

# Biodiversity Description Simulation: a Tool to Stimulate Interest in Plant Taxonomy during Class



Rafael Medina. Augustana College (Illinois, USA)

# Plant Blindness in Higher Education

*Editorial*

## The Naturalists Are Dying off

... natural history has earned the pejorative epithet of 'alpha ecology,' and it has often been considered to have little or no potential for generating ideas.

F. C. Evans (1985, *Bulletin of the Ecological Society of America* 66:455–460)

*Journal of Mammalogy*, 86(3):449–456, 2005

## WHAT IT MEANS TO BE A NATURALIST AND THE FUTURE OF NATURAL HISTORY AT AMERICAN UNIVERSITIES

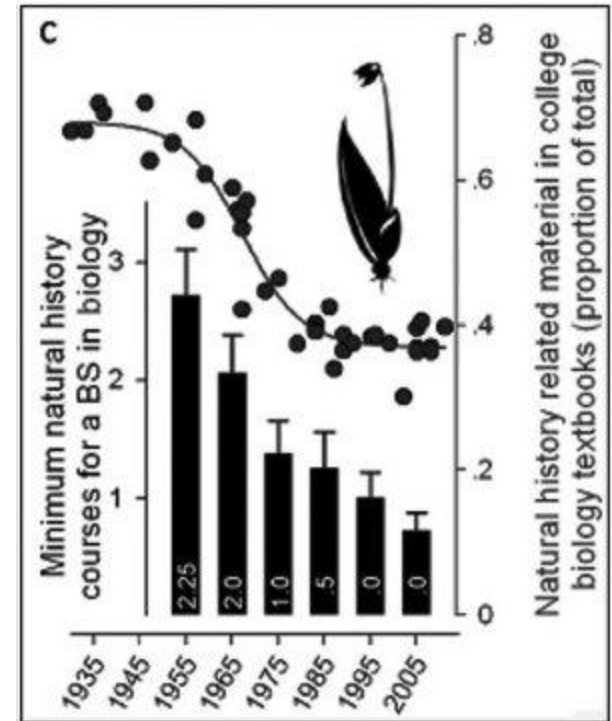
DAVID J. SCHMIDLY\*

*Office of the President and System CEO, 107 Whitehurst, Oklahoma State University, Stillwater, OK 74078-1015, USA*

*Overview Articles*

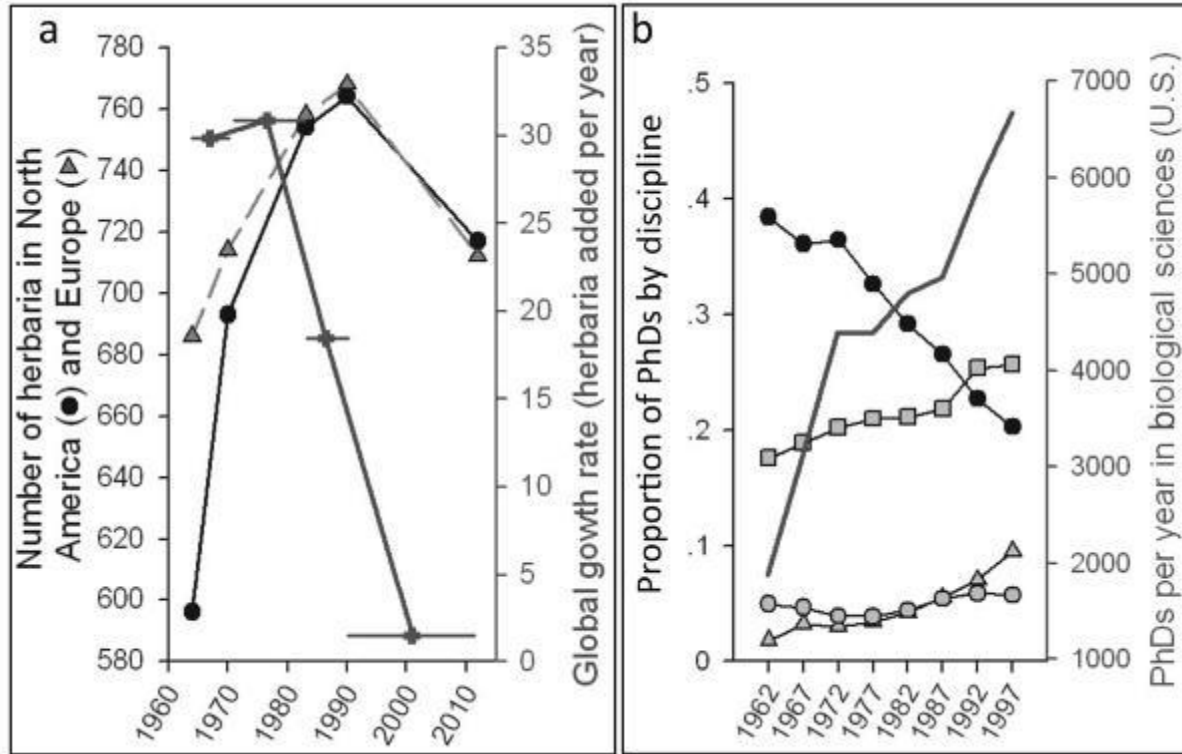
## Natural History's Place in Science and Society

JOSHUA J. TEWKSBURY, JOHN G. T. ANDERSON, JONATHAN D. BAKKER, TIMOTHY J. BILLO, PETER W. DUNWIDDIE, MARTHA J. GROOM, STEPHANIE E. HAMPTON, STEVEN G. HERMAN, DOUGLAS J. LEVEY, NOELLE J. MACHNICKI, CARLOS MARTÍNEZ DEL RIO, MARY E. POWER, KIRSTEN ROWELL, ANNE K. SALOMON, LIAM STACEY, STEPHEN C. TROMBULAK, AND TERRY A. WHEELER



Tewksbury et al. 2014  
*BioScience* 64(4):300-310

# Plant Blindness in Higher Education



Tewksbury et al. 2014 *BioScience* 64(4):300-310

# Plant Blindness in Higher Education

*Essay*

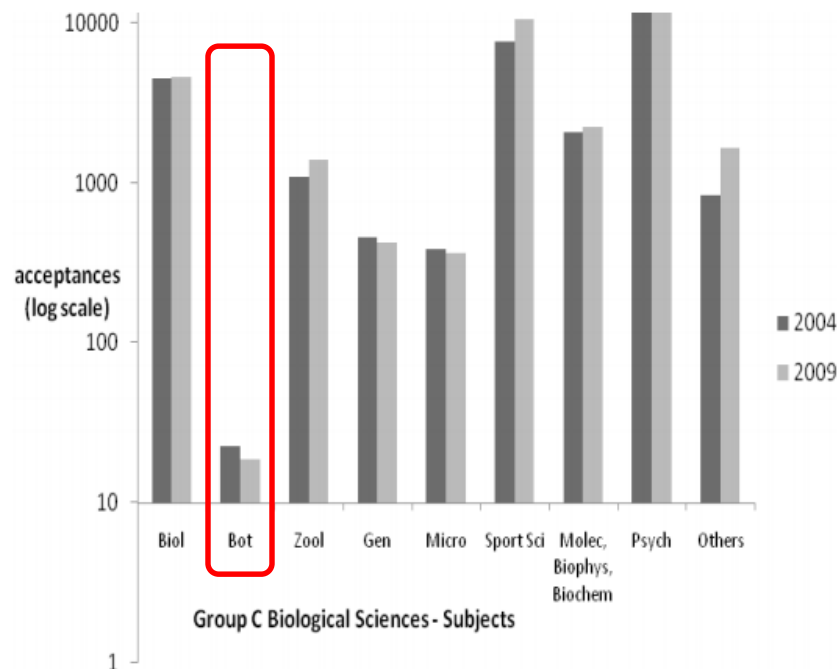
## The End of the Botany Degree in the UK

Sinéad Drea

*Department of Biology, University of Leicester*

*Date received: 23/09/11*

*Date accepted: 21/02/11*



# BIO220: General Botany in Augustana College



Liberal Arts College (4-year degrees)  
About 200 new BIO majors every year

Requirements for Biology majors include General Botany (3 credits + labs)  
The term lasts for 10 weeks, so there is no much time!

# Plant Blindness as a theme for a botany course

Most of the calories consumed by the humankind come from *just 3 plant species*



But ultimately, it's the diversity of plants what supports our lifestyle



(There is no substitute of chocolate, coffee, wine, etc that we can “generate” without plants)

However: lack of engagement with some basic topics  
In particular with taxonomy, nomenclature and why they matter

**More hands-on experience is required!!!!**

**Back in 2005...**

**conference of Cryptogamic Botany (Bilbao)**

2 species described almost simultaneously under different names. The principle of priority had to be applied  
(Students seemed to like this story, for some reason)

**Let's make a game with it!**

Gamification

+

hands-on practice with real plants

+

learning how taxonomy works

# Premise:

there is an undescribed species of tree on campus,  
different teams of botanist will try to “name it first”

Students receive a  
general briefing a  
week in advance.  
They have to sign up  
and choose a role...

**Explorer - Editor - Curator**



**Introduction**  
A rumor is spreading among the scientific community: there is a population of trees in the campus of Augustana College that belongs to a species overlooked by botanists and still undescribed. It won't last much though: following their insatiable thirst for glory and recognition, botanists from several research groups all over the world will try to find the undescribed species and name it before anybody else. The challenge will not be easy: fierce competition, a rigorous peer-review process lead by the most exigent editors of the world and the strict zeal of herbarium curators will be some of the obstacles preceding botanical glory.

(SIGN UP asap below either as an explorer, editor or curator. Remember to name your team)

**There are 6 explorer teams with 4 members each, 4 journals with 4 editors each and a herbarium with 4 curators.** The bottleneck that this situation will generate is intentional.

**Explorers**  
Six teams of four botanists arrive to Augie looking for an undescribed new plant species. The competition will be fierce, but remember the principle of priority: only the first name to be validly published will get the glory. **Each explorer group must bring one laptop to class**

Name of team 1:  
Name of team 2:  
Name of team 3:  
Name of team 4:  
Name of team 5:  
Name of team 6:

**Editorial boards**  
Science is tough. Those botanists out there think they know their job but they don't. They are sloppy, they make mistakes. You belong to the editorial board of one of the most prestigious science journals ever. Your job is to make sure that only excellent research is published. Any mistake in the published papers will diminish the prestige of your publication. **(Each editor must bring one laptop on Friday)**

Name of journal 1:  
Name of journal 2:  
Name of journal 3:



## **Premise:**

Teams are made up of 3-4 students, and there is an intentional bottleneck



AFTER they have signed up, they receive specific instructions for their role only

# Explorers

GOAL: to discover and publish the new species of plant first

1. Find the plant
2. Make sure that the sp. has not been described yet
3. Prepare type specimen
4. Write the manuscript with proper name and description
5. Deposit the type specimen in the herbarium
6. Submit the manuscript

Template of species description for this activity


**Description of a new species of maple in shore of Rock River**

Jennifer Lewis, Yang Chang & Stephen Christensen  
Rock River Biodiversity Institute

*Acer vikingianum* sp. nov. Lewis, Chang & Christensen

HOLOTYPE: USA. Illinois. Rock Island Co. North riverine of Rock River in the Ben Williamson Park. Growing on muddy soil by the river. Collected by Chang on 7/5/2014 F-0003666738

Trees up to 10 meters tall, with dark brown coarse bark. Branches with white lenticels. Leaves opposite, simple, with a long petiole. Blade parted, palmately veined, margins pointy lobed. Upper side of blade bright green. Underside of blade dark green.



Title of the ms. Must be informative

Authors and affiliation (members of the team and name of the team)

Name of the new species. Make sure it belongs to the right genus and it is correctly written. You can come up with the name that you prefer. Add "sp. nov." to clarify that the species is new. Add the authors of the name behind

Type specimen. Include all the details of the label of the specimen, including exact location, collectors and date. You **MUST** obtain a herbarium code number to include here

The description itself. Describe the tree bark and all the details you can about the leaf (simple/compound; petiolate/sessile; phyllotaxy; shape of the blade; venation pattern; margin; any other detail that you find relevant.

Include a couple of pictures you took of the specimen in the "wild"

A template with a proper description is provided

# Editors

GOAL: to create a journal and publish only sound science

1. What makes a scientific journal “good”?
2. Announce your journal
3. Get the authors on board
4. Review manuscripts
5. Reply to authors:  
**Accept- Revision- Rejection**
6. Publish!

Template for editors: make sure you don't miss any of the requirements

YOU will need to add the name of your journal as a headnote only when you send it for publication

*Journal of awesome science*


**Description of a new species of oak in shore of Rock River**

Jennifer Lewis, Yang Chang & Stephen Christensen  
Rock River Biodiversity Institute

*Quercus augustanii* sp. nov. Lewis, Chang & Christensen

HOLOTYPE: USA. Illinois. Rock Island Co. Augustana College campus. Growing at the quad near the Gerber Center. Collected by XXXXX on 10/7/2016  
XXXXXXXXXX

Trees up to 10 meters tall, with dark brown coarse bark. Leaves alternate, simple, with a short petiole. Blade elliptical, pinnately veined, margins lobate. Upper side of blade dark green. Underside of blade whitish.



Check that the title makes sense

All the authors should be here, as well as their institution (team name)

Make sure that the scientific name is in italics and only the genus in high case. The genus must be *Quercus*, the epithet is up to the authors. You should read “sp. nov.” after the name, plus the last names of the authors

Type specimen. Make sure there is enough detail about where, who and when collected the specimen.

Absolutely essential: the type specimen must be associated with an official herbarium code

The description itself. Make sure it contains: info about the tree size and bark; detailed info about the leaves that match the picture: (simple/compound; petiolate/ sessile; phyllotaxy; shape of the blade; venation pattern; margin) and the requirements setup by the instructor during the briefing

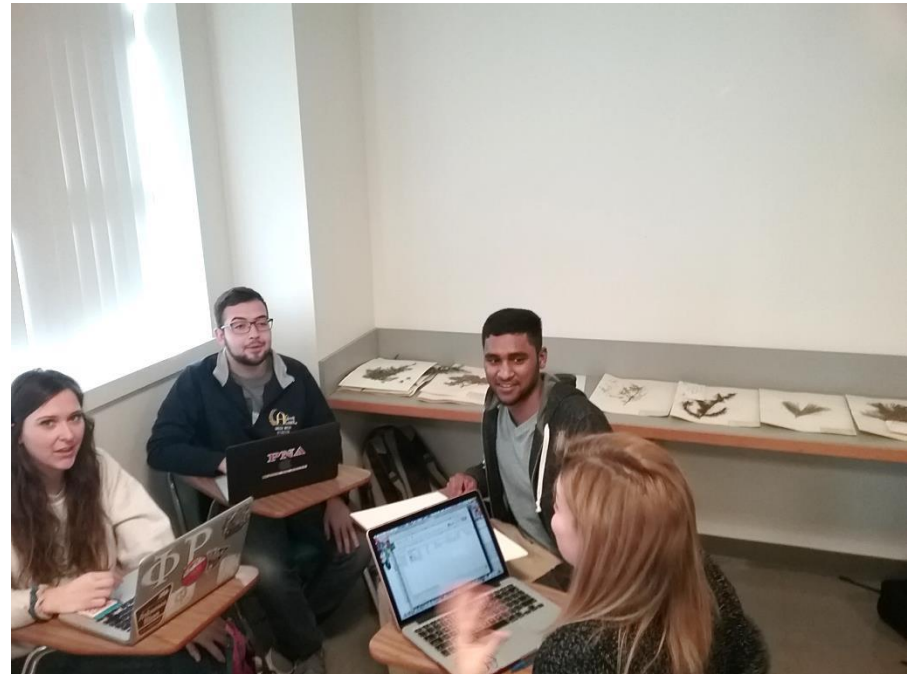
There should be a couple of pictures too

A template with a proper description is provided, with emphasis on typical mistakes and essential parts

# Curators

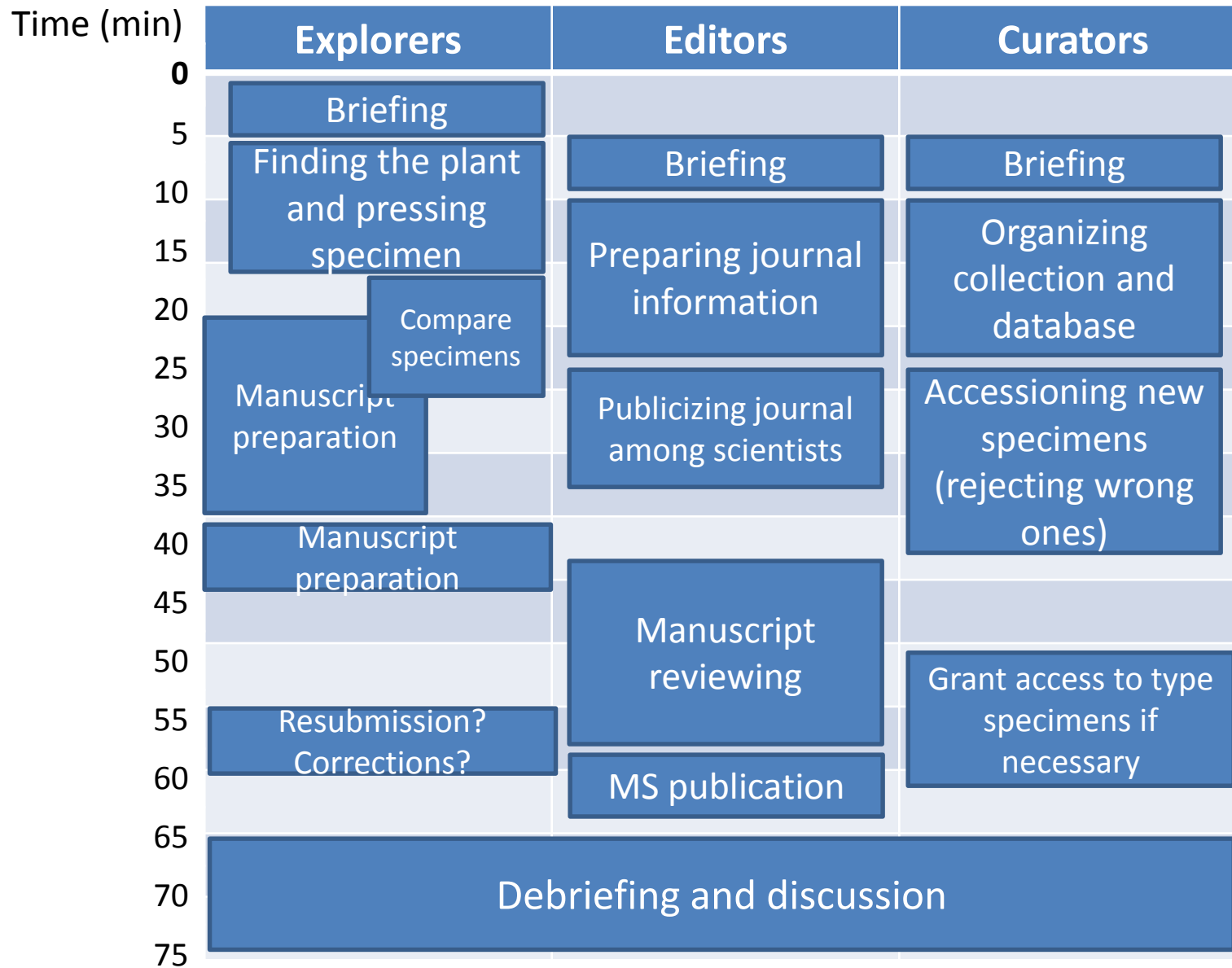
GOAL: to database properly as many specimens as possible AND keep the integrity of the collection

1. Prepare your database
2. Choose an acronym for your herbarium
3. Organize the collection
4. Allow explorers to visit your collection
5. Accession and database incoming specimens (make sure there is no information missing)
6. Guarantee the safety and integrity of the collection




Curators receive a small reference collection from the teaching herbarium (minus the target plant)

# Timeline







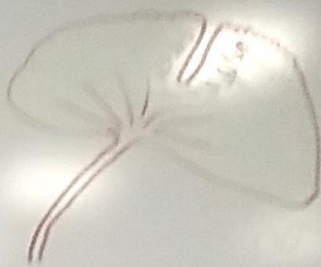
# Plants Weekly

editor in chief:

clintonhoward15@  
augustana.edu



Ginkgo toxin<sup>tm</sup>



-Editorial boards

EIC: colgey.soderman14@wyustata.edu

Go with the  
Ginkgo!



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# The Botanical Archive

- Accredited, peer-review publication
- From Cornell University

kaileypeterson15@augustana.edu

- BSA Merit Award Recipient

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pay you off

# DIARY of a PLANT WHISPERER

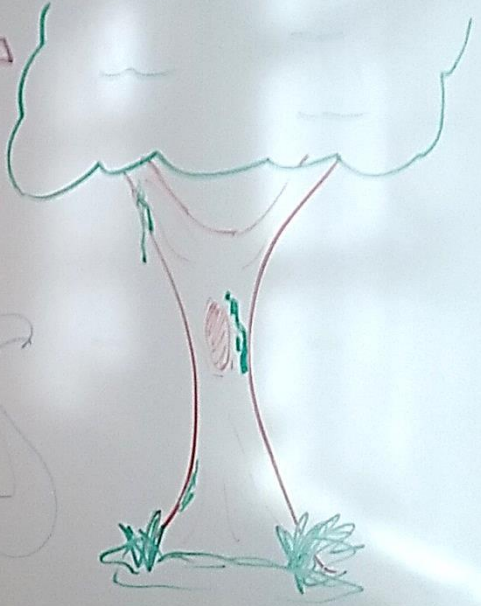
CONTACT: [andrewzimmerman@augustana.edu](mailto:andrewzimmerman@augustana.edu)

"embryo like a bro"

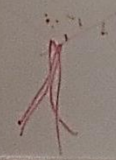
## EDIT

Like a

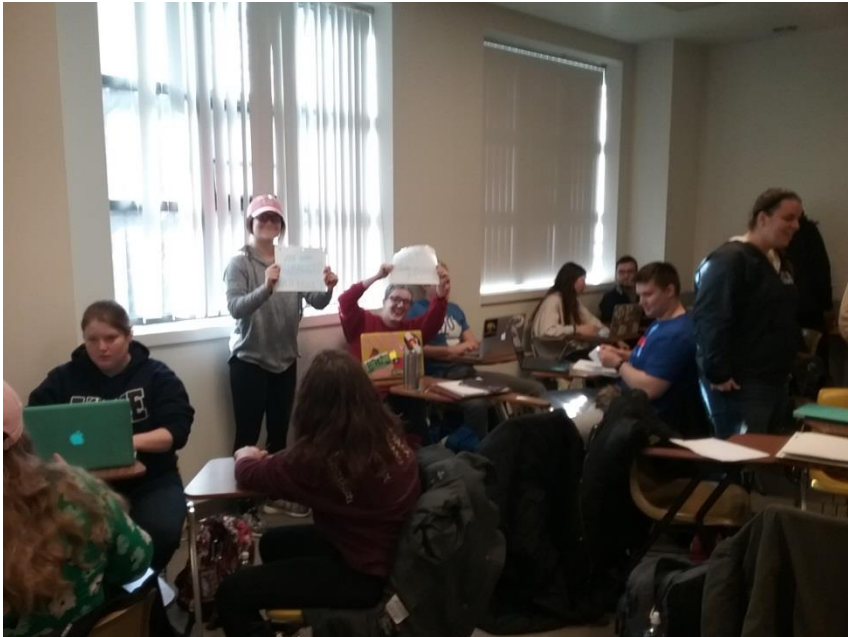
## MOSS



"GAMETOPHYT"  
4  
your right







# Topics of discussion

How similar is this process in real science?

How does the peer-review system work? Why does it exist?

What are the role of herbaria in current botany?

What are the odds of discovering a new species of plant today?

Are actual specimens necessary?

# Perks of the activity

- Scalable to any level of skill or knowledge, place or season
- Can be accomplished in one class/lab session
- (Almost) no extra resources needed
- Brings the opportunity to work with actual plants if there are not enough labs
- ...they seem to like it!

# Recommendations and areas of improvement

- There are several dead times, especially for editors
- Works best with fewer students
- It is crucial that they take seriously the orientations
- The plant needs to be really easy to find
- Some students suggested a multi-session activity would work better

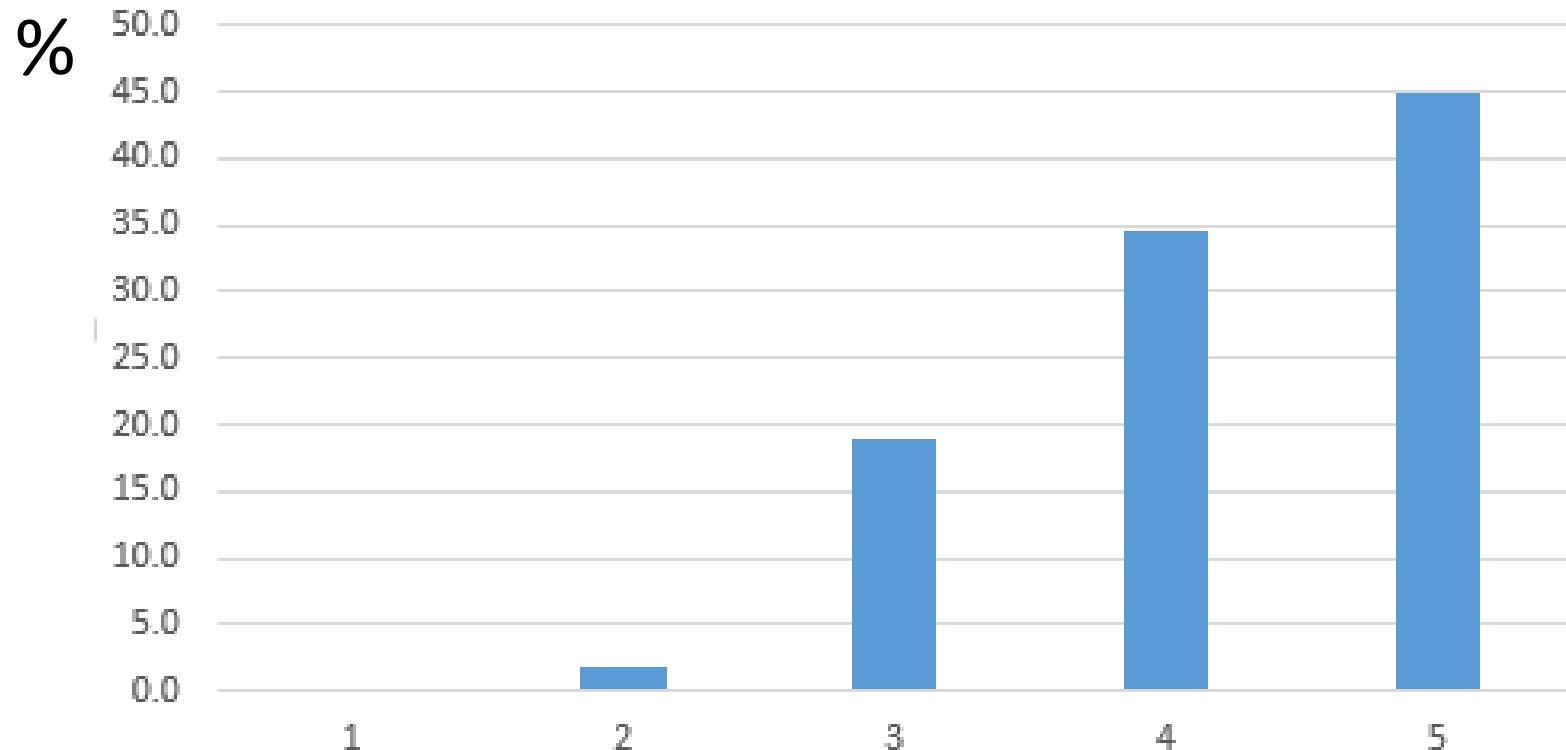
# Feedback

Post activity survey (n=58)

1=completely disagree

5=completely agree

Helped me learn something new





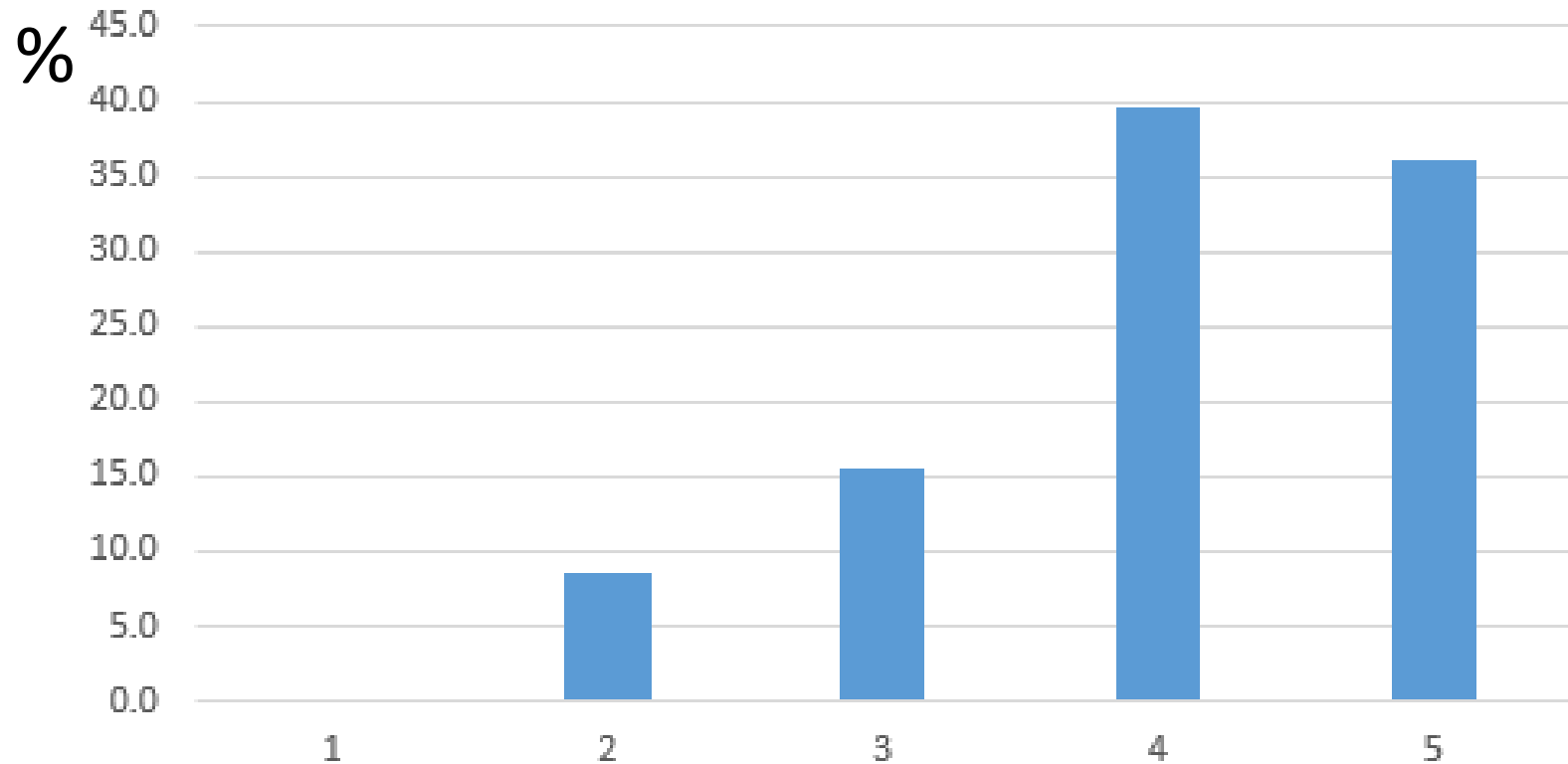
# Feedback

Post activity survey (n=58)

1=completely disagree

5=completely agree

Helped understand something I had learned

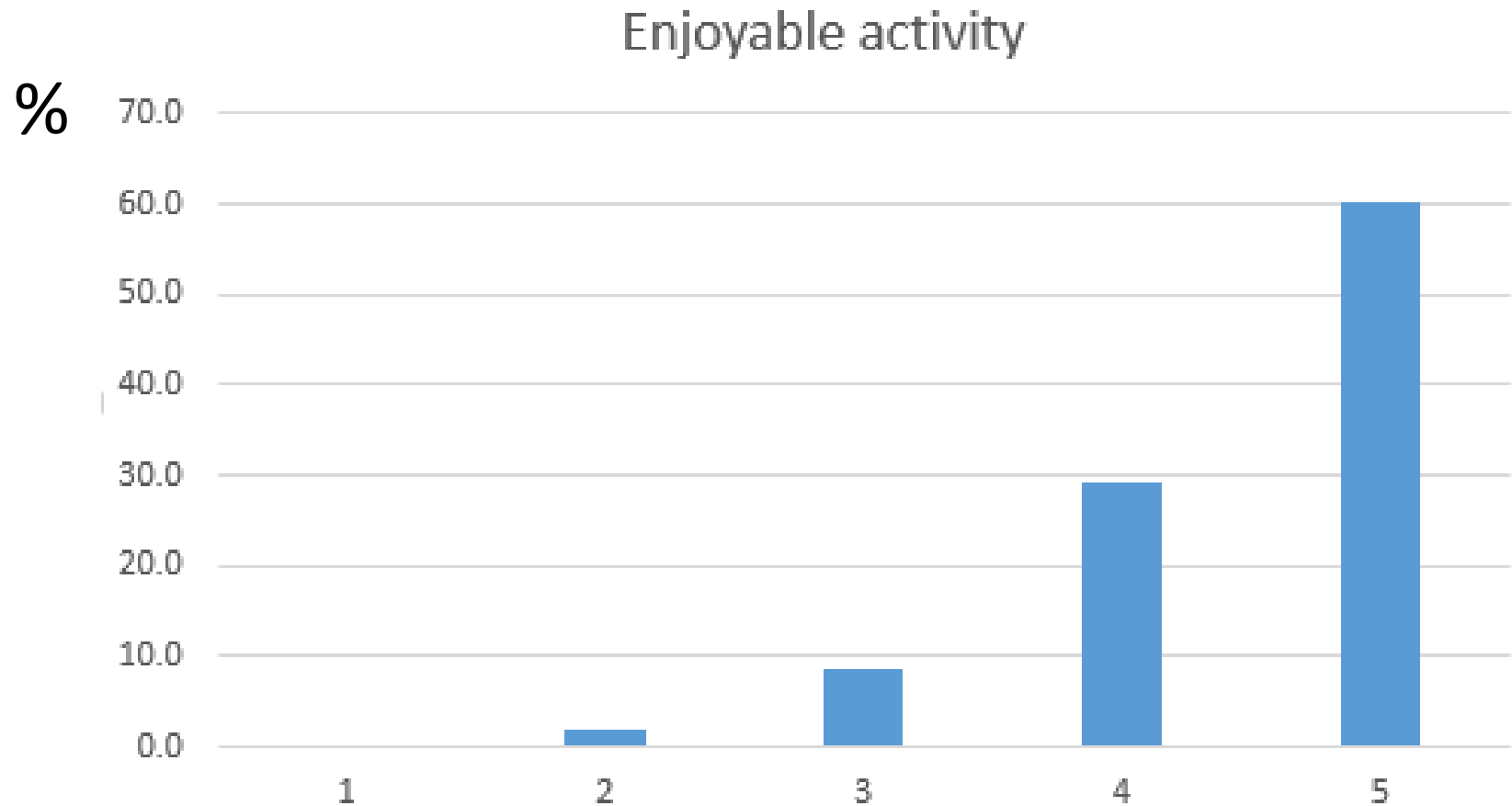


# Feedback

Post activity survey (n=58)

1=completely disagree

5=completely agree



# Feedback (yes, I am cherrypicking now)

The collaboration between the curators and the explorers was very unique. It was like a sales deal between the two

I enjoyed getting out of the classroom and looking at an actual plant

It was fun and it got my heart racing to be competing with the other editors to get published first

What worked best was assigning different groups separate tasks. This made it seem like less of an assignment and more of an activity having different groups interacting

The intensity of trying to be first but also making sure the article was good was great!

# Acknowledgements

- Jason Koontz (Biology) and Mike Egan (Gen Ed)
- all the students from BIOL220 (General Botany)



**IBC 2017**  
XIX International Botanical Congress  
Shenzhen China

