Robert B. Payne & Michael D. Sorenson, 2003). Such examples of collection’s use are proving the multidisciplinary importance of information content carried by biological collections for the academic and social development, an information content that it goes further then traditional macroscopic investigation notes and requires further micro and nanostructural analyses. This scientific needs evolution has led researchers to search new fixation and preservation methods and techniques in order to maintain readability of micro and nano as well as macro structure of wet preserved biological specimens.

Wet specimens are stored and displayed in glass or plastic containers filled with a preservative solution. Consequently, the immediate microclimate that specimens are exposed is the preservative solution containing them. However, exogenous levels of heat and light radiation are factors that directly affect the preservation condition of specimens.

The most common group of fixative material (almost all cases of animal tissue fixative) are aldehydes. But there are few cases where acids and alcohols are used. During the last years, various new materials (fixatives and preservatives) have been developed, aiming to limit toxicity and to preserve biochemical and biomolecular content of specimens (such as DNA). (Stoddard RW 1989, Cato Paisley S. 1990, Carter J. 2002, Moore S.

2002, Mythily Srinivasan et al. 2002, Payne RB & Sorenson MD 2002, Waller R. & Simmons JE 2003, Gillespie W. John et al, 2002, Andries J. Van Dam 2003).

IV. RESEARCH INVESTIGATION

A. Methods

The present experimental research focuses on assessing the preservation condition of certain animal tissue fixed with different fixative material, stored in identical containers and preservative solution, according to modulated external environmental parameters of temperature and radiant. In this way a number of factors affecting the preservation quality of wet specimens were considered as fixed and they were not taken into account during the evaluation process. The evaluation focused on the relationship between preservation condition, preservative solution and and time of exposure to exogenous corrosive environmental factors. The evaluation was conducted in two stages. During first stage the preservation condition of specimens was assessed by macroscopic evaluation after asselerated aging simulating corrosive environmental conditions. In second stage, the same specimens were evaluated for tissue discoloration after one year of the experiment.

B. Results

Experiment showed that weight loss of specimens was similar among all different exposure conditions and with no significant alterations depenting on the exposure time. Weight loss is clearly a result of ethanol use as a preservative solution, due to its lipid solubility properties (Stoddard 1989). Noticeable however is the smallest loss shown by specimens fixed in formalin solution, suggesting formation of stronger and more stable bonds between biomolecules. Changes of specimens size are not observed to be associated with weight alterations. Specimens fixed in acetic acid solution shown greater resistance to size changes.

Specimens fixed in formalin solution show greater original colour preservation. Ethyl alcohol causes bleaching of the tissues. This appears to be direct and independent of environmental conditions. Results comparison suggest that fixation with formalin is superior then others, as hardening and elasticity of fixed specimens allow their subsequent management. Specimens fixed in a solution of acetic acid and ethyl alcohol show photochemical alteration upon exposure to such corrosive conditions while the formalin fixed specimens show excellent tolerance and stability in similar conditions.

The results of these experimental observations conclude that the use of ethanol as a fixative solution causes a series of physical and chemical alterations in the tissue that should be taken into account and attempts should be made to reduce them, probably by adding material in solution to maintain color stability and to reduce shrinkage. The neutral formalin solution seems to be most appropriate of all tested solutions as it provides stability of important physicochemical properties of the fixed animal tissue.

IV. CONCLUSION

Accepting that the biological collections should be treated as "scientific information in waiting" and the specimens contain unknown information whose reading ability or the necessity of reading them may not have emerged yet, it is important to research and investigate techniques and methods capable of preserving both macroscopic and microscopic structure of biological specimens in a recognisable, readable and comparable condition so scientific community and society at large can benefit from the vast numbers of specimens preserved in collections.

Finally, it should be noted that there isn't a specimen that it is not worth preserving, and even if not directly presents a demonstrated importance and usefulness, perhaps in years to come it may be proved to be particularly important. In other words, every sample of natural history is unique. It is never safe to assume that a specimen does not contain any useful information. The "hidden" information of the exhibits can be displayed with an unexpected way, perhaps a century after the acquisition of the preparation. The interdisciplinary research for the optimum material and methods for safeguarding the structural and material integrity of wet specimens is under development and has long way to go.

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