



# Undergraduates in natural history collections: What are the educational gains and how can we make the experience more impactful?

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# CMC Herbarium

<http://cmcherbarium.bio.cmich.edu/>



CMC HERBARIUM  
Central Michigan University

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Welcome to the Central Michigan University Herbarium Website!

The Central Michigan University Herbarium (CMC) strives to integrate research and education, providing centralized botanical resources, research facilities, and educational opportunities to the University and broader scientific community.



This web page is part of an ongoing collaboration between The CMC Herbarium Director and CMU Assistant Professor, Anna Monfils, and CMU Graphic Design Assistant Professor Larry Burditt. This webpage was designed by the students in the Fall 2007 ART 335 Design Bureau.

Herbarium | Biology Department | College of Science & Technology | Central Michigan University

# Students in Natural History Collections



Found a Chara sp. within Fagaceae ..  
I mean,  
WHO on Earth would  
do that?



someecards  
user card



# CMU Herbarium – Student Blog

<http://cmc-herbarium.blogspot.com>

## CMC Herbarium - Central Michigan University

Monday, February 3, 2014

### Collections I've Known



If you are standing in the doorway of the CMC Herbarium, chances are that you could turn around and see me at my desk: headphones on, head bobbing to some tunes. While the connection between the herbarium and music might not be readily apparent, I don't have to make too great of a stretch when linking them in my mind.

For example, I take great pride in the organization of my digital and physical collections. Digitally, there are no "Track 1" or "Unknown Artist" tags to be found in my iTunes. The bitrate of my songs is pretty standardized at a higher quality variable bit rate (VBR) of V0 (which averages about 245 kilobytes per second). I chose this to maximize sound quality while also keeping file sizes down. Digitization of specimens in the herbarium also

### Blog Archive

- ▼ 2014 (3)
  - ▼ February (1)
    - Collections I've Known
  - ▶ January (2)
- ▶ 2013 (21)
- ▶ 2012 (29)

### Contributors

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Clint Pogue, Comparing organization and preservation of digital and physical music collection to curation and digitization of herbarium specimens

# Lessons Learned from Digitization: Student Perspective

<http://www.micob.org/mshi/index.html>



Emilie Jordao and Abigail Hollingsworth

# Questions:

- Who are the students working in collections?
- What impact are these collections-based experiences having on the students' understanding of the nature of science?
- How is collection-based employment and/or research impacting the students' undergraduate experience, and/or future career plans?

CENTRAL MICHIGAN  
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# Student Survey Questions\*

\*IRB approval from the University of Florida (Protocol #2013-U-0656)

- URSSA: Undergraduate Research Student Self-Assessment developed at the University of Colorado at Boulder and funded by the NSF  
[http://www.colorado.edu/eer/research/  
undergradtools.html](http://www.colorado.edu/eer/research/undergradtools.html)
- SURE III: Survey of Undergraduate Research Experiences developed at Grinnell College and funded by the Howard Hughes Medical Institute  
[http://www.grinnell.edu/academics/areas/psychology/  
assessnebts/sure-iii-survey](http://www.grinnell.edu/academics/areas/psychology/assessnebts/sure-iii-survey)

# Curator Survey: General

- 167 responses
  - 85% university or college affiliated
  - 50% from “small collections” (<100,000)
  - 74% do not receive NSF funding
    - 25% unaware of national digitization effort
  - 54% not part of a collection network



# Curator Survey: Students

- 97% incorporate undergraduates
  - >3300 UGs over 5 year period
    - 87% database
    - 72% conduct research
    - 62% field collect

# Curator Thoughts\*

\*66 Responses/ 25 Collection Centered

*“Students are critical to the function of the collection, the mission of our museum, and the high quality of research that we publish.”*



# Curator Thoughts\*

\*66 Responses / 24 Student Learning Centered

*“The students have universally expressed their excitement about working with the collection, gaining recognition skills with the flora involved, and appreciating the importance of the various kinds of information contained in the collection.”*



# Student Survey: Collections

- 258 Responses (76% “Biology” Majors)
  - 54% Herbarium
  - 30% Mammalogy
  - 32% Ornithology
  - 14% Ichthyology
  - 14% Herpetology
  - 13% Invertebrates
  - ~ 11% Paleontology (Invert, plant, vert)

# Student Survey: Capacity

- 78% worked in collections one year or more\*
  - Paid – not work study/work study (~47%)
  - Research – paid/unpaid (~22%)
  - Volunteer (~13%)
  - Course Credit (~10%)

\*average percentage of time spent

# Student Survey: Interactions

Students working in collections spend the majority of their time alone or with other undergraduates\*

- Alone (~36%)
- Fellow undergraduates (~23%)
- Faculty (~13.5%)
- Collections Staff (~12%)
- Post-docs/graduate students (~11%)

\*average percentage of time spent

# Student Survey: What are students doing in collections?

...In short, students are participating in all curatorial tasks.

- >50% Enter data, process specimens, prepare labels, accession, file, organize collections, loan processing
- 49% Research
- 49% Field Collection
- 46% Specimen ID

# Small Collections

Students working in collection are more likely to:

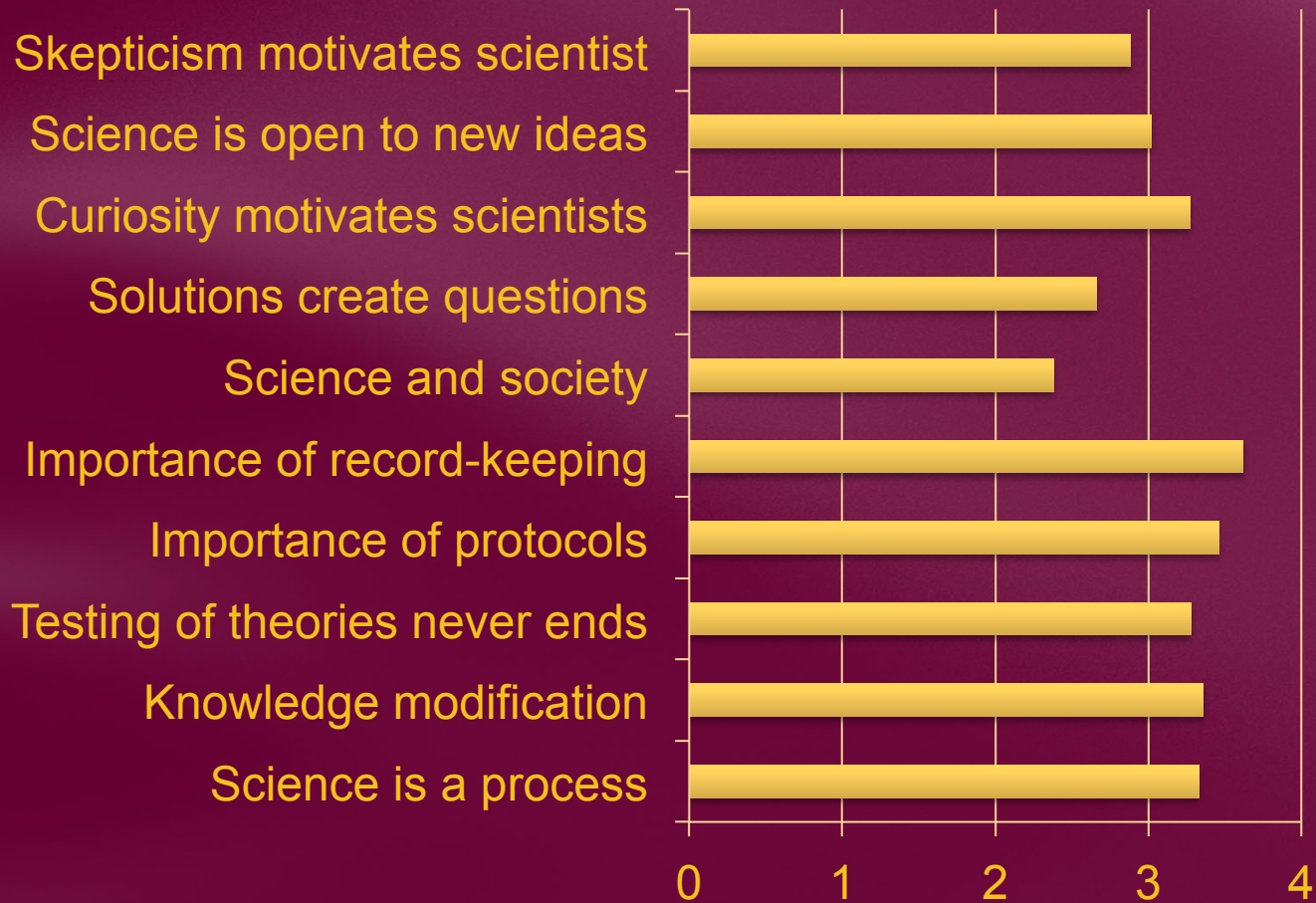
- Work in a greater variety of collection types
- Work with others (not alone)
- Write a manuscript or give a talk



What impact are these collections-based experiences having on the students' understanding of the nature of science?



# Nature of Science



None = 0; Very Little = 1; Some = 2; A Lot = 3; Very Much = 4

Is collection-based employment and/or research impacting the students' undergraduate experience, and/or future career plans?



# Student Survey: Influence on Career and Major

- 68/165 Indicated this influenced their course selection or choice of major
- 64/138 indicate collections experience influenced post-graduate plans
- 47% Intend to pursue graduate work in life, earth or physical science immediately after graduation

# What was most rewarding about working in a Natural History collection?

- Working with researchers

*“Being able to meet some of the most visible people in the field and talk about their interests in not just their work but on other humanizing topics to make it seem more feasible to me that research was a career option.”*

# What was most rewarding about working in a Natural History collection?

- Contributing to science

*“I love working in natural history collections because I feel like I'm making a long-lasting contribution to science and education. “*

# What was most rewarding about working in a Natural History collection?

- Connectivity to science, past and present

*“The connection to all the people who collected plants and contributed in general. Sometimes it felt they were still there with me in the room! “*

*“Being able to use data collected over a hundred years ago in current projects and being able to make that information available to others electronically all over the world. “*

# How would you improve the student experience in natural history collections?

- Exposure to application/context/research opportunities

*“Help stress the history and importance of the work. Many undergrads just come in, skin some voles, label some tubes, and go home without really understanding the history and longevity”*



# How would you improve the student experience in natural history collections?

- Interactions with researchers internal and external to the institution

*“My best experiences came from just talking with researchers in/around/in connection to museums. So talk to your students about your scientific experiences!”*

# How would you improve the student experience in natural history collections?

- Professional development opportunities

*“Involve the undergraduates more in professional development aspects instead of just using them as grunt work.”*

40% of students surveyed had attended a professional meeting;  
30% of students surveyed had no experience communicating science

# How would you improve the student experience in natural history collections?

- Variety of tasks within the collection

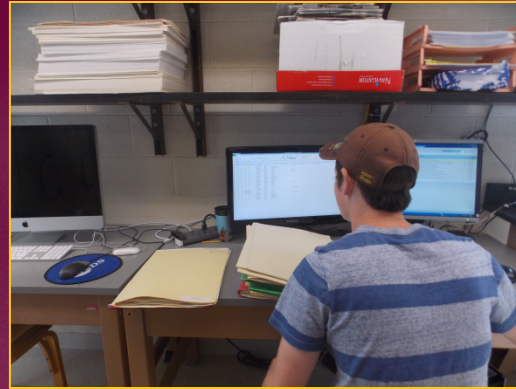
*“One way to improve the undergrad experience would most likely be given through the opportunity to work various steps in the collections process- for example, the opportunity to join while professionals are collecting during field work, participation in grant proposals if possible, perhaps experience how to market and spread word of the collection, and of course participate in the preservation itself. “*

# Conclusion

- Students working in collections are:
  - Performing high order curatorial tasks
  - Critical to curation and digitization
  - Expressing increased understanding of the nature of science
  - Indicating collections based experience is influencing their undergraduate experience, course/major selection and graduate school plans

# Opportunities

- Potential to optimize undergraduate experience by increasing:
  - Exposure to research
  - Interactions with internal/external researchers
  - Professional development opportunities
  - Training in all aspects of collection science



*“If you give people tools and they use their natural ability and their curiosity, they will develop things in ways that will surprise you very much beyond what you might have expected.”*

Bill Gates

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