

Collections-based Approaches to Undergraduate Education



What do collections-based approaches add to undergrad education?

- Scale—time and space
- Integration
 - biotic and abiotic
 - genomic to organismal and ecosystems
- Complexity
- Web-based Discovery
- Database exposure
- Scientific Process
 - Experiential vs passive



A Few Challenges



- Few educators (& fewer students) seem to know:
 - about natural history collections
 - or their role in development of key concepts
 - how to access museum information
 - how to incorporate specimen data in teaching
 - Surveys developed to begin to understand these

A Few More Challenges

- Collections and databases have limitations
 - What are they? Do we need to tweak what we do or change how we think about our collections?
 - Databases originally developed for collection management, not outreach or education.



NSF Research Coordinating Network

- Goal: create new directions in education and research through groups (networks) supported to communicate and coordinate activities across disciplinary, organizational, geographic and international boundaries.

RCN-UBE

- RCN-Undergraduate Biology Education focuses on improved participation and learning in undergraduate biology curricula.



Undergraduate Experiences in Curation



Undergraduate Experiences in Museum Fieldwork



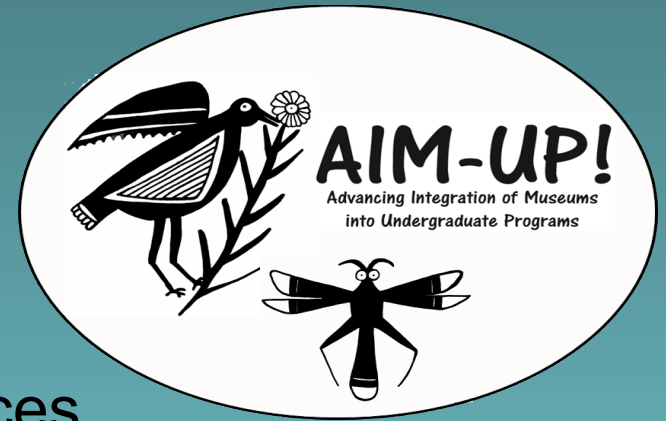


Undergraduate Learning Through Exhibits

Graduate and Undergraduate Research Experiences Based on Collections

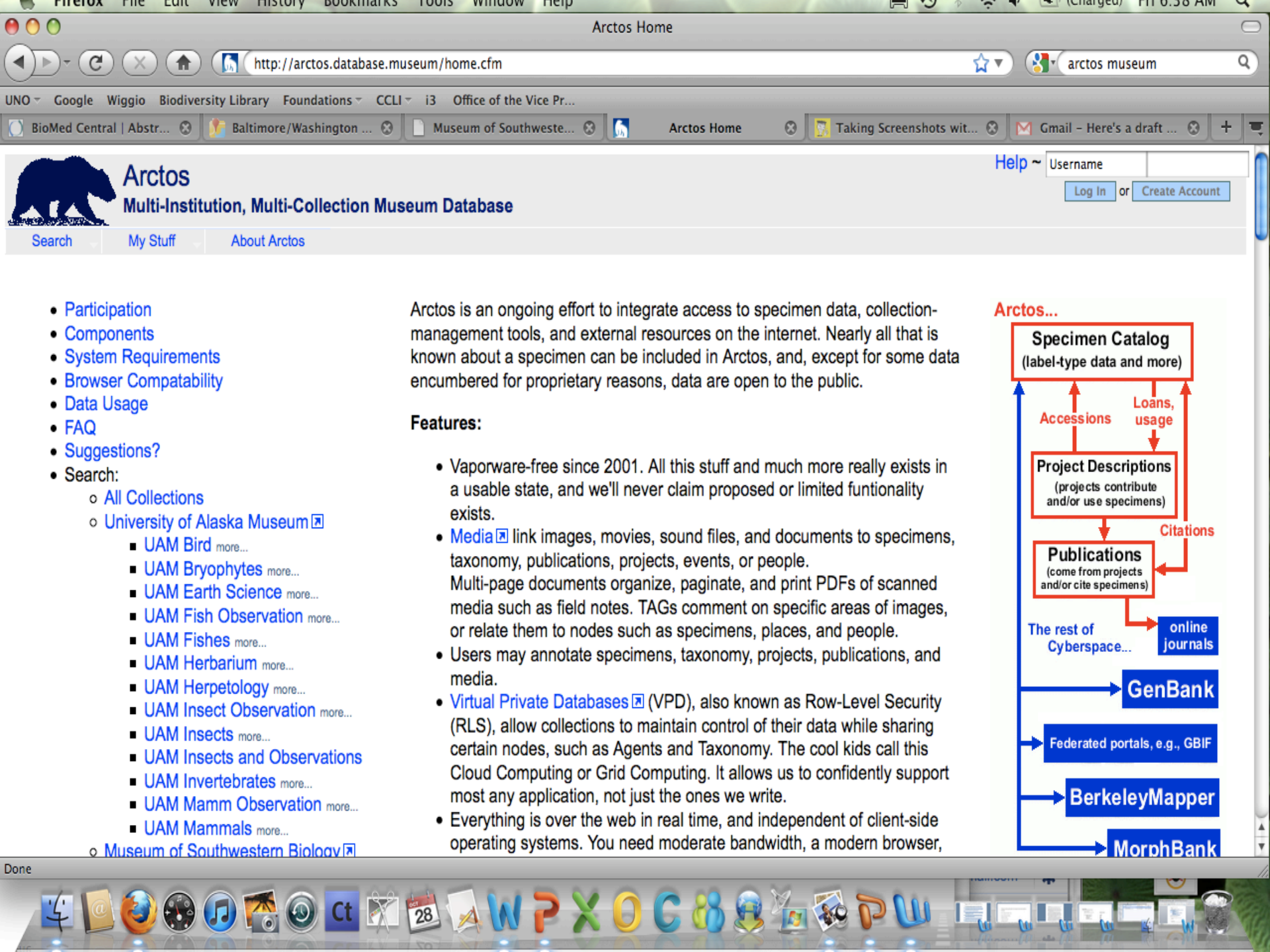


AIM-UP!



Expand on traditional museum experiences

- Develop novel ways of using collections and data.
- Increase accessibility of natural history collections to educators/public through databases.
- Develop tools, guidelines, and “front-end” entry into databases to facilitate on-line use by educators.
- Partner with other non-traditional museum users
(e.g., Behavior, Geography, Art)
- Develop international collaborations
– (Latin America & Spanish language)



Arctos

Multi-Institution, Multi-Collection Museum Database

Help ~ Username
 or

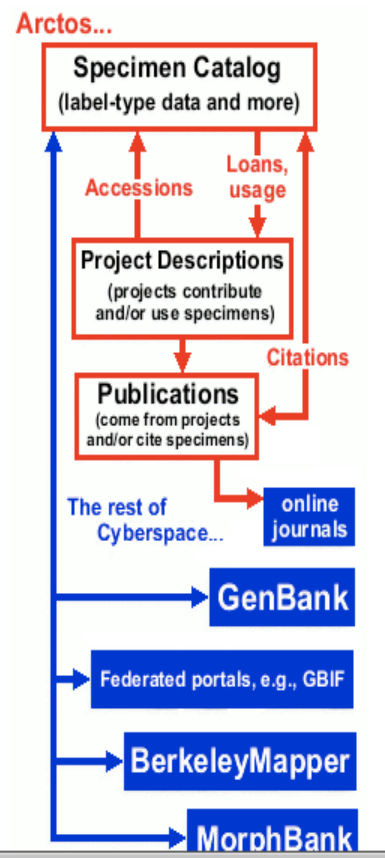
- Search
- My Stuff
- About Arctos

- [Participation](#)
- [Components](#)
- [System Requirements](#)
- [Browser Compatability](#)
- [Data Usage](#)
- [FAQ](#)
- [Suggestions?](#)
- Search:
 - [All Collections](#)
 - [University of Alaska Museum](#)
 - [UAM Bird](#) more...
 - [UAM Bryophytes](#) more...
 - [UAM Earth Science](#) more...
 - [UAM Fish Observation](#) more...
 - [UAM Fishes](#) more...
 - [UAM Herbarium](#) more...
 - [UAM Herpetology](#) more...
 - [UAM Insect Observation](#) more...
 - [UAM Insects](#) more...
 - [UAM Insects and Observations](#)
 - [UAM Invertebrates](#) more...
 - [UAM Mamm Observation](#) more...
 - [UAM Mammals](#) more...
 - [Museum of Southwestern Biology](#)

Arctos is an ongoing effort to integrate access to specimen data, collection-management tools, and external resources on the internet. Nearly all that is known about a specimen can be included in Arctos, and, except for some data encumbered for proprietary reasons, data are open to the public.

Features:

- Vaporware-free since 2001. All this stuff and much more really exists in a usable state, and we'll never claim proposed or limited functionality exists.
- [Media](#) link images, movies, sound files, and documents to specimens, taxonomy, publications, projects, events, or people. Multi-page documents organize, paginate, and print PDFs of scanned media such as field notes. TAGs comment on specific areas of images, or relate them to nodes such as specimens, places, and people.
- Users may annotate specimens, taxonomy, projects, publications, and media.
- [Virtual Private Databases](#) (VPD), also known as Row-Level Security (RLS), allow collections to maintain control of their data while sharing certain nodes, such as Agents and Taxonomy. The cool kids call this Cloud Computing or Grid Computing. It allows us to confidently support most any application, not just the ones we write.
- Everything is over the web in real time, and independent of client-side operating systems. You need moderate bandwidth, a modern browser,



AIM-UP!--the network

UAM, MVZ, MCZ, MSB, DMN&S,
USDA National Parasite Lab,
UMMZ, UNSM, NYSM, UGuelph,
UN-Montevideo, U Arizona, KU,
USGS, UASE, UAA, CNM

Highland High and Sitka High

Annual “All-Hands” Meetings



1. Theme Development
2. Demonstration
3. Implementation & Evaluation (beta test)
 - Rotates among UAM, MCZ, MVZ, MSB
 - Selection of New Participants and Local Teachers based on commitment to undergraduate mentoring and willingness to test new modules

Annual “All-Hands” Meetings Workshop on Third Day

- 6 educators from the surrounding region invited to learn about new curricular materials and tools
- To **increase dissemination** of curriculum materials, **pilot new materials**, provide **immediate feedback** from educators, and **increase** pool of participants in **evaluation activities**.

Products

- **Better Understanding of Current Programs**
- **Survey of Educators and Students**
- **Individual modules** centered around themes
- Stimulate **Interdisciplinary Use** of Specimens
- **Publications—**
 - Perspectives, Surveys, Educational Venues, Texts
- **Proposal** based on emergent curriculum
- **Durable Network**
 - Grow the Community of Users**

Primary Conceptual Themes:

- 1) Integrative Inventories: Exploring Complex Biotic Associations Across Space and Time (MSB)
- 2) Decoding Diversity: Making Sense of Geographic Variation (UAM)
- 3) Generating Genotypes: Evolutionary Dynamics of Genomes (MCZ)
- 4) Fast Forward: Biotic Response to Climate Change (MVZ)
- 5) Coevolving Communities and the Human Dimension (MSB)



Educational Modules Working Groups

ISLES---Alexander Archipelago

Climate Change—Sierras (Grinnell transects), pikas

Geographic Variation in Bird Song Dialects- audioartist

Virtual Herbaria (190,000 herbarium sheets)

GenBank & Museum Specimens:

phylogeny & phylogeography

Exploring Genomic Variation--

gene environment interactions

Host/Parasite dynamics

Niche Modeling (e.g., Id host/emergent pathogen)

Workshops--Spring 2012

Co-Evolution: Art and Natural History

- 1) Fluid Taxonomy -- on the dynamic, ever shifting practice of classification and its
- 2) Cataloguing Wonder -- recapturing the sense-experience in empiricism; collecting through the senses
- 3) Morphology and Evolution -- investigating change in nature and culture through place and time



Join Us!