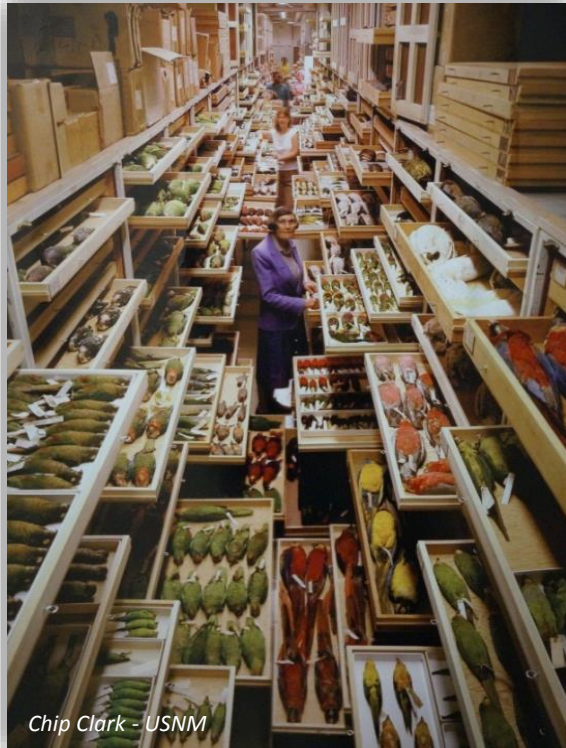


Coleções biológicas

patrimônios da humanidade sob constante ameaça



Ricardo Moratelli
Fiocruz Mata Atlântica
rmoratelli@fiocruz.br

“Coleções sistematicamente organizadas estarão sempre na vanguarda da pesquisa biológica...se organismos não são nomeados corretamente, simplesmente não é possível saber sobre o que se está falando.”

R. Y. Edwards, 1985

“...o maior valor de nosso museu... não será percebido por muitos anos, talvez um século...mas o estudante do futuro terá acesso ao registro original das condições faunísticas na Califórnia e no Oeste, onde quer que trabalhemos.”

J. Grinnell, 1910

Museus de história natural



Herbários



Jardins e parques zoológicos e botânicos



Origens – gabinetes de curiosidades



Importância

- Repositórios de todas as formas de vida, atuais ou extintas, conhecidas no planeta
- Evidências testáveis de pesquisas finalizadas
- Potenciais usos que vão muito além do imaginado pelos coletores



Biological Survey members in the field, California, June 1891

Left to right: V.O. Bailey, C.H. Merriam, T.S. Palmer, and A.K. Fisher

Bomb-curve radiocarbon measurement of recent biologic tissues and applications to wildlife forensics and stable isotope (paleo)ecology

Kevin T. Uno^{a,1,2}, Jay Quade^b, Daniel C. Fisher^{c,d}, George Wittemyer^{e,f}, Iain Douglas-Hamilton^{g,h}, Samuel Andanje^h, Patrick Omondi^h, Moses Litoroh^h, and Thure E. Cerling^{a,i}

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Edited by Mark H. Thieme, University of California at San Diego, La Jolla, CA, and approved May 15, 2013 (received for review February 4, 2013)

Above-ground thermonuclear weapons testing from 1952 through 1962 nearly doubled the concentration of radiocarbon (¹⁴C) in the atmosphere. As a result, organic material formed during or after this period may be radiocarbon-dated using the abrupt rise and steady fall of the atmospheric ¹⁴C concentration known as the bomb-curve. We test the accuracy of accelerator mass spectrometry radiocarbon dating of 29 herbivore and plant tissues collected on known dates between 1905 and 2008 in East Africa. Herbivore samples include

portions of eye lenses also provide accurate birth-year estimates (11). Several studies have explored the use of radiocarbon to date tusk ivory (4, 12, 13) but offer only limited data and, in some cases, lower precision than accelerator mass spectrometry (AMS) methods (13).

Here we use animal and plant tissues of known ages to expand significantly on previous studies in the number of samples and tissue types to show that from 1955 to the present ¹⁴C-calibrated ages measured by AMS accurately record the date during which

Tsangaras et al. *BMC Genetics* 2012, 13:92
http://www.biomedcentral.com/1471-2156/13/92



RESEARCH ARTICLE

Open Access

Historically low mitochondrial DNA diversity in koalas (*Phascolarctos cinereus*)

Kyriakos Tsangaras¹, María C. Ávila-Arcos², Yasuko Ishida³, Kristofer M. Helgen⁴, Alfred L. Roca³ and Alex D. Greenwood^{1*}

Abstract

Background: The koala (*Phascolarctos cinereus*) is an arboreal marsupial that was historically widespread across eastern Australia until the end of the 19th century when it suffered a steep population decline. Hunting for the fur trade, habitat conversion, and disease contributed to a precipitous reduction in koala population size during the late 1800s and early 1900s. To examine the effects of these reductions in population size on koala genetic diversity, we sequenced part of the hypervariable region of mitochondrial DNA (mtDNA) in koala museum specimens collected in the 19th and 20th centuries, hypothesizing that the historical samples would exhibit greater genetic diversity.



HOME NEWS MULTIMEDIA MEETINGS PORTALS ABOUT

PUBLIC RELEASE: 13-AUG-2015

Critically endangered species successfully reproduced using frozen sperm

Genetic Diversity of the species significantly increased providing fresh hope for the future survival of this near-extinct species

LINCOLN PARK ZOO



WildEarth Guardians

Descoberto em 2007, “Lyuba” -- o mamute lanoso -- ficou preservado no Ártico por mais de 40.000 anos



OPEN ACCESS Freely available online

PLOS BIOLOGY

Perspective

Making De-Extinction Mundane?

Carrie Friese^{1*}, Claire Marris²

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A. Rus Hoelzel Science 2015, 349:388

Science
AAAS

Scientific Collections International -- SciColl

Missão: Aumentar o retorno no investimento que países e inst. fazem em suas coleções biológicas e catalisar colaborações

Usar coleções biológicas para resolver problemas em

Segurança alimentar

Mudanças climáticas

Migração humana

Doenças emergentes infecciosas



Grandes coleções

- Cortes significativos em orçamento e pessoal (corpos técnicos drasticamente reduzidos)
 - Conjuntos de curadores substituídos por um único técnico com conhecimento muito limitado sobre curadoria e diversidade dos grupos representados
- National Museum of Natural History (Washington, DC)
(122 curadores em 1993, 81 em 2014)
- The Field Museum (Chicago)
(39 curadores em 2001, 21 em 2015)
- Mudança no foco: ciência → divulgação científica



Save the museums

Italy's curators must band together to preserve their valuable collections.

19 November 2014

[PDF](#)[Rights & Permissions](#)

Fausto Barbagli's first curation job was at the University of Pavia in northern Italy. It was the end of the 1990s, and the university was finally starting to pay attention to its valuable but long-neglected zoological collections.

Barbagli is passionate about birds, so he was distressed to find that the labels had fallen off 700 precious taxidermied specimens, devastating their scientific value. A well-intentioned but untrained staff member had decided to spruce up the collection, gifted to the university three decades earlier. He had painted the birds' pedestals — onto which species names had been inscribed — and had fixed neatly typed labels to their feet with rubber bands. As any professional curator knows, rubber perishes.

This story is emblematic of what has happened in historic scientific collections in universities and museums around the world. Now, there is a chance

“Museologists estimate that at least one-third of all biological specimens have been lost.”

They must sometimes fight against it. It has not been kind to such collections. When it came into fashion in the 1970s, universities pushed out old collections to make room for modern biology departments. There is little interest in paying for proper curatorship.



ZOOLOGISCHE
STAATSSAMMLUNG
MÜNCHEN

The Bavarian State Collection of Zoology

- Maior coleção de Zoologia Sistemática da Alemanha (> 20 milhões de espécimes)
- Uma das maiores coleções zoológicas do planeta



1817-1820

Pequenas coleções

- Sobrevivem do esforço pessoal e isolado de um ou poucos pesquisadores, sem qualquer apoio ou compromisso institucional (técnicos, material de consumo etc.)
- Tendência a esconder os problemas das coleções para evitar que essas sejam descartadas pelas instituições



Para economizar, governo gaúcho fechará Fundação Zoobotânica

Por Daniele Bragança

quarta-feira, 13 agosto 2015 18:27

Comente

[f](#) [t](#) [s](#) [+](#) Compartilhar



Manifestação contra o fechamento da Fundação Zoobotânica. Foto: Facebook / APOIO à Fundação Zoobotânica do Rio Grande do Sul

EU APOIO
FUNDAÇÃO
ZOO^{RS}
BOTÂNICA

PERSPECTIVES

ECOLOGY

Avoiding (Re)extinction

Ben A. Minteer,¹ James P. Collins,¹ Karen E. Love,¹ Robert Puschendorf²

Field biologists have traditionally collected voucher specimens to confirm a species' existence. This practice continues to this day but can magnify the extinction risk for small and often isolated populations. The availability of adequate alternative methods of documentation, including high-resolution photography, audio recording, and nonlethal sampling, provide an opportunity to revisit and reconsider field collection practices and policies.

Cases such as the extinction of the great auk remind us what is at stake in taking animals from small and declining populations. The last wild great auk (*Pinguinus impennis*) was sighted in 1844 on Eldey Island, Iceland. Centuries of exploitation for food and feathers, and, to some degree, a changing climate, had stressed the species, but overzealous museum collectors also played a role in its extinction (*1*). As the bird's numbers dwindled in the 19th century, ornithologists and curators increasingly prized great auk skins and eggs, with museums and universities sending out collection parties to procure specimens. On Eldey, fishermen killed the final breeding pair of the flightless birds and sold them to a local chemist, who stuffed the specimens and preserved them in spirits. Their internal organs now reside at the Zoological Museum in Copenhagen (*2*).



Species loss and rediscovery in Costa Rica. The loss of the golden frog (*Atelopus varius*) has been linked to the decline and extinction of an

Cases such as the extinction of the great auk remind us what is at stake in taking animals from small and declining populations. The last wild great auk (*Pinguinus impennis*) was sighted in 1844 on Eldey Island, Iceland. Centuries of exploitation for food and feathers, and, to some degree, a changing climate, had stressed the species, but overzealous museum collectors also played a role in its extinction (*1*). As the bird's num-

Many taxa are difficult to identify from morphology alone. The collection of voucher specimens by field biologists is therefore increasingly augmented by other kinds of samples. Cultural traditions within a research community can, however, reinforce the collection of voucher specimens even where it is not necessary by insisting that a preserved specimen in a natural history collection is the gold standard—or only standard—for publishing a species description or documenting a species' presence. Collecting specimens is no longer required to describe a species or to document its rediscovery.

INSIGHTS

LETTERS

Edited by Jennifer Sills

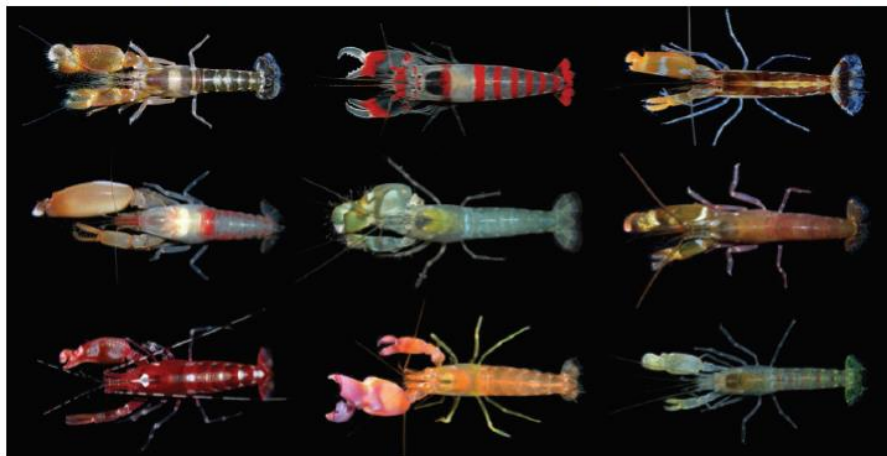
Specimen collection: An essential tool

COLLECTING BIOLOGICAL specimens for scientific studies came under scrutiny when B. A. Minteer *et al.* ["Avoiding (re)extinction," 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 alternatives—photographs, audio recordings and nonlethal tissue sampling for DNA analysis—are sufficient to document biological diversity.

The isolated examples that Minteer *et al.* cited to demonstrate the negative impact of scientific collecting have been carefully analyzed, and none of these extinction events can be attributed to that cause (1–3). For example, only about 102 Great Auk specimens (*Pinguinus impennis*) exist today

biodiversity is hidden deep in its habitat (see image)]. 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)

distract 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.

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OPINION¹

Wildlife biologists are on the right track: A mammalogist's view of specimen collection

"At this point I wish to emphasize what I believe will ultimately prove to be the greatest value of our museum. This value will not, however, be realized until the lapse of many years, possibly a century, assuming that our material is safely preserved. And this is that the student of the future will have access to the original record of faunal conditions in California and the west, wherever we now work."

Joseph Grinnell (1910)

"Another important issue worldwide is the power and mindset of the animal-rightist movement. These people try to confuse legitimate animal welfare issues with their concepts of animal rights and don't understand that there is no morality in nature; the morality is a human construct."

Alfred Gardner (2005)

Wildlife biologists do not collect vouchers because of tradition; we do it because we are scientists, and in science the question drives the method. Biological surveys, species descriptions, and rediscoveries are only a few of the investigations that require vouchers as the primary verifiable and testable evidence of such efforts. There are many other scientific questions in the fields of ecology, evolution, animal and human health, physiology, morphology etc. that cannot be correctly assessed unless specimens are collected. Nevertheless, we recognize that some taxa are more sensitive to collecting than others, and we have developed non-lethal methods to study those groups. Also, protocols for most of the field research that has been done in recent decades have been previously approved

Misconceptions about the behavior of wildlife biologists and taxonomists (and the role of natural history museums) constitute an important step back in decades of hard work to raise awareness about what scientists have contributed to understanding and sustaining life on Earth. This can lead misinformed citizens in general and decision makers in particular to remove vital support that keeps biological collections and field and museum-based research running. Those negative impacts can be magnified in developing countries where the investment in basic research is much more limited.

Principais dificuldades – pequenas coleções

(Panorama da mastozoologia brasileira; N = 34)

Pablo R. Gonçalves (NUPEM/UFRJ), Bruna S. Pagliani (NUPEM/UFRJ), Ricardo Moratelli (Fiocruz Mata Atlântica)

- Infraestrutura deficiente (82%)
- Ausência de apoio financeiro (74%)
- Carência de profissionais técnicos (68%)
- Políticas institucionais desfavoráveis (53%)

O que fazer para mudar esse cenário?

Capacitação de potenciais curadores (25%)

Natural History Collections as Emerging Resources for Innovative Education

JOSEPH A. COOK, SCOTT V. EDWARDS, EILEEN A. LACEY, ROBERT P. GURALNICK, PAMELA S. SOLTIS, DOUGLAS E. SOLTIS, COREY K. WELCH, KAYCE C. BELL, KURT E. GALBREATH, CHRISTOPHER HIMES, JULIE M. ALLEN, TRACY A. HEATH, ANA C. CARNAVAL, KIMBERLY L. COOPER, MARK LIU, JAMES HANKEN, AND STEFANIE ICKERT-BOND

Figure 1. Undergraduate students at Harvard use specimens and associated data to explore speciation and molecular evolution in spring 2013. Photograph: Scott V. Edwards.

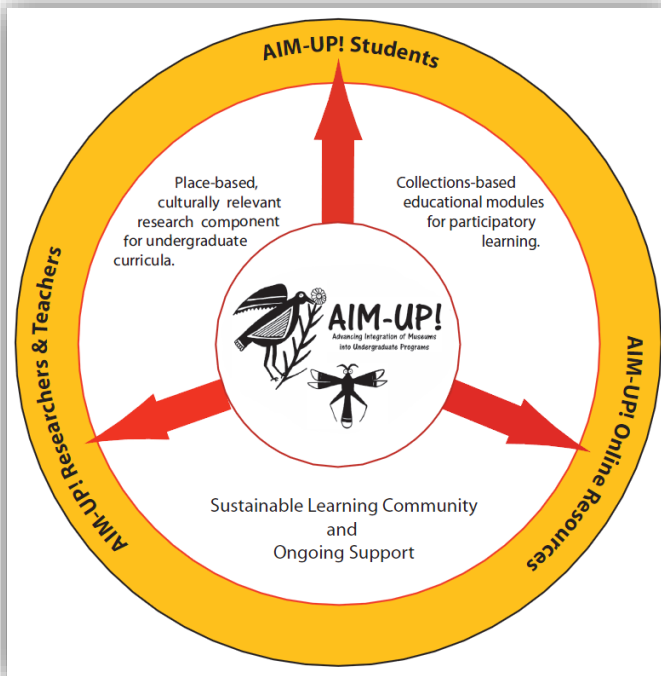


Figure 2. Advancing Integration of Museums into Undergraduate Programs (AIM-UP!) is a National Science Foundation Research Coordination Network focused on museums and undergraduate education.

★ AMAZING FACTS

? BIG QUESTIONS

HYPERSONIC

VIDEOS

LISTS

Natural History Museum Dioramas Are Disappearing

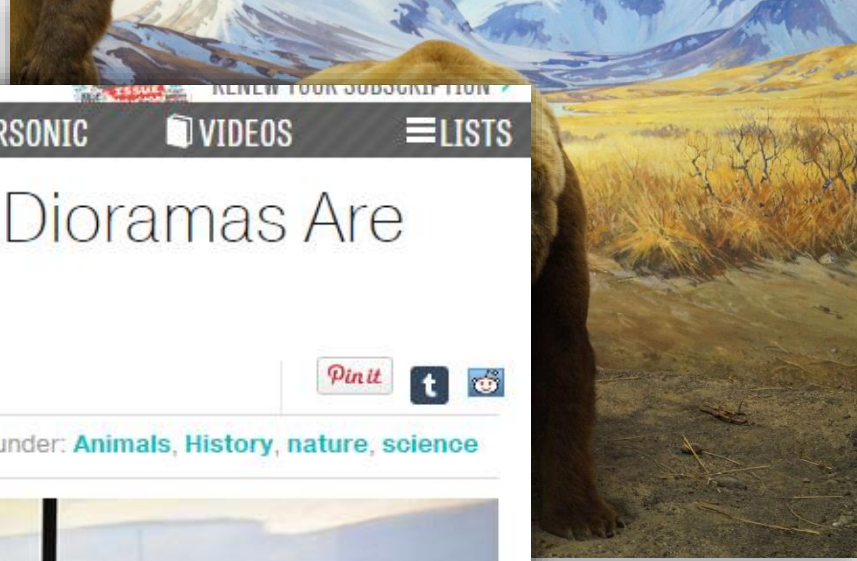
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Shaunacy Ferro

filed under: [Animals](#), [History](#), [nature](#), [science](#)



WHITE SHEEP

Would You Pass This 1910 Museum Curator Test?

Don't know how to steer a canoe? Instant fail



Loren P. Woods, curator of fish at the Field Museum of Natural History in Chicago in 1968. But could he handle a horse? (Bettmann/CORBIS)

Conclusões

- Buscar fontes alternativas de recursos
- Ampliar programas de capacitação de taxonomistas
- Criar programas de capacitação de curadores e técnicos
- Criar um programa nacional de inventário da biodiversidade
 - ✓ Dentro do universo da saúde – Programa de levantamento da diversidade de grupos taxonômicos-chave na compreensão das relações entre biodiversidade e saúde (artrópodes, parasitos, vírus e seus hospedeiros) – delineado para cobrir, de forma padronizada, todos os biomas brasileiros, usando estruturas regionais da Fiocruz