

Annual Report for Period:05/2011 - 04/2012**Submitted on:** 05/09/2012**Principal Investigator:** Cook, Joseph A.**Award ID:** 0956129**Organization:** University of New Mexico**Submitted By:**

Cook, Joseph - Principal Investigator

Title:

RCN-UBE: Advancing Integration of Museums into Undergraduate Programs (AIM-UP!)

Project Participants**Senior Personnel****Name:** Cook, Joseph**Worked for more than 160 Hours:** Yes**Contribution to Project:****Name:** Edwards, Scott**Worked for more than 160 Hours:** Yes**Contribution to Project:****Name:** Lacey, Eileen**Worked for more than 160 Hours:** Yes**Contribution to Project:****Name:** Ickert-Bond, Stefanie**Worked for more than 160 Hours:** Yes**Contribution to Project:****Name:** Demboski, John**Worked for more than 160 Hours:** No**Contribution to Project:**

Attended AIM-UP! Santa Fe conference, October 2010 and working with educational staff at Denver Museum of Nature and Science on related topic

Name: Gardner, Scott**Worked for more than 160 Hours:** No**Contribution to Project:**

Attended AIM-UP! Santa Fe conference, October 2010 and as Curator and Professor is working on parasite educational modules based on collections

Name: Hanner, Robert**Worked for more than 160 Hours:** No**Contribution to Project:**

Attended AIM-UP! Santa Fe conference, October 2010 and working with Barcode of Life educational efforts (connection to museum specimens through genetic vouchers)

Name: Heidorn, Bryan**Worked for more than 160 Hours:** No**Contribution to Project:**

Attended AIM-UP! Santa Fe conference, October 2010 and working with educational modules from museum collections in bioinformatics course he is teaching Spring 2011

Name: Hoberg, Eric**Worked for more than 160 Hours:** No

Contribution to Project:

Attended AIM-UP! Santa Fe conference, October 2010 and working on integrated host-parasite (collection based) educational efforts

Name: Jones, Tricia

Worked for more than 160 Hours: No

Contribution to Project:

Remotely tapped into evaluation discussion at AIM-UP! Santa Fe conference, October 2010 and working on evaluation of RCN with Phil Myers, U Michigan

Name: Myers, Philip

Worked for more than 160 Hours: No

Contribution to Project:

Attended AIM-UP! Santa Fe conference, October 2010 and Spring 2012 Fairbanks conference working on evaluation of RCN with Tricia Jones, U Michigan and also potential connections to Animal Diversity Web.

Name: Kirchman, Jeremy

Worked for more than 160 Hours: No

Contribution to Project:

Attended AIM-UP! Santa Fe conference, October 2010 from NY State Museum of Natural History

Name: Turner, Thomas

Worked for more than 160 Hours: No

Contribution to Project:

Attended AIM-UP! Santa Fe conference, October 2010 (University of New Mexico, Curator and Professor)

Name: Witt, Christopher

Worked for more than 160 Hours: No

Contribution to Project:

Attended AIM-UP! Santa Fe conference, October 2010 (University of New Mexico, Curator and Assistant Professor)

Name: Urban, Tomislav

Worked for more than 160 Hours: Yes

Contribution to Project:

Attended AIM-UP! Santa Fe conference, October 2010 (Texas Advanced Computing Center). Helped develop website and connectivity among participants.

Name: Wiczorek, John

Worked for more than 160 Hours: No

Contribution to Project:

Attended AIM-UP! Santa Fe conference, October 2010 (MVZ Berkeley programmer)

Name: Guralnick, Rob

Worked for more than 160 Hours: No

Contribution to Project:

Participated in the February 2012 All-Hands meeting in Fairbanks from Univ of Colorado. Also interested in use of educational modules in his bioinformatics courses.

Name: Hastings, Kim

Worked for more than 160 Hours: No

Contribution to Project:

Collections database manager and remote participant in AIM-UP! from National Park Service.

Name: Hanken, James

Worked for more than 160 Hours: No

Contribution to Project:

Interested participant from MCZ Harvard and actively involved in database development and integration for research and

education use and member of Steering Committee of Arctos.

Name: Lessa, Enrique

Worked for more than 160 Hours: No

Contribution to Project:

Attended AIM-UP! Fairbanks conference, February 2012 and working as Director, PEDICIBA and Professor, Univ. de la Republica-Uruguay. He is involved in educational module development using phylogenetic approaches.

Name: MacDonald, Stephen

Worked for more than 160 Hours: Yes

Contribution to Project:

Developing ISLES website, a place based site for education and research based on museum specimens in Southeast Alaska.

Name: McClatchey, Will

Worked for more than 160 Hours: No

Contribution to Project:

Remote participant in AIM-UP! and leader of Botanical Research Institute of Texas RCN aimed at undergraduate education in ethnobotany.

Name: Moritz, Craig

Worked for more than 160 Hours: No

Contribution to Project:

Director and professor at MVZ UC Berkeley interested in developing educational use of museum collections and member of Steering Committee of Arctos.

Name: Talbot, Sandra

Worked for more than 160 Hours: Yes

Contribution to Project:

USGS Director of the Molecular Ecology Lab in Anchorage interested in using museum collections and associated data in educational outreach efforts in Alaska.

Name: Olson, Link

Worked for more than 160 Hours: Yes

Contribution to Project:

2010-2012

Assoc. Professor of Biology and Curator, University of Alaska Museum and member of Steering Committee of Arctos. He participated in the UAM Open House and Final Social.

Name: Kaden, Ute

Worked for more than 160 Hours: No

Contribution to Project:

Attended AIM-UP! Fairbanks conference, February 2012 and working at the University of Alaska Fairbanks School of Education on STEM education teacher training issues.

Name: Huettmann, Falk

Worked for more than 160 Hours: No

Contribution to Project:

Attended AIM-UP! Fairbanks conference, February 2012 and working at the University of Alaska Fairbanks Dept. of Biology and Wildlife, contributes to science education using spatial approaches

Name: Sikes, Derek

Worked for more than 160 Hours: No

Contribution to Project:

Attended AIM-UP! Fairbanks conference, February 2012 and working at the University of Alaska Fairbanks Dept. of Biology and Wildlife. Derek is Curator and Associate Professor and working on entomology educational modules based on collections.

Name: Daly, ﻿Meg

Worked for more than 160 Hours: No

Contribution to Project:

Attended AIM-UP! Fairbanks conference, February 2012 and working at the Ohio University as Curator of Marine Invertebrates and Assoc. Professor. She is working on marine invertebrate educational modules based on collections.

Name: Paz Echevariarrza, Maria

Worked for more than 160 Hours: No

Contribution to Project:

Attended AIM-UP! Fairbanks conference, February 2012 and working as Director & Science Educator, UNESCO-Montevideo on innovative approaches to teaching science education for UNESCO.

Name: Ho, Szu-Han

Worked for more than 160 Hours: Yes

Contribution to Project:

2011-2012

Szu-Han is an Assistant Professor of Art and Ecology at the University of New Mexico. She participated in the Fall 2011 retreat at the Sevilleta and then co-taught the Spring 2012 seminar course that was delivered to Art, Honors, and Biology students at UNM and also transmitted to UC Berkeley (3 students working with Elineed Lacey), U Alaska Fairbanks (3 students working with Steffi Ickert-Bond) and Harvard University (Scott Edwards). Szu-Han also organized the 3, two-day workshops that brought in imminent natural history artists, Brandon Balengee, Suzanne Anker, and Brian Conley to instruct, explore and discuss ways that art, museums and education intersect.

Name: Langer, Miriam

Worked for more than 160 Hours: No

Contribution to Project:

Attended AIM-UP! Fairbanks conference, February 2012 and working as Professor and Chair of Media Arts, Highlands University, NM. She is involved in the Spring 2012 Seminar course on using diverse media approaches to science education and has worked heavily with the Santa Fe Institute on museum exhibits.

Name: Welch, Corey

Worked for more than 160 Hours: No

Contribution to Project:

2012

Attended AIM-UP! Fairbanks conference, February 2012 and working as Assistant Director, Biology Scholar Program, UC Berkeley. Contributes to educational module development increasing participation of underrepresented groups in STEM education.

Name: LeBounty, Kitty

Worked for more than 160 Hours: No

Contribution to Project:

Attended AIM-UP! Fairbanks conference, February 2012 and working at the University of Alaska Southeast -Sitka and participates in the biogeographical educational modules as well as island biogeography modules.

Name: Flamme, Melanie

Worked for more than 160 Hours: No

Contribution to Project:

Attended AIM-UP! Fairbanks conference, February 2012 and working as National Park Service Biologist, Fairbanks, Alaska.

Name: Klein, David

Worked for more than 160 Hours: No

Contribution to Project:

Attended AIM-UP! Fairbanks conference, February 2012 and working as Emeritus Professor of Wildlife, University of Alaska Fairbanks.

Name: Natvig, Don

Worked for more than 160 Hours: No

Contribution to Project:

2012

Dr. Natvig provided a series of lectures and a PCR/Sequence Lab related to the tools that we use to explore genomic diversity in organisms as part of Suzanne Anker's workshop in the Aim-UP Spring 2012 seminar.

Name: Loeffler, Jack

Worked for more than 160 Hours: No

Contribution to Project:

Participated in Fall at Sevilleta LTER 2011 retreat to plan seminar on intersection between natural history collections and art and ecology.

Name: Holden, Chris

Worked for more than 160 Hours: No

Contribution to Project:

Participated in Fall retreat to plan seminar on intersection between natural history collections and art and ecology.

Name: Collins, Scott

Worked for more than 160 Hours: No

Contribution to Project:

Participated in Fall retreat to plan cross-disciplinary seminar (and courses) on intersection between natural history collections, environmental history, and art and ecology.

Name: Harris, Catherine

Worked for more than 160 Hours: No

Contribution to Project:

Participated in Fall retreat to plan seminar on intersection between natural history collections and art and ecology.

Name: Truett, Sam

Worked for more than 160 Hours: Yes

Contribution to Project:

2011-2012

Environmental historian (tenured Profess, History UNM) who participated in Fall retreat at Sevilleta LTER to plan seminar and new coursework focused on intersection between natural history collections, history, and art and ecology.

Name: Irland, Basia

Worked for more than 160 Hours: No

Contribution to Project:

Doctorate in neuroscience and Assistant Professor at UNM. Participant in Spring 2012 Seminar.

Name: Elmore, Marne

Worked for more than 160 Hours: No

Contribution to Project:

Student participant in Art in Spring 2012 Seminar.

Name: Wong, Michelle

Worked for more than 160 Hours: Yes

Contribution to Project:

Enrolled in Spring 2012 seminar and developed educational module.

Post-doc

Graduate Student

Name: Bell, Kayce

Worked for more than 160 Hours: Yes

Contribution to Project:

Graduate student assistant on AIM-UP!. Facilitated IM-UP! Santa Fe conference, October 2010 and Fall 2010 seminar as well as

website development and connectivity.

Name: Ryan, Mason

Worked for more than 160 Hours: No

Contribution to Project:

Participant in Spring 2012 Seminar.

Undergraduate Student

Name: Chen, Xiangyun

Worked for more than 160 Hours: No

Contribution to Project:

Participant in Spring 2012 Seminar. She developed educational module on natural selection on lava flows using museum specimens.

Name: Anderson, Julia

Worked for more than 160 Hours: No

Contribution to Project:

Participant in Spring 2012 Seminar. She developed educational module on climate change using museum specimens.

Name: Marquez, Antonio

Worked for more than 160 Hours: No

Contribution to Project:

Participant in Spring 2012 Seminar. He developed educational module on evolution that focused on the role of barriers in divergence using museum specimens (Kaibab squirrels at Grand Canyon).

Name: Davis, Lauren

Worked for more than 160 Hours: No

Contribution to Project:

Participant in Spring 2012 Seminar.

Name: Doyle, Lauren

Worked for more than 160 Hours: No

Contribution to Project:

Participant in Spring 2012 Seminar.

Name: Rix, Robert

Worked for more than 160 Hours: No

Contribution to Project:

Participant in Spring 2012 Seminar. He developed educational module on natural selection on lava flows using museum specimens.

Name: Hulse, Hugh

Worked for more than 160 Hours: No

Contribution to Project:

Student participant in Spring 2012 Seminar. He developed educational module on natural selection on lava flows using museum specimens.

Name: Alanis, Robert

Worked for more than 160 Hours: No

Contribution to Project:

Participant in Spring 2012 Seminar.

Name: Carillo, Katie

Worked for more than 160 Hours: No

Contribution to Project:

Participant in Spring 2012 Seminar.

Name: Lee, Casie

Worked for more than 160 Hours: No

Contribution to Project:

Enrolled in Spring 2012 seminar and developed educational module.

Name: Groth, Claire

Worked for more than 160 Hours: No

Contribution to Project:

Enrolled in Spring 2012 seminar and developed educational module.

Technician, Programmer

Name: Cicero, Carla

Worked for more than 160 Hours: No

Contribution to Project:

Attended AIM-UP! Santa Fe conference and will present AIM-UP! poster at SPNCH/NSCA meeting in San Francisco in 2011

Name: Macdonald, Dusty

Worked for more than 160 Hours: No

Contribution to Project:

Attended AIM-UP! Santa Fe conference, October 2010 and working on programming websites and databases for educational use (University of Alaska Fairbanks)

Name: Jarrell, Gordon

Worked for more than 160 Hours: Yes

Contribution to Project:

Member of Arctos development group that will be handling integration of educational modules and databases.

Name: McConnell, Marjorie

Worked for more than 160 Hours: No

Contribution to Project:

Participant in Spring 2012 Seminar.

Other Participant

Name: Ballenge, Brandon

Worked for more than 160 Hours: No

Contribution to Project:

As part of the Spring 2012 seminar course through Aim-UP, Brandon Ballenge presented a campus-wide lecture on his museum-based educational efforts related to drawing attention to the causes of amphibian deformities. He then led a 2 day workshop with undergraduate students from biology, art and the honor's program that explored the interface between art and natural history. The workshop included field collection of specimens and review of a large series of larval specimens collected and housed at MSB. His art (e.g., 'Insect Love Motels' & 'Amphibian Deformities') have been exhibited nationally (current installation at National Zoo through Smithsonian) and internationally (Europe, India, Canada).

Name: Anker, Susan

Worked for more than 160 Hours: No

Contribution to Project:

The second workshop for Spring 2012 was led by Suzanne Anker, Chair, NYC School of Visual Arts. She has long been a leader in the art community in efforts to explore and understand the intersection between art and biology. She presented a campus-wide lecture at UNM on her work in natural history and molecular genetics. She then led a 2 day workshop with 9 undergraduate

students from biology, art and the honor's program that explored the interface between art and natural history with a focus on introducing and exploring genomic diversity through molecular identification of several species of fungi that we obtained at a local market.

Name: Dunnum, Jon

Worked for more than 160 Hours: No

Contribution to Project:

Participant in Fall 2010 and Spring 2012 Seminars.

Name: Espinoza, Candice

Worked for more than 160 Hours: No

Contribution to Project:

Participant in Spring 2012 Seminar. She developed educational module on evolution that focused on the role of barriers in divergence using museum specimens (Kaibab squirrels at Grand Canyon).

Name: Snyder, Alexandra

Worked for more than 160 Hours: No

Contribution to Project:

Participant in Spring 2012 Seminar.

Name: Giermakowski, Tomas

Worked for more than 160 Hours: No

Contribution to Project:

Participant in Spring 2012 Seminar.

Name: Conley, Brian

Worked for more than 160 Hours: No

Contribution to Project:

The third workshop for Spring 2012 (April 26-28) was led by Brian Conley, Professor California College for the Arts. He has long been a leader in the art community in efforts to explore and understand the intersection between art and natural history. He presented a campus-wide lecture at UNM on his work and then led a 2 day workshop with 9 undergraduate students from biology, art and the honor's program that explored the interface between art and biology with a focus on complexity, evolution and self-organization.

Research Experience for Undergraduates

Organizational Partners

BarCode of Life

Designing ways to build educational modules into BarCode of Life website.

The University of Michigan

Staff are participating in the RCN AIM-UP!

USGS, Alaska Science Center

Staff are participating in the RCN AIM-UP!

Florida Museum of Natural History

Staff are participating in the RCN AIM-UP!

Texas A&M University Main Campus

Staff are participating in the RCN AIM-UP!

New York State Museum and Science Service

Staff are participating in the RCN AIM-UP!

University of Texas Advanced Computing C

Staff are participating in the RCN AIM-UP!

University of Nebraska-Lincoln

Staff are participating in the RCN AIM-UP!

Denver Museum of Nature and Science

Staff are participating in the RCN AIM-UP!

USDA Beltsville

Staff are participating in the RCN AIM-UP!

University of Arizona

Staff are participating in the RCN AIM-UP!

United Nations Educ Scientific & Cultural Organization (UNESCO)

Staff are participating in the RCN AIM-UP!

Ohio State University**U.S. National Park Service**

Staff are participating in the RCN AIM-UP!

University of Alaska Southeast Sitka Campus

Professors Jon Martin and Kitty LeBounty have been incorporating the island educational module into their classes as well as teaching students through fieldwork by preparing and using specimens from their island inventories to museums as they further develop this place-based approach.

Other Collaborators or Contacts

2011

Alan Prather, Michigan State University and CollectionsWeb (RCN)---we are connecting our respective RCNs where they intersect with regard to educational themes and missions.

Will McClatchey, Botanical Research Institute of Texas (Ethnobiology RCN)---preliminary discussions have pointed toward common themes that cross anthropology and biology education using museum collections. Kayce Bell participated on behalf of AIM_UP! in their Annual Meeting in Baltimore in September 2011.

2011-2012

Szu-Han Ho, Art and Ecology Program- UNM---two undergraduate courses in Art Department are now using museum collections as basis for student projects. Discussions have revolved around integration of Art and environmental sciences and potential to trace the development of the careers of renowned museum Arctic biologists from Art perspective. These discussion led to a set of joint courses and workshops in Spring 2012 (see AIM_UP! website for course details) that explored the intersection between Art and Natural History.

2011

Jessica Light-Texas Wildlife & Fisheries Collections---interest in integration of collections-based host/parasite themes into undergraduate education experiences.

2011

David Reed-Florida State Museum of Natural History---interest in integration of collections-based host/parasite themes into undergraduate education experiences.

2011-2012

Laura Carsten-Conner, Education Director, UAM---interest in integration of collections-based themes into teacher training workshops to be held this summer at the museum as well as at rural sites throughout AK.

2011-2012

Ute Kaden, Assistant Prof., School of Education, UAF---interest in integrating collections-based themes into teacher training and research into improving educational opportunities in Alaska bush communities.

Activities and Findings

Research and Education Activities:

Seminars (Fall 2010; Spring 2012) for AIM-UP! the RCN in Undergraduate Biology Education.

2012--AIM-UP! undergraduate seminar offered Spring 2012 at UNM through Biology, Arts and Ecology and Honors Programs (14 regular attendees) and broadcast on Tuesday's at noon to Harvard (Scott Edwards), UC Berkeley (Eileen Lacey and 3 students) and University of Alaska Fairbanks (Steffi Ickert-Bond and 3 students).

The course provided an interdisciplinary overview of how natural history collections are used to investigate and learn about geographic variation. The course and associated blog provided a forum for initial discussion of museums-based educational models and students worked in teams to develop 'dispersion modules' on related topics that drew on diverse expertise of team members.

Student surveys (2010-2012).

Periodic surveys of the undergraduates at our institutions are useful for determining the level of undergraduate awareness of our respective collections as well as undergraduate perceptions of the importance of collections to different biological disciplines. Building upon discussions held during the seminar, we designed a survey that was distributed to a variety of courses at UNM, Berkeley, and Alaska at the start of the Spring 2011 semester. Preliminary survey results are provided in the next section of this report.

Spring 2012 All-Hands Meeting (Fairbanks, AK) Feb 20-22

This meeting was attended by 25 individuals representing 15 different institutions, departments or agencies.

Goals for the meeting include:

a. Module development:

Peer-reviewed and allow authorship.

Evaluation: student evaluations, measuring performance on lecture exams, and evaluating students' performance and knowledge of topics before and after a l module.

Modules based in peer-learning are effective ways to gain knowledge.

Focus on improving introductory biology courses,

Implement recommendations in Vision and Change

Lab exercises provide museums an opportunity to develop inquiry driven modules.

b. Challenges:

? Encouraging students to find value in the process of science,

? Increasing enthusiasm for inquiry-based learning (vs. grades).

? Linking meaningful lab experiences to museums,

? Increasing visibility and value of collections to biology students.

? Additional venues/resources: Bioquest, Merlot? There are already some modules available at these and other sites. Do any use museum resources?

? Dissemination, use and follow-up (evaluation) important.

? Standardize materials and include things such as time needed to complete a module, possible subunits, pre-requisites.

? Research what types of modules are actually needed by those who teach evolution, ecology, etc.

? Interact with faculty in charge of introductory biology to see what they need.

? Check online materials associated with textbooks.

? Develop a module in which students work in groups and generate their own questions, rather than just having a well-scripted exercise.

? Intermediate approach: question already identified, but methods open and problem sufficiently challenging.

See AIM-UP! website for Summary Report on Spring 2012 All-Hands Meeting in Fairbanks
(<http://www.aim-up.org/home/meetings/2012-fairbanks/fairbanks-2012-summary>)

Findings: (See PDF version submitted by PI at the end of the report)

See attached findings related to 2011-2012 student surveys for AIM-UP! the RCN in Undergraduate Biology Education.

Training and Development:

2012 for AIM-UP! the RCN in Undergraduate Biology Education

For the 4 PIs, the second year of the RCN (2012) generated important opportunities to improve our skills at (1) survey design and implementation, (2) evaluation of project goals, and (3) public dissemination of RCN activities. Students who participated in the Spring 2012 seminar course gained critical new insights into how natural history collections operate and how they might interface with other disciplines like art. In addition, students gained valuable experience working in interdisciplinary teams and using museums databases while designing pilot educational (or dispersion) modules as part of the seminar.

Outreach Activities:

For the First Year (2010-2011)

Our RCN in Undergraduate Biology Education worked with a Geographic Information Systems instructor to develop a lab activity that utilizes museum specimen and locality data for introductory GIS courses.

Educational modules were distributed to University of Colorado and University of Arizona bioinformatics courses.

We linked to ISLES a website promoting place-based studies using museum specimens from the Alexander Archipelago. ISLES is tied to University of Alaska Southeast (Sitka campus) and local high schools in Southeast Alaska.

For the Second Year (2011-2012)

Conferences: AIM-UP! presentations were delivered at the annual:

Society for the Preservation of Natural History Collections (SPNCH) meeting in San Francisco in May, 2011,

Evolution meeting in Norman Oklahoma in June 2011,

American Society of Mammalogists meeting in Portland, OR in June 2011

Botanical Society of America meeting in St Louis, MO in July 2011

We worked with Education Director Laura Carsten UAM- Conner to incorporate museum-based activities in the teacher training workshops fall 2011 and at rural communities throughout AK. The activities include work with historical herbarium specimens and making leaf impressions to show how increasing CO₂ levels are affecting stomatal density in arctic plants.

We continued work toward linking the Island Surveys to Learn About endemic Species (ISLES) effort through further development of and Islands Educational Module and a website that promotes place-based studies using museum specimens from the Alexander Archipelago. ISLES is tied to University of Alaska Southeast (Sitka campus), local high schools in Southeast Alaska, and now an inner city HYper-diverse high school in Albuquerque (Highland High School) which has a 46% graduation rate, through Dana Allen a biology honors instructor who is using the module as part of his evolution and ecology courses.

Journal Publications

Ryan, MJ, Bolanos, F, Chaves, G, "Museums help prioritize conservation goals", Science Express (online), p. , vol. , (2011). Published, www.sciencemag.org/content/329/5997/1272/reply#sci_el_13658

Books or Other One-time Publications

Web/Internet Site

URL(s):

www.aim-up.org

Description:

The AIM-UP! website was created (www.aim-up.org) and we are now building links to ongoing museum-based educational materials. The website has contact information for all participants, links to natural history collections, and links to multiple on-line educational resources and databases. Some of the educational modules developed in the fall seminar course are posted and more are in final development. Introductory information to help get instructors started using online museum databases in their classroom activities has been developed and posted on the website.

Other Specific Products

Product Type:

Teaching aids

Product Description:

We developed educational modules targeting various undergraduate courses. These modules were posted on the website and distributed to instructors. We have initiated discussions related to the redesign of the curriculum for the Biology 203 laboratories at University of New Mexico (approx. 400 undergraduates enrolled per year) to include increased use of museums resources.

An educational kit on using museum herbarium specimens in climate change studies has been assembled and can be signed out for interested teachers through the University of Alaska Museum, Education Department. Two additional kits on making acetate peels from coal balls have also been completed.

Sharing Information:

Available via website and shared through presentations at professional meetings and through websites such as NSCA.

Contributions

Contributions within Discipline:

Aim-UP! the RCN in Undergraduate Biology Education has stimulated dialog among a variety of museum curators, collection managers, investigators and undergraduate educators. Already the PI and Co-PIs have been clearly informed about need for increased understanding of museums and museums collections at our home institutions, which house some of the largest university-based natural history collections in North America. During the Fall 2010 Seminar, a total of 17 graduate students and 2 undergraduate students (and a number of faculty and staff)

saw museum collections from a completely new perspective; very different from the research only use of collections that has been traditional.

The Spring 2012 Seminar and associated 3, two-day workshops allowed us to further develop educational modules related primarily to how museum specimens and associated databases can be incorporated into ecology, behavior and evolution courses.

Contributions to Other Disciplines:

AIM-UP! is further developing connections to IT and biodiversity informatics groups by engaging them in the workshops and through the website. Because distance learning and experiential learning are rapidly being incorporated in undergraduate curricula nationwide, this effort to tap the vast resources of the natural history collections is timely.

For the Spring 2012 Seminar, in addition to Biology majors, we added in students from the Art and Ecology Program and the Honors Program at UNM as we designed additional educational modules with a truly interdisciplinary perspective. Three two day workshops and 3 public lectures by internationally-recognized artists (Brando Ballengee, Suzanne Anker, and Brian Conley) who are heavily involved in the exploration of the interface between art and natural history allowed us to more fully understand the possible intersections between these fields. Miriam Langer, Chair of the Media Arts Department at New Mexico Highlands University also presented to this seminar and attended the Fairbanks meeting. She is a leader in efforts to make natural history collections available digitally and has been involved in the design and execution of several new museum exhibits including one with the Santa Fe Institute on the Origins of Life (Emergence--at NM Museum of Natural History).

Contributions to Human Resource Development:

Our seminars and workshops in Fall 2010 and Spring 2012 have engaged a diverse set of students and other participants from 5 institutions and a diverse set of disciplines (art, geography, ecology, pathology, evolution, behavior, and a number of taxonomic disciplines). Students learned how these diverse disciplines have used museum collections as a basis for addressing fundamental questions in science and how we might think about using these databases to design hands-on learning experiences for undergraduate students.

Contributions to Resources for Research and Education:

In the second year (2011-2012) of AIM-UP! the RCN in Undergraduate Biology Education, we continued working on a number of angles that aim to incorporate the vast natural history collections and associated databases into undergraduate curricula. Many of these efforts, which are web-accessible, will be portable to K-12 and the general public.

Contributions Beyond Science and Engineering:

None yet.

Conference Proceedings

Special Requirements

Special reporting requirements: None

Change in Objectives or Scope: None

Animal, Human Subjects, Biohazards: None

Categories for which nothing is reported:

Any Book

Any Conference

Undergraduate surveys.

2011. The courses and number of survey responses at each of the participating institutions were as follows:

Institution	Course title	Upper/lower division	# respondents
UNM	Tropical Biology	upper	14
Alaska	Entomology	upper	7
	Vertebrate Paleontology	upper	7
	Systematic Botany	upper	10
	Ichthyology	upper	19
Berkeley	Mammalogy	upper	32
	Ornithology	upper	7
	Intro Biology	lower	71

Analysis of survey results is still in progress, but data from the introductory biology course surveyed at Berkeley (a randomly selected subset of students representing ~ 15% of total course enrollment) indicate that the vast majority (71%) of lower division undergraduates included in the survey are unaware of the existence of the Museum of Vertebrate Zoology and less than 8% of these students have visited the MVZ. When asked to rate the importance of natural history collections to undergraduate education in several biological disciplines (1 = unimportant, 5 = very important), mean scores ranged from 3.27 (systematics) to 4.18 (physiology); this outcome is particularly intriguing given that systematics has traditionally been the core of museums-based science. Overall, these data suggest that lower division undergraduates (1) are not aware of museum resources available on the Berkeley campus and (2) do not understand the relevance of such collections to multiple disciplines within biology.

This initial round of student surveys was extremely useful in terms of identifying issues related to survey design and distribution that will be addressed in future years. For example, most of the upper division courses polled are taught by museum curators and thus students in these courses are likely biased in favor of being familiar with the museum at their respective institution. As a result, future sampling of upper division courses will be spread among museums-based classes and classes that do not have a direct museum connection. Further, because courses taught by museum curators frequently introduce students to museums collections during their initial meetings, the timing of survey distribution within the semester may also bias the data obtained. Building upon these experiences, we will implement an improved round of survey distribution during the 2011-2012 academic year in order to gain a more comprehensive assessment of undergraduate knowledge of museums during the early phases of our RCN project.

2012. Surveys of undergraduate impressions of natural history museums were repeated using a modified questionnaire that included (1) improved clarity of questions and (2) more quantitative responses that can be tallied via scantron. The net effect of these changes was to improve the quality of the information obtained from the surveys. In addition, greater effort was made to sample a mix of introductory and advanced biology courses. In particular, responses from intro courses were considered important as a baseline measure of undergraduate understanding of museums, before students have the chance to experience university-based museums through courses or other instructional activities.

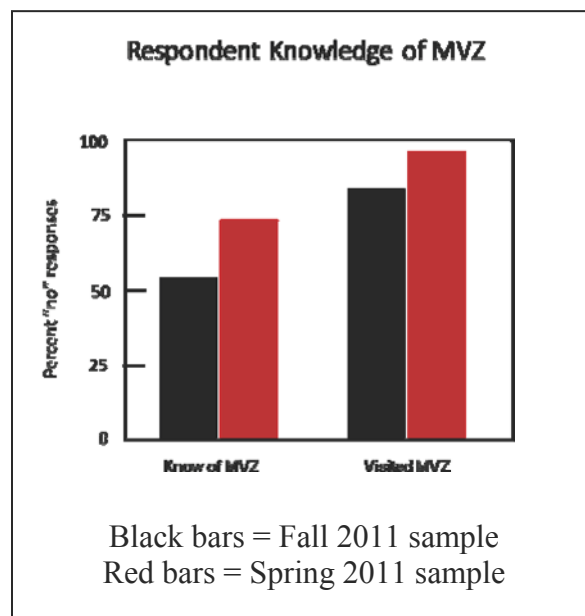
The surveys completed during 2012 consisted of:

Berkeley	Introductory Biology (1B)	N = ~ 700 surveys
New Mexico	Introductory Biology	N = ~ 800 surveys

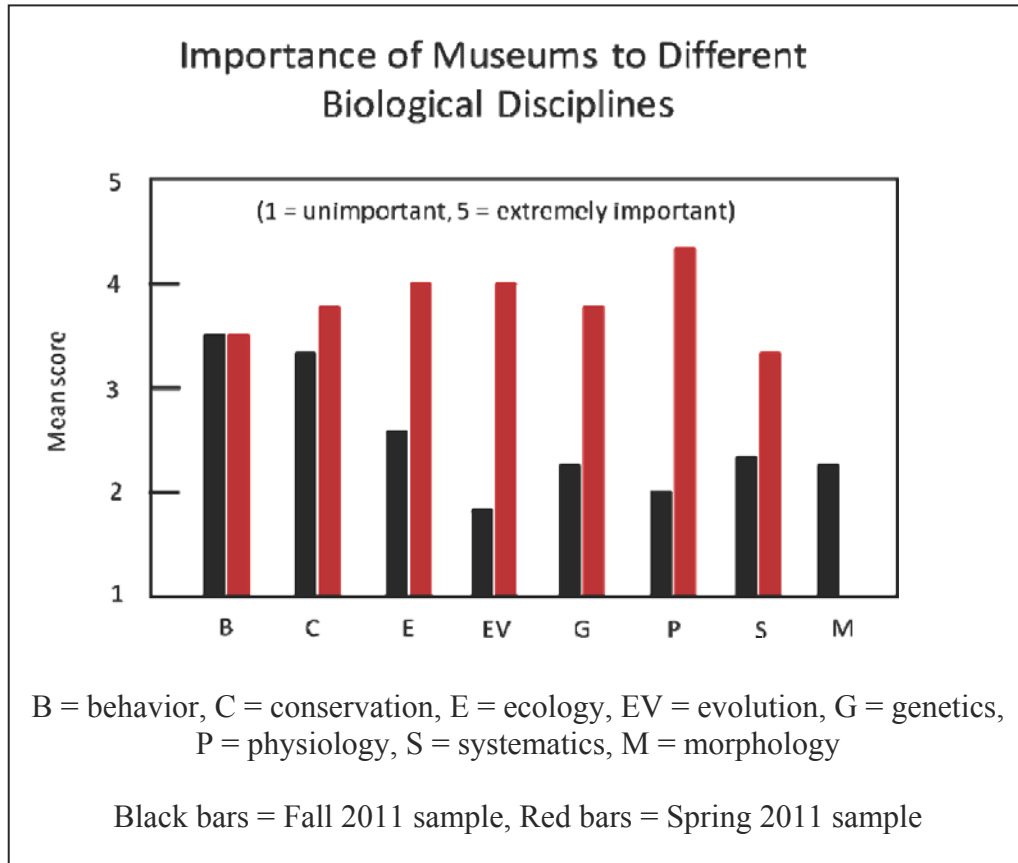
Preliminary analyses of the Berkeley surveys revealed a number of widespread misconceptions regarding the nature of university-based natural history collections. Some of these data are summarized below.

Data for two semesters of introductory biology courses at Berkeley are shown. The composition of these courses differs between semesters, with the fall semester consisting largely of biology majors intending to pursue careers in medicine and other health related disciplines. In contrast, the spring semester consists largely of students interested in ecology, evolution, and conservation biology.

Questions: Do you know of the MVZ? Have you ever visited the MVZ?



A second set of questions asked respondents to rate the importance of natural history museums to multiple biological disciplines, with 1 being unimportant and 5 being very important. Results of these ratings are shown below:



Interestingly, student impressions of the importance of natural history collections to different biological disciplines varied markedly between semesters, with fall (pre-med) students consistently rating collections as less important to most disciplines. Additional sampling is required to determine if this pattern holds across years. Analyses of data from the other participating schools are required to determine if the same biases are evident across campuses.

Analysis of the 2012 surveys is ongoing. Having now developed a reasonable series of survey questions and a logistically tractable method of survey scoring (scantron), we will be making an additional “final” survey effort during the 2012-2013 academic year. Currently, we pursuing IRB approval for our survey efforts so that data collected during the 2012-2013 academic year and beyond can be used in publications and presentations at professional meetings.