

Scientific Collections International (SciColl) Conference  
Organized under the auspices of the OECD Global Science Forum:

## INTERNATIONAL COORDINATION OF AN INTERDISCIPLINARY GLOBAL RESEARCH INFRASTRUCTURE

Hosted by the Royal Belgian Institute of Natural Sciences  
Brussels, 8-9 February 2010

Supported by the European Science Foundation, US National Science Foundation,  
and the Belgian Science Policy Office

### Conference Agenda

#### Monday, 8 February 2010

**9:00 – 10:00 Session 1:** Welcome and Overview; Session chair Patrick Grootaert

9:00 Welcome by host organization

Patrick Grootaert, Royal Belgian Institute of Natural Sciences, Brussels

9:10 The global landscape of scientific collections

Scott Miller, Smithsonian Institution, Washington, USA

9:25 SciColl: Overview of the concept

Richard Lane, Natural History Museum, London, UK

9:45 SciColl as part of the research infrastructure landscape

Marc Heppener, Director of Science and Strategy Development, European Science Foundation

**10:00 – 10:30** Coffee break

**10:30 – 12:30 Session 2:** The role of collections in global research: What are limits of current information and what new information is needed for breakthroughs? Session chair David Schindel

10:30 Introduction of proposed SciColl research programme on Environmental Change

David Schindel, Consortium for the Barcode of Life, Smithsonian Institution, Washington, USA

10:40 Climate, Environment, and Ecosystem Change from Paleo Proxy Collections

David M. Anderson, NOAA's National Climatic Data Center, Boulder, CO

11:00 Hypothesis Driven Research of Changing Disease Patterns: The Role of Collections with Three Case Studies

Gregory Glass, Johns Hopkins University, Baltimore, Maryland, USA

11:20 Importance of natural history collections in climate change research

Adrian Lister, The Natural History Museum, London, UK

11:40 Data Management in the Global Earth Observation System of Systems (GEOSS)

Rob Koopman, Group on Earth Observations (GEO), Geneva, Switzerland

12:00 Open discussion of interdisciplinary collections-based research

**12:30 – 13:30** Lunch

**13:30 – 14:30** Visit to research collections

**14:30 – 15:30 Session 3:** Breakout discussion groups. Each group will discuss:

- Interdisciplinary solutions to research bottlenecks using collections
- Other opportunities for interdisciplinary research based on collections
- SciColl's proposed research programme on global change

**Discussion group A: Moderators Richard Lane and Gregory Glass**

**Discussion group B: Moderators David Schindel and David Anderson**

**Discussion group C: Moderators Christoph Häuser and Michel Guiraud**

**15:30 – 16:00** Coffee break

**16:00 – 17:30 Session 4:** Presentation and discussion of breakout discussion groups;  
Session chair Richard Lane

16 :00 Rapporteur reports on obstacles and opportunities

16:45 Moderated discussion to identify priorities

**17:30 Adjourn**

**19:00** Dinner at the Royal Belgian Institute of Natural Sciences

## **Tuesday, 9 February 2010**

**9:00 Session 5:** Improving scientific collections; Session chair Leo Kriegsman

Presentations of four initiatives to improve collections and their management:

9:00 SciColl's proposed programme of work to improve collection management

Dr. Leo Kriegsman, Naturalis Museum, Leiden, The Netherlands (to be confirmed)

9:15 The Global Biological Resource Centre Network (GBRCN): Aiming to improve the management and networking of collections of laboratory-held living microorganisms and cultured cells

Dr. David Smith and Dr. Dagmar Fritze, GBRCN Secretariat, Germany

9:30 Korean National Research Resources Center

Prof. Yeonhee Lee, Director General KNRRC, Korea

9:45 SYNTHESYS network activities: Assessing and sharing best practice in European collections to ensure their future survival and value as an infrastructure

Dr. Rob Huxley, Natural History Museum, London, UK

**10:00 – 10:30** Coffee break

**10:30 – 12:30 Session 6:** Plenary discussion; Moderator Christoph Häuser

10:30 Proposed SciColl Programme of Work

11:00 Identification of priorities

11:30 SciColl membership

12:00 Next steps in the development of SciColl

**12:30 Conference adjourns and lunch**

## The Global Landscape of Scientific Collections

Scott Miller, Smithsonian Institution, Washington, D.C. USA

### Abstract

Object-based scientific collections are a critical part of the research infrastructure of many scientific disciplines around the world. These include an extraordinary diversity of research objects from moon rocks and stardust to deep-sea sediments and polar ice cores, from micro-organisms to archeological artifacts. A process in the United States that recognizes collections as distributed scientific infrastructure illustrates many challenges and opportunities that are shared globally as well. The presentation will describe the United States example and put the issues into a global context.

Starting in 2004, the White House Office of Science and Technology Policy highlighted the importance of scientific collections to many agencies of the Federal government and charged them, in an annual statement of priorities, to increase interdisciplinary coordination among their collections. An Interagency Working Group on Scientific Collections (IWGSC) was established and from 2005-2008 conducted a study of approximately 300 collections in 14 agencies. In parallel, the National Science Foundation (NSF) conducted a survey of more than 300 collections in 147 non-government institutions (primarily university museums and herbaria) that had received NSF grants for collection improvement.

Both the IWGSC and NSF studies pointed to the long-term responsibility to maintain these collections and to provide physical access to the specimens and electronic access to their associated data. The IWGSC report ([http://www.ostp.gov/galleries/NSTC%20Reports/Revision\\_1-22\\_09\\_CL.pdf](http://www.ostp.gov/galleries/NSTC%20Reports/Revision_1-22_09_CL.pdf)) included examples of the impact of collections within a discipline and unexpected impacts in other fields of research. The report pointed to the need for:

- Creation of a comprehensive government-wide mechanism to ensure better management of collections within and among agencies;
- Periodic surveys of collections and their condition and accessibility;
- Better coordination between Federal and non-Federal collections;
- Sharing of best practices in collection management and conservation;
- Improvement in the digitization of collections and interoperability of databases; and
- Distinct budget categories devoted to collection maintenance.

### Biographical Sketch



Scott E. Miller is the Deputy Under Secretary for Science of the Smithsonian Institution, responsible for major research, collections management, exhibits, and education programs of national and international scope in astronomy, geology, anthropology and biology. These science units include over 1800 employees and a budget of over \$300 million. He is also responsible for pan-Smithsonian programs in fellowships, scholarly publishing, and international relations. He is Chair of the Executive Committee of the Consortium for the Barcode of Life and Co-Chair of the US Government Inter-Agency Working Group on Scientific Collections.

Miller previously served the Smithsonian as Associate Director for Science at the National Zoological Park, spearheading the rehabilitation of the Conservation and Research Center (Front Royal, Virginia) from 2004 to 2006, and as Chairman of the Departments of Entomology and Systematic Biology at the National Museum of Natural History from 2000 to 2006. Before coming to the Smithsonian, he led the Natural Science Department and Hawaii Biological Survey at Bishop Museum (Hawaii) and the Biodiversity and Conservation Programme at International Centre of Insect Ecology and Physiology (Kenya). A major focus of these positions was enhancing research programs, increasing their accessibility and relevance to broad communities, and updating their supporting infrastructure.

Miller maintains an active research program as a curator of entomology at the Smithsonian National Museum of Natural History. He has published over 160 publications, and co-edited four books. His current research focuses on moths of New Guinea and Africa. Miller received a bachelor's degree from the University of California at Santa Barbara; he earned his doctorate degree in biology from Harvard University.

## SciColl as part of the research infrastructure landscape

Marc Heppener, Director of Science and Strategy Development, European Science Foundation

### Abstract

The European Science Foundation is an independent association with 79 members from 30 countries all over Europe. The members are research funding organisations, research performing organisations, academies and learned societies. The European Science Foundation provides a common platform for its Member Organisations in order to advance European research and explore new directions for research at the European level. Through its activities, the ESF serves the needs of the European research community in a global context.

In order to accomplish its mission, ESF and the heads of European research funding and research performing organisations (EUROHORCs) develop strategic research agendas for its Member Organisations. They do this in close collaboration with the major stakeholders in Europe, like the European Commission and the European Research Council. The recently published "EUROHORCs and ESF Vision on a Globally Competitive ERA and their Road Map for Actions" structures their joint strategic ambitions. One of the key actions in this vision paper is to develop shared funding and exploitation of research infrastructure. To this end ESF has created a Member Organisation Forum on Research Infrastructures in order to establish a network of stakeholders, complementary to ESFRI, for discussing and sharing best practices in funding and operating the transnational research infrastructures. ESF wants to achieve a map of the European Research Infrastructure Landscape and thereto submitted the MERIL proposal to an EC-FP7 call for a Support Action grant.

SciCOLL is part of this research infrastructure landscape and its objectives partially coincide with those of MO Forum, MERIL and the ESF, aiming at the promotion of world class research infrastructure in Europe. Therefore ESF welcomes SciCoLL as observer to the MO Forum on Research Infrastructures.

### Biographical Sketch

Marc Heppener studied physical chemistry at the University of Amsterdam and obtained his PhD in 1986 on a thesis describing time-resolved molecular dissociation processes in ultracold van der Waals complexes. After his PhD he worked as project leader X-ray detector development at the Space Research Organisation of the Netherlands (SRON). Three years later, in 1989, he joined the SRON management, taking up the position of manager external research. In this position he was responsible for the Dutch national programmes in Earth observation and microgravity research. He participated in several boards and commissions, notably the Dutch interdepartmental committee on space, and served as Dutch delegate in Programme Boards of the European Space Agency (ESA). From 1996-1999 he was chairman of the ESA Microgravity Programme Board.

In 1999 Dr. Heppener joined the European Space Agency as head of the science and applications division in the directorate of human spaceflight and exploration. In this capacity he developed a user-driven programme for life and physical sciences in space, which was endorsed by the ESA Ministerial councils in 2001, 2005 and 2008. He was responsible for the interaction with the research community, the evaluation and selection of experiment proposals and the promotion of applied research projects with industrial involvement. Simultaneously, he contributed to the development of the Aurora exploration programme, taking care of the scientific priorities and requirements culminating in the definition of the scientific package of the ExoMars mission aimed at finding traces of extinct or extant life in the subsurface of Mars. In the context of Aurora he also initiated studies into the effects of extreme isolation on human performance as a preparation for human exploration missions. Dr. Heppener was mission scientists for all flights of European astronauts to the International Space Station.

In 2009 Dr. Heppener joined the European Science Foundation as director of science and strategy development. In this capacity he is responsible for the interaction with the European research community represented through the ESF Standing Committees and Expert Boards, providing scientific foresights, the execution of the ESF Open Calls and peer review processes, as well as ESF communications and the conference programme. He is currently active in implementing the different actions from the EUROHORCs-ESF Road Map for Actions for a globally competitive European Research Area, notably in the areas of scientific foresights, European peer review, research infrastructures and establishing a European Grant Union.

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#### Conference Abstracts and Speaker Biographies

## Introduction of proposed SciColl research programme on Environmental Change

David Schindel, Consortium for the Barcode of Life, Smithsonian Institution, Washington, USA

### Abstract

Each scientific collection originates and develops within the context of a research community of practice. Researchers collect, process, analyze and publish on their specimens and then pass them to a repository that will maintain them for future research in that community. The systems used to organize the specimens, digitize them, and make them accessible reflect the research traditions and practices in that field. As collections grow in size and complexity these systems are critical for providing access to specimens in a field. Unfortunately, access to collections by researchers in other fields is seldom a consideration and interdisciplinary research may suffer as a consequence.

One component of SciColl's mission is to promote interdisciplinary research that relies on scientific collections. Increasing the interoperability of collection databases is one critical step to enabling cross-disciplinary research. As a proof-of-concept, SciColl seeks to promote an interdisciplinary research program on environmental change over the past few million years – the period covering the dawn and rise of humanity. A wide variety of collections can be brought to bear on this topic: fossils, sediment and ice cores, anthropological remains, archeological artifacts, plants, animals and microbes from historic times, and even biomedical specimens. By promoting this ambitious research program, SciColl hopes to demonstrate the potential for integrative research that relies on collections drawn from diverse communities of research.

### Biographical Sketch



Dr. David Schindel is the Executive Secretary of the Consortium for the Barcode of Life (CBOL), an international initiative hosted by the Smithsonian Institution's Museum of Natural History and supported by a grant from the Sloan Foundation. The Consortium includes natural history museums and other biodiversity research organizations and is devoted to developing a global system for identifying species using short genetic sequences.

Dr. Schindel was trained as an invertebrate paleontologist and holds a B.S. in Geology from the University of Michigan and a Ph.D. in Geological Sciences from Harvard. He was a member Yale University's Department of Geology & Geophysics and was

Curator of Invertebrate Fossils in the Yale Peabody Museum from 1978 to 1986. In 1986, Dr. Schindel joined the staff of the National Science Foundation where he has directed a variety of funding programs that provided support for: research in systematic biology; improving facilities and constructing specimen databases in natural history museums and herbaria, improving elementary school science education, major research instrumentation, interdisciplinary research centers, and strategic evaluation. During 1997 Dr. Schindel worked in the U.S. Senate as a Brookings Institution LEGIS Fellow in the office of Senator Jeff Bingaman (D-NM). From 1998 to 2004, Dr. Schindel served as NSF's European representative, based in the US Embassy in Paris. He joined the Smithsonian Institution and the Consortium for the Barcode of Life in September 2004.

## Climate, Environment, and Ecosystem Change from Paleo Proxy Collections

David M. Anderson, NOAA's National Climatic Data Center, Boulder, CO

### Abstract

Paleoclimate data from tree rings, ice cores, ocean and lake sediments, and other natural recorders help extend the record of climate, environment, and ecosystem change back in time before the Dawn of Humanity. Scientists around the world have contributed the results of their scientific research to the World Data Center for Paleoclimatology, creating a unique data archive useful in understanding Global Change.

Some of the material analyzed (ice, wood, sediment) resides in discipline-specific repositories supported at institutional, national, or international levels. Preservation and availability of sample material varies widely, as do curatorial practices and conventions.

While some success has been achieved utilizing paleo data across disciplines, much more could be done to foster successful use of the sample material across disciplines.

### Biographical sketch

David M. Anderson is the Director for the World Data Center for Paleoclimatology, Chief of the Paleoclimatology Branch of NOAA's National Climatic Data Center, and an Associate Professor Adjoint at the University of Colorado. His research interests in paleoclimatology lie in the marine geologic record of the Asian monsoons and other aspects of tropical air-sea interaction, and in the ocean's role in regulating atmospheric carbon dioxide in the past and future. He has served on national and international advisory committees for paleoclimate research, ocean research, and data management issues, and contributed to national reports on abrupt climate change and climate extremes.

Dr. Anderson received a B.S. degree in Biology in 1981, an M.S. in Marine Science from San Jose State University, and an M. S. and Ph.D. in Geological Sciences from Brown University in 1991.

## Hypothesis Driven Research of Changing Disease Patterns: The Role of Collections with Three Case Studies

Gregory E. Glass & W. Harry Feinstone Department of Molecular Microbiology & Immunology  
The Johns Hopkins Bloomberg School of Public Health; Baltimore, MD 21205

### Abstract

The emergence of infectious diseases, especially those affecting human and animal populations, has been an area of continued and increasing research for the past 30 years. Disease patterns may change for a large variety of reasons, and these factors affect both infectious disease agents as well as other aspects of ecosystem function. The question of why certain diseases increase in specific places at particular times often is used to infer key issues related to how humans impact ecosystems, including climate change, land use impacts and invasive species effects. However, there rarely is sufficient information gathered in and around the time of emergence to satisfactorily address these questions. In some cases, scientific collections can provide the historical context to begin to address these questions. Three case studies are discussed. The first examines the role that collections played in whether the emergence of Lyme disease in Eastern North America in the 1980's reflected a recent introduction into the region. The second examines the recognition of Hantavirus Pulmonary Syndrome in Southwestern North America and whether it represented a release of an infectious agent. The third example describes the role Scientific Collections may play in ongoing efforts to predict the types of agents that are likely to emerge in the future.

### Biographical Sketch

Dr. Glass received his Bachelor's degree in Biology from Boston University and his graduate training in the Department of Systematics and Ecology at the University of Kansas where he studied the role of seasonal competition on the community structure of small mammals and developed theoretical models of frequency dependent natural selection for age-structured populations. Subsequently, he received a post-doctoral fellowship at JHBSPH in Immunology and Infectious Diseases. His laboratory's work on hantaviruses in urban rats of Baltimore was the first to characterize the transmission cycle of the virus, the risk to humans, and developed modern diagnostic methods such as the polymerase chain reaction assay, that presaged the renewed national interest in emerging infectious diseases. He was promoted to Professor in the Department of Molecular Microbiology and Immunology at JHBSPH in 2002. He has led efforts to develop tools to predict changing patterns of disease risk based on the application of ecological studies of disease systems integrated with environmental surveillance using remote sensing on satellite systems. These methods have been used to forecast patterns of disease risk for Lyme disease, Hantavirus, Bubonic Plague and mosquito-borne diseases such as Dengue Fever and malaria during the past 15 years.

He has served on national and international committees, most recently advising the U.S. National Science Foundation on the design of its National Ecological Observatory Network (NEON) to study infectious diseases, and NASA on implications of satellite sensor systems (HyspIRI and SMAP) to be used for human health studies. He serves on scientific advisory boards to groups such as the Gates Foundation, MalERA and the Committee on Conservation Medicine.

## Importance of natural history collections in climate change research

Adrian Lister, The Natural History Museum, London, UK

### Abstract

In 2009-10 the Natural History Museum has undertaken a wide-ranging review of its collections with the object of identifying collection areas with potential for research into climate-change-related issues. This exercise has revealed an enormous range of potential research projects and methodologies - a huge untapped resource lying dormant in all natural history collections. Topics include distributional and altitudinal change, phylogeography and genetic change using DNA, community composition, isotopic studies of diet, life-history analysis, response to ocean acidification, and timing of seasonal events (phenology). The exercise also brought out collections management and curatorial priorities, including databasing, repeat collecting, not splitting unsorted site collections taxonomically, and collaboration across institutions. On a research level, the importance of linking with modern survey data and with modern and historical climatic datasets was also highlighted.

Case-studies from the author's own research provide examples of the application of new technology to collections in just one area: the response of species to climate change by range shifts and ultimately extinction, illustrated by large mammals in the Late Quaternary. An extensive programme of radiocarbon-dating hundreds of museum specimens including the extinct mammoth (*Mammuthus primigenius*) and giant deer (*Megaloceros giganteus*) revealed a complex pattern of range expansions and contractions in response to fluctuations in climate. Accurate dating allows us to separate the effects of climatic and vegetational change, and to observe 'lags' in the process. Species of differing adaptation respond differently to the same climatic forcing, but the end-result is typically a reduced and fragmented population, often with quite a long 'extinction lag' in terminal refugia, but ultimately sensitive to being wiped out by further environmental or stochastic change. DNA studies indicate an unexpectedly high rate of populational turnover during this process. They also demonstrate that species do not always 'track' their preferred habitat, but populations die out *in situ* when conditions change, leaving all-important refugial populations to seed re-expansion if conditions improve. The relevance of these patterns for present-day concerns over biodiversity loss with climate change is self-evident.

### Biographical Sketch

Adrian Lister is a Research Leader in the Department of Palaeontology at the Natural History Museum, London. He obtained his BA and PhD in Zoology from the University of Cambridge, and was Professor of Palaeobiology at University College London 1991-2007. Lister's special interests are in the evolution of mammals during the Quaternary ice ages – with special reference to large mammals such as mammoths and deer. He has authored over 150 scientific papers and his book *Mammoths* (with Paul Bahn) has sold over 60,000 copies in six languages. Other research interests include the analysis of ancient DNA from Quaternary fossils, and the causes of extinction of large mammals at the end of the ice age. He is on the specialist panels of IUCN for both Asian elephants and deer, and has led expeditions to study living elephants in Nepal, India, Ghana and Borneo. Lister currently convenes the Climate Change Research Group at the Natural History Museum.

## Data Management in the Global Earth Observation System of Systems

Robert Koopman, Expert, GEO, the Group on Earth Observations

### Abstract

The Data Management activities in GEOSS are designed to meet its strategic objective of providing a shared easily accessible sustained stream of comprehensive data of documented quality, as well as metadata and information products for informed decision making. The presentation will review activities and achievements in the field of data harmonisation, data quality, data access, data discovery, data integration, and continues downstream to address decision-making support systems.

### Biographical sketch

Robert Koopman is Senior Scientific and Technical Officer for Data Management at the Group on Earth Observations (GEO) Secretariat, and is also active in its Task Forces dedicated to Data Sharing and GEOSS Common Infrastructure, and in the GEO Architecture and Data Committee. He joined the European Space Agency (ESA) in 1996 to work on Remote Sensing of the Atmosphere, after an earlier career in Astrophysics. In 2000 he became responsible for algorithm development, validation, calibration and quality assessment for four atmospheric missions in ESA's Earth Observation Programme.

Since 2009, he is seconded by ESA to the GEO Secretariat for an initial period that includes its triennial Ministerial Summit.

## SciColl's proposed programme of work to improve collection management

Dr. Leo Kriegsman, Naturalis Museum, Leiden, The Netherlands

### Abstract

Collections management (CM) includes a broad range of activities from conservation and storage to physical and digital access and basic scientific description. Various disciplines of scientific collections have seen major efforts to improve quality assessment of CM in recent years (e.g. DNA collections: ISBER, natural history collections: SYNTHESYS). In addition, there is a strong incentive to increase digital access to scientific collections by digitising key objects and related archives and/or describing subcollections at metadata level (e.g., through GBIF). The challenges in single collection domains include prioritisation of object-level digitisation, targeted and often restricted acquisition, increasing the efficiency of storage systems and levels of environmental monitoring, and optimizing the work flow of basic operations.

SciColl will play a major role in all these aspects and will lift them to a higher dimension by confronting demands and best practices from different disciplines. For example, prioritising object-level digitisation may benefit greatly from the formulation of overarching research initiatives (see SciColl's proposed research programme) in which demand for specimens in one discipline may put constraints on digital and physical access in another discipline. To be useful, such specimens must obey the requirements for conservation state, documentation quality, analytical purity, etc., of the user's discipline. This process will certainly influence the mutual thinking on collections quality.

The programme of work should develop by open dialogue between collections communities in SciColl.

Whatever the exact outcome, the programme will at least cover:

- raising the community standards of management, curatorial, and training practices among institutions charged with the long-term stewardship of scientific collections
- meeting the challenges of world-class research that take advantage of scientific collections internationally and across disciplines
- promoting database interoperability
- compiling good practices and disseminating them
- design performance indicators and monitoring systems for collection management
- develop self-evaluation systems that collection managers can use

The talk will briefly touch on some of these aspects.

### Biographical Sketch

Dr. Leo M. Kriegsman obtained his PhD in 1993 from the University of Utrecht (Netherlands), in the field of Structural Geology. Following post-docs at the University of New South Wales (Sydney) and the Mining University of Leoben (Austria), he became Professor of Geology and Mineralogy at the University of Turku (Finland), where he initiated projects in crustal melting and fluid-rock interaction. He returned to the Netherlands to become Head of Mineralogy at Naturalis in 2001 and Head of Geology in 2005. He was also acting Science Director in 2005-2006. Leo has been member of various steering groups of programmes, networks and organisations at national and international level: EU FP6 Network of Excellence EDIT (since 2007), EU FP6/FP7 programme SYNTHESYS (since 2007), OECD Global Science Forum mechanism on scientific collections, now Scientific Collections International (since 2007), Consortium of European Taxonomic Facilities (2008-2009) and the Dutch National Research Programme on Plant Health (2006-2009).

## **The Global Biological Resource Centre Network (GBRCN): Aiming to improve the management and networking of collections of laboratory held living microorganisms and cultured cells**

David Smith & Dagmar Fritze, BRCN Demonstration Project Secretariat, Julius Kühn-Institut (JKI), Inst. for Crop & Soils Science, Braunschweig.

### **Abstract**

A demonstration project has been established to follow up the work of the OECD Biological Resource Centre Initiative to enhance collection management and networking. The OECD developed the concept of a Global Biological Resources Centres Network (<http://www.gbrcn.org>) to improve access to high quality biological material and information. The German Federal Ministry of Research and Education funds a small central office to demonstrate the delivery of defined benefits from networking a number of key biological resource centres. The Secretariat co-ordinates activities to deliver the implementation of OECD Best Practice in BRCs (OECD, 2007) and at the end of the 2 year project it will present: A strategy for setting up a GBRCN; An infrastructure with governance mechanisms; A programme of activities; A Secretariat structure and function. The aim is to enhance the efficiency in collections of laboratory held, living biological material, by co-ordinating and driving activities to meet user needs. The reduction in traditional taxonomic expertise in microbiology necessitates that we will rely more and more upon reference materials and data generated from them in the future. We must ensure that sequence databases have information based on authentic materials and that these materials remain available for further research and confirmation of results. The task of ex-situ conservation is enormous and exceeds the technical potential of an individual collection in any individual country. Adequate collection management of well preserved and authenticated organisms is essential to guarantee quality and safety in the various areas of application. The co-ordination of activities enables the GBRCN network to focus on bridging information gaps and delivering solutions.

The GBRCN will provide improved services to identify and characterise newly discovered strains that will help drive biotechnological research microbial based innovation and bioeconomy<sup>3</sup> development. BRCs need further enhancement to provide adequate support for research, innovation and discovery. Agriculture and food security are facing important challenges linked in particular to globalisation, consumer demands and environmental concerns. The GBRCN will provide resources and information to help resolve problems, improve production and provide protective measures. The mega diversity countries are outside Europe and the envisioned globalisation of the network will provide facilitated access to this huge, mainly undiscovered resources. GBRCN efforts will be strongly linked to initiatives being undertaken currently e.g. in Brazil, China, Japan, Kenya and Russia.

Currently the source of biological materials and information is fragmented, research is poorly co-ordinated and there are large gaps in materials and services provided. The number of taxonomists is diminishing and most currently practicing are approaching retirement age. Drawing the specialists together and planning for the future will ensure continued access to this expertise needed to support new species discovery. Current databases of molecular data are incomplete and have erroneous data; co-ordinated action across the research

infrastructure to fill the gaps using authenticated strains will ensure our future ability to identify and utilise new species. Such services are essential, for example biosafety, biosecurity and quarantine control is based upon knowing the name of the microorganism so that it can be compared to the controlled organism or pathogen lists. There are a plethora of initiatives and projects that are running and continually undertaken many not taking advantage of what is already known several unnecessarily repeating work and most not considering the fate of the resources developed and the information generated at great expense. The GBRCN will strive to co-ordinate the output of such initiatives to help guide future research programmes. The BRCs will protect investments by storing, adding value to and delivering essential services.

### **Biographical Sketch**

Dr. David Smith Joined CABI in 1974 with a Higher National Diploma (HND) in Applied Biology as a preservation technologist working in the Commonwealth Mycological Institute. Over a 33 year career developed expertise in the operation and management of living microbial resource collections, preservation technology and development of operational procedures for BRCs. Gained a PhD with Imperial College London University in the long-term preservation of fungi became Curator of CABI Genetic Resources Collection in 1987. Research areas include the freeze-drying of microorganisms, the optimisation of cryopreservation techniques and cryogenic light microscopy for fungi. Have a keen interest in policy on Intellectual Property Rights (concerning microorganisms), codes of practice for working within the Convention of Biological Diversity and the production of Quality Management Systems for Microbial Resource Collections. Co-ordinated one and participated in two further European Union international projects. Appointed Director of Biological Resources in 2006 with the role of operations manager for CABI's Bioservices, responsible for the collection, identification, industrial services and a small research team. Key current activities are associated with the World Federation for Culture Collections WFCC and The OECD Biological Resource Centre (BRC) Initiative.

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### **Conference Abstracts and Speaker Biographies**

## The Korea National Research Resource Center (KNRRC)

Yeonhee Lee, Director General KNRRC, Korea

### Abstract

Research resources with associated information are the most essential materials in the study and application of the life sciences, since these are employed in everything from basic research to advanced industrial high technology. Numerous nations recognize the importance of these scientific assets and are simultaneously enhancing their internal security measures and strengthening international cooperation to protect and share them. Consequently, most resource centers are sustained by governments under various national strategic plans. The Korea National Research Resource Center (KNRRC) is supported by the Ministry of Education, Science and Technology (MEST) and consists of 33 research resource centers (RRCs), 5 core centers, and a head office. Its collection includes microorganisms, plants, animals, human specimens, and non-biologic materials. The KNRRC headquarters provides a total management system for the RRCs including database management, guidelines and educational programs, and certification of resources, workers, and the research centers themselves. These supervisory powers are granted to the KNRCC headquarters under national legislation entitled "Management and Application for Biological Resources." The KNRRC has signed memorandums of understanding for cooperation with nine national and five international agencies. The former include the National Agro-biodiversity Center, the Rural Development Administration, and the Functional Proteomics Center, and the latter include the International Vaccine Institute and the RIKEN BRC of Japan. Currently, the KNRRC is serving as head office of the Asian Chapter of the International Society for Biological and Environmental Repositories.

### Biographical Sketch

- Head of Planning Department, Korean Federation of Women's Science and Technology Associations
- Vice President, Women bioforum (Next president)
- Member of Advisory Committee, Korea Food and Drug Administration
- Member of Advisory Committee, Agency for Technology and Standards, Ministry of Commerce, Industry and Energy
- Korea Representative to ISO TC34 and TC212
- Head Director, Culture Collection of Antimicrobial Resistant Microbes
- Head Director, Korea National Microbiology Resource Center
- Professor, Department of Biology, Seoul Women's University
- President, Korea National Research Resource Center
- 1976.3 ~ 1980.2 B.S., Dept of Microbiology, Seoul National University
- 1980.3 ~ 1982.8 M.S., Dept of Microbiology, Seoul National University
- 1984.9 ~ 1988.8 Ph.D., Department of Chemistry and Biochemistry, University of California, Los Angeles (UCLA)
- 1988.9 ~ 1989.2 Post Doc. Department of Chemistry and Biochemistry, University of California, Los Angeles (UCLA)
- 1989.2 ~ 1990.2 Post Doc. Dept of Microbiology, Seoul National University

### SYNTHESYS network activities:

## Assessing and sharing best practice in European collections to ensure their future survival and value as an infrastructure

Dr. Rob Huxley, The Natural History Museum, London, UK

### Abstract

SYNTHESYS was initially a 13M€, 5 year project funded by the European Union bringing together 20 European natural history institutions to create an integrated European infrastructure for researchers in the natural sciences. The two elements of the project were *Access*, providing funding for researchers to visit institutions and use collections and other facilities and *Networking*, encouraging sharing of collections-related best practice, policies and protocols. A further 7.2M€ has been awarded to continue the project for 4 more years. The project will continue to provide access to collections and improve the standard of collections management in Europe. In addition, 5 research projects will develop tools and protocols to improve access to DNA in museum and herbarium collections.

The networking activities in the first tranche of funding provided tools to improve development and management of natural history collections, e.g.

- A survey of taxonomic and geographical strengths and weaknesses
- A survey of molecular collections and their management in Europe
- Training 43 staff from 14 EU countries in collections management
- A review of literature on extraction of DNA from museum and herbarium collections
- A workshop on the needs of users beyond the traditional taxonomic community
- Launching the BIOCASE portal, providing access to collections databases across Europe -
- Reports on the use of SEM, CT and MRI on Natural history collections
- New collaborations across Europe leading to new projects.

The second tranche builds on this success and adds 5 research activities aimed at devising tools and protocols to maximise successful extraction of DNA from museums collections whilst minimising damage to the collections themselves.

The two networking activities build on the work carried out in the first phase. The first activity has begun work on designing a web based self assessment tool that will enable institutions to carry out surveys of how they are performing against a standard. The survey Contributors receive report to assist them in identifying addressing weaknesses that actually or potentially access and preservation of collections at risk. The data will be used to build up a more comprehensive picture of standard of collections and their management across Europe. The activity will provide advice to institutions in addressing weaknesses through mechanisms such as a help desk and expert panel. Specialist training will assist in raising the standard of staff expertise and awareness in critical areas such as emergency planning. A set of performance indicators will be devised to assist in planning and resource distribution for collections management.

### Biographical Sketch



Dr. Huxley is Head of Collections in the Botany Department of the Natural History Museum, London. He is educated to doctoral level in botany and marine biology at Liverpool and London Universities but has devoted the last 20 years to museology, specialising in developing new methods and training in collections management. He heads a team of curators and support staff managing access, preservation and development of the 6 million strong NHM botany Collections. Dr Huxley is Advisor to the Director of Science on International Collections Initiatives and leads the networking and molecular research elements of the EU funded SYNTHESYS project - a consortium of 19 natural history museums, herbaria and universities dedicated to maximising

access to European collections. He has extensive experience in assessing and reporting on natural history collections and their management across Europe, North America and Africa. Dr Huxley represents the NHM at CETAF and is a member of the core group of the EDIT Directors of Collections Group. He is a board member of the North America-based Natural Sciences Collections Alliance and was President of the Society for the Preservation of Natural History Collections from 2003-2005.

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### Conference Abstracts and Speaker Biographies