

LifeWatch
e-Science European Infrastructure
for Biodiversity and Ecosystem Research

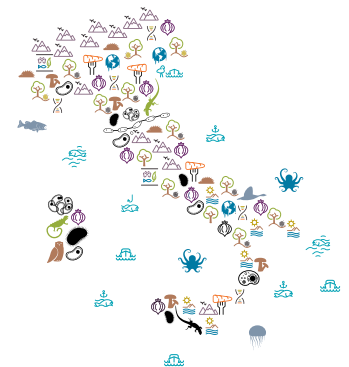


ATTIVITA' IN CORSO & PRIORITA' STRATEGICHE

CENTRO TEMATICO COLLEZIONI



Luca Bartolozzi, Fabio Cianferoni, Stefano De Felici, Valerio Sbordonni,



CONFERENZA ANNUALE LIFEWATCH ITALIA

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16 Dicembre 2015 ROMA

Activities

- The CTC selects high-quality data to be made available to the scientific community, therefore it works upgrading, standardizing and refining data to be hosted in the LifeWatch Italy infrastructure.
- Namely, CTC seeks to promote and support all initiatives directed to the digitization of biodiversity data from natural history collections and Citizen Science projects, with the aim of ensuring their availability online.



Collaborations

CTC collaborates in the development of the National Biodiversity Network (NNB) which aggregates currently 54 datasets from various sources for a total of approximately 1,200,000 records of occurrence.

Data portal Naturaitalia (<http://www.naturaitalia.it/>), the official site of Biodiversity in Italy owned by the Ministry of Environment.



RICERCA DATI PRIMARI SPECIE

Utilizzare l'asterisco (*) come carattere jolly. Minimo 3 caratteri (ad esempio Abi*)

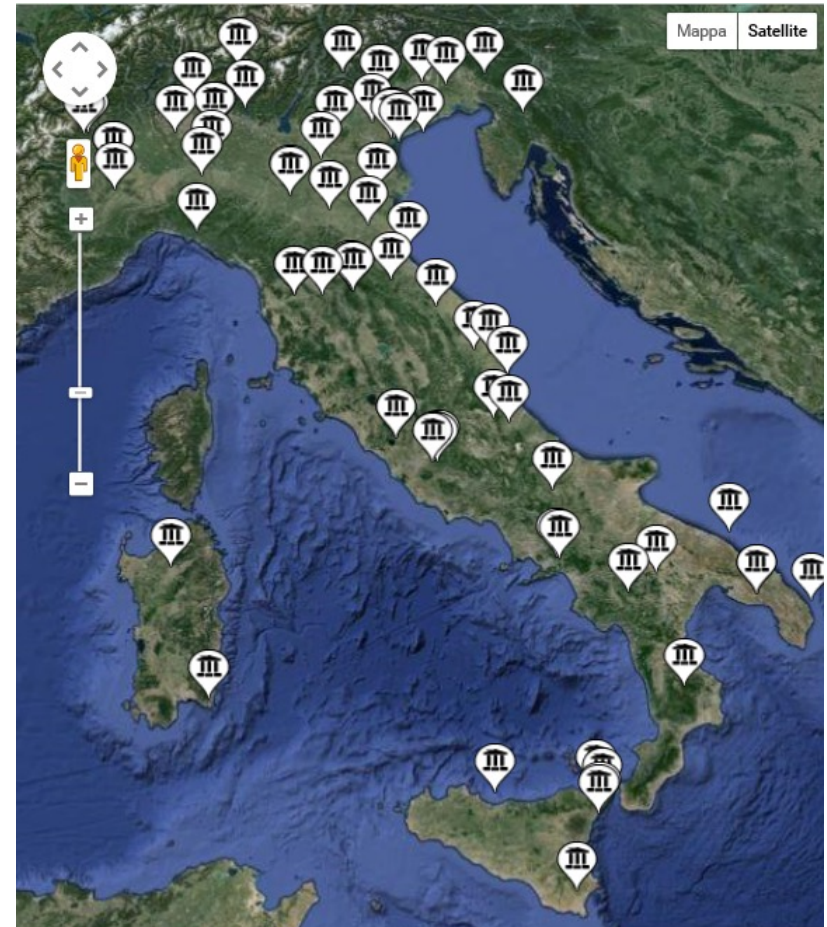
Limite massimo di risultati per singolo database

Tempo di attesa massimo in secondi

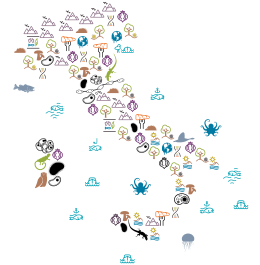


Collaborations

«CollMap» Project: MOU LifeWatch-ANMS



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Biological collections and ecological/environmental research: a review, some observations and a look to the future

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(Received 17 February 2009; accepted 19 August 2009)

ABSTRACT

Housed worldwide, mostly in museums and herbaria, is a vast collection of biological specimens developed over centuries. These biological collections, and associated taxonomic and systematic research, have received considerable long-term public support. The work remaining in systematics has been expanding as the estimated total number of species of organisms on Earth has risen over recent decades, as has estimated numbers of undescribed species. Despite this, the growth of biological collections upon which systematic and biological research has been based is slow.

INSIGHTS

LETTERS

Edited by Jennifer Sills

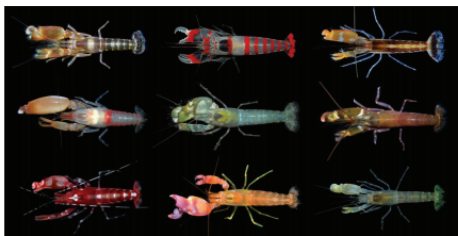
Specimen collection: An essential tool

COLLECTING BIOLOGICAL specimens for scientific studies came under scrutiny when B. A. Minter *et al.* ("Avoiding reextinction" Perspectives, 18 April, p. 260) suggested that this practice plays a significant role in species extinctions. Based on a small number of examples (rare birds, frogs, and a few plants), the authors concluded that collection of voucher specimens is potentially harmful to many species, and that alternative—photographs, audio recordings and nonlethal tissue sampling for DNA analysis—are sufficient to document biological diversity.

The isolated examples that Minter *et al.* cited to demonstrate the negative impact of scientific collecting have been carefully analysed, and none of these extinction events can be attributed to that cause (7–9). For example, only about 102 Great Auk specimens (*Pinguinus impennis*) exist today in scientific collections, many of which are skeletons obtained after extinc-

tion. Moreover, identification is often not the most important reason to collect voucher specimens. Studies of morphological diversity and its evolution are impossible without whole specimens. Preserved specimens also provide verifiable data points for monitoring species health, distribution, and phenotypes through time. Both historical and new collections played a key role in understanding the spread of the chytrid fungus infection, one of the greatest current threats to amphibians (5). The decision to ban dichlorodiphenyltrichloroethane (DDT)

detract from the primary causes of modern extinction: habitat degradation and loss, unsustainable harvesting, and invasive species (10). It is important to distinguish protecting the lives of individuals from conserving populations and species. Individuals are lost every day to predation, natural death, and anthropogenic factors, hence it is the populations we try to save. Halting collection of voucher specimens by scientists would be detrimental not only to our understanding of Earth's diverse biota and its biological processes, but also for conservation and management efforts. Species descriptions, biodiversity



Undercover. Many Alpheidae shrimps live deep in the reef and are impossible to collect nonlethally.

research is a branch of biology that determines abundance, and explains the causal processes may affect organisms (Minter *et al.* 2005) and through space (Thomson *et al.* 2005). These processes can vary over time (Minter *et al.* 2005) and through space (Thomson *et al.* 2005). These processes can vary over time (Minter *et al.* 2005) and through space (Thomson *et al.* 2005). These processes can vary over time (Minter *et al.* 2005) and through space (Thomson *et al.* 2005).

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Museum Specimens Find New Life Online

By ERIC OLSEN

BERLIN — In a brightly lit room at the Museum of Natural History here, stacks of wooden drawers are covered in glass, some panes so dusty that it is difficult to discern exactly what's inside. When the glass is removed, rows of carefully pinned insects are revealed, peering in brilliant colors like precious jewels.

The biologist Alexander Kroupa picks an amber-colored beetle from the drawers with pincers. "As beautiful as the day they were collected," he says.

Mr. Kroupa and 14 colleagues are in the midst of a vast undertaking: digitizing and publishing online the museum's entire collection of insects, including high-definition 3-D images of thousands of particularly important specimens. The researchers here are not alone. Museums around the globe are trying to harness the power of digital technology to make available collections that have long lain dormant on shelves and in dusty cabinets.

Technical advances provide new opportunities to create extraordinarily detailed images and data that may be critical to answering some of the big questions in conservation biology, experts say.

Looking at the historical distribution of a species as revealed in the collections, for example, scientists can determine how the ecology of a region has changed because of industrialization, human settlement or climate change. The old collections provide insight into changes in genetic diversity, crucial for saving a species from urban planning or protection.

ing vital food resources in the future. "To really understand biodiversity, you have to look to the museum," said Brent Mishler, a professor of plant biology at the University of California, Berkeley.

The digitization efforts also are helping scientists create a permanent record of the natural world in a period of rapid extinction. "This is one way of documenting what we are about to lose," said Quentin Wheeler, an entomologist at the State University of New York. Digitizing museum specimens is revealing "irreplacable evolutionary history," under-

stand where we are and all the other species came from." In Berlin, the natural history museum's collection consists of more than 35,000 drawers holding about 15 million individual specimens. So far, the team has scanned about 10,000 drawers. Some specimens are selected for high-definition scanning, which will allow scientists from anywhere in the world to examine these colorful creatures in remarkable detail, even to never them on screen.

"We want everyone to see them, the public and researchers, to see what's in the collection," said Bernhard Schurian, an imaging specialist at the museum.

It is slow, painstaking work. Some of the specimens are type specimens—individuals used to characterize their species. Each is like the Mona Lisa, said Katia Seltsman, a biologist at the American Museum of Natural History in New York. "If an antenna or a leg breaks, all of a sudden, a really large part of information

about that organism is gone." In a room in the basement, type specimens are placed on a rotating drum in a lightbox and photographed at many angles with a macro lens. The team uses computer software to stitch the photographs together into a single, focused image, which can be downloaded and viewed at up to 100 angles.

Depending on the size of the insect, as many as 500 images are taken at a single angle. 3,000 to 5,000 images are taken of a single specimen. The resulting data can add up to more than 100 gigabytes, far too large to download from the Web.

The team relies on compression and an algorithm similar to that used by Google Maps to load only a few portions of the image at a time on an individual screen. The result, called ZoSphere, is a magnificently detailed picture of the type specimen.

access to massive

Review

Collections-based systematics: Opportunities and outlook for 2050

Jun Wen^{1*}, Stefanie M. Ickert-Bond², Marc S. Appelhaus^{1,3}, Laurence J. Dorr¹, and Vicki A. Funk¹

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Abstract Systematic biology is a discipline of conservation and are important to provide an invaluable resource for geologists.

THE NEW YORK TIMES INTERNATIONAL WEEKLY
SCIENCE & TECHNOLOGY

MONDAY, NOVEMBER 2, 2015



A wasp was loaded into a rotating drum to make 3-D images. Below, the Orthophagus elegans.



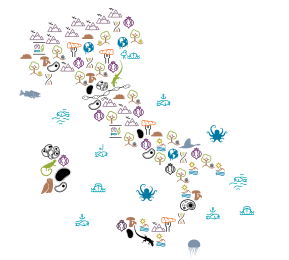
The researchers here are focused on insects, but other institutions have been trying to digitize vast collections of plants, mammals and fish. Few have attempted to provide this level of visual detail.

One of the largest efforts in the United States, called the Integrated Digitized Biocollections, or iDigBio, is currently underway at the University of Florida.

The natural world in a way that scientists only dreamed of a decade ago. Science advances in knowledge gained from the advances in technology. Students pursue careers in biology. Larry Page, the director of iDigBio, said, "This is a chance to make everyone aware of how valuable the data are in natural history collections, how much they tell us about the natural world."



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Centro Tematico Collezioni



CBD

FORUM PAPER

DIVERSITY & EVOLUTION

Lack of well-maintained natural history collections and taxonomists in megadiverse developing countries hampers global biodiversity exploration

Omid Paknia · Hossein Rajaei Sh. · André Koch

Received: 7 September 2014 / Accepted: 21 January 2015
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Opinion

... discussions on the positions for taxonomists and the expansion of existing or the establishment of new natural history collections in MDCs. Considering the lack of sufficient financial resources, we suggest that joint political priority should be given to...



Biodiversity data should be published, cited, and peer reviewed

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Concerns over data quality impede the use of public biodiversity databases and subsequent benefits to society. Data publication could follow the well-established publication process: with automated quality checks, peer review, and editorial decisions. This would improve data accuracy, reduce the need for users to 'clean' the data, and increase data use. Authors and editors would get due credit for a peer-reviewed (data) publication through use and citation metrics. Adopting standards related to data citation, accessibility, metadata, and quality control would facilitate integration of data across data sets. Here,

we are most concerned with the primary biodiversity data rather than the secondary (e.g., modelled or simulated) data derived from them, and interpretations and descriptions around data. Thus, data can be numerical, categorical (e.g., species or place names), images, or sounds. The rate at which new data are published through the Global Biodiversity Information Facility (GBIF) (Box 1), as a proportion of available data, is declining each year [6]. GBIF was established to make biodiversity data publicly available and, thus, to satisfy a key aim of the Convention on Biological Diversity. Nonetheless, more data are continually being



Convention on Biological Diversity

Distr. GENERAL

UNEP/CBD/COP/11/INF/8
17 August 2012

ENGLISH ONLY

CONFERENCE OF THE PARTIES TO THE CONVENTION ON BIOLOGICAL DIVERSITY
Eleventh meeting
Hyderabad, India, 8-19 October 2012 |

A REVIEW OF BARRIERS TO THE SHARING OF BIODIVERSITY DATA AND INFORMATION, WITH RECOMMENDATIONS FOR ELIMINATING THEM

Note by the Executive Secretary

1. The Executive Secretary is pleased to circulate herewith the document entitled "A review of barriers to the sharing of biodiversity data and information, with recommendations for eliminating them". This document, whose preparation was led by UNEP-WCMC in its capacity of the secretariat of the Friends of the Conservation Commons, is a contribution to the following decisions highlighting the importance of sharing biodiversity data and information for the implementation of...

(a) In paragraph 2 of decision V/7... and associated indicators...

Professional Biologist

Data-intensive Science: A New Paradigm for Biodiversity Studies

STEVE KELLING, WESLEY M. HOCHACHKA, DANIEL FINK, MIREK RIEDEWALD, RICH CARUANA, GRANT BALLARD, GILES HOOKER

The increasing availability of massive volumes of scientific data requires new synthetic analysis techniques to explore and identify interesting patterns that are otherwise not apparent. For biodiversity studies, a "data-driven" approach is necessary because of the complexity of ecological systems, particularly when viewed at large spatial and temporal scales. Data-intensive science organizes large volumes of data from multiple sources and fields and then analyzes them using techniques tailored to the discovery of complex patterns in high-dimensional data through visualizations, simulations, and various types of model building. Through interpreting and analyzing these models, truly novel and surprising patterns that are "born from the data" can be discovered. These patterns provide valuable insight for concrete hypotheses about the underlying ecological processes that created the observed data. Data-intensive science allows scientists to analyze bigger and more complex systems efficiently, and complements more traditional scientific processes of hypothesis generation and experimental testing to refine our understanding of the natural world.

Keywords: data-intensive science, informatics, biodiversity, machine learning, statistics

Downloaded from <http://dx.doi.org/10.1016/j.tree.2014.08.001>



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Collaborations

- **Fauna Europaea** (official db of the Pan-European Species directories Infrastructure – PESI)

museum für
naturkunde
berlin

**FAUNA
EUROPAEA**
ALL EUROPEAN ANIMAL SPECIES ONLINE



- **Catalogue of Life**

Catalogue of Life



- **Bio-Blitz initiatives**



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DEST courses

Last event: 18-22 May 2015 – Firenze

International Course on "entomological research in protected areas" in collaboration with the Distributed European School of Taxonomy (DEST)



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Introductory courses to the Insect systematics

Last event: 14-18 September 2015 – Firenze



Collaborazione tra:

- LifeWatch Italia
- ANMS (Associazione Nazionale Musei Scientifici)
- Museo di Storia Naturale dell'Università degli Studi di Firenze
- GET (Gruppo Entomologico Toscano)

ANMS
ASSOCIAZIONE NAZIONALE MUSEI SCIENTIFICI



UNIVERSITÀ
DEGLI STUDI
FIRENZE

**MUSEO DI
STORIA
NATURALE**



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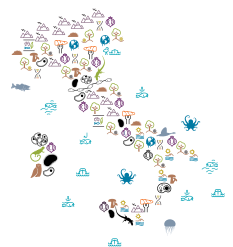
Il Centro Tematico Collezioni di LifeWatch Italia organizza il Workshop:

Strumenti informatici per la condivisione dei dati di occorrenza nel Network Nazionale della Biodiversità

Roma, Università di Tor Vergata
25 novembre 2015



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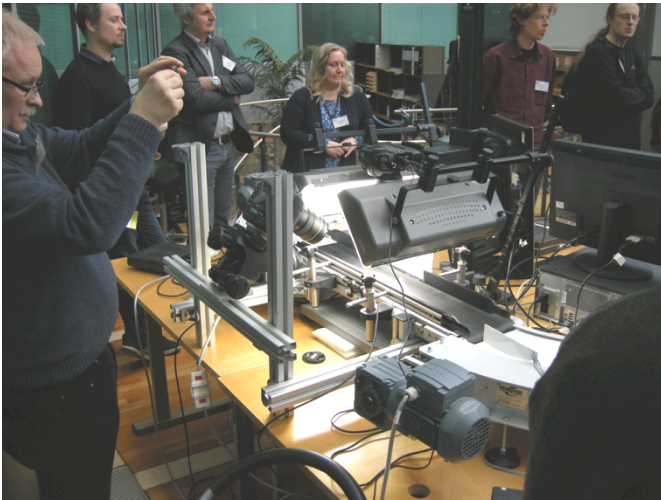




Strategic priorities

1. Expanding collaborative project LifeWatch ITA –ANMS

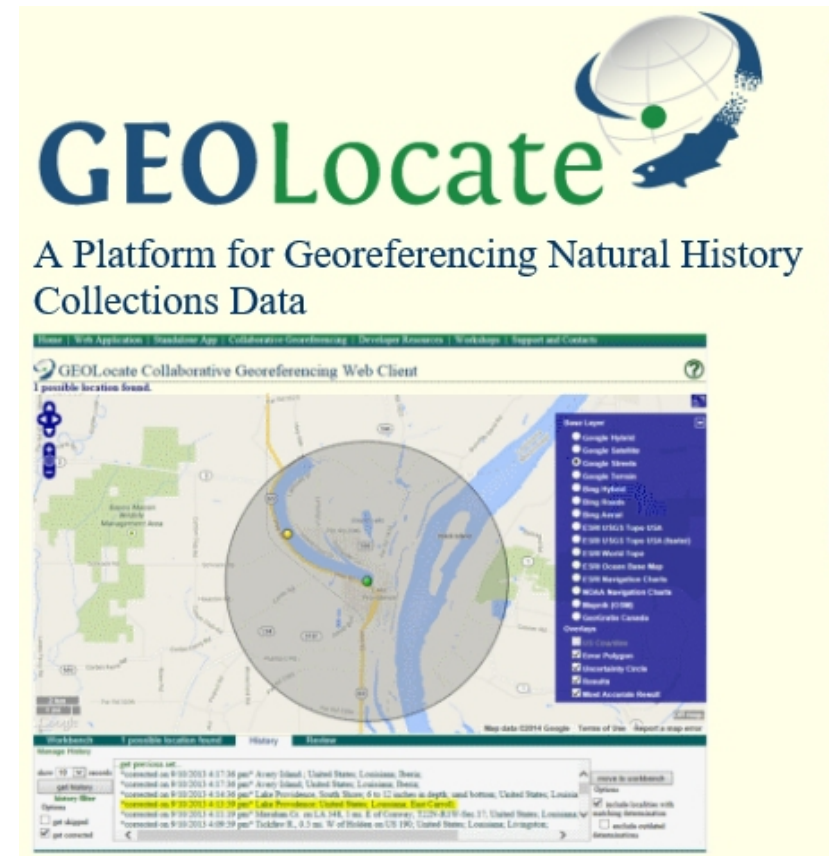
- ❖ CollMap Local: a special focus on geographically sound collections
- ❖ Search of partnership to develop an EUCollMap Project



Strategic priorities

2. Encourage biodiversity data digitization of data collection by:

- ❖ dissemination and assistance in the use of specific software
- ❖ development of tools dedicated to the geo-referencing of the data



Strategic priorities

3. Citizen Science

- ❖ Develop a metadata catalog of Citizen Science projects available online as a means to their information content and audit strengths and weaknesses of the projects.
- ❖ Establish a coordination point of BioBlitz initiatives to serve as a newsboard, exchange of materials, and a data-collection spot.
- ❖ Provide a unified access to the existing wide array of natural science forums to highlight and finalize the individual activities of stakeholders.





Grazie per l'attenzione



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