

ABSTRACTS - SPNHC 2004

Disaster Response Training is Fun!

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Last summer the University of Iowa Collections Coalition (UICC) hosted a two-day Disaster Response Workshop with the Upper Midwest Conservation Association. As well as classroom training, the workshop included a day-long "disaster scenario" where we divided into teams responsible for salvaging objects from paddling-pools filled with water. The workshop was great fun and we learned valuable lessons about teamwork and communication as well as key procedures for disaster response. As a result of our training experience, UICC plans to run regular refresher courses, and a mini Disaster Response exercise is now included in the Collection Care and Management module of the University's Museum Studies Certificate.

1. Tiffany Adrain
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3. Oral Presentation

Comparison of methodologies for genomic DNA extractions from various biological specimens

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Background: Nucleic acid isolation is the first step in genomic- based investigations. The performance of down stream applications such as genotyping, SNP analysis, gene array etc is directly related to nucleic acid quality. Since a large number of methods exist for genomic DNA extraction, it is necessary to choose the appropriate DNA extraction method(s) that are best suited to the specimen type and research objective. DNA isolation efficiency, throughput, degree of automation and associated costs of reagents and equipment are other factors which must be considered in evaluating extraction methodologies.

Methods: Automation vs. manual methodologies were compared for isolating DNA from whole blood and its components such as buffy coats, packed cells and RBC granulocytes. Buccal mouthwashes are preferred over blood collection for a number of epidemiological studies. Experiments were conducted to select the efficient manual method for isolating high quality DNA from these specimens. New methodologies such as Whole Genome Amplification is an alternative method for generating high quality and quantity of DNA from samples that yields low DNA such as plasma, serum, Laser Capture Microdissection cells (LCM), blood spots etc.

Results: DNA isolated from automatic methodologies such as Gentra System's Autopure LS workstation gave high quality and more consistent DNA and is cost effective. Organic and salting out methodologies gave similar quality and quantity of DNA with buccal mouth wash samples but the cost per extraction using the salting out method is half compared to the organic method. Using WGA, DNA from rare material types can be amplified 10,000 fold.

Conclusion: Automation is an effective choice for DNA isolation when working with large number of samples. Manual methods using salting out methodologies are more efficient, cost effective and scalable compared to other methods. WGA is an alternate method to generate DNA from rare or minimum amount of sample.

ENCOMPASSTM: A New Expandable Approach for Large-Scale, Multi-Format Sample Management

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3. Poster presentation

Involvement of mitochondrial-associated pathway of apoptosis in cryopreservation of human fibroblasts

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The post-thaw viability following cryopreservation (CP) remains sub-optimal for many cell systems. Recent focus on delayed-onset cell death (DOCD) is providing an explanation for this observed failure. One potential avenue for the activation of DOCD

involves the intrinsic mitochondrial-apoptotic pathway. Specifically, stressors can disrupt the pro-/anti-apoptotic protein balance associate with the mitochondrial and the related Bcl-2 protein family. We hypothesized that CP-dependent disruption of the pro-/anti-apoptotic ratio (specifically, Bcl-XL:Bax) contributes to the activation and progression of DOCD. In this study, human dermal fibroblasts were cryopreserved in media + 5% DMSO or CryoStor™ CS5. Cells were incubated at 10oC (10 min) in the preservation media, cooled at -1o C-min-1 to -80oC and quenched in LN2. Following storage, cells were thawed at 37oC and plated in culture media. Viability was assessed daily using a metabolic indicator (alamarBlue) and a nucleic acid probe (sytoDye). Total cellular protein was isolated from adherent populations at 0, 6, 12, and 24 hours post-thaw, and Bcl-XL and Bax expression were analyzed via western blotting. Results 1) Utilization of CryoStor™ CS5 yielded an increase in cell survival over that of media + 5% DMSO (61% vs. 37%, 24 hours post-thaw). 2) Cryopreservation resulted in the disruption of the pro-:anti-apoptotic ratio, shifting towards pro-death signaling, during the recovery period. 3) Utilization of CryoStor™-CS5 decreased the shift in the pro-:anti- apoptotic ratio as compared with storage in Media + 5% DMSO (up to 4-fold). In conclusion, examination of mitochondrial protein levels following CP revealed distinct temporal profiles between differing CP protocols. These studies demonstrate that activation of the mitochondrial-associated apoptotic pathway plays an integral role in the execution of CP-induced DOCD. These data demonstrate that the control of apoptotic cell death, particularly mitochondrial associated, may facilitate further enhancement in cell survival following CP.

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3. Oral presentation

Design and organization of a small reproductive cryobank

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No one really knows how many reproductive cryobanks exist in this country. On January 21, 2004, FDA published a requirement that all reproductive tissue banks register with FDA. This is a step towards including reproductive cryobanks under FDA's Final Rule regulating human tissues. It is believed that possibly hundreds of small reproductive cryobanks are housed in infertility clinics. In addition, numerous commercial cryobanks operate in this country.

Some states require reproductive tissue banks to acquire a license in order to ship cryopreserved reproductive tissue into their state. The New York State Department of Health also conducts on-site inspections to ensure compliance with New York State Statues. The American Association of Tissue Banks (AATB) manages a voluntary tissue bank Accreditation and Inspection program. Nearly all of AATB's accredited reproductive cryobanks are free-standing commercial cryobanks rather than part of a physician's infertility practice.

Reproductive cryobanks store tissue in liquid or vapor phase of liquid nitrogen. Monitoring of liquid nitrogen levels or storage tank temperatures is seen as a normal part of a Quality Control Program. AATB Standards and proposed FDA Good Tissue Practices require segregation of cryopreserved tissue based on the testing profile of the gamete providers. Security of the storage tanks and client data has become more of a concern following implementation of HIPAA rules.

AATB Standards require that reproductive cryobanks determine if cryopreserved tissue is classified as donor or client depositor tissue. Client depositor tissue by definition is intended for transplantation into a recipient who is the sexually intimate partner of the gamete provider (s). Screening, testing, storage and distribution requirements are very different for these two categories of tissue.

1. Russell Bierbaum
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3. Oral presentation

Upgrading the Arachnid and Myriapod Collection at the American Museum of Natural History

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A conservation survey of the Arachnid and Myriapod Collection at the American Museum of Natural History was initiated to prioritize needs, develop a plan for upgrading collection storage, and identify the resources necessary to accomplish this. The

survey set out to assess the state of the fluid preservative, specimens, storage containers and labels by examining a sample of the collection. A brief history of collections-maintenance procedures and policies was compiled, as were environmental data and composition of current cabinetry. Major problems were identified in the collection, of which those most urgently requiring attention are the inadequate storage environment of the type material and the inappropriate storage containers pervasive throughout the collection. This presentation provides a brief outline of the findings of the survey and the steps being implemented to upgrade the collection.

1. Randy Mercurio
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3. Oral Presentation

Evidence of learning from exhibits at a university natural history museum

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Education and learning in museums has been studied from a wide variety of viewpoints including ethnographic description of visitor behaviour, careful testing of exhibit parameters, and visitor evaluations to measure the museum experience. The literature is replete with evaluation techniques and procedures, each lending a specific type of information but each with its own inherent limitations. The general consensus regarding museum learning is that it is constructivist and investigative, and is often socially mediated. Yet despite all the evidence, the nature of museum learning has long proved difficult to measure and lacks coherent theory. We know little about how learning actually occurs in museums.

Somewhat similarly, investigation of natural history museum exhibits and student learning at the Redpath Museum has been under-researched in comparison to the importance of the matter. In an attempt to rectify the situation, a pilot study was initiated during the fall of 2004 with the students of two university undergraduate courses. The students were surveyed using a pre and posttest-questionnaire designed to measure their understanding of the exhibit topics. The questionnaire was developed in conjunction with the professors teaching the courses. This multiple-choice questionnaire was administered to the students prior to viewing the exhibit and approximately 10 days after viewing. During this time period the students were also introduced to the exhibit topic(s) by the course instructor's lecture and instructed to visit the specific exhibit at the museum. Similar or exact questionnaire items were placed on the final exams for each course in order to measure the effect of long-term cognitive memory and exhibit data. The instructors for both the undergraduate courses involved in this study focus at least one lecture on the exhibit topic(s); in this case the Burgess Shale Fauna and the Cambrian explosion. The total number of students tested was 209.

Brief focus group interviews were conducted with individual students during their visit to the exhibit in order to collect qualitative data about students' perceptions of what they learned from the exhibits. The interview guide was created by the researcher from the literature and from personal knowledge of the exhibit design.

Preliminary results from the pilot study show that students make meaning out of what is exhibited at a natural history museum and that the learning compliments what is taught in specific university courses.

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3. Poster Presentation

New Tools to Manage Urban Pests in a Museum Environment

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The backbone of any integrated pest management (IPM) program relies on monitoring to obtain information about both the occurrence of pest species, and the status of a given facility and its contents. Information obtained from monitoring is also used to determine the best corrective actions to be taken. Unfortunately, current monitoring techniques typically consist of an awkward, multi-step process that ultimately slows down and/or interferes with the transfer of information to decision-makers.

Consequently, the importance of accurate and thorough monitoring is often ignored, forcing collections managers to turn to pesticides - rather than IPM - to control indoor pests.

Fortunately, the advent of new technologies has automated the monitoring process, facilitating the transfer of data and thus simplifying the practice of IPM. For this project, ISCA Technologies' patented agricultural pest management information system (Moritor® www.moritor.com) is being adapted for the automation of indoor monitoring. The development of the automated indoor monitoring system (AIM) is the latest tool to be made available for the management of urban pests.

When using AIM, data collected with handheld or automated devices are then sent to an Internet-accessible centralized database, where they are parsed, stored and analyzed to generate reports and maps which identify alarm situations and predict pest population densities, thereby facilitating decision making and the deployment of pest control measures wherever needed. By shortening the process of data management from weeks to hours or minutes, AIM will allow pest management professionals to stop pest problems as soon as they are detected, thus avoiding crisis pest management weeks later. This faster response time will improve the effectiveness of pesticide-free alternatives, which, in turn, will result in a safer working environment.

Since 1999, the Riverside Municipal Museum has utilized IPM procedures in the assessment and control of pest species occurrences and infestations in public spaces, work areas and collections storage. The Museum has earned significant recognition for its success in demonstrating IPM methods for a medium-sized museum facility in an urban setting. Across the US and in other nations, many museums and research collections are housed in rehabilitated and/or historic structures, such as old railway stations, post offices, libraries and school buildings. In collaboration with ISCA Technologies, the Museum will provide the profession with a demonstration of how a new approach to pest management data collection and analysis can increase accuracy, and decrease response time, all in a cost-efficient manner.

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3. Oral Presentation

Creation of a centralized biorepository at a biopharmaceutical company

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In September 2002, human biological material receipt and storage were consolidated into the Molecular & Biologic Resource Center (MBRC) at Millennium Pharmaceuticals. Previously, human biological material was received by two major groups at Millennium: Molecular Pathology and Molecular Medicine. The MBRC was developed to consolidate specimen receipt, handling and storage into one facility and standardize sample handling procedures at Millennium.

MBRC receives, stores and manages all human biological and most animal specimens for Discovery & Research, Drug Safety & Disposition, and Clinical Research Studies in a streamlined and standardized environment, at the same time as moving toward GLP and 21CFR Part 11 compliance. The focus is to provide excellent service to each group in Millennium while managing and tracking specimens in a high quality facility with the use of a validated Sample Management System. The main functions include:

Tissue Acquisition: Collaboration with Tissue Suppliers to acquire high quality specimens for Discovery and Research; collaboration with Study Leaders on how to best handle clinical research samples arriving at MBRC;

Sample Management: Receipt and accessioning of incoming specimens from internal and external scientists; maintenance of 22 MBRC freezers by removal and return of samples per automated system requests; creation of audit trail to track all specimen movements.

Data Management: Data entry and verification in controlled sample management system; management of pathology reports and specimen collection forms in archive server; creation of receiving logs for Study Leaders and Scientists for up-to-date information on sample status.

Facilities Management: Controlled access freezer room; consultation with Facilities Department for improvements to facilities, equipment, security and loss prevention control measures.

Quality Management: Cycle count, an ongoing inventory procedure of all frozen specimens; quality control through H&E review of all frozen human tissue specimens by Molecular Pathology pathologist.

1. Jennifer Morgan
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3. Poster presentation

Rehousing the dry molluscan collections at the Academy of Natural Sciences of Philadelphia

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This is a general report on the first year of the rehousing project in the Academy's dry molluscan collection. A large collection with considerable historical value is being rehoused in new cabinets and containers that conform to current archival standards. Issues covered in this presentation include assessment of the condition of the existing collection environment, space planning, the design of new cabinets and the logistical problems surrounding the physical movement of large collections.

1. Paul Callomon
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3. Oral Presentation

Lessons Learned from the Pentagon: Post September 11

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After September 11, 2001, each of the Department of Defense Historical Divisions worked together to respond to the attack on the Pentagon. Normally the individual Historical Divisions of the armed services has a responsibility to collect, preserve, and interpret the operational, technological, and cultural aspects of the development of their individual service, but with September 11 came the mission of documenting the terrorist attack on the Pentagon. This presentation will incorporate images of the Pentagon as a disaster site as well as document the recovery efforts and problems that were encountered while recovering historical property from the Pentagon to include:

- 1) The objectives and mission of the recovery team
- 2) The scope of work for the recovery efforts
- 3) Treatment of the Pentagon as a crime scene and how that hampered efforts, equipment, hazmat, and safety concerns
- 4) The removal and staging of historic property
- 5) The results of our overall efforts

The presentation will conclude with the important lessons that were learned from the recovery efforts.

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3. Oral presentation

Disaster Recovery and Asbestos Abatement of Oversize Museum Collections

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In November 1992 a tornado struck and severely damaged Buildings 25 and 26 at the Smithsonian Institution's Paul E. Garber offsite storage facility. In this disaster hundreds of oversized natural history collections stored in these buildings were contaminated by the asbestos insulation that had lined the buildings. The Museum Support Center (MSC) Move Office of the Smithsonian Institution's National Museum of Natural History was involved in the recovery of the collections and the cleaning and re-housing of the objects.

After initial stabilization of the building and its contents, recovery of the collections was done in several stages over the following years. Staff training, personal protective equipment, and attention to safety for personnel and collections were all addressed throughout the process.

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3. Poster Presentation

The Frozen Zoo®: A unique genetic repository for research and conservation

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The need for banking genetic resources such as frozen cell lines and nucleic acids has been recognized for several decades, but has received increasing attention recently as genome biology has developed. CRES initiated its own efforts in this area 29 years ago with the formation of the Frozen Zoo®. This continuously growing repository holds biomaterials from approximately 7000 endangered or threatened mammals, birds, and reptiles. Our collection is primarily used for conservation-oriented research aimed at the preservation of species and their habitats. Early passage fibroblasts saved in the Frozen Zoo® provide an extended resource of cell cultures from which chromosomes, cellular materials, DNA and RNA may be extracted. Frozen tissue samples represent a source of nucleic acids, including tissue specific RNAs.

Many influential studies involving aging, evolution, medicine, physiology, and animal conservation have been facilitated by access to the samples in our repository. We have finalized Research Material Agreements and transferred 4500 samples from 450 different species to 210 institutions in 39 states and 17 countries. Recently we made major efforts to expand the Frozen Zoo®, beginning in 1999 with a far-reaching plan to collect samples from all dwindling species held in zoos accredited by the American Zoo & Aquarium Association, and then through sponsorship of an international conference in 2000 on "Genetic Resources for the New Century". A major NSF-funded initiative, the Integrated Primate Biomaterials and Information Resource or IPBIR, involving the ZSSD, Coriell Institute, Princeton University, International Species Information System, and UCSD Supercomputer Center, was created in 2001 to expand the availability of primate biological materials for the scientific community. Even as technical capabilities grow, biodiversity is being lost. However, samples accessioned into the Frozen Zoo® over the last three decades can facilitate future endeavors to improve the welfare and persistence of animal populations and, particularly, endangered species.

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3. Poster presentation

Creating Alliances with Emergency Responders

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While many museums and libraries have stepped up emergency planning efforts in recent years, even the best-prepared institutions cannot protect collections and buildings without the help of their neighbors and professional first responders. To help foster these critical partnerships, the Heritage Emergency National Task Force, a Heritage Preservation program, created Alliance for Response. In the first phase of the project, three invitation-only, one-day forums in Dallas, Boston, and Cincinnati were held in late 2003. A fourth forum will take place in New York City in 2004.

The Alliance for Response initiative represents an unprecedented effort to build bridges at the community level between disaster management professionals and the stewards of cultural, historic, and scholarly resources. The forums brought together representatives of historical societies, museums, archives, and libraries with emergency responders from local, state, regional and national levels – from Fire Chiefs to FEMA representatives. A primary goal of the forums has been to establish viable local networks, and already two have been launched in February 2004: START (State of Texas Alliance for Response Team) and in Boston, CEMT (Cultural Emergency Management Team).

This session will be presented by Tom Clareson, Manager of Education & Planning for the Digital Collection & Preservation Services of OCLC, a Heritage Preservation board member, and chair of the Cincinnati Alliance for Response Forum; and Jane Long, director of the Heritage Emergency National Task Force. They will relate key findings of the "Alliance" meetings, and offer practical advice on how to:

- develop an effective disaster plan,
- find professional training opportunities,
- create collaborative disaster response networks,
- build relationships with first responders, and
- help integrate cultural heritage into your community's incident command system.

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3. Oral Presentation

Earthquake Strapping for Collections

Collas, Tania; Gambill, Vicki

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Southern California may have beautiful scenery and mild weather, but it also has its share of natural disasters. Los Angeles and its environs experience as many as thirty earthquakes in a typical day, although most are very small and go unnoticed (<http://www.trinet.org/trinetdesc.html#hist>). An earthquake of significant magnitude could strike downtown Los Angeles at any time without warning. To mitigate potential earthquake damage to collections, staff from the Natural History Museum have started an earthquake strapping project in targeted collection areas. Immobilizing 33 million artifacts and specimens is a tall order, so we are addressing the most vulnerable collections first. Our method of earthquake strapping is not new, but it is low cost, easy to install and use, and adaptable to many different types of collection storage units. This presentation will show the steps involved in making the earthquake straps and will provide examples of their use in museum collection storage areas.

1. Tania Collas
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3. Oral Presentation

Rwanda - A Memorial to the Genocide

Collins, Chris

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In mid-2003, the Palaeontology Conservation Unit (PCU) at the Natural History Museum was approached by the Aegis Trust, a trust formed to highlight and educate on issues relating to genocide and the Holocaust, to assist in the development of a memorial to victims of the genocide in Rwanda. The project involves the building of a large scale passive environmental chamber for display of remains and artefacts from the Genocide, 10 years ago. The display and material involved however raises a range of complex ethical issues which need to be assessed before the memorial can be built. This paper outlines the ethical stance that conservators have taken in the development of this project and the technical issues involved in putting such sensitive material on display.

1. Chris Collins
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3. Oral Presentation

Surface cleaning Natural History objects with lasers (how to build more than one bridge at a time)

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Surface cleaning of museum objects is a frequently performed task in conservation. In the last decade interest has developed in the use of alternative, "non-contact", methods of treatment. This is mainly in response to the fragility of some surfaces and the invasive nature of more traditional methods, such as mechanical and chemical cleaning. Laser cleaning is one such non-contact method. It is now routinely used in many countries for cleaning of stone and marble. In the Natural Sciences laser cleaning is less well known and there are few well documented instances of its use.

Because of the prohibitive price of purchasing a laser a joint initiative was set up in London in 2000 between The Natural History Museum, Imperial College, The Victoria and Albert Museum and the Tate with the aim of purchasing a dual wavelength laser. A grant was secured through the Joint Research Equipment Initiative scheme which provided half the purchase costs - the rest was secured by contributions from each partner institution. The main aim of the consortium is to use the laser on the widest possible range of museum objects and to carry out analysis of the surface pre and post cleaning. The laser spends time at each institution and students from the joint Royal College of Art/V&A conservation course have access for project work. All results are shared.

Having the laser at the Natural History Museum has meant we have had an opportunity to cross departmental boundaries and involve curators and researchers from across the museum. This has led to permission being given for a wide range of objects ranging from Wasps nests to Herbarium Sheets to be test cleaned. This was one of the first cross-museum conservation initiatives at the NHM.

This project has meant we have been able to build a number of useful bridges both within the Natural History Museum and Institutions across London. We are now looking to build bridges globally.

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3. Oral Presentation

Saving the Ark: The Ambrose Monell Cryo Collection (AM-CC) at the American Museum of Natural History (AMNH)

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In a time of massive species loss, natural history museums are poised at the forefront of biodiversity information access, especially concerning biomaterial collections used in modern genetic, genomic and taxonomic studies. The American Museum of Natural History (AMNH) launched the Ambrose Monell Cryo Collection (AM-CC) to help meet the demand for properly documented frozen tissue specimens required by modern scientific researchers.

The Monell Collection maintains specimens in an array of liquid nitrogen cooled vats, at temperatures below -150 ° Celsius. Liquid nitrogen is a safer solution, since it does not require mechanical and electrical technologies to remain cold, and we also advocate a “colder is better” position on archiving tissues, particularly when the long-term use of the resource is undefined.

The Monell Collection supports ongoing genetic research by insuring that all research materials are vouchered (i.e. they point back to a specimen in a curated collection), a much-needed service that the Museum extends to the entire scientific community, under the guidance of an institutional policy. Scientists using the Monell Collection have access to legally collected, authoritatively identified and properly documented specimens for use in their research, complete with Museum catalogue numbers to reference in their scholarly publications.

The broad scope of the Monell Collection addresses an under-served niche within the cryogenic biorepository community by attempting to catalog all biodiversity at the molecular genetic level. We are further distinguished from other repositories because we exist within the framework of the American Museum of Natural History (AMNH), where tissue samples can be referenced with documented collecting events involving traditional voucher specimens and associated data. Here, modern bioinformatics initiatives will ultimately link collections with taxonomic determinations, bibliographic citations, geospatial referencing information, genetic data, digital images and photographs.

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3. Poster Presentation

Preserving the Ark: The Ambrose Monell Cryo Collection (AM-CC) at the American Museum of Natural History (AMNH)

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Ambrose Monell Cryo Collection American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024

In a time of massive species loss, natural history museums are poised at the forefront of biodiversity information access, especially concerning biomaterial collections used in modern genetic, genomic and taxonomic studies. Tissue collections are proving to be an extremely valuable resource to science. This is certainly true of the tissue collections at the AMNH. Yet the long-term viability of this resource is in jeopardy. While storing research materials in individual laboratories during their use is an acceptable practice, it remains an uncontrolled and potentially disastrous way of attempting to preserve valuable specimens over the long term. As both the value and amount of the research material grows, it becomes necessary to maintain it in a centrally managed repository with institutional oversight where standard procedures can be applied, and access and security better controlled. In this context, security means protection against physical disappearance or loss of integrity of the biological specimens through freezer failure, or loss of the association between the physical material and the data that supports it.

The American Museum of Natural History (AMNH) launched the Ambrose Monell Cryo Collection (AM-CC) to help meet the demand for properly documented and securely preserved frozen tissue specimens required by modern scientific researchers. The Monell facility uses sophisticated databases and environmental monitoring equipment to document storage conditions and locations. The AM-CC maintains specimens in an array of liquid nitrogen cooled vats, at temperatures below -150 ° Celsius. Liquid nitrogen is a safer solution, since it does not require mechanical and electrical technologies to remain cold. Furthermore, the database of the AM-CC links the tissue samples to their collecting events, their traditional voucher specimens and associated data. Here, modern bioinformatics initiatives will ultimately link collections with taxonomic determinations, bibliographic citations, geospatial referencing information, genetic data, digital images and photographs.

1. Angélique Corthals.
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3. Oral Presentation

Preparation of A Fossil Dinosaur: Learning from Conservation

Amy Davidson

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In 1994 the nearly complete fossil remains of a new species of oviraptorid dinosaur, *Citipati osmolskae*, were found in the Gobi desert of Mongolia. The preparation of this important specimen for study and publication posed numerous challenges due to the extreme fragility of the fossil and the request by the scientists that the bones be removed from the matrix and disarticulated as much as possible.

Collaboration with objects conservators in the Anthropology Department of the American Museum of Natural History proved an important part of the project. The combination of traditional fossil preparation techniques with the materials and approaches of object conservation resulted in several innovative solutions and proved a valuable learning experience for everyone involved.

The treatment of the fossil involved removing it from the matrix using a wide variety of tools and techniques. The bones were consolidated with Butvar B76 and joins were made with Acryloid B72. During the preparation and consolidation process glass beads, tin foil, plaster bandage, fiberglass and cellulose nitrate were used to create a variety of temporary supports. Permanent supports for the most fragile areas were fashioned using the sandy matrix mixed with Butvar B76.

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3. Oral Presentation

Design and organization of a small reproductive cryobank

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Voice-entry databasing

Matt Dean

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The utility of accurate electronic databases cannot be questioned. Nevertheless, time and money are often limiting factors hindering database growth. I will demonstrate a technique for voice-entry databasing that increases efficiency and accuracy of database entry. This technique combines the databasing software Microsoft Access with the voice recognition software Dragon NaturallySpeaking (disclaimer: I receive no benefit of any kind from either company). This system was used to database 953 mammal and 899 bird specimens, each containing up to 60 and 36 fields of data, respectively, including detailed ecological and morphological information. Total time spent was approximately 40 hours. At an electronic accession rate of approximately 46 specimens per hour, this approach yielded a substantial increase in data input efficiency over strictly manual techniques.

Advantages of the system include both speed and accuracy. Furthermore, the user's hands remain free for specimen or label manipulation. The major disadvantage is that user-specific speech files must be created which are not easily transferred among computers due to differences in background noise.

1. Matt Dean
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3. Oral presentation

Sharing Collection Resources: Dr. Roy Miner Collection

Delovio, Rachel Kaleilehua

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The Miami Museum of Science and Planetarium received the donation of the Dr. Roy Miner Photograph Collection in 1976. Miner (1875-1955) was Curator of Living Invertebrates at the American Museum of Natural History in New York as well as the developer of exhibits ranging from synoptic models to the Andros Coral Reef diorama in the Hall of Ocean Life. The collection contains images circa 1920's to the 1940's covering themes of scientific expeditions, exhibition development, ethnology, and pioneering underwater photography. Until recently, the collection was rarely accessed for exhibition, education, or research.

In 2001, the National Endowment for the Humanities awarded a modest grant to the Miami Museum of Science and Planetarium to support the rehousing and digitizing of the Miner collection. The inventory and data capture of these images advanced communication surrounding the collection and generated an on-line database on the Museum's Website. It also resulted in the development of an exhibit on Miner scheduled to open in the Spring of 2004.

The Miami Museum of Science and Planetarium intends to share images from this collection through loans to other museums across the country. In 2002, the Museum loaned images scanned from the Miner collection for use in the Hall of Ocean Life at the American Museum of Natural History. These images were used in exhibition, Website, and educational and promotional applications.

1. Rachel Delovio
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3. Poster Presentation

Moldy Mammals in Milwaukee

Del Re, Christine

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In January 1999, working in consultation with Natural History Conservator Catharine Hawks, MPM embarked an ambitious plan to stabilize the mammal collection that suffered mold growth while in cold storage. The mammal mold abatement project accomplished the following: a complete inventory and MS Access database of the 675 specimens; a scientific and research value assessment by the Committee on Systematics Collections of the American Society of Mammalogists; freeze drying of the skin specimens (skin moisture contents were lowered from 14-29% to 2-4% during freeze drying) followed by careful and detailed HEPA vacuuming; 70% ethanol baths (soaked a minimum of 48 hours) for still roughed-out moldy skeletal material; complete decontamination of both the hide cooler and its refrigeration equipment and all ductwork by BMS-Cat (a firm that specializes in disaster clean-ups). Mold plates were run after the decontamination process to confirm that the clean-up had been successful; the floors and walls of the hide cooler were patched, repaired and sealed with epoxy paint. All phases of the mammal stabilization project, and the clean-up of the cooler were completed in August 2001. In addition to the decontamination and clean-up process, based on recommendations from Catharine Hawks, the temperature in the hide cooler was raised from 32F to 65F, resulting in a decrease in relative humidity from around 65-75% to 45% where it has remained stable for the last three years.

1. Christine Del Re
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3. Oral Presentation

Recovery & Renovation of the Pentagon following 9/11: The Phoenix Project

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Original construction began on the Pentagon on September 11, 1941 and completed in just 16 months. Declared a National Historic Landmark in 1992, the Pentagon evolved without a major renovation or growth plan until the inception of the Pentagon Renovation Program in 1993. In addition to making the Pentagon compliant with current building codes, several safety and security measures were implemented as part of the renovation process. Despite the tremendous amount of damage caused by the terrorist attack on September 11, 2001, improvements made by the Pentagon Renovation Program helped save lives and prevent further destruction. The Pentagon Renovation Program challenged itself to rebuild from the damage and re-occupy the outer-ring of offices at the point of impact by the one-year anniversary of the attack. The first tenants moved back into these offices on August 15, 2002, 28 days ahead of schedule. The Renovation Program is continuing its plan to renovate the remaining 4.5 million square feet of Pentagon building space. The schedule for completion has not been delayed by the terrorist attack but actually advanced by four years, from 2014 to 2010, to incorporate lessons learned from September 11 into the rest of building. These lessons learned primarily address protecting Pentagon personnel from fire, blast and chemical, biological and radiological events. This is being accomplished through a dedicated work force, strong leadership and an innovative contracting approach.

1. Brett Eaton
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3. Oral presentation

Collections Theft: A Guide to Preventive Measures and Developing a Theft Response Plan

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Responding to a theft is like responding to a human-caused or natural disaster – the measures that those of us charged with protecting our cultural heritage should take both before and after the incident can minimize damage and facilitate recovery. This presentation provides an overview of the functions that come into play in a theft response and suggests actions to take before and after the incident.

Who will be involved in the theft if an artifact or valuable object is stolen? An effective theft response plan calls for coordinated effort from a wide range of people, including the museum director, collections manager, security manager, registrar, and public affairs person and will also include the institution's insurance broker and local law enforcement agencies.

What steps can be taken on both the prevention and response sides? Each "role" has a checklist of activities that should be initiated before and after the incident. We will review the suggested steps to be taken.

The time of a theft of collections is NOT the time to pull an action plan together!

The key to an effective theft response plan is the same key to effective fire prevention or emergency response: Taking active steps to prevent the problem, creating an action plan for effective and efficient response, and practicing the response through table-top exercises, drills, etc.

1. Wilbur C. Faulk
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3. Oral Presentation

ENCOMPASS™: A New Expandable Approach for Large-Scale, Multi-Format Sample Management

Fillers, William S.
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Traditional approaches to automating large-scale sample storage, retrieval and distribution have been limited to costly, customer engineered “cathedral” systems. Though these systems have met the capacity and process control demands of the select few, they present a number of significant implementation burdens and operational risks to many. Large-scale systems (>1M samples) are typically engineered to meet fixed capacity and throughput requirements, necessitating immediate capital investment to meet potential future storage needs. Custom development and construction of facilities to house the system is frequently necessary further expanding the cost and time for system implementation that, by design, provides no cost effective option for progressive expansion. Additionally, due to the complexity of these single-point-of-access systems, failures of individual robotic components can bring the entire sample management operation to a halt.

To address these challenges TekCel has developed Encompass, an expandable, large- scale sample storage and retrieval system configurable to specific customer requirements. Encompass employs a versatile system architecture based on TekCel’s Universal Storage Module (USM). USMs serve as functional building blocks combined to provide the capacity and format scope (plates, tubes, vials, racks) required by the customer’s operational needs. Standard environmental control and robotic elements, established in TekCel’s modular sample management systems (TubeStore, PlateStore, etc.), are utilized to meet desired throughput and sample processing specifications while maximizing sample integrity. Encompass systems provide the highest degree of flexibility to address customer workflow requirements and allow staged implementation to support process change and manage capital outlay.

1. William S. Fillers
2. 508-544-7000 x 221; steve.fillers@tekcel.com
3. Poster presentation

White Gloves & Bone Folders: Paper Handling in Natural History Collections for Non-Archivists

Flemming, Clare
The Explorers Club, 46 East 70th Street, New York, NY 10021

Members of the Society for the Preservation of Natural History Collections (SPNHC) know how to handle specimens, whether DNA samples or mammoth tusks. But how many of us know how to handle the paper and other archival documents in our collections? Unique, often fragile, highly varied, natural history archives are as much a part of the specimens they document as are the teeth from a T. rex skull. Archivists and conservators have long been concerned with the state of paper materials in their care, and lately the worm has turned: now we see curators, researchers, and support staff paying attention to the irreplaceable value stored in the paper burden of their collections. Presented here is an illustrated demonstration of essential tools and techniques to guide the non-archivist in the care and proper handling of paper-based materials (e.g., manuscripts, photographs, field notes, maps, tags). Best practices, current thinking, and worse-case scenarios from the archivists perspective are illustrated with examples from the collections of the American Museum of Natural History and The Explorers Club.

1. Clare Flemming
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3. Oral Presentation

The National Biological Information Infrastructure – Technologies and standards for biodiversity data

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Looking out an office window or exploring a community park, one can easily see the tremendous challenges that biological information management and delivery presents. Biological information varies in format, content, distribution depending whether or not it is information pertaining to a particular species (i.e. Brown Tree Snake), or a specific ecosystem, which often includes multiple species, land use characteristics, and geospatially referenced information. The complexity and uniqueness of each individual species or ecosystem do not easily lend themselves to today's computer science tools and applications. To address the challenges that the biological enterprise presents, the National Biological Information Infrastructure (NBII) (<http://www.nbio.gov>) was established in 1993. The National Biological Information Infrastructure (NBII) serves as an electronic gateway to biological data and information products maintained by federal, state, and local government agencies; non-government institutions; and private sector organization in the United States and around the world. The NBII is also designed to address these issues on a national scale and regional scale within the United States, and through international partnerships abroad. This presentation discusses current computer, geospatial, and information-science efforts within the National Biological Information Infrastructure Program to aid in the development and implementation of regional and thematic nodes throughout the country.

1. Mike Frame
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3. Oral presentation

Large scale repository design

RJ Frome, PM Baird
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Background/Problem: The design of a large repository is an exercise in highly detailed planning. Decisions made in the process effect the operation, effectiveness, and costs for years to come.

Methods/Tools: This paper discusses many of the elements to be considered, including such aspects as floor space, electrical planning, HVAC requirements, workflow, security, monitoring, data and communications system considerations, equipment, safety, and general operation. Use of design criteria and principle cost drivers are necessary.

Results: A large-scale repository differs from most small-scale design in that it typically involves establishing a dedicated facility. The resulting economies of scale permit the cost effective use of automated systems and greater redundancy in providing for the security of the material being preserved. By the same token the greater volume and concentration of equipment place high demands on such services as electrical power and air conditioning, which must be considered in the base facility design.

1. Richard Frome
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3. Oral presentation

The National Children's Study: Status and role of repositories in a longitudinal study of environmental influences on children's health and development

Galke, WA
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The National Children's Study is a longitudinal cohort study of environmental influences on children's health and development. Mandated by the Children's Health Act of October 2000, the National Children's Study is a partnership between the Department of Health and Human Services (DHHS) and the U.S. Environmental Protection Agency. Within the DHHS, the National Institute of Child Health and Human Development (NICHD/NIH) is the lead agency for planning and implementing the study. The National Institute for Environmental Health Sciences (NIEHS/NIH) and the Centers for Disease Control and Prevention (CDC) are also important contributors to the overall planning. Planning and protocol development for the National Children's Study is well underway, and the study is expected to enroll participants in 2006. Current information about the study may be obtained from the website: www.NationalChildrensStudy.gov.

The National Children's Study will enroll women as early as possible in pregnancy, and perhaps some before conception, and will follow their children into adulthood (approximately 21 years of age). Outcomes of interest include pregnancy outcomes, growth and neurobehavioral development, asthma, injuries, and obesity and physical development. The environmental factors to be studied include chemical, physical, biological, behavioral, and social factors, as well as genetic factors and their interactions with the environment.

The study will directly address a set of specific hypotheses that have been developed through an intensive public process that require a study of about 100,000 children. However, a key outcome of the study is the planned capacity to address as yet unknown hypotheses that may arise during the implementation of the study. The planned large-scale repository of environmental and biological samples will facilitate this goal. Current status of repository planning will be presented.

1. Warren A. Galke
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3. Poster presentation

AIDS and cancer specimen resource: A resource for HIV reservoir research

DL Garcia¹, L Ayers², S Silver³, J Orenstein³, S Lamers⁴, MS McGrath⁵

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AIDS and Cancer Specimen Resource, Central Operations and Data Coordinating Center
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Background: The National Cancer Institute (NCI)-funded AIDS and Cancer Specimen Resource (ACSR) is the country's leading nationwide multi-site source for documented tissue and biological samples serving investigators working in the fields of HIV/AIDS and related cancer, virology, immunology, pathology, epidemiology, tumor biology, assay development, as well as others. Technologies available through the ACSR include the production of tissue microscopic arrays (TMA) and access to HIVbase, new software capable of sophisticated HIV genetic sequence analysis. The purpose of this ACSR pilot study was to test whether tissues available for TMA analysis would have HIV DNA present at levels and complexities sufficient to advance HIV tissue reservoir research.

Methods: A disease category cross section (>100 specimens) of cryopreserved blood cells, frozen and fixed tissues from HIV infected patients were obtained through the ACSR after approval of an LOI and review by the ACSR independent research evaluation decision panel (REDP). HIV copy number was evaluated using quantitative PCR and HIV genetic complexity was analyzed using HIVbase.

Results: HIV DNA levels of greater than 1 per 10,000 /genomic equivalents was present in: >1/3 of lymphoma and KS tissues, >1/3 of lymph nodes, <10% of non-lymphoid controls, >50% of PBMC CD4 and >30% CD14 cells separated from early and late stage patients. TMA studies identified the HIV DNA containing lymphomas as containing HIV p24+ macrophages. Lymphoma DNA sequence analysis of 3 cases showed the HIV's to be consistent with macrophage tropic strains of virus and have a low level of diversity as compared to control tissues.

Conclusion: The ACSR controls and has access to a large quantity of high quality specimens suitable for evaluating HIV tissue reservoirs, HIV phylogenetic relationships and histologic characteristics for a broad spectrum of HIV-related diseases. The availability of TMAs and HIVbase analysis software facilitate analyses.

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Challenges in developing a pediatric leukemia reference lab management and banking system

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Columbus Children's Research Institute

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Background/Problem: In 2003 our laboratory became the second Molecular Reference Laboratory for the Children's Oncology Group (COG) Acute Lymphoblastic Leukemia (ALL) committee. Genetic stratification of pediatric ALL specimens is critical for the risk-based treatment approaches used by the COG and allows for research on banked samples with well-defined genetic alterations. We aimed to develop a database that would link patient registration/clinical data with molecular testing results and repository information for the corresponding specimens/nucleic acids. Our challenge was also to allow for links with the other Molecular Reference Lab at the University of New Mexico and the COG data center.

Methods/Tools: A relational database was created using MS SQL and a Visual Basic application layer with an integrated web-based interface to facilitate input of results from our off-site partner testing lab.

Results/Conclusions: Within the database, each lab process is a separate module. The major components include registration (with automated download of COG information); sample processing/aliquoting; DNA, RNA, and FISH pellet preparations; result entry for RT-PCR and FISH; and banking/distribution sections. All modules include automatic calculations and printable worksheets for technologists to use at the bench. The work flow of the molecular and FISH testing includes a screen for “ordering” tests, the ability to access all pending assays by date due, and a tracking system for the lab director to monitor pending cases. The system allows for verification of technologist entry, ordering by a manager, and case sign out by directors. Generation of barcodes for all banked specimens, nucleic acids, and FISH pellets is integrated into the database. The system has multiple search capabilities including a patient history screen that allows a user to determine all specimens ever received on a patient, view test results, and determine the quantity and location of residual banked material. Security to maintain patient information is included.

1. Julie M. Gastier-Foster
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3. Oral presentation

Increasing the value of regional collections through collaborative efforts: an online resource center for herpetology in New Mexico

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** Charles Darwin Foundation, Puerto Ayora, Galápagos Islands, Ecuador

Traditionally, university and other agency researchers are the primary users of regional natural history collections. The general public, however, who provides much of the support for such collections, rarely takes advantage of the expertise of museum collections, personnel and auxiliary materials, including maps, reprints or books. Furthermore, the availability of information is often unknown, resulting in a spiraling trend of non-use by a broader array of people. As recently reported in the literature, financial support of natural history collections has declined greatly, causing the closure of several museums. Perhaps the lack of use and appreciation by the general public is related to declining support. As a test of that hypothesis, currently the Museum of Southwestern Biology, Division of Amphibians and Reptiles is starting to establish an authoritative and centralized web-based resource center on New Mexican amphibians and reptiles. This is a collaborative effort, which includes the Centennial Science and Engineering Library at the University of New Mexico, and the New Mexico Department of Game and Fish. The Division is working with various scientists, librarians, educators, and biologists to develop an integrative website that will provide a gateway to information on New Mexico amphibians and reptiles. Our objectives include: providing a complete and searchable bibliography, photographs, selected field data, and information on each species; and providing downloadable PDF files of documentation related to past research on each species, such as unpublished reports submitted to the Division and the New Mexico Department of Game and Fish. One of the most unique aspects of this project is that all information will have a geographical component and will include links to a mapping interface. Users will be able to access information for specific locations or regions and, vice-versa, view the spatial extent of the information selected. We are working on designing a simple and intuitive interface to provide information, making it accessible to both the professional and the public, including middle-school students, and consequently reaching a wide audience. Additionally, because of existing cooperation between the Division and the Charles Darwin Foundation, we will be adapting parts of this project to provide information on herpetology in the Galápagos Islands, Ecuador. Aside from becoming a portal to collections of amphibians and reptiles housed both at MSB and at the Charles Darwin Research Station, we also provide other resources, such as GIS (Geographical Information Systems) data to researchers. We hope that this project will serve as a template for other regional collections and will stimulate cooperation between libraries, museums, and federal and state agencies to increase the educational value of public assets.

1. Tom Giermakowski
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3. Oral Presentation

Bringing Order out of Chaos: The Curator's Role

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Nothing is more chaotic than the scene following a major disaster, and any museum can fall victim on its own or as part of a larger event. The realities of the post-9/11 world require special responses from curators to safeguard and salvage their collections. These include:

1. Advance training and networking with law-enforcement and emergency-services authorities
2. Special awareness of procedures in HAZMAT, evidence collection and chain-of-custody, and the Incident Command System (ICS, which is our national emergency disaster plan)
3. Knowledge of health and safety issues that affect on-site activities

All of these issues arise in the often prolonged and difficult aftermath to a disaster, which is when curatorial skills and expertise are most needed. The realities of this important work, especially in the field recovery of specimens, may be harsh. In other words, it isn't for everyone. The question is: Is it for you? And, are you up to it?

1. Richard Gould
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3. Oral Presentation

Lessons from a Fire in a Natural History Museum

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Fourteen years after a fire in the Royal Saskatchewan Museum left a layer of soot over exhibitions and collections, the lessons learned from the event continue to inform a conservator's work. Examples include:

- 1) The development of guidelines for contractors working in museums
- 2) Advice regarding the design and maintenance of fire detection and suppression systems
- 3) The design of exhibition and storage spaces
- 4) The cleaning of specimens and artifacts

Above all, the need for emergency planning in order to prevent or mitigate disasters in museums is reinforced with every loss. Hard-earned advice from the Saskatchewan experience is still valid today, whether it is inviting the local fire department to tour the museum or proofing cases and cabinets against dust and soot.

1. Fiona Graham
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3. Oral presentation

Collaborative Emergency Planning: Building Partnerships Outside-In

Gregory, Dale Marsha
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Challenged by Emergency Planning in your institution? Discover how NYC Museums, Libraries, and Cultural Institutions responded to the aftermath of 9/11 by developing a collaborative framework for an emergency plan and shared resource network. Learn how local professional networking meetings can strengthen and develop your resources and help prepare for the unexpected. Samples of Museum, Library and Cultural Properties Facility Group of Greater NYC meeting announcements, agendas and notes will provide a model for forming a local networking group and collaborative planning committee of your own.

1. Dale Marsha Gregory
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3. Oral presentation

Performance of liquid handling robotics in preparing plates for genetic analysis

Hanner, RH; Bender, PK; Beggs, WR; Maista, C; Toji, LH
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Genomic investigations emphasize high throughput methods to screen large cohorts at many loci. Thermocyclers, capillary electrophoresis, Real Time PCR, and even microarray assays are migrating to 96 and 384 well plate formats. These high throughput methods increasingly place the bottleneck in the process on the preparation of the plates. In genetic applications,

often small amounts of DNA in aqueous solution must be transferred into multi-well plates and, due to the sensitivity of today's assays, cross contamination cannot be tolerated. The Coriell Institute has been evaluating robotic liquid handling instruments for the preparation of multi-well plates. A protocol was designed for testing demonstration instruments from four different manufacturers. A fifth manufacturer refused to participate, claiming that pipetting DNA exposed their employees to a biohazard. The protocol tested the coefficient of variation (CV) of repetitive pipetting 1 to 5 microliters, and the cross contamination between samples. The instruments were required to array 16 samples of water and DNA into a 96 deep-well plate such that each sample was replicated in 6 wells. Into this deep-well plate, the robotics added diluent and mixed the samples. From the deep-well plate, the robot prepared PCR-ready daughter plates by repetitively transferring small volumes from the deep well plate. The daughter plates were assayed for DNA content in a PicoGreen assay and replicate plates were assayed for cross-contamination by DNA fingerprinting with six microsatellites. Of the four instruments tested, two prepared PCR-ready plates with noticeable cross-contamination and two performed miserably in their CV values. No instrument was able to complete this simple protocol successfully. All manufacturers claimed that the shortcomings with their instruments occurred because the demonstration units were worn and out of calibration. Nevertheless, based on our results no instrument could be recommended for the preparation of plates for downstream genetic analysis.

1. Robert H. Hanner
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3. Poster presentation

A Strategy to bring the Geological Survey of Canada's (GSC) Geoscience Data and Collections Online

Hardy, Iris A.

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Historically, physical collections and their information management needs had been designated as a divisional responsibility with little or no coherence between divisions or regions and little or no corporate-wide direction. Under the new revised and evolving program structure, collections had neither quite been subsumed by individual programs nor completely and clearly designated to a particular program.

One main objective for the 2003-2004 year was to create and conduct a survey of the nature and information practices of GSC Collections, to compile and summarize the survey results, to document the observations made on the best methods, standards, procedures and practices utilized by the GSC for all geoscience collections and to make recommendations on next steps based on the results and those observations. This included an assessment of software, technologies and data management initiatives, with the ultimate goal to introduce procedures for data capture and eventual population of this data through a Geoscience Data Repository (GDR).

An overview of the submitted responses together with some observations as to how an information system for the GSC, can ensure a consistent and reliable geoscience information flow from samples collected in the field, processed by laboratories, and stored into related corporate geoscience databases and archives is presented.

1. Iris A. Hardy
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3. Poster Presentation

Challenges in developing a pediatric leukemia reference lab management and banking system

JM Gastier-Foster^{1,2}, M France-Dyckes¹, R Neville¹, Y Moyer¹, E Fagan¹, M Hartzl¹, C Wilhelm¹, M Stuart¹, SJ Qualman^{1,2}
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1. Julie M. Gastier-Foster
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3. Oral presentation

Solid-state protein archiving: GenVault technology

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Background/Problem: Modifications of the GenVault storage technology for the solid state, room temperature storage and retrieval of protein.

Methods/Tools: In experiments described here, we demonstrate room temperature storage and retrieval of serum proteins on a number of different treated paper supports. In all instances, fresh serum was applied to a 6mm paper disk (10 microliters each) followed by air drying and storage of the disk in one well of a sealed 384 well plate at 25, 37 or 50 degrees Celsius as part of an ongoing stability study. Samples were then rehydrated by addition of distilled water, followed by fluorescence quantitation of overall protein recovery. Data have been accumulated up to day 218.

Results: Although no commercially available paper substrate can adequately support protein storage and recovery, it is shown that certain modified paper substrates allow for nearly complete polypeptide recovery. For those several improved treatment combinations, we demonstrate that the protein complement of serum can be recovered intact from a 6mm paper disk with greater than 95% efficiency at 1.1+/-0.1mg of recovered protein per disk, independent of storage time or temperature. Western blot analysis was performed with antibody probes specific for oxidized protein. These data demonstrate modest but finite oxidation of amino acid side chains during storage, via a process that appears to be temperature independent. Additional Western blot analysis using probes specific for phosphorylation show no measurable storage temperature dependence. Data acquired on the Luminex bead platform demonstrate greater than 90% (of 165 analytes) retention of analyte activity during storage out to 218 days.

Conclusions: Based upon modifications which are currently under evaluation at GenVault, it seems likely that a dry-state, room-temperature serum protein storage half time of 5-10 years is achievable in the near term.

1. Mike Hogan
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3. Oral Presentation

Strategies to address the challenges of multiple locations and databases in a large epidemiologic study

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The Laboratory Core of the Children's Environmental Health Center at UC Berkeley (www.ehs.sph.berkeley.edu/chamacos) collected, processed, and banked more than 50,000 biological and environmental samples from a unique cohort of 600 Latina women and their children in the CHAMACOS study focused on health effects of pesticide exposure. CHAMACOS involves a complex network including field office and collection locations, core laboratory, sample storage repositories, and analytical laboratories. Several strategies have been developed to address issues of: 1) multi-level communication; 2) multiple processing and storage locations; and 3) multiple databases.

Easy-to-understand flow-charts and single-page bulleted instruction sheets in addition to SOPs were useful in assuring compliance by field staff and hospital clinic/laboratory personnel (Holland NT, Smith MT, Eskenazi B, Bastaki M (2003)

Challenges of Biological Sample Collection and Processing for Large Epidemiological Projects. *Mutat Res/Rev* 543: 217-234.). Regular follow-up and refresher training, as well as discrepancy or problem reports, were effective for tracking and eliminating problems. Bilingual staff ensured good communication with the Latina cohort. Quality control procedures established in pilots assured that samples were not compromised during collection over a diverse geographical area or when shipping from the field to analytical labs. CHAMACOS Biorepository low-temperature freezers are in diverse locations to assure that samples are not lost as a result of a disaster. Remote monitoring, backup power, and temperature charts to monitor freezer performance, as well as backup storage space, are essential for pre-empting emergencies. Customized, compatible Access-based databases were designed for tracking participant and sample information in the Biorepository. Reports and queries linking tables in the databases assist at all stages, from collection to analytical results. Weekly flags highlight problems in a timely manner. Regular inventory of samples within the laboratory database reveal problems with sample location. These strategies, outlined in our QA/QC plan and strictly enforced at each step of the project, helped to overcome many of the obstacles faced by the CHAMACOS study (Eskenazi B, Bradman A, Gladstone E, Jaramillo S, Birch K, Holland N (2003) CHAMACOS, A Longitudinal Birth Cohort Study: Lessons from the Fields. *J Childr Health* 1: 3-27.).

1. Nina Holland
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3. Oral Presentation

Sharing data versus sharing databases: the merits of centralized systems

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Initiatives such as the Global Biodiversity Information System (GBIF) and the Mammal Network Information System (MaNIS) now provide access to specimen data, and hence biodiversity data, via distributed providers on the Internet. As exciting as this is, these initiatives are largely limited to "label data" from institutions that already have information systems in place. More capacity is within easy reach.

A single database can serve many institutions regardless of its physical location. Electronic commerce and banking show that deep relational data can be distributed, gathered, and managed using secure and reliable Web applications. Thus, the technology exists to not only share data, but also to share the sophisticated computing resources that good biodiversity data require. Systems that authoritatively encompass and represent the imprecision and ambiguities intrinsic to centuries of human assertions about biodiversity are expensive to build and maintain. But as centralized, shared systems these would be less expensive than the combined IT budgets of even a few mainstream institutions. Participation in such systems could easily be subsidized for institutions in the Third World where biodiversity is highest.

The Arctos database at the University of Alaska Museum (UAM) is a prototype for such a centralized system. Developed in collaboration with Berkeley's Museum of Vertebrate Zoology, it embraces an engineered data structure that now extends beyond vertebrates to specimens of any life form. All data are entered and manipulated through Web compliant applications, many of which are extensions of the public interface. Usage of specimens is documented through both project descriptions and through full citations of literature; images are stored and displayed; specimen records are linked to and linked from DNA sequences at GenBank.

Arctos is extending beyond UAM. The paradigm suggests a rapid method for distributing sophisticated technology to under served collections.
(arctos.database.museum)

1. Gordon Jarrell
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3. Oral presentation

Overview of IATA/ICAO and the New DOT Transport Regulations for 2004

JP Johnson
QuickSTAT, 7271 Bluffside Court, Raleigh, NC. 27615, USA

This brief presentation will provide attendees an overview of the new regulations affecting how biological supplies and samples are transported. This will NOT be a dry summary on the regulations, but instead a supplement session providing hands-on-tools and references to help attendees meet the new regulatory requirements.

Significant regulatory changes are now in effect that could dramatically change the way certain types of clinical samples are transported domestically and internationally. As a result of the 2003-2004 regulatory amendments to the ICAO/IATA regulations, specimens known or suspected of containing pathogens meeting the criteria for risk groups 2 or 3 may be transported as "diagnostic specimens" when transported for diagnostic or investigational purposes. At the same time, new Department of Transportation (DOT) regulations require human or animal material shipped for the same reason to be properly packaged, marked and labeled.

These changes could bring huge savings for some and additional costs for others. Countries and airline carriers also have the right to make their own (more restrictive) variations to these regulations. It is important that everyone shipping supplies and samples be in compliance with new requirements.

1. Jay P. Johnson
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3. Poster presentation

Sample collection in emerging markets

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The logistical challenges faced when conducting sample collection in emerging markets are numerous. Addressing the transportation and distribution issues when planning will help to avoid potential pitfalls in the clinical logistics process. Ensuring that supplies get to remote locations and time/temperature critical biological samples reach their destinations are always of paramount importance. Transportation and distribution planning is sometimes overlooked when preparing for a major clinical sampling. As more sponsors look towards investigators and their patient populations in Latin America, East Europe, India, China, etc to participate in clinical studies, the issue of effectively transporting specimens and clinical supplies in/out of these areas is becoming more formidable. Determining logistic feasibility is a critical first step before investigator sites can be selected. Considerations include many forms including lengthy export permit application processes, limited export flight options and restrictive customs regulations. All of these issues can severely impact the success and need to be considered before sites are initiated and patients enrolled. Attendees will learn how investigator sites, the central lab, CRO, sponsor and clinical supply groups can work and plan together to minimize these challenges, maximize efficiency and ensure logistical success.

Consent and confidentiality: Responsible specimen distribution

1. Jay P. Johnson
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3. Poster presentation

Bridge Building 101: Partnerships for Collection Risk Management

Kronthal, Lisa*; Muething, Garnet** and Waller, Robert**.

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** Canadian Museum of Nature, P.O. Box 3443, Station D, Ottawa, ON, K1P 6P4

The American Museum of Natural History (AMNH) holds more than 30 million specimens and artifacts in dozens of interconnected buildings within several divisions. Recent concerns about disasters (both man-made and natural) together with observations of ongoing deterioration led to a need to identify priorities in order to address collection care issues throughout these vast and widely dispersed collections. An Institute of Museum and Library Services (IMLS) conservation assessment conducted in 1997/98 recommended training in risk assessment and management for staff development. The AMNH, through shared support by the Office of the Dean of Science for collections and the Senior Vice President for Operations had the Canadian Museum of Nature (CMN) deliver a workshop "Assessing and Managing Risks to the Collections of the American Museum of Natural History". Following the training the AMNH has applied the risk assessment approach in stages. This approach is collaborative between departments within the museum and between the AMNH, the CMN, and other external sources of expertise. AMNH staff within Collections, Security, Facilities Operations and Operational Planning needed to clearly communicate their needs, expectations, constraints and limitations. In doing so, they built bridges of understanding and mutual appreciation. Externally, the AMNH worked with the CMN to borrow established practices wherever possible, to ensure consistency of approach, and to benefit from peer review of results. They will need to work with external agencies such as Federal Emergency Management Agency (FEMA), United States Geological Survey (USGS), and National Oceanic and Atmospheric Administration (NOAA) to understand the severity of rare and catastrophic risks. Many bridges both internal

and external are being established or strengthened in ways that will improve the long-term preservation of collections.

1. Lisa Kronthal and Garnet Muething
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3. Oral Presentation

Consent and confidentiality: Responsible specimen distribution

Kucharski, LM; Wyza, M; Drzayich Jankus, D; Foulds, J; Whalen, CC; Boom, WH.
Case Western Reserve University, Tuberculosis Research Unit, School of Medicine, E202, 10900 Euclid Avenue, Cleveland, OH, 44106, USA

The Tuberculosis Research Unit's Specimen Repository was established to maintain and distribute high quality clinical specimens obtained during approved TBRU research studies. Samples were collected from subjects who were screened and enrolled into various clinical research studies coordinated by the Unit. Although all of these samples were collected under institutional review board-approved protocols, retention and future usage in separate studies required additional consideration. Historically, research subjects were not specifically asked to consent or decline to the future use of samples, although consents routinely advised them that their samples could be retained. It is widely recognized that such samples are too valuable to simply be destroyed. In the past twenty years, there have been many examples of the unanticipated research value of such well-characterized samples. However, it is clear that such samples should only be used if subject confidentiality is carefully maintained.

The potential long-term value of research specimens is now apparent. Following the release of the National Bioethics Advisory Commission (NBAC) report in 1999 addressing this concern ("Research Involving Human Biological Materials: Ethical Issues and Policy Guidance"), subjects were given an explicit and separate consent opportunity to allow or disallow the retention and future use of their samples. In 2001, an additional option was added to allow the subject to consent to the use of their samples only if stripped of identifying data.

We have developed an IRB-approved protocol for maintaining and distributing samples to qualified researchers. Our protocol stipulates that personal identifiers be removed from samples that were collected without specific consent for future usage. Samples obtained with specific usage consents are retained or destroyed according to subject's wishes. Investigators outside the research collaboration under which the samples were collected are required to prepare their own protocol and obtain separate IRB approval prior to obtaining samples from the repository that have not been anonymized.

1. Lisa Jucharski
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3. Poster presentation

Data management of a multi-site international specimen repository

LM Kucharski, D Drzayich Jankus, J Foulds, CC Whalen, WH Boom
Case Western Reserve University, Tuberculosis Research Unit, School of Medicine, E202, 10900 Euclid Avenue, Cleveland, OH, 44106, USA

Background/Problem: The Tuberculosis Research Unit coordinates clinical and epidemiological studies in four countries and has established a Specimen Repository to maintain and distribute specimens not utilized during these projects. TBRU specimens are processed and stored at six different laboratories, each with its own data management needs. An efficient repository should maintain a central dataset that includes specimen description, location, and test result data. Relevant patient demographic, clinical, and consent information must also be incorporated. Here we describe our approach to integrating laboratory and clinical data to manage our Specimen Repository.

Method/Tools: Our diagnostic, immunology, and microbiology laboratories all have unique data management needs beyond those of the Repository. In addition to capturing specimen data, laboratory data management addresses experimental result reporting and laboratory workflow. Data relevant to the specimen repository is routinely exported from laboratory datasets. These data are easily integrated because common data fields are standardized. Additional patient demographic and clinical data from each site's coordinating center are routinely integrated into the central Repository dataset as well.

Results: To date, this process has been implemented in four laboratories in two countries. In the future, we will expand our laboratory data management to our other sites to facilitate a complete, collaboration-wide Specimen Repository dataset.

Conclusions: We have found that data management for a multi-site, international specimen repository is best approached by first addressing the specific data management needs of the laboratories where specimens are initially collected, processed, and stored.

The TBRU has developed a data management plan that will coordinate relevant specimen repository data from multiple sources into a useful and complete dataset.

1. Lisa Kucharski
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3. Oral Presentation

The Global Biodiversity Information facility

M Lane

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In very broad strokes, biology can be thought of at three levels of organization: molecular/genetic, species, and ecosystem. The raw data of the molecular level are nearly all digital, as are many of those for the ecological level. However, the raw data of the species level (where they are found - physiology, morphology, etc.) are almost all not digital. However, there are developments in informatics at each of these levels that can be of service to the others. The Global Biodiversity Information Facility (GBIF) was established to enable the digital capture and dissemination of data related to natural history specimens (including those in culture and other living collections), of which there are an estimated 1.5 billion in 6000 collections worldwide. Selection of the data to be digitized must be project-driven, because the funding needed to digitize all existing specimens wholesale is lacking. Thus, specimen data for species of economic or conservation importance, or research interest, will receive attention first. However, another of GBIF's tasks is to generate an Electronic Catalog of Names of Known Organisms, which is the element needed to enable data-mining across all three levels in a single query. GBIF's work at the species and specimen levels of biological organization can be thought of as unifying the biological information domain. In addition, it provides worldwide coordination among the many ongoing digitization, standards development, and networking efforts within biodiversity informatics.

1. Meredith Lane
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3. Oral presentation

The living will of an endangered species: partnerships with zoos and aquaria

Lehn, C.

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The development of partnerships between zoological parks/aquaria and repositories can impart great advantages to each collection. Many zoos currently maintain biological samples collected from their animals in freezers located on zoo grounds, however the curation of these samples is oftentimes very limited. The advantage to a zoological park in transferring samples to a repository is that the responsibility for the curation and distribution of these samples is also transferred. The advantage to a repository, whether it is a natural history museum or a tissue bank, in accepting samples from a zoo can be found in the diversity of animals represented in zoos, as well as the information accompanying the material. Records from zoo animals contain information not readily available from animals in the wild, including pedigree, health records, and behavioral information. For rare and endangered species in captivity it is recommended that arrangements for the disposition of biological materials is made in advance of the death of the animal. Pre-arranged plans ensure that material is collected properly and that all requested material is transferred to the appropriate researchers and partners.

A possible reason that so few partnerships have been formed between zoos and repositories may simply be a lack of communication between institutions that leads subsequently to a misunderstanding of process and purpose for each. The American Zoo and Aquarium Association has recently formed a Scientific Advisory Group to assist and advise its 200+ accredited institutions in the collection, curation and distribution of biomaterials. It is our hope that the Biomaterials Banking Advisory Group can facilitate the much needed communication between institutions.

1. Cathi Lehn
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3. Poster presentation

A Report on the Conservation Condition Survey of the Akeley Hall of African Mammals

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** Exhibition Department, American Museum of Natural History

The dioramas of the Akeley Hall of African Mammals at the American Museum of Natural History in New York City are widely recognized as the finest examples of a distinctive art form that was used as a method of environmental education by natural history museums in the first half of the twentieth century. Their preservation is important for two reasons: first, as representations of an art form unique to a particular historical period that will not and cannot be replicated today; and second, as scientifically accurate representations of pristine habitats and species that have since been seriously threatened or have even disappeared. From October 2002 through October 2003 a condition survey was carried out of the 28 dioramas in the Akeley Hall, as well as of the group of eight mounted elephants. This report represents the work carried out by a group of staff members at the American Museum, as well as the consultants that were hired as part of the project. The project was carried out with the support of the Getty Grant Program.

Pre-planning stages for the survey included compilation of historical information related to the hall for distribution to all survey participants, design of access platforms within the dioramas to provide access to specimens and paintings, air quality monitoring in the dioramas, and long-term monitoring of the temperature and relative humidity in the dioramas, as well as in the hall.

The actual survey was carried out in three phases to provide for minimal closing of dioramas and to keep the hall open to the public. The body of the survey included assessments of the mostly-mammal and ornithological specimens in the hall, and assessment of all foreground materials and of the background paintings in the dioramas. In addition, evaluation of the HVAC system in the hall, its capacity as well as its current operation, was performed. The current lighting strategy was documented, light levels were recorded and recommendations for future lighting strategies using less damaging, lower energy equipment was recommended. A lighting mock-up in one diorama was carried out to test the efficacy of the proposed lighting fixtures. Micro-samples from specimens and paintings were analyzed to help resolve issues related to deterioration and prior restoration.

The final stage of the survey, the pre-implementation stage, is currently underway. Activities associated with this stage involve further analyses to resolve health and safety issues and to help plan for the course of implementation, as well as its costs. As there are no standard techniques for the preservation of museum dioramas and because many other natural history museums have exhibits from this same period with similar conservation challenges, this project is of considerable importance as it creates a model conservation plan that others can use as a resource in addressing the needs of their own diorama exhibits.

1. Judith Levinson and Steven Quinn
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- Oral Presentation

Lesson in Integrated Pest Management (IPM): The Herbarium of the Academy of Natural Sciences, Philadelphia.

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In the early 1980s, one of the first open-faced compactor systems, adapted from library storage systems, was installed in the Academy's herbarium. After installation it was quickly realized that non-standard 'cubby' size was contributing to specimen damage by causing the sheets to torque, and an inefficient gasket system was allowing pests to infest the collection. In addition, the herbarium's location on the top floor caused the environmental conditions to fluctuate, most importantly creating a warm, humid spike beginning in early spring ideal for the life cycle of the main pest, *Lasioderma serricornis*, the Cigarette beetle.

In 2000, when new staff arrived, it was immediately obvious that an IPM protocol needed to be established. Upon evaluation, two procedures were initiated, pheromone trapping and specimen freezing. Pheromone traps were stratified throughout the herbarium and frequent counts were conducted. Trapping proved highly effective and based on monitoring, infestation 'hot spots' were identified, allowing us to concentrate the freezing effort on these areas. An inventory of the plant families prioritized the freezing of specimens that were most susceptible to damage. Specimens were frozen for one week at -20°C. To avoid reinfestation upon return to the compactors the folders were heat-sealed in polypropylene bags; bags of specimens were individually labeled to facilitate retrieval. In 2002, we were awarded a National Sciences Foundation grant to upgrade to modern, steel cabinetry and provide climate control. The new carriages and cabinetry were installed in fall of 2002.

Soon after the movement of the specimens into their new cabinets we noted, to our alarm, that beetle larvae were present in the doorsills. Further, the larvae were witnessed within a few days after the cabinet's entire specimen holdings had been frozen. Experimentation proved that the larvae were, in fact, coming from specimens that had recently been frozen. These larvae were studied in consultation with our Entomology department and positively identified as *Thylodrias contractus*, the Odd beetle. A literature search revealed that the most likely hypothesis for the sudden appearance of these beetles after freezing was that cold followed by warming acted as a natural trigger for the hatching of this temperate beetle. Further, it seems likely that the Odd

beetles were scavenging the dead Cigarette beetles as a primary food source because they do not typically eat dead plant material. As the Odd beetle is a major pest of dried animal specimens, and thus poses a threat to other collections, the freezing regime was changed to two weeks at -25°C and we have not witnessed any larvae since.

1. Sasha Eisenman
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3. Poster Presentation

Protection of collection-based data resources: Proactive vs. Reactive thinking

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Two parallel thought processes are necessary to protect collection-based printed and electronic data. A manager needs to have backups of data to react to an event causing the loss of data while at the same time being proactive in trying to prevent situations that could lead to data loss. Proactive thinking about collections data starts with an assessment of the threats to those data. Issues of concern in a risk assessment may include theft of computer equipment, hard drive and other storage media failures and other physical risks to computer equipment and printed records from fire or water damage. Data loss may also occur through corruption or exposure from malicious internet viruses or hacking, and damage to data by disgruntled employees. Proactive measures such as improved physical security, network security training, maintenance of network security, and measures that allow reaction to an incident such as developing an incident response team and developing a backup system may emerge as priorities from a threat analysis. A good backup scheme involves analysis of what data to backup and how often it should be backed up including an analysis of how frequently the data changes, the time required to re-capture any missing data, and the time the recovery process will take. Some data may require evaluation on an economic scale, where the time the information is unavailable may cause financial loss to be incurred. Any backup scheme should include tests to make sure that the original data can be restored from backup, checks of the integrity of each backup copy, and offsite storage of backup copies. Appropriate measures should be taken to protect paper documents from fire and water damage such as publication and distribution of type catalogs, storage locations and containers that minimize risks, storage of microform copies in water and fireproof safes.

1. James Macklin
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4. Oral Presentation

The Effects of Acetone on Keratin

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Acetone is a solvent commonly used in the conservation treatment of keratin, such as stain removal, recovery of wet-site archaeological objects, textile cleaning, etc., as well as in some preparation steps for natural history specimens. A number of studies have shown that acetone affects the physical properties of keratin. However, little has been reported about the chemical changes correlated with these variations in the physical properties of the fibers. We treated a set of samples with an acetone/water solution for different periods of time, and tested its physical properties before and after treatment. We also conducted amino acid and FTIR analyses.

The data indicate that the acetone/water baths had a significant impact upon the properties of new wool samples. Among these properties, percent strain at maximum load, as well as the strain itself at maximum load, increased after the samples were treated with the solution. The moisture regain was considerably affected, with the acetone treated fabric showing an increase in its capability to absorb water. An increase in thickness was also observed after treatment.

The results from the FTIR analysis show that the absorbencies attributable to the amide group in wool (1775-1535 wavenumbers cm⁻¹) have increased with exposure to acetone. However, this increase in the area of the peak may be due partially to an increase in the optical contact between the FTIR crystal and the samples. In addition, these results suggest a possible alteration of the fiber at the surface level.

1. Fernando Marte
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- Oral Presentation**

Emerging Standards: Planning for Integrated Access to Archival Collections in Natural History Collections

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The information contained in manuscripts, personal papers, field-notes, photographic collections, and the diverse paper records abundant in natural history collections can be extraordinarily useful for the Natural Science Collection Manager and for researchers who use the collections. Creating access to archival collections is an important task and dependent upon principles somewhat different from those used to organize item-level databases of specimen and object collections.

Generally, cataloged on the collection level not the item level, these collections are traditionally arranged and described in a manner that reflects the two basic principles of archival practice, provenance and original order. In this way, the varied information is related and placed in a context that reveals the history upon which the collections were based.

This presentation will provide a basic overview of the theoretical and practical basis of traditional archival work and will briefly review how data and organizational standards can be used in the new networked environment to make it possible to search across collections held in different departments within an institution or across completely different institutions as in the proposed CLD (Collection-Level Description) project.

1. Barbara Mathé
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3. Oral Presentation

Enhanced hypothermic preservation: Modulation of apoptosis and necrosis improves cell storage

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Within many biomedical engineering subspecialties, there is a need for reversible physiological/developmental arrest of cells and tissues (biopreservation) in support of global distribution. One avenue utilized to achieve short-term (hours to days) biopreservation is that of hypothermic (4°C) storage. Although widely utilized for decades in the area of organ preservation, standard hypothermic preservation processes have severe time limitations, creating impediments for utilization in many applications. As a result, a need for improved methods for storage/transportation exists in areas such as cellular and tissue-based therapies. Recently we have identified the activation of apoptotic and necrotic cell death as a critical factor in determining the preservation window for a given biologic. In this study we investigated the ability of HypoThermosol® (HTS) to extend the preservation interval and enhance cell quality following preservation in a human keratinocyte cell line (NHEK) as well as an engineered human epidermal construct (EpiDerm).

Keratinocytes preserved in HTS solutions demonstrated a 40-60% improvement in viability versus cells stored in standard media for 2 days. In addition, cells stored in an HTS variant designed to inhibit apoptosis exhibited an overall ~55% decrease in apoptotic and necrotic cell death. Investigations into the ability of HTS to preserve an engineered skin equivalent, EpiDerm™, revealed a significant improvement in tissue quality following preservation, and enabled an extension of the preservation window to a week versus 24 hours in media-based storage.

In conclusion, we demonstrate that the utilization of HypoThermosol as a hypothermic preservation medium significantly improves cellular and tissue quality during and following storage as well as facilitates a significant extension in the storage window. This enhancement is due to the direct result of a modulation of the cellular-molecular response during and following the preservation interval, which was observed in the overall reduction in the associated levels of apoptosis and necrosis

1. Aby J Mathew
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3. Poster presentation

High-throughput germ cell, embryo, and tissue DNA archiving for ENU mutagenesis

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Background: The goals of the Centre for Modeling Human Disease (CMHD) are to use high-throughput genome-wide N-Ethyl-N-nitrosourea (ENU) mutagenesis in mice for the discovery of new genes involved in the etiology of important human diseases and to create useful new mouse models for testing disease therapies. The Canadian Mouse Mutant Repository (CMMR) works in partnership with the CMHD to recover and archive the expansive germ cell, embryo, and tissue DNA resources generated by the CMHD.

Materials & Methods: The CMMR maintains a physical archive from all mutant mice generated in the CMHD's ENU program. Our tissue archive consists of formalin-fixed wet tissue, snap frozen tissue for DNA, paraffin-embedded tissue, and glass-slide tissue sections. Tissue is systematically harvested at necropsy for preservation and distribution from a central tissue bank or for downstream processing, analysis, and archiving in tissue block modules. This physical archive provides a source of high molecular weight DNA for complex molecular biological investigations, naked DNA suitable for PCR, and tissue blocks for more intensive or retrospective pathological analysis. The CMMR's physical archive also consists of germ cells (sperm and ovaries) and cryopreserved embryos. The germ cell program focuses on research and development of robust and efficient techniques for cryopreservation that are used to support a national repository and resource for the physical archive of cryopreserved spermatozoa, ova, and embryos generated by Canada's mouse genome effort.

Results and Conclusions: Comprehensive multiple tissue archiving is an essential component of the CMHD's contribution to the international genome-wide mutagenesis initiative.

1. Colin McKerlie
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3. Poster presentation

Real-time integration of digital pathology repositories with medical imaging, gene expression, and lab data for mouse models of human disease

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Background: Targeted and random mutagenesis approaches, either gene-driven or phenotype-driven, promise to identify new clinically relevant mouse models of human disease. Each approach is designed to generate a useful phenotype; each phenotype represents the complex and combined characteristics of the model system. Morphology-based pathology phenotype is a major contributor to these heterogeneous digital datasets. Generation of pathology-based pheno-genomic data on any individual mouse model is generating massive and complex dataset repositories.

Materials & Methods: To advance utility of these model systems, we need to move beyond cataloguing the components of a given genomic alteration with a limited representation of the associated pathology phenotype. Meaningful integration and visualization of complete phenotype datasets, in real-time and accessible format is required. The tasks involved include display, visualization, and query of 2D and 3D gross-, histo-, and molecular pathology repositories (e.g., high resolution whole slide scans) co-registered across multiple heterogeneous medical imaging (MRI, μ CT, ultrasound, radiology) and clinical laboratory data sources, along with gene nomenclature and expression datasets. An approach is required that combines the disciplines of biology, pathology, genomics, imaging, scientific visualization, human-computer interfaces, information technology, and data integration. Examples of relevant approaches will be presented.

Results and Conclusions: As pathology-based phenotype mapping of mutant mice continues to generate staggering amounts of data, our ability to manage the data and share that information has become one of our biggest challenges. To be successful at improving access to, and utility of these models of human disease, innovative new approaches to digital repository design are required.

1. Colin McKerlie
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3. Oral presentation

Relational database management system (RDBMS) design requirements for repositories

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Background/Problem: As the size of specimen collections increases and the amount of biological material necessary to perform analysis shrinks, the data requirements for tracking specimen collections are exploding. Even small collections have outgrown the paper or spreadsheet environment. Repositories and study managers are being forced to move their collection data to relational databases in order to meet their users' data storage and access requirements. Additionally, the increasing need to share data has created a need for standardized data collection and reporting.

Methods: There are many considerations that go into the proper design of a computerized inventory database including: database size, fields, single vs. multi-user access, hardware environment, reporting needs, regulatory requirements, data integrity, functionality, security, cost, maintainability, and the ability to meet future unknown needs. And, to ensure maximum utilization, a user-friendly interface is essential.

Three approaches can be considered when faced with the task of converting or building a computerized inventory database: build your own database in-house, hire a consultant to build a custom database, or buy an existing commercial product. Each of these approaches has identifiable benefits and costs.

Building the database yourself allows for a high degree of customization and adaptation to your workflow, but can be costly in terms of time and in-house resources, and may have maintainability issues. Hiring a consultant allows for a high degree of customization, but can be costly in actual dollars. Commercial software may be less expensive and offers advantages over home grown development such as ongoing support and maintenance. However, you must ensure that the software can operate within your workflow.

Conclusions: Converting your data into a computerized inventory database is not a trivial task. Whether you build, buy, or customize, the most critical element is clearly defining your requirements for the database.

1. Cheryl Michels; Kevin Meagher
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3. Oral presentation

Organizing specimens and data for large-scale projects in insect molecular systematics

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Keeping specimens and data organized and accessible can be difficult when doing multiple, overlapping, large-scale insect molecular systematics studies. We have created a freezer storage and data organization system centered around an MS Access database. The database provides information about physical location of DNAs and specimens, but also includes information about specimens such as collection data, extraction information and taxonomic placement. In addition, the database includes information about genes used in the lab, projects being conducted and sequence data for the specimens. Because of the sophisticated query system provided by this relational database, information about specimens, genes, sequences and projects can be retrieved in nearly any combination. This allows a single piece of data, such as a gene sequence for a particular specimen, to be used in several projects or in several different types of output without having to actually duplicate the piece of data.

1. Kelly B Miller
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3. Poster presentation

Design and implementation of specimen tracking software

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Sample Management System (SMS) is a software database system that will centralize biological specimen handling between collaborators, our Biorepository and various labs within Millennium. SMS will track specimens from cradle to grave, improving scientific accuracy and legal and regulatory compliance. As a 21CFRpt11 validated system, SMS will provide a platform for GLP sample processing, compliant tracking of patient consent restrictions, and provide a platform for GLP laboratory integration. The solution will be based on a commercial LIMS software package that will be customized by Informatics. SMS will completely replace the existing SPECTRUM (SPECimen TRacking and Utilization at Millennium) database.

1. Jennifer Morgan

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3. Poster presentation

DMDM-Hydantoin revisited: Experiments concerning Preservation Methods allowing Multipurpose Analysis of Long Stored Samples

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In modern biomedical research the growing interest and possibilities for tissue analysis, ranging from classical morphology and immunohistochemistry to real time RT-PCR and micro-array, allow medical researchers to recover as much data as possible from one and the same sample. This multipurpose usage requires a preservation method, which effectively retains high quality of the four major components of the sample, i.e. morphology, mRNA, DNA, and protein content.

Effective methods to preserve one or more of the four major groups have been developed, however, their multipurpose application is only limited, destroying either the morphology of the sample or its mRNA content. With the recent introduction of the formaldehyde-releasing agent DMDM-Hydantoin as a possible alternative in fluid preservation of biological tissue (van Dam 2003), we were interested in its applicability for multipurpose analysis in comparison with classic preservation methods.

To test the effect of the fluid preservatives on mRNA and to evaluate their reactivity on (functional) protein level, we used tissue of transgenic embryonic mice that express the β -galactosidase enzyme in every cell. Total RNA isolated with the Trizol protocol was used to test the effect of the preservation on the 'naked' total RNA content. The preservatives used were PFA (2, 4 and 8%), HAC/EtOH, EtOH (70%), MAW (Merck Neo-Fix®), and DMDM-Hydantoin (5%).

From the experiments we can conclude that DMDM-Hydantoin, in contrast to all other agents tested, has a potential to preserve tissue for multipurpose sample analysis which require high quality mRNA, enzyme activity, or protein content.

1. Andries J. van Dam
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- Oral Presentation

Rock around Austin at the Discovery Drawers: Connecting Collections to the Public

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New exhibit halls developed by the Texas Memorial Museum include a broad spectrum of innovations aimed to stimulate the public. One exciting development is the Discovery drawer zone of the new Hall of Geology. Located next to an active paleontologist's work station, these drawers entice the public to browse many more specimens than could be included in the main display islands.

The visitor can locate school or home on a geology map and key to drawers full of identified fossils from their local area. Other drawers are topic based and are aimed at expanding the visitor's knowledge of paleontology, local geology and comparative Recent marine environments. For example, 'Oysters on the half shell' opens up an evolutionary sequence of oysters; 'Time keepers' exposes a biostratigraphic collection of ammonites, each with a simple explanation. Further information and imagery is being developed into an on-line web and database to encourage continuing investigation after the visit to the Museum.

The project was made feasible within our restricted budget and time constraints by the presence of a searchable database linked to a GIS map of the repository. It also required collaboration between the artistic designer, carpenter, and collections staff in order to ensure that the end product was both inviting and accurate. Older cabinetry from the repository was re-cycled into the design. Development of the drawers to provide conservation, stability, safety and visibility of specimens within the confines of antique furniture was both challenging and illuminating.

We are unable to open our collections to the public but we can allow them access to more specimens in the display halls using drawers, and to even more via the web component of those drawers.

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5. Oral Presentation

A Consortium of University Museums and Collections Facilities: Its role in Emergency Preparedness and Response

Moreno, Teresa

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The Arizona State Museum (ASM) has taken a leadership role with twelve other collections facilities at the University of Arizona. Together, this group forms a Consortium on campus. The ASM, however, is the only unit that has a division dedicated to preservation, a conservation lab and full time faculty conservators. For this reason, many of the other museums and units with collections have looked to the ASM for support and guidance in matters of preservation and collections care issues including emergency preparedness and response.

The concept of emergency planning is not new to ASM. In the late 1980s, Head Conservator, Dr. Nancy Odegaard initiated the museum's first emergency preparedness plan, which later resulted in the production of the ASM Emergency Manual. The manual was intended to: provide instruction on steps to take to prevent and mitigate damage and disruption of museums operations caused by an emergency situation, make the museum more resistant to the effects of a disaster, minimize the direct and consequential loss of resources resulting from a disaster, and prepare in advance to speed the museum's recovery from any damage sustained. This manual has been requested by and shared with institutions both within the University of Arizona and throughout the country.

Following the terrorist attacks in September 2001 colleges and universities around the United States were asked to prepare plans to deal with emergencies and crises should they occur. As a result, the University of Arizona Initiative on Preparedness and Emergency Response was established and produced the Campus Emergency Response Plan. In the fall of 2002, following a tragic shooting at the University of Arizona College of Nursing, the Arizona Board of Regents mandated that the UA create a second volume that would consist of a Business Continuity and Disaster Recovery Plan. This plan produced by a team under the direction of UA Vice President Julius Parker, focuses on minimizing the disruption of academic and support operations after a disaster.

Representatives from the University of Arizona Museums and Collections Facilities Consortium were invited to join this team in order to address recovery concerns as they pertained to rare and valued cultural property owned by the university. The result of this collaborative effort is a document included in the UA Campus Emergency Response Plan. This paper will discuss the objective of the Consortium's Annex within the wider university plan, its focus on human safety, security and preservation of collections, quick response to preclude damage to collections and valued items, and recovery procedures.

1. Teresa Moreno
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3. Oral Presentation

Digital archives and metadata standards

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Logical synthesis and technical integration of scientific data and information are among the primary promises of this -- still emergent -- digital era. Rigorous ontological analysis of domains of knowledge taken together with the application of robust technical standards for integration and interoperability are critical to these efforts. The AMNH digital library (together with other leading digital initiatives) has made considerable progress in recent years toward the definition and application of these approaches. In this framework, the current, NSF-supported research activities of the AMNH digital library program and its relation to other AMNH collections will be discussed.

1. Tom Moritz
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3. Oral presentation

Ethical issues in biobanking for hospitals' IRBs: Informed consent and genetic privacy

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Background/Problem: Some commercial research tissue repositories have approached hospital pathologists in the U.S. to establish agreements in which the hospital would function, in part, as a tissue collection site for the repository. The repository would provide staff to the hospital to collect leftover tissue from surgeries and some related clinical information. The ethical issues of these collaborations present unique problems for Institutional Review Boards (IRBs). IRBs need to consider new challenges to informed consent because the time frame and objectives of genomic research, as well as the identity and location of researchers are usually unspecified. Genetic privacy is particularly important when tissue samples are linked and patient information is gathered prospectively as well as at the time of donation and made available to numerous researchers. To study informed consent and genetic privacy in biobanking, we collected data from several commercial tissue repositories in the U.S., as well as IRB members, administrators, and pathologists at several medical centers. Here we review our findings and present our own assessment of best practices. We encourage international discussion, particularly among professional medical/research organizations, to establish guidelines on consent and privacy in biobanking.

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3. Oral presentation

Human prostate cancer biospecimens repository: the Mayo Clinic experience

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Background: A repository for human prostate tissue, blood and urine from men with prostate cancer is important for translational research. It should include informed consent, biospecimen collection, clinical and pathologic data abstraction, data and biospecimen quality assurance, database queries, and biospecimen tracking. SPORE investigators need the highest quality biospecimens with associated clinical and pathologic data in order to conduct meaningful translational research. The repository must meet institutional, federal and state governmental regulations regarding patient confidentiality and protection.

Methods: A Mayo Clinic prostate SPORE biospecimens core group formed to develop 1) a mechanism to obtain informed consent, 2) a collection process for fresh tissue, blood and urine, and 3) a unique Access7 database for the collection of common data elements and tracking biospecimens. Fresh frozen tissues are reviewed by a pathologist, and data entry is reviewed by two data managers for quality control. The repository contents are summarized on an intraclinic webpage. Investigators can request tissues through an electronic form. All requests are evaluated for scientific merit, amount of tissue, blood and urine requested and biospecimen availability.

Results: The Mayo Clinic Prostate SPORE biospecimens repository has collected over 1200 frozen prostate tumor and benign tissues since the fall of 1999. The Prostate SPORE repository successfully provides researchers with high quality human biospecimens with associated clinical and pathologic data elements while maintaining institutional, state and federal regulations.

Conclusions: Mayo Clinic prostate SPORE biospecimens repository is fully functional. Several of the repository's practices were incorporated into the AStandards of Best Practice for Human Tissue Repositories@ produced by the RAND Corporation for the National Cancer Institute.

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4. Poster presentation

Post-Fire Recovery of the Lundy Trophy Collection

Nieuwenhuizen, Linda

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The Lundy Collection is a natural history/trophy collection comprised of taxidermy life mounts, shoulder mounts, head mounts, tusks (teeth), horns and antlers, hooves, rugs, fish, shells, and memorabilia. On 13 November 1995, the collection of approximately 180 pieces was involved in a devastating fire.

The specimens in the collection were obtained by Mr. and Mrs. Burrows T. Lundy, prominent North Carolina pork packers. The collecting and amassing of the trophies took place in Africa and in the Arctic with safari expeditions in the late 1960s and early 1970s. The Lundy collection was housed and viewed for many years within the Lundy Pork Packing Factory in an upstairs annex located above the factory floor. In the late 1980s, after the passing of Mr. and Mrs. Burrows T. Lundy, the collection was donated to a small, private school, Campbell University, located in Buies Creek, North Carolina. The Lundy Family also donated a considerable sum of money to create a "museum" for the collection. The museum, however, was still on paper and the collection was still at the plant when on the 13 November 1995, the assemblage of taxidermy was involved in a grease fire. The local volunteer fire department tried to put out the fire with water spreading the fire even further and when the water sprinklers in the trophy room were activated the fire burned rather uncontrollably for 24 hours. The fire consumed several of the specimens, the floor of the room, and deposited a lot of soot.

Conservation consultation began shortly after the fire had been quenched and directions were given for handling and lifting the artifacts from the trophy room. A piece by piece survey was conducted and estimates were given for probable conservation protocol and outcome of the pieces after conservation. The actual conservation began six months later with the pieces arriving in New York. The soot, hair, and pesticides were analyzed for efficacy in treatment proposals. Various conservation treatments were employed for the removal of soot, the stabilization of the mounts, and filling of losses. Two and a half years later, the conservation project reached an end and the collection was moved into storage to await the construction of a new museum. In 2001, the new museum, on the grounds of Campbell University, opened.

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3. Oral Presentation

Cost-effectiveness in emergency preparedness and response: A case for Africa South of the Sahara.

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This paper addresses avoidance of human-made disasters that affect institutions and homes in Africa South of the Sahara, cost analysis and finances. The cost effectiveness is seen in terms of avoiding the human-made disasters as the natural disasters are rare and less severe when they occur. The natural disasters in Africa are made worse by poor infrastructure, materials, engineering practices, staff practices, drainage systems, open gutters etc. While other continents concentrate on mitigation of disasters, Africa on the other hand should put more emphasis on avoidance and mitigation in that order. Natural disasters cannot be avoided but their impact can be reduced with disaster plans in place. Human-made disasters on the other hand, can be avoided and hence question of mitigation cost would not arise. However, training and education for museum users, staff and public is a must. Lack of disaster preparedness plans in Africa is a result of funding and lack of awareness and mismanagement. Most museums in Africa are funded by their governments who give priority to developmental issues and money generating programmes. As such, museums and museum projects are not given priority and of course little funding is availed. Education of government officials through seminars, training of public through media, public programmes, brochures, exhibitions and staff through in house training etc will play a major role in reducing the occurrences of human-made disasters, aid in fundraising and promote networking as well as encourage volunteers in case of emergencies and hence cutting down on the burden that would have been born by the museum.

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3. Oral Presentation

Emergency Response and Salvage of Natural History Specimens at Livingstone Museum -A case Study

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Museums house historical, cultural and natural history collections and are at risk of disasters and theft. Museums must have preventive measures in place to reduce risks caused by disasters and theft. The biggest risk to Natural History collections at Livingstone Museum is theft. This is because most of the specimens have economic value and ready market available. The paper highlights measures required to reduce risk of disasters and theft in a museum, deficiencies faced by Livingstone museum and recommendations proposed for safe keeping of Natural history collections. The paper elaborates security measures required like security personnel, increased surveillance of visitors, restrictions to access of store rooms, monitoring visitors in store rooms and alarm systems to protect specimens from theft. In addition, doors should have alarm system connected and switched on when museum premises is left after working hours. Requirements to protect specimens from disasters like floods and fire are discussed. The need for a disaster reaction document, training staff in emergency response and sufficient disaster/salvage management equipment is emphasized. Problems faced by Livingstone Museum as regards to security of museum collections are discussed. The main root problem is funding. Lastly the paper outlines measures that can be undertaken to improve the security of Natural History Collections.

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3. Oral Presentation

Ingenuity in the Midst of Inadequacy

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Ingenuity hereby conceived involves all those tactful attributes that improvise workable solutions to problems, which would otherwise be solved conventionally using available materials, technology and skills. However, Liberia with its recent violent past has experienced the destruction of its rich cultural and natural heritage by man-made and natural situations, thus prompting the need to plan and execute emergency preparedness, response and salvage measures. Such actions be it mitigating against armed

conflicts, neglect, lack of support, landslides, flooding and insect infestation, are leading causes for the rapid deterioration and disappearance of heritage properties.

The absence of basic ready-made evacuation facilities and early warning equipment has made it comparative to devise often simple and less expensive solutions to problems that seem insurmountable and require vast, complex investment as you might imagine. In Liberia, we believe the key to safeguarding the depleting and threatened heritage of ours lies in preventive conservation. This entails the development of appropriate techniques and methodologies to address unforeseen events that might result in tragic loss of lives and property thus creating a devastating effect on the socio-economic system with a given level of vulnerability, which prevents society from coping adequately. Additionally, the Infrastructures' existence and the way in which public policy and administration are engaged in emergencies management, the level of education, information and sensitization about hazards to man and heritage pieces are a central part of our strategy. Some major component of this approach involves first and foremost the initiative spirit, desire and commitment to make use of what is available in changing situations of inadequacies. Proper planning based on forecast, inspections, sharing task and responsibilities, evaluating results and above all, sustaining the improvements made are crucial steps we have taken.

A particular case in point is how because of the frequency of eruption of hostilities in the city and other parts of the country, we planned and prevented in collaboration with communities leaders, heritage managers and rural inhabitants the manual evacuation of hundred of priceless artifacts from all our museums to a secluded building and environment in the absence of storages, bagged the artifacts, dug and buried them up to the end of the fighting. Although other problems could develop with the artifact but at least they were safe, reconditioned and are serving as some of the few cultural items and historical documentation now available in the museum. The strength of is approach is that it guarantees the safety of museum collections and sites at minimum cost, but maximum effectiveness and efficiency in the face of inadequate resources and risk.

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3. Oral Presentation

The Collection Survey: Linking observation to cause across disparate collections

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During 2002 to 2004 the Palaeontology Department of the Natural History Museum is undergoing refurbishment. This provided an opportunity to survey the collections to provide baseline information on their condition. The survey gives a quantitative report on the agents of deterioration that affect the collections, as well as reporting on the effects themselves. This allows us to compare or combine condition data across disparate collections.

The survey is already giving vital information on current problems that require action. These results give a picture of the risks facing our collections and will allow us to target our resources more effectively in the future. Also, the survey is to be repeated post-refurbishment to check on the performance of the upgraded building environment.

The survey works by collecting data on observable indicators, e.g. degree of pyrite oxidation present on a specimen. These indicators link to a set of agents of deterioration by means of a weighted average. A single indicator can link to any number of agents, with different weightings for each one. For example, breakage of a specimen links to both poor handling and poor storage; breakage through handling being weighted as more likely than breakage through storage. Moreover, the same indicators can have different weightings for different specimen types. For example, delamination of sub-fossil vertebrate material is strongly linked to low relative humidity whereas delamination of a bivalve mollusc has a weaker link. The result is a quantitative measure of the amount of damage due to each of the causative agents.

Using this process we can choose to survey different indicators for different specimen types and still combine the final results to create a valid cross-collection condition report.

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The History of Taxidermy, "clues for the conservation"

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Along with fluid preservation, or "fixation", taxidermy represents one of the oldest methods used to preserve natural history specimens. Its goal is to conserve the form and coloration of an animal by first skinning the animal, tanning the skin, then drying it, stuffing it many times on a frame), then mounting the skin. The technique as we know it today, has evolved from the desire of European naturalists to preserve specimens for the purpose of describing their role in the natural world, and for comparing specimens. Though the technique has evolved through time, taxidermy was, and still is, trying to answer some of the conservation problems of natural history collections, as well as meet the requirements of scientists.

Using old taxidermy handbooks and documents, it is possible to list the different methods used for the preparation of stuffed animals (tanning processes, materials used for stuffing and mounting the specimens, etc.). With searching, this information is available for the last three centuries. For example, one can follow the evolution of tanning recipes, from those that used aromatic plants, to the use of alum or arsenical soap. One can then also follow the repercussions of various tanning methods on the characteristics of the specimens. In addition, when all the preservation information is collected, it can give us some clues toward understanding the current conservation status of this type of collection.

Today, researchers have greatly expanded the earlier uses of natural history collections to also include the molecular information of the specimens, as DNA sequences and protein structures. This information is used in research projects as divergent as habitat loss, public health and safety concerns, environmental monitoring, etc. Most of these studies require a comparison between old and modern specimens. This requirement makes museum specimens an essential source of information. Assuring the preservation and correct use of these specimens, then, requires an understanding of ancient preparation techniques

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3. Oral Presentation

Collection and preservation of great ape brain tissue

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Identifying the evolutionary specializations of the human brain requires comparing humans to chimpanzees and other great apes, the animals most closely related to us. At present, there is little neuroscientific study of apes because few facilities have ape colonies and because the brains must be harvested within a few hours after death to be of much value. Our laboratory has developed procedures for collecting and preserving ape brain tissue, building on methods used to preserve human brains. It is crucial that brains be processed shortly after death: consistently good results required postmortem times of less than 6–8 hours. Protocols and materials must therefore be in place before an animal dies and trained personnel must be rapidly mobilized after an animal dies.

Obtaining brains promptly is the hardest part; preparation is comparatively straightforward. Preparing unfixed tissue appropriate for studying protein and mRNA expression levels requires prompt dissection, flash freezing in liquid nitrogen, and permanent storage in an ultracold freezer. Preparing fixed tissue, which is preferable for most histological procedures, is somewhat more complicated. The traditional approach of storing cadaver tissue in formalin results in overfixation, rendering the tissue nearly useless for immunocytochemistry. Much better results can be achieved by fixing brains in paraformaldehyde for a short period (4–7 days), and then storing tissue at -20°C in an ethylene-glycol-based cryoprotectant solution. Tissue can be stored after sectioning, or in large blocks that can be sectioned later. Tissue so prepared yields excellent immunostaining for a variety of antigens, with little obvious diminution of staining intensity even after 6 years in the freezer, and significant enzymatic activity is preserved as well. With a well-designed dissection plan, both fixed and unfixed tissue can be preserved from a single animal. Wider application of these techniques would contribute significantly to our understanding of human neurobiology.

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3. Oral presentation

The national biomonitoring specimen bank – a NIST satellite facility at the Hollings Marine Laboratory, Charleston, SC

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The National Institute of Standards and Technology (NIST) maintains the U.S. National Biomonitoring Specimen Bank (NBSB) at the Neutron Research Facility on the Gaithersburg, Maryland campus and a satellite facility in Charleston, South Carolina, at the recently completed Hollings Marine Laboratory (HML). The NBSB, established in 1979, is a cryogenic environmental specimen bank that stores specimens (e.g. human livers, fish tissues, mussels, oysters, marine mammal tissues, and bird eggs and feathers) collected as part of several monitoring and research programs in collaboration with numerous national and international agencies. The NBSB is specifically designed to store environmental specimens over long periods of time (50-100 years). The HML was established in July 2000 through a Joint Project Agreement with five institutional partners collaborating to provide the science and biotechnology to sustain, protect, and restore coastal ecosystems emphasizing linkages between environmental condition and the health of marine organisms and humans. In the HML, the NBSB consists of 788 sq. ft. of certified ISO Class 5 (Class 100) and 2,430 sq. ft. of Class 7 (Class 10,000) clean room space, along with 504 sq. ft. of support, ante rooms and office space. The NBSB contains liquid nitrogen (-150 °C) vapor phase freezers and -80 °C ultra-cold upright freezers for sample storage, and equipment used to process samples for analyses. Additional equipment will be purchased for the production of Standard Reference Material (SRM) and control materials. A 3,000 gallon bulk storage tank delivers LN₂ into the building through vacuum jacketed liquid nitrogen piping located underneath the building. With the specimen bank's location in certified clean rooms, special considerations in the facility design included the use of non-metallic materials and the placement of the LN₂ piping system.

1. Rebecca Pugh
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3. Oral presentation

Keynote Address: Alliances for Response = Effective Emergency Response

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While the United States does not have an official national policy regarding the provision of assistance to museums, historical societies, and libraries to mitigate, prepare or respond to disasters and other kinds of emergencies, it does have an increasingly effective network to address these events at the national, state and local levels. This paper will focus on the work and initiatives of the Heritage Emergency National Task Force. Over the last several decades there have been major accomplishments in deterring the slow but relentless threats to the preservation of our scientific and cultural heritage. Efforts have focused principally on preventive conservation. The Society for the Preservation of Natural History Collections (SPNCH) has been a leader in this movement. However, the swift but catastrophic destruction of collections, whether from breaking of water pipes or natural or manmade disasters has not received similar the ongoing attention. Since September 11, 2001 this has begun to change. Led by Heritage Preservation and the Federal Emergency Management Agency (FEMA), a voluntary partnership of 34 non-governmental associations, including, SPNCH, and U.S. government agencies established the Heritage Emergency National Task Force in 1995. The Task Force's mission is to assist non-profit institutions that own collections to better protect their collections from disasters. It promotes preparedness and mitigation measures and provides expert information on response and salvage to institutions. The Task Force works to prevent or minimize damage to cultural heritage by developing and providing information about emergency preparedness and response; creating a database of conservation and preservation specialists available for onsite assistance in major disasters; and preparing a training manual for personnel of collecting institutions. Best known of the Task Force's accomplishments is the Emergency Response and Salvage Wheel, a highly respected and practical tool for protecting documents, art, and artifacts from water damage in both English and Spanish. More than 90,000 of these wheels are in use throughout the world in our and 40 other countries. It has been translated into Chinese, Dutch, French and Japanese. Cataclysm and Challenge is a comprehensive report of the damage and loss to cultural property that resulted from the events of September 11, 2001. It also addresses basic emergency management needs and explores what resources institutions will need to cope effectively in the future. The report was widely disseminated to the cultural heritage community and many groups are taking action to implement its recommendations. It also received considerable national and local media attention, making the general public more aware of the importance of cultural heritage. The latest Task Force initiative, "Alliance for Response," will bring together cultural heritage leaders and emergency management professionals, e.g., firefighters, together to strengthen local response networks and develop mitigation projects for their communities. While much has been accomplished, even more remains to be done to have a truly comprehensive national strategy. For more information go to www.heritagepreservation.org

1. Lawrence Reger
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3. Oral presentation

When we put out the SOS – Not Them! - International Planning, Alliances and Response Strategies

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Collaborative projects with the Armed Forces of the United States of America, UNESCO, ICOM, ICCROM and ICOMOS, recent discussions in Hyderabad, India on networking and ongoing talks with the American Red Cross will be presented. The Canary Islands and the Las Palmas “wave” will be used as an example.

“Your country needs you!” Yes... AND we need to set up our response mechanisms for working with others who will wish to help us when our turn comes. The Eastern seaboard of the USA is now living with a known threat that could happen any time and will cause similar destruction to a major West Coast earthquake. The speaker will not discuss the New Madrid fault possibilities.

To be pre-warned is to be forearmed. Mitigation thoughts and response ideas will be requested of the SPNHC Annual Meeting participants.

1. Barbara O. Roberts
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3. Oral Presentation

Whole genome amplification using multiple displacement amplification

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Background: Lymphoblast cell lines (LCLs) are the preferred source of DNA for large-scale genomic studies, but it's sometimes not possible to obtain LCLs from key individuals. To overcome this limitation, several approaches in which the whole genome can be amplified from limiting or sub-optimal sample sources have been published. Here we describe our experience with multiple displacement amplification (MDA), a recently introduced procedure for whole genome amplification (WGA) (Amersham Biosciences).

Methods: Purified DNA from LCLs and blood and crude extracts from blood were used for MDA. The amplified DNA was purified and quantified, and aliquots of the genomic and corresponding amplified DNAs were analyzed using a ten loci multiplex PCR kit (Profiler Plus) and the Genetic Analysis System 310 (both from ABI).

Results: The mean yield from 10 ng of genomic DNA was 3.74 µg (SD 1.94, N = 10), giving an overall amplification of 374-fold. The variance was large within as well as among samples, indicating that lack of reproducibility was a function of the assay and not of the sample. One µl of crude blood extract produced 2.52 µg amplified DNA (SD 1.41, N = 10), equivalent to 30,240 µg per ml whole blood. This represents a > 1,400 fold-amplification compared with DNA extracted directly from blood.

Multiplex PCR of genomic DNA gave consistent amplification of all ten loci, but there was substantial amplification bias with PCR of MDA-amplified DNA. Amplification was not uniform across all loci, suggesting that MDA DNA may not be suitable for whole genome scans.

Conclusions: These findings suggest that MDA, like previous WGA procedures, should not be used as a primary source for large amounts of DNA. In its present form, MDA may serve as a backup procedure to amplify DNA from precious samples.

1. Amrik Sahota
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3. Poster presentation

Emergency Preparedness and Salvage in the Event of Armed Conflict

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In October 2003 the US State Department sent four museum professionals to Baghdad to assess the conditions of the Iraqi Museum and make recommendations about what needed to be put in place in order to get the museum functioning after the war. As the only collections person on this team, I saw first hand the effects of the war on the collections in the museum. This paper will discuss what precautions the museum staff were able to implement to protect the collections and assess their effectiveness. It will also discuss how the war affected staff morale and the role this, in turn, had on the safety of the collections. The paper will then look at the broader issues of how museums can, or cannot, be protected against armed conflict, using examples in Beirut, Kuwait and Afghanistan as well as Iraq.

1. Catherine Sease
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3. Oral presentation

Enabling multi-site specimen repositories: Meeting critical software requirements with a novel physical and software architecture

Shon, J; Barber, D; Jin, J; Redd, D; Ross, R; Wittman, P; Hogan, M; Eggers, M.
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Background/Problem: Blood and DNA specimens are increasingly collected and archived at multiple sites within and among institutions and studies. Robust software is required to manage a large number of specimens from multiple resources into a collective repository. Previously, two architectural approaches have been employed to address such requirements. The first is a centralized model with central physical storage of specimens and a centrally maintained database for specimen annotation. The second is a distributed model with distributed physical specimen storage and a distributed virtual, or peer-to-peer network database for specimen annotation. Both models have limitations depending on the characteristics of the repository being built.

Method/Tools: Through a review of the literature and existing repository software, we gathered critical requirements of software necessary to manage specimens collected from multiple sites. Using these requirements, a novel physical and software architecture was devised to meet the needs of repository builders in multiple settings.

Results: The accommodation of multiple users at multiple sites entails a host of software requirements, such as network security, role-based authorization, secure authentication, remote data entry, work-flow management, and administrative functionality. We describe an architecture which enables repository directors to configure archives in a centralized, distributed, or hybrid model. The key components of the flexible model are the use of repository automation, networked automation interfaces, web-based application interfaces, and the use of high density, scalable physical storage solutions. In particular, the use of networked robotic sample management enables the decoupling of sample storage and sample data management.

Conclusions: We describe a novel, network-enabled architecture that enables repositories to grow and adapt as needed in multiple configurations to accommodate scientific user communities and research imperatives. The GenVault Dynamic Archive is described as a prototypical implementation of this architecture.

1. John Shon
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3. Poster presentation

Ethical and Regulatory Annotation of Tissue Specimens in XML: Specimen Ethical and Regulatory Markup Language (SERML)

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Background/Problem: The reuse and sharing of specimens promises the hastening of research discoveries promoting health and alleviating disease. Preserving informed consent and respecting the desires of donors is of paramount importance in a setting of multiple uses of specimens. Currently, there is no standard format by which specimens can be annotated with ethical or regulatory information. A standard, machine-readable format would enhance the search, retrieval, and appropriate use of samples accessible through a database or network.

Method/Tools: We constructed a list of data elements that are associated with research specimens for regulatory or ethical purposes, using the literature, regulatory documents, and research databases as primary sources. XML is a widely adopted, machine-readable format for the semantic markup and exchange of content. An XML schema was constructed to represent the regulatory and ethical data in an efficient and structured manner.

Results: An XML schema was constructed to hold and transmit regulatory and ethical data associated with biological specimens. Top level elements include: SpecimenDeposit, SpecimenRequest, RequestApproval, SpecimenDistribution, Organization, PrincipalInvestigator, InstitutionalReviewBoard, IRBApproval, ResearchStudy, InformedConsent, ResearchRestriction, CommercialUse, HIPAAIdentifier, and RegulatoryDocument.

Conclusions: We propose an XML schema, the Specimen Ethical and Regulatory Markup Language (SERML), to be used in the repository community to facilitate the ethical and regulatory compliant exchange and use of samples. This format will be published and openly available for comments, use, and enhancements.

1. John Shon
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3. Oral presentation

Collections-based Biology in Dublin

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A new programme in the National Museum of Ireland is tackling curatorial backlog through undergraduate education. The Collections-based Biology in Dublin (CoBiD) programme is an innovative partnership between the Museum (Natural History; NMINH) and University College Dublin (Department of Zoology; UCD). CoBiD activities provide "value-added" research, involving students, faculty, and technical staff from both institutions. In particular, during the spring term (2004) we conducted a senior undergraduate course in collections-based research skills, "Biodiversity Collections Research". This course culminated in students working in small groups on curation projects in the museum, resulting in assessment reports and detailed catalogues for six small parts of the collection. Projects were on a variety of groups and preservations, from fluid-preserved mussels to lion osteology. Our primary educational goals with the CoBiD programme are to teach young proto-researchers (1) that natural history museums exist, worldwide, as scientific resources, (2) what kinds of biological research collections are relevant to (focusing on biodiversity and systematics), and (3) how to productively interact with collections as a researcher, as well as the impact of preservation techniques and object conservation. At this point, we report on the implementation of our techniques for teaching undergraduates with hands-on experience in research collections. In the longer term, our course is planned as a part of the core Zoology curriculum at the third year, and possibly earlier. Even at this embryonic stage, we believe we can show the success of our course both in teaching and in curation.

1. Julia Sigwart

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3. Oral Presentation

Hypothermic storage of mammalian cardiomyocytes: Assessment of multiple markers of viability

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Successful hypothermic storage of primary cells is emerging as the rate-limiting step to the application of regenerative medicine in clinical and research settings. Heart transplantation and stem cell cardiomyoplasty require hypothermic storage for successful isolation and transport to the recipient. These processes are time-constrained, in part due to the ability to recover fully functional bioproducts following the hypothermic interval. Despite numerous attempts, extension of the cold storage interval of myocytes while maintaining viability has not been realized. In this study, an evaluation of several commercially available hypothermic storage solutions in the neonatal rat ventricular cardiomyocyte model (NRVCM) was performed. Samples were assessed by a panel of indicators including membrane integrity, metabolic activity, and spontaneous contractile function. Additionally, biochemical analyses were performed to discern differences in hypothermia-induced oxidative stress levels and molecular responses. Cultured NRVCM were held at 4°C for 24 to 72 hrs in standard culture media, ViaSpan® (UW) or HypoThermosol® (HTS) variants (HTS-Base, HTS-DCC or HTS-FRS). Samples stored in HTS-DCC and HTS-FRS yielded overall survival rates 10 to 30% greater than the base solution ($p < 0.05$), and $> 50\%$ versus cells stored in conventional media ($p < 0.01$). Upon return to normothermic conditions, NRVCM stored in HTS-FRS for ≤ 48 hours regained spontaneous cellular contraction in vitro and 90-95% metabolic activity as compared to 37°C controls. Extension of the storage interval to 72hr resulted in a drop in viability; however cells stored in HTS-FRS maintained adherence and contractile activity. Western blot analysis revealed that extended/suboptimal storage conditions elicited a 5-fold increase in AIF protein levels in adherent cells following storage. These data demonstrate successful preservation of primary NRVCM cultures in selected cold storage solutions, which provide protection from the cellular and molecular stress encountered during and following hypothermic storage. These results provide important basic steps towards increasing the cold storage window for sensitive biologic products.

1. Kristi K. Snyder

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3. Oral Presentation

Metals And Bones: A Geochemical Answer To A Paleontological Problem

Skulán, Joseph and Masbruch, Melissa

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During their collection and storage fossil bones are often brought into prolonged contact with metals. In the field fossils may be wrapped in aluminum foil prior to applying a plaster jacket, and in repositories fossils may be stored near or in direct contact with iron shelves. Fossil bones and the matrix in which they are embedded are mineralogically complex, frequently containing sulfides, sulfates, carbonates, and other reactive moieties with the potential to react with metals. Thus both the long-term chemical behavior of metal-bone combinations, and the short-term behavior of these combinations during disasters such as floods, is of concern to curators of collections of vertebrate fossils. However, information on the chemical interactions between metals and fossil bones is scarce and largely anecdotal.

We have used geochemical techniques to model the thermodynamic stability of bone minerals in contact with aluminum and iron under a variety of hydration conditions and in the presence of a range of minerals and mineral combinations commonly found in association with fossil bones. These models allow us to predict potential damage to fossil bones resulting from corrosive products of metal-mineral or metal catalyzed reactions. Our main conclusions are that long-term contact with aluminum does not damage fossil bone, but that contact with iron has great potential for damage. These results have implications for the safe storage of vertebrate fossils, and also illustrate the utility of a cross-disciplinary approach to solving problems in the conservation of natural history collections.

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3. Poster Presentation

Effects of chemical and biological warfare remediation agents on the materials of museum objects

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In the fall of 2001, anthrax contaminated letters were sent to public figures in the United States. Chemical and radiation treatments were employed to decontaminate exposed buildings, objects, and materials. These treatments are effective, but potentially damaging to exposed objects and materials. The recommended surface chemical treatments include solutions, gels, and foams of oxidizing agents such as peroxides or chlorine bleaching agents. Such oxidizing agents are effective against a wide range of hazardous chemical and biological agents. Knowing how these reagents affect various substrates would help to anticipate and to minimize any potential damage. We examined the effects on typical museum materials of reagents likely to be used, including hydrogen peroxide, sodium hypochlorite, and potassium peroxydisulfate. We treated a large number of materials following the military guidelines. Results showed significant changes in a number of materials. Surface corrosion was observed on metals such as copper, silver, iron, and brass. Color changes occurred with at least one reagent in about one fourth of the dyed fabric swatches tested, and about half of the inks. Samples of aged yellowed paper are bleached. Organic materials such as collagenous and keratinous materials were also treated and showed in some cases changes in the amino acids profile. Oil paints, marble and photographs were also studied. Effects varied with both the substrate and the tested reagent. The observed changes were generally less drastic than might have been expected. Enough materials were affected, though, to preclude the use of these reagents on museum objects unless no less drastic alternative is available. It appears that many objects of lesser intrinsic value can be treated without severe loss of properties or usefulness. For example, most documents should remain legible if the appropriate reagent is used. This work provides a basis for determining which treatment is most appropriate for a specific situation and what consequences are to be expected from other treatments.

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3. Oral Presentation

Catastrophic floods in the Czech Republic in 2002: Rescue activities and Experiences

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In 2002 the Czech Republic was afflicted by catastrophic floods that affected many institutions responsible for keeping and administering objects of cultural heritage including museums, libraries, archives, monuments of the church, theatres, etc. The total damage caused to objects of cultural heritage amounted to 2.318.842.000,- CZK (EUR 77.301.900).

The subject of the contribution includes:

1. A survey of the damage (the course of the flood, affected institutions, and information policies of the state)
2. Rescue activities (evacuation, communication with state authorities, safety, hygienic aspects)
3. Procedures and activities of the crisis management (crisis center, information exchange, procedures and results)
4. Repair of damaged objects (documents in deep-freeze, financial assistance from abroad, financial assistance from the state, priorities)
5. Experiences and Lessons Learned (crisis plans, risk analysis, new methods of rescue and communication)

Fundamental roles concerning the organization of rescue activities and repairs of damage caused by the flood were carried out by the Association of Museums and Galleries of the Czech Republic, Ministry of Culture of the Czech Republic and the National Museum. These three organizations have formed the crisis center that coordinated information and assistance. The subsequent phase of repair of damage was financially supported from the state budget, initially organized by the intergovernmental commission and later organized by the Ministry of Culture.

1. Michal Stehlik
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3. Oral presentation

Minimizing Risk - The Bridge between Collections and Staff Safety and the Design for New Wet Collections Facilities for the National Museum of Natural History

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Using the new National Museum of Natural History Wet Collection Facility in Suitland Maryland as a case study, the presenters describe the collaborative effort that developed the design for a safe wet collection facility for storage, collections management, and research activities. The process used by the team from the Smithsonian and the consulting architects/engineers was, by necessity, highly collaborative, interactive, and iterative. Starting with a 3-day pre-design workshop involving 25 professionals, efforts focused on goal setting, assessing the space needs, sizing the building for collections growth, setting safety criteria for staff as well as developing the definition 'an event' with an acceptable loss, setting criteria above the requirements of prescriptive codes, and developing a building concept with systems that could create the highest level of safety possible to meet these criteria. Solutions were further informed by discussion with peer institutions and visits to other facilities.

Over the course of design, the team of Collections Managers, Curators, Researchers, Smithsonian in-house architects and engineers with the Architect/Engineering design consulting team discovered that there were no applicable codes, guidelines or simple solutions that could be easily adopted. The solution developed was influenced by each stakeholder and shaped not only the building, but also the protocols that will change collections access, maintenance activities, and research. The facility design solution was impacted by the final definition of 'an event' and the interplay of many factors: evaporation from containers up to 100 years old, the size of compartments to contain 'an event', the ratings of structure and walls, the temperature of the facility, air-changes required to maintain a clean environment, the use of compact storage shelving, special lighting, fire protection systems, the definition of 'hazardous waste' acceptable to the local water authority, the available supply of fire protection water, soil conditions. Ultimately, all these factors influenced costs and outcomes including changing project scope. Lessons learned from this project will help all institutions meet the challenges of wet collections planning and design.

1. Walter L. Crimm and Bryan L. Stemen
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3. Oral Presentation

Conservation of a Historic Blue Whale Skeleton

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In 1908, Canterbury Museum acquired a 26.5 metre long Blue whale skeleton after the animal had beached on the west coast of New Zealand's South Island. De-fleshing was undertaken and the cleaned bones, including the 1.5 tonne, 6.24 meter long skull, were transported to Christchurch on the east coast. Articulation of the skeleton relied on a steel mount structure, as was typical for the time. Wood and plaster represented intervertebral discs and cartilaginous material in the flippers, and steel pins with plaster fills were used to repair breaks in the bones.

Due to its size, the skeleton was displayed outdoors under shelter until 1994 when the need for environmental control and conservation attention was recognised. Initially the skeleton was moved into a purpose-built, yet cramped, "visible storage" gallery and the skull and vertebrae were installed re-using the original corroded steel support structure. However, following the establishment of the Museum's Objects Conservation Lab in 1995, the installation was put on hold awaiting an opportunity for full examination and treatment.

That opportunity arose in 2001 when the Museum initiated a significant building renovation project planned to include a new entrance with a high-ceilinged atrium of sufficient scale to accommodate the skeleton. In 2002, the 63 vertebrae (weighing 20 grams - 65 kilograms) were removed from their mount structure, examined and documented, and treatment research and testing were undertaken. Fortunately, the historic retrieval and some aspects of the three previous installations and cleaning endeavours were well documented photographically, revealing the origin of various condition details.

A materials science research project was initiated with Canterbury University to assess the effectiveness of specific consolidants on weathered historic whale bone, with reference to the 1997 SPNHC Leaflet Adhesives and Consolidants in Geological and Paleontological Conservation, more recent literature, and personal communications.

The treatment carried out to date has involved removal of the previous invasive mount and repair materials, superficial cleaning, consolidation of embrittled areas, pinning and adhesion of detached components, and filling/inpainting the wide variety of voids resulting from the previous mount design and reattached portions. Treatment for the two 6.2 meter long mandibles and most of the 196 post cranial bones has been completed. Considerations for the skull treatment are currently being resolved.

Additionally, the right maxilla (4.7 meters long) was never delivered to the Museum. Replication using techniques borrowed from the rapid-prototyping industry is being investigated. The existing left maxilla will be laser-scanned, the data mirror-imaged and fed to a computer-driven milling machine to create the bone in dense inert foam, which will be coated to blend with the rest of the skeleton.

A new non-invasive mounting system is currently being designed utilising inert materials and incorporating methods of adjusting individual bone mounts during installation.

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3. Oral Presentation

Evolution of WFCC-MIRCEN World Data Centre for Microorganisms (WDCM)

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In 1966, experts had meetings sponsored by UNESCO for the promotion of ex situ repositories of microbes, and recognized that networking of culture collections was a prerequisite for this promotion. The first International Congress for Culture Collections (ICCC-1) in 1968 followed. Then the World Federation for Culture Collections (WFCC) and the data center (WDCM) were set up. The first edition of the World Directory of Collections of Cultures was published in 1972 by the late Professor Skerman in Australia. In 1986, WDCM was transferred to Japan.

The World Directory is now a database named CCINFO that contains information on 473 CCs in 63 countries. Most of them are CCs of bacteria (314 CCs) and fungi (256 CCs), but 45 CCs maintain cell lines. According to CCINFO and a survey by WDCM, 172 CCs publish catalogues and about 60 CCs provide Web sites. However, CCs that provide on-line databases are not as numerous as those with Web sites. Therefore, a centralized data system and a distributed data system are complementary for users of cultures. Some CCs have actually asked WDCM to provide their data from the WDCM system.

WDCM provides the user with several data systems as follows:
an on-line registration system for CCs
centralized databases of CCs (CCINFO) and their holdings
a one-stop query system to distributed databases in bacteria, fungi and cell lines
a work-bench for databasing, classification and identification

It should be noted that wrapping of distributed databases is done solely by WDCM. Both WFCC and WDCM are voluntary organizations. CCs are not obliged to use a standard data system to be an WFCC member or to register in CCINFO. It is expected that WFCC will become the professional organization to set standards for any aspects of operations in CCs including data management.

1. Hideaki Sugawara
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3. Oral presentation

Non-Structural Mitigation against Earthquake: a Case Study of Istanbul Museums

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The exposure of the Marmara and Aegean regions of Turkey to a major and devastating earthquake in the near future is a scientific fact. An earthquake will put rich and irreplaceable cultural heritage of world civilizations which are exhibited and stored in Istanbul Museums, at great peril. The tourism economy and hospitality services sector in the Marmara Region is entirely dependent on the integrity of the world class cultural heritage that tourists come to see. Protecting the tourism sector of the economy involves disaster preparedness education and business resumption planning.

There are more than 50 public and private museums in Istanbul, which daily host thousands of visitors. As a result of the programs held earlier and the projects by Bogazici University, Kandilli Observatory and Earthquake Research Institute, Disaster Preparedness Education Program (AHEP), the custodians of the rich heritage of the region were well-aware of and very much concerned about the risk. However, they had in their hands very little specific "how-to" educational materials and information on where to begin.

The pilot project entitled "Seismic Conservation of Historical and Cultural Treasures of a World City: Sizing the Need and Formulating an Action Plan for the Museums of Istanbul, Turkey" has been realized during the 6-month period from July through December 2003. The project is one of the applied research grants of the ProVention Consortium Disaster Risk Reduction Program which is managed by the World Bank's Disaster Management Facility.

The pilot project aimed to research the needs, priorities and feasibility of taking non-structural mitigation measures to protect the cultural heritage of Istanbul Museums; to make the knowledge about disaster preparedness focusing on non-structural mitigation more widely available in order to save lives and prevent injuries of museum staff and visitors; to preserve the cultural heritage for future generations; to protect business continuity in the tourism sector and assist this sector in prioritizing and developing practical non-structural mitigation action plans. Since Istanbul leads the nation in most respects, it is expected that its best practices in seismic preservation will be emulated by other cities of Turkey and throughout the region.

This paper will focus on the methodology of the pilot project like compilation of examples of hazards and best practices to develop an educational presentation; organization of an educational seminar, and development of survey forms; museum visits and analysis of data such as the most common non-structural risks both on display and in storage; challenges faced when undertaking non-structural mitigation work; recommendations in accomplishing mitigation efforts and the achievements of the pilot project.

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3. Oral presentation

After the Fire: salvaging the stores of the Department of Archaeology & Natural History, Australian National University, Canberra

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On 18th January 2003 a devastating bushfire swept through Canberra, the capital of Australia. In this fire over 500 private homes were destroyed along with many other commercial and public properties. The latter included a large building in the suburb of Weston which belonged to the Australian National University which in addition to several other functions, housed the collections of the Department of Archaeology and Natural History. The immediate priorities of the university were to help staff and students directly affected by the fire and, to assess and begin re-building the Mount Stromlo Astronomical Observatory that was also destroyed. Thus it was some time before personnel were allowed onto the site in Weston to assess the damage to the collections and the stability of the building. When this occurred a salvage team was set-up to 'excavate' the remains. This was a new process for all concerned and the methods employed were often changed to adapt to the circumstances. This paper provides an overview of the final procedures used in the salvage and the post-salvage data management. This reveals that many of the problems

encountered were a consequence of deficiencies in the management and methods of storage. These problems are not so immediate in the carefully managed collections at museums. However, they are pertinent to the numerous stores scattered through natural history, anthropology and archaeology research departments worldwide. Often, but not always, these suffer from a lack of funds and/or curatorial staff which effects the implementation of procedures and strategies. This paper discusses the response of the Department of Archaeology & Natural History to the destruction of their stores, and highlights how this impacted on the methods employed for the salvage of archaeological, natural historical and ethnographic collections. From this, recommendations are made to allow for better preparedness and response when future catastrophe strikes, which will ultimately allow for better management of collections.

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3. Oral Presentation

From Salvage Operation To In Situ Preservation: Current Techniques Used In Conservation At The Mammoth Site Of Hot Springs, South Dakota

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Two weeks of salvage excavation and stabilization were conducted on fossil remains discovered on the southern city limits of Hot Springs, South Dakota, in 1974. Ten days of testing in the summer of 1975 proved the site to be paleontologically significant and formal excavations began. Skeletal evidence from 27 years of excavation has revealed 53 mammoths and 41 other species with a date of 26,000 B.P. Over 2,500 sub-fossil bones remain on display in-situ. This presents a unique challenge for long-range conservation. Conservation techniques have evolved over the course of the years as new materials and methods are recognized. Current conservation methods practiced at the Mammoth Site include examination, documentation, treatment, and preventive care, supported by research and education. We present a description on sub-fossil in-situ stabilization procedures and conservation techniques planned and used at the Mammoth Site.

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3. Poster Presentation

Collection-Level Descriptions - preview of a new joint project

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Unlocking the richness of biodiversity collections is an aim for most institutions that is being tackled through the creation of database records for each item in each collection. A complementary approach is to describe a whole collection in a single record.

Collection-Level Descriptions (CLDs) can provide a number of benefits whether within an institution or across several institutions. A new project is being developed with partners on both sides of the Atlantic that aims to maximise these benefits for the biodiversity research, learning and history of science communities

Using elements from existing international data standards, descriptive records will be created for all the collections in the partner institutions - including specimens, original artwork, library and archive materials, expedition materials, exhibitions, databases, electronic and learning resources.

Links will be made to databases, where these exist, so that enquirers can pass from collection level to item level across the institutions.

1. Neil Thomson and Carol Butler
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3. Oral Presentation

Interval from blood collection to LCL cryopreservation varies with disease type and subject age

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Background: The availability of lymphoblast cell lines (LCLs) provides an important resource for the identification of genes for complex human diseases. LCLS also provide renewable sources of DNA, RNA, and proteins for gene function studies. The National Institutes of Health (NIH) and several private agencies are actively pursuing initiatives to promote this research field. LCLs can routinely be established from young, healthy individuals with success rates exceeding 98%, but the success rates from subjects with a wide spectrum of diseases, age groups, and ethnic backgrounds have not been fully evaluated.

Methods: The Rutgers University Cell and DNA Repository is a contractor for several NIH and privately funded repositories that span multiple diseases and age groups. Some of the diseases and conditions under investigation include mental retardation, drug addiction, alcoholism, diabetes, and aging. We examined the mean time from date of sample receipt to cryopreservation of a viable LCL with respect to disease type and subject age.

Results: Based on data from six studies for the above diseases and conditions, the mean time to cryopreservation was 51.7 days, but there was a wide variation among the studies (range 43.5 to 67.6 days). The shortest time was for the youngest age group (< 30 years of age) and the longest was for the aging study (> 90 years of age).

Conclusions: Disease type and subject age are among the many variables that influence the time required for successful LCL transformation. It's important to be aware of these variables when designing new study protocols.

1. David A Toke
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3. Poster presentation

Developing an Emergency Response Plan for Natural History Collections

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Developing an Emergency Response Plan is not rocket science, so why is it that many people find it so onerous? What is disturbing is a certain reluctance, or resistance, on the part of some institutions to face the reality that emergencies can and will happen and start planning for them rather than waiting until an incident has occurred. Consequently, most institutions are not well prepared. There are three key aspects to emergency preparedness which must be considered:

1. Preventing the event from occurring, or mitigating its effects if this is not possible
2. Cohesive teamwork and collaboration; and
3. Ensuring that the right people are kept informed and properly trained

No matter what type of collection you have, whether it is a natural history collection, library, archives, museum, or art gallery, the planning process will be the same. There are many tasks to be performed, much information to be gathered and collated, but if it is organized in a logical and methodical way and work is shared, then the plan can be accomplished with less hassle. First, there are four questions that need to be asked:

1. Who needs to be involved in the planning process?
2. What needs to be done, and in what order?
3. What needs to be included?
4. What are the pitfalls?

The plan can only work if the right people are involved and all areas of responsibility are included in the planning process. It must first involve determining what is to be protected (assets), and identifying the threats and hazards that will have an impact on the institution or collection. This involves carrying out a risk assessment, the result of which will be to develop procedures for reducing the risk of the different types of threats that have been identified. Planning will generate a lot of information to collate, but it should not be the task of one person; it should be delegated to all members of the planning team. The important thing is organizing each task so that it is manageable and achievable within a realistic deadline.

Compiling a list of resources (supplies and equipment, funding, alternate locations, conservators, and salvage procedures) is an essential part of any plan. Once the plan has been completed, staff needs to be trained and the plan tested and updated on a regular basis.

1. David Tremain
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3. Oral Presentation

Data validation of a six-year-old specimen database

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Background/Problem: SPECTRUM is a Small Talk specimen database created at Millennium Pharmaceuticals, Inc. in March 1998. It holds sample and inventory information for up to 220,000 human, biologic and animal specimens. Data entered into SPECTRUM has not been validated in six years. It has become a priority to clean the data immediately following data-entry to avoid errors and more importantly to move towards GLP compliance.

Method/Tools: The specimens of interest are queried using the SPECTRUM browser application. All pertinent fields of the specimen are selected to be displayed with the query results. The data manager verifies the information on each query page with the Specimen Collection Form (SCF) for data discrepancies. The specimen with the error is corrected in the SPECTRUM database where direct changes can be made to all fields of the specimen. The data manager validating the data returns to the query results and continues with the next set of samples.

Result: Thousands of specimens have been validated and will continue to be validated on an ongoing basis. One of the most important fixes that have occurred is linking the appropriate specimens to the patient subject id. In the event where the patient has decided to withdraw from a study, all the samples received from the patient need to be destroyed. With the fix, all the samples of the patient can be located including the derivatives that were generated from the parent sample.

Conclusion: Maintaining data integrity is an important part of Data Management. Data is validated and approved by the data manager to be used by scientists. The Sample Management Group at Millennium Pharmaceuticals, Inc. is moving towards GLP compliance and it requires the highest data quality in a controlled and validated Sample Management Database.

1. Aimy Tse
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3. Poster presentation

Risk Perception: Are you "Flying Low"?

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How humans perceive risk establishes the means by which they will both identify hazards and respond to consequences. Understanding risk perception is therefore fundamental to Emergency Response Planning and Preparedness. While museum and research collections will face a variety of risks to their existence, we as their caretakers have in common that we perceive the risks they face and this perception will provide the framework to guide our response. This paper will consider the human perception of risk; the range of psychological tools we use to identify potential hazards, the effects of value systems and beliefs in modifying these perceptions and the conditions they impose upon response planning.

By considering and understanding risk perception as the context in which we develop our Emergency Response and Planning systems we are then better able to broaden the range of tools we utilize to identify and analyze risks, modify the impacts of beliefs and values and as a result develop more effective Emergency response plans - so we don't get caught with our pants down!

1. Suzanne Twelker
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3. Oral Presentation

Keynote Address: Managing large biorepositories: Are there smarter ways to collect and store specimens?

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The NCI intramural biospecimen program currently stores over 8 million biological specimens, including 80 different specimen types, and is exemplary of the evolution of the biospecimen management field over the last three decades. The NCI Division of Cancer Epidemiology and Genetics operates large biorepositories in support of molecular epidemiology studies, and is facing

new challenges in specimen collection, processing and storage. NCI investigators and their biorepository collaborators have refined techniques for collecting and processing blood, urine and buccal cells for molecular epidemiologic assays including genotyping, virus detection, and testing for pesticides, endogenous hormones, micronutrients and insulin-like growth factors. These methodologic studies have resulted in reliable approaches to DNA extraction and quantification, enhanced specimen integrity during transport and storage, and in general a high level of quality control for laboratory assays. However, as molecular epidemiology studies have grown in complexity, rather than focusing exclusively on laboratory testing for evaluating exposures, study goals have broadened to include testing biospecimens to refine endpoints and to delineate mechanisms of pathogenesis. These developments have resulted in a new focus on refining techniques for collecting cells and tissues, and the increased use of molecular techniques (e.g. expression arrays, proteomics) to characterize cancer cases. In addition, genotyping assays that previously required microgram quantities of DNA now require nanograms. The NCI biospecimen program is meeting these new challenges through the assessment of alternate specimen processing and storage methods, such as whole genome amplification, tissue microarrays, multiplexing assays to conserve specimens of limited abundance, and using filter cards or other alternatives for blood and saliva collections. The challenges faced in the NCI program are representative of those faced by many ISBER member organizations involved in managing large, diverse biorepositories.

1. Jim Vaught
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3. Oral presentation

BCCA's Tumour Tissue Repository – A Powerful Resource in our Fight Against Cancer

Vielkind, JR¹; Gormari, M¹; Leung, A¹; Schmidt, BM¹; Vigouret Lee, S¹; Moody, P²

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The British Columbia Cancer Agency (BCCA) has a government mandate to reduce cancer incidence and mortality and improve the quality of life of patients and thus has created the Tumour Tissue Repository (TTR), a not-for-profit entity driving cancer research. The TTR is comprised of two parts, a Tissue Processing and Storage Laboratory (TPSL) and a Bioinformatics Clinical Research Database (BCRDB). During its first year TTR has optimized conditions necessary to acquire high quality frozen tissue within 15-30 min of surgery. Quality control of frozen tissue specimens includes review by a pathologist at the TTR to determine the type and grade of tumor, and a quantitative/quality RNA test using an Agilent Bioanalyzer. This review information is added to the TTR database. Microdissection provides pure populations of tumor cells. The database has been designed to provide convergence of patient and lifestyle data with the patient's clinical history, tissue pathology and molecular data. Special effort has been made to develop cryptography and anonymization techniques to protect the confidentiality of patients while giving researchers the data they require and 'need-to-know' access to authorized users. Data are collected in XML intermediate format and transferred into an Operational Node; from there, after cleansing, they are transferred into a Repository Node. Data are provided to researchers from a Research Workbench. Research projects that wish to make use of the samples and/or information in the TTR are first vetted and approved by the Scientific and Ethics Advisory Committee before any samples and/or data are released. We present unique TTR features such as, the concept of patients being donors of their tissue and data, specifics of the Consent Form, the ability to revoke consent, patient privacy impact assessment, the collection of SOPs and specifics of the data base design.

1. Juergen R Vielkind
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3. Poster presentation

Building a new wildlife tissue repository for the National Wildlife Research Centre of Environment Canada

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The Specimen Bank at the Canadian Wildlife Service has been in operation for over 20 years. It was set up to standardise the processing and treatment of wildlife specimen samples being collected throughout Canada in monitoring and survey programs and to ensure that the treatments in the laboratory were well documented. This presentation describes the nature of the repository and some of its research uses.

Originally set up in the late 1970's with standard household freezers (-20°C), the collection facilities have been twice increased significantly. As the collection grew, a permanent system using freezer rooms was built in 1981. In the early 1990's, the capacity of the permanent freezer storage area was doubled with two additional freezer rooms, as well as liquid nitrogen freezers and -

85°C chest freezers to ensure sample viability for biochemical analyses. There are now in excess of 75,000 different specimens stored and if all individual aliquots are counted there are more than 500,000 discrete containers.

In 2000, a decision was made to build a new building to house the National Wildlife Research Centre at Carleton University in Ottawa and this presentation gives a brief overview of the process taken to build the Specimen Bank in the new building. The goal of the new facility was to provide at least 40% additional space for specimens. Particular attention was paid to the walk-in freezer rooms to ensure that they incorporated the newest technologies in security and efficiency of operation. The types of storage built, the monitoring systems, backup power etc. are described. Important considerations in the design of walk-in freezers include the redundancy of mechanical systems, alarms, and temperature monitoring devices. The experience and the lessons learned in designing and constructing as well as moving a mature collection is presented.

1. Bryan Wakeford
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3. Oral presentation

Predicting temperature dependency of deterioration in storage

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Problem: Repositories use low temperatures to extend the shelf life of specimens. However, the extent to which shelf life can be prolonged is poorly understood, as is the relative benefits of different storage temperatures. Better predictive tools would help when scheduling regeneration times or estimating the cost and benefits of different storage strategies.

Methods: We have adapted a method to predict molecular mobility of the aqueous matrix at cryogenic temperatures that is based on measurements of configurational entropy, calculated from heat capacity measured using differential scanning calorimetry. Molecular mobility estimates were then correlated with deterioration rates measured for seeds stored for 20 - 40 years under refrigerated, freezer, and cryogenic temperatures.

Results: Molecular mobility estimated by heat capacity measurements correlated well with deterioration rates of seeds. Molecular mobility decreased almost exponentially as the seed sample was cooled through the glass transition temperature (about 28°C). However, there was a change in the temperature dependency of molecular mobility at temperatures between -5 and -15°C. Below this temperature range, the temperature coefficient was shallow. The temperature dependency of seed aging followed a similar pattern.

Conclusions: Our experiments support the hypothesis that the rate at which biological samples deteriorate in storage is correlated with the molecular mobility within the aqueous portions of cells. This suggests that the relative shelf life of samples at different temperatures can be predicted using a relatively simple, non-invasive technique.

1. Christina Walters
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3. Oral Presentation

Assessing Fire Risks and Steps toward Mitigation

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This meeting's theme centers on strategies for emergency preparedness, response and salvage. No one should disagree that these important topics need to be included as part of any long range preservation plan. The focus of this paper, however, is to emphasize prevention measures that should be followed to avoid one of the most prevalent threats facing all cultural institutions - FIRE. Cultural institutions are just as susceptible, if not more so, to the wide variety of common ignition sources that are responsible for most fires elsewhere. The most important factor in preventing a fire loss is through the maintenance of a good fire prevention program. The program must be based on a high standard of housekeeping, orderliness, maintenance of equipment, and continuous staff training and awareness in both recognizing and eliminating fire hazards (ignition and fuel sources). The fire program (policy) also needs to be in writing and updated periodically. Management and staff responsibilities need to be defined, and fire prevention procedures established.

1. Andy Wilson

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3. Oral presentation

Recovery of High Quality Double-Stranded DNA from FTA® Paper

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A novel room-temperature method for eluting double-stranded DNA from Whatman FTA® paper has been developed. The yield and quality of the genomic DNA is comparable, and in some cases better, than DNA extracted using conventional techniques. A 6 mm disk of FTA spotted with 10 microliters of whole blood yields on average 75 - 150 nanograms dsDNA, and the length of the DNA is in the 10 - 50kB range as shown by pulsed-field analysis. PCR fragments up to 23kB are consistently obtained with eluted DNA. The eluted DNA is readily amplified with current whole genome amplification techniques, with 10 nanograms reliably generating 100's microgram DNA. Eluted DNA is compatible with Taqman STR assays such as the ABI Identifiler® and SNP assays such as on the Illumina platform. Similar quality results are obtained with DNA from buccal or mouthwash samples. The recovery of high quality double-stranded DNA with GenVault protocols further enable researchers to achieve maximum efficiencies from a dry-state repository platform.

1. David Wong
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3. Poster presentation

Tracking Alcohol Volumes

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Local fire code requires that a current inventory be kept of the alcohol volume in each wet collection storeroom. A Microsoft Access database was developed to perform and maintain the inventory for the mammal collection. Because containers are topped up to their full volume, reliable average alcohol volumes could be calculated for the six differently sized containers used in the collection. Ultimately, the full volume of each container was used in inventory calculations to provide a "safety buffer" for the total volume. The size and number of containers are tracked at the species and geographic locality (country, province, or county) level. The database serves to facilitate a number of other functions as well; these include planning for moves and future space requirements, budgeting for supplies and equipment, and providing way-finding documentation for the collection.

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3. Poster Presentation