

BEACON BUZZ

BI-MONTHLY NEWSLETTER

MAY 2014

BEACON'S EDUCATION DIRECTOR WINS AT&T FACULTY AWARD AT MSU

Dr. Louise Mead won the 2014 AT&T Faculty Award for Best Technology-Enhanced Course at Michigan State University for her leadership in BEACON's Evolutionary Biology for Non-Life Scientists. Emily Weigel and Caroline Turner served as Dr. Mead's co-instructors during the Fall 2013 course, and deserve equal recognition for this achievement. The award recognizes and encourages best practices in the use of technology and enhanced teaching and learning.

During the course, computer science and engineering students were asked to compose blog posts as their homework assignment. Once submitted, the posts were then peer-reviewed by three of their classmates. While this is common practice for graduate courses,



BEACON's Evolutionary Biology for Non-Life Scientists instructors in the Fall of 2013: Dr. Louise Mead, Emily Weigel and Caroline Turner.



Tag Archives: [Evolution 101](#)

Evolution 101: Group Selection

Posted on January 22, 2014 by Danielle Whittaker

This week's Evolution 101 post is by MSU graduate student Thomas LaBar. Many organisms live and interact within groups. Beehives, wolf packs, and bird flocks are just a few of the groups that exist in the natural world. Humans also ... [Continue reading →](#)

Posted in [Evolution 101](#) | Tagged [abulbas](#), [animal behavior](#), [Evolution 101](#), [group selection](#), [kin selection](#) | Comments Off

Evolution 101: Digital Evolution

Posted on January 13, 2014 by Danielle Whittaker

This Evolution 101 post is by MSU graduate student Armand Burks. W process of evolution in living organisms, two of the key limiting factors amount of data available. In practice, it ... [Continue reading →](#)

Posted in [Evolution 101](#) | Tagged [avulbas](#), [evulbas](#), [Digital Evolution](#), [Evolution 101](#) | Comments Off



Evolution 101: Beauty is in the Genes of the Beholder

Posted on January 8, 2014 by Danielle Whittaker

This Evolution 101 post is by MSU graduate student Anselmo Pontes. What do you think when you see a woman painfully balancing on sky-high heels? How about when you overhear the lame

the ante was raised when the quality posts were scheduled to be featured on BEACON's weekly blog as Evolution 101 features.

In order to be published, the writers had to make their communication clear enough for consumption by the general public. Three graduate students earned the honor: Anselmo Pontes authored "Beauty is in the Genes of the Beholder," Armand Burks explained "Digital Evolution," and Thomas LaBar explained "Group Selection."

Visit <http://beacon-center.org/blog/tag/evolution-101/> (or scan the QR code to the left) to read these, and many other, excellent introductions to evolutionary biology! Also, if you are brave enough to try your hand at writing a post contact Danielle Whittaker via djwhitta@msu.edu.

BEACONITES ON THE ROAD

The Darwin Day Roadshow

Each year members of NESCent (The National Evolutionary Synthesis Center) team up with scientists around the country to show communities different faces behind evolutionary biology through The Darwin Day Roadshow.

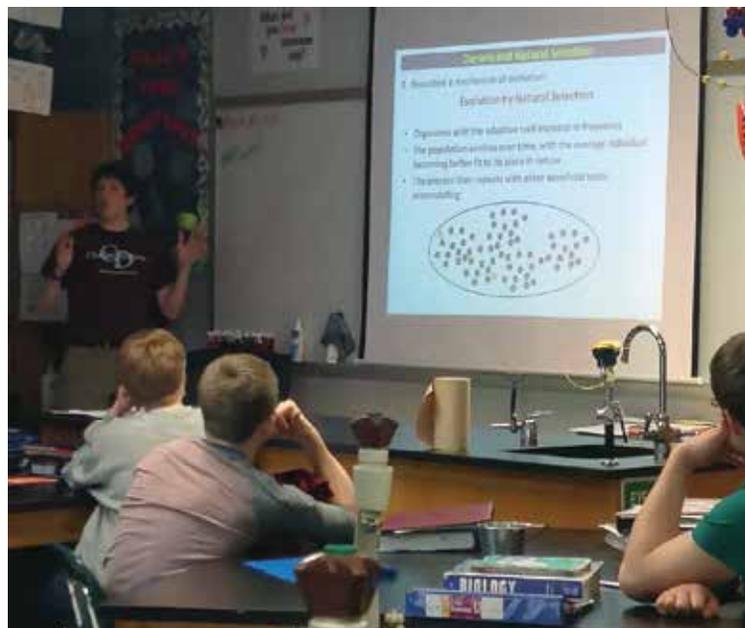
The team shares their excitement about evolution while explaining the fundamental principles and why it is important. Each participating scientist talks about not only their personal research, but also the path they took in their career.

For the first time, the BEACON Center for the Study of Evolution in Action sent five members from MSU to speak to schools around Michigan. Education Director Dr. Louise Mead, Managing Director Dr. Danielle Whittaker, Dr. Zachary Blount, Jason Bundy, and Anya Johnson took to the road to share their perspectives with three different school communities.

For many of the students at Akron-Fairgrove High, Hesperia High and Mason County Eastern High schools, this was their first exposure to evolution in Action. Some had heard about evolution in their biology classes, or would soon be studying the topic, but the idea of studying evolution in a digital environment, and applying evolutionary processes to solve engineering problems, was an exciting new area.

In addition to learning about Whittaker's research on birds or Blount's work with *E. coli*, the students also learned about evolution in action in the digital and engineering realms with Avida and BoxCar2D.

The inflow of information was certainly overwhelming, but a seed of interest was planted, and students asked great questions – every-



Dr. Zachary Blount explains how wells contain individual populations *E. coli* prospering or perishing under different levels of a red-orange colored antibiotic.

(Credit: S Hammarlund/U of Washington)

thing from “do birds have personalities?” to “how does God fit in with evolution?”

The BEACON team also learned from the experience and had a great time communicating their passion for science.

2014 BEACON CONGRESS IS COMING!

Mark your calendars! The 2014 BEACON Congress will be held August 16-19 at Michigan State University.

For our new BEACONites, the Congress always features “Sandbox Sessions” to encourage collaboration between on topics in evolutionary science. These events never fail to excite, so come prepared to contribute to the community. BEACONites also contribute workshops on topics ranging from how to use analytical software to how to give better presentations. The Congress features more traditional research talks as well.

Like the last two years, we will start with a grad student/postdoc retreat day on Saturday, August 16, and will have our regular sessions Sunday, August 17 through Tuesday, August 19.

This his is an exellecent way to show off your scientific discoveries,



network with BEACON, brainstorm, and share best practices that make our center the success it is.

LARGEST SOIL DATASET SEQUENCED BY BEACON TEAM AT MSU

Team asks for: "More Data, Please!"

After four years of diligence, the GED (Genomics, Evolution and Development) lab's flagship toolkit, khmer, has enabled the assembly of a soil metagenomic dataset consisting of 398 billion bp.

The paper documenting their approaches, "Tackling soil diversity with the assembly of large, complex metagenomes" (A. Howe, et al), has been selected for publication in *Proceedings of the National Academy of Sciences*.

The dataset was part of the Great Prairie Grand Challenge that started with a mere 500m reads and was increased by 2 billion reads as sequencing technology improved. Among the challenges Dr. Adina Howe faced were large computational requirements and the need for a scalable solution. Assembling the first set of reads led to the development of a probabilistic de Bruijn graph, which in turn lead to a 40-fold decrease in RAM usage.

As Dr. C. Titus Brown noted on his blog, the team's announcement that they successfully assembled the first set of reads was immediately met with introduction of a



Dr. C. Titus Brown, Dr. Adina Howe, and Dr. James Tiedje capped off five years of intense work with a publication on the assembly of metagenomic dataset in *Proceedings of the National Academy of Sciences*.

larger data set. Assembling the additional reads required rethinking their approach so it would easily scale. The result was dignormalization, the process of selecting a subset of reads to represent all the information that's in your sample, even those with low abundance.

Along the way, Dr. Howe spent a great deal of time benchmarking the different approaches featured in the article. She was able to determine that 80% of the data could not be assembled, and that as much as 10x more data were needed to fully characterize the soil microbiome.

Dr. Brown provides his take on the entire journey on his blog, <http://ivory.idyll.org/blog/2014-assembling-soil.html> or simply scan the QR code to the left. The blog links to all press releases as well as Dr. Howe's own blog post.

Living in an Ivory Basement

Stochastic thoughts on science, testing, and programming.

misc personal python science teaching testing

The Story Behind "Tackling soil diversity with the assembly of large, complex metagenomes"

I'm pleased to announce the publication of "Tackling soil diversity with the assembly of large, complex metagenomes", by Adina Howe, Janet Jansson, Stephanie Mallatt, Susannah Tringe, James Tiedje, and myself. The paper is openly available on the PNAS Web site ([here](#), [open access](#)).

Mon 10 March 2014

By C. Titus Brown

In Science

Tags: assembly @genomic partitioning

External links:

- [Joint Genome Institute press release](#)
- [GenomeWeb article](#)
- [MSU press release](#)

This paper is a milestone for me personally, because it's one of the two projects that drove my first Ph.D. research. This is the project that led us to develop [scalable sh-mer counting](#) with [the khmer toolkit](#); [a compressible De Bruijn graph and partitioning](#); and ultimately led to [digital normalization](#).

The story starts way back in ~2009, when Adina Howe arrived in my lab. She had applied for an NSF post fellowship in bioinformatics to work between [Jim Taylor](#) and me. Adina endearingly refers to me as his advisor. Over the first few weeks of her time in our lab, we decided that we would bring Adina at the [Grand Challenge](#), an effort to apply the newly available Illumina sequencing technology to the character I had some previous experience with metagenomics [from my school](#), and somewhat to my surprise for



SHARE YOUR PASSION FOR RESEARCH!

Register to Present a Summer Seminar.

We have several openings available for Friday BEACON seminars over the summer. All BEACONites are encouraged to give presentations on their research or education projects, whether it's a finished product or a work in progress!

This is an excellent opportunity improve your presentation

skills in a familiar environment. As a bonus, if your topic is still a work in progress you get unbiased feedback to incorporate into your project before seeking publication.

Contact Danielle Whittaker (djwhitta@msu.edu) if you'd like to schedule a seminar.

CONGRATULATIONS, BEACONITES!

Celebrating recent efforts around BEACON

Awards:

Rayna Harris and Hans Hofmann won the Best Poster Award in the Division of Neurobiology Sponsor at SICB 2014.

Cory Kohn was presented the Tracy A. Hammer Award for Professional Development from the MSU Graduate School.

Kenna Lehmann received the EEBB Summer Fellowship Award and the MSU Zoology Shaver Award.

Leigh Sheneman received the BEACON Science Communication Fellowship for Spring and Summer.

Gwendolyn M Stovall was honored with the College of Natural Sciences Teaching Excellence Award.

Chris Waters was named the 2014 Undergraduate Research Faculty Mentor of the Year.

Outreach activities:

Zachary Blount, Sarah Gibbons, Kate Fedewa, and Holcomb Brian presented “Science, Fiction and the Real Monsters of Our Imagination” at the MSU Science Festival. It explored the link between fiction, creativity, and science through an exploration of the inspirations for monsters in folklore and popular culture. The centerpiece of the event was a demonstration of a synthetic epidemic.

Randal Olson and Bjørn Østman created a video to show how fitness landscapes can be used to visualize evolution in action. This video was submitted to the ALife 2014 Science Visualization Competition and publicly released on YouTube (<http://youtu.be/4pdiAneMMhU>).

Caroline Turner served as the Michigan Science Olympiad Water Quality Event Supervisor for Science Olympiad in Michigan.

Emily Weigel, Michael Wiser, and Anya Elaine Johnson presented the principles of evolution using LEGO car design and directed families to BoxCar2D to use at home at Marble Elementary Science Night.

Conference Posters:

Ellyse Cipolla, Emily Weigel, and Jenny Boughman presented a poster at the Midwest Ecology and Evolution Conference (MEEC).

Savannah Foster, Emily Weigel, and Jenny Boughman also had a poster at the Midwest Ecology and Evolution Conference (MEEC). The same poster also appeared at University Undergraduate Research and Arts Forum.

Dr. Aditi Gupta presented a poster at the Keystone Symposium on HIV Pathogenesis.

CURIOUS ABOUT SUBMITTING CONTENT?



New to BEACON? Veteran BEACONite? Here's how to submit possible content to the newsletter:

1. Do what you're already doing: Log into the BEACON Intranet (accessible through the BEACON site: <http://beacon-center.org>, at the “For Current Members” tab.) Then go to the “Outputs and Activities” tab at the top banner, and fill in information

about your papers published, grants received, etc. New entries will be flagged automatically.

2. Tweet about it. Tweet about what you'd like to cover as it happens to @BEACON_Center with the hashtag #news. We'll see it, and so will others!

3. Email content directly. Please email leighs@msu.edu if you've got content you'd like to highlight that doesn't fit into the website categories.