

Anna Furches

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Work Experience

ASTRO Postmaster's Intern in Genetic Engineering: Oak Ridge National Laboratory (April 2015 – Present)

I engineer metabolic pathways in *Pseudomonas putida* for biofuel and bioplastic production from lignin. This involves deletion of existing metabolic pathways and insertion and optimization of exogenous pathways using genetic tools in order to produce valuable hydrocarbons.

Scientific Consultant: Assured Bio Labs, LLC (April 2015 – Present)

I work on various projects as an independent consultant, including ecological data analysis.

Interim Lab Manager: Assured Bio Labs, LLC (November 2014 – April 2015)

I developed and revised protocols for microbiology and chemistry methods; generated, reviewed, and edited analysis reports; oversaw daily operations; held weekly lab meetings and professional development workshops for employees; served as an advocate for employees (including negotiation of benefits/HR); performed cost analyses; ordered supplies; processed customer billing and payments; and delivered and interpreted analysis results to clients.

Quality Assurance Manager: Assured Bio Labs, LLC (November 2014 – April 2015)

I supervised accreditation compliance, monitored quality of analyses and reagents, monitored equipment maintenance and calibration, and oversaw employee training.

Lead Scientist: Assured Bio Labs, LLC (May 2014 – April 2015)

I designed a qPCR assay for a fungal species, coordinated and performed field work to collect environmental samples for a client project, coordinated and performed analyses of field samples (culture, Sanger sequencing, qPCR), reported results, designed/wrote explanations of methods for clients, trained employees in sequencing and qPCR techniques, trained employees on developing experimental designs, developed field sample collection devices for rainwater, developed lab protocols, and improved existing protocols.

Phylogenetic Consultant: Assured Bio Labs, LLC (April 2014 - May 2014)

I analyzed literature regarding the taxonomic classification of a fungal species and wrote a critique of the phylogenetic methods utilized for classification.

Education

Master of Science, Ecology & Evolutionary Biology - University of Tennessee (Spring 2013)

Thesis Title: "Genetic variation and dispersal in *Penstemon hirsutus* and *P. tenuiflorus*."
(Available: http://trace.tennessee.edu/utk_gradthes/1592/)

Bachelor of Science, Plant Biology (Spanish minor) – University of Tennessee (Fall 2007)

Research Projects:

Optimal concentrations of mineral salts in growth medium for *Ceratopteris richardii*.
Review of plant reproductive pathogens.

Additional Research Experience

Research Collaborator: Lincoln Memorial University (May 2014 - Present)

Projects include a flora of LMU campus and an assessment of genetic diversity in freshwater sponges.

M.S. Thesis Research Project, University of Tennessee (2008 - 2013)

I investigated pollination biology, population genetics, and dispersal in native plant populations. I collected ~250 samples from 28 populations of ten *Penstemon* (Plantaginaceae) species. I utilized a nuclear gene, a chloroplast intergenic spacer and eight microsatellite markers to collect genetic data. I used command line and GUI programs to perform phylogenetic, population genetic and geographic analyses on desktop computers and high performance computing clusters.

Research Collaborator: Dr. M. Steven Furches, University of Tennessee (Summer 2009, Summer 2010)

I collected tissue samples in the field from six *Sarracenia* species for genetic analyses. I performed troubleshooting of molecular protocols and phylogenetic analyses.

Field Assistant: Dr. Mackenzie Taylor, University of Tennessee (November 2009)

I performed pollination biology experiments and collected samples from an aquatic basal angiosperm species (*Trithuria*) in Western Australia. This entailed tagging and caging individual plants, collection of fertilized ovules, and collection of whole plant specimens.

Field Assistant: Herbarium of The University of Tennessee (July 2009)

I identified, collected, and preserved plant specimens throughout Colorado, Kansas, Missouri, Nebraska, Oklahoma, South Dakota, and Utah.

Lab Technician: Dr. Karen Hughes, University of Tennessee (2008)

I performed genetic barcoding of fungal specimens using the ribosomal internal transcribed spacer *18S* for the All Taxa Biodiversity Inventory project of the Great Smoky Mountains National Park.

Lab Technician: Dr. Joseph Williams, University of Tennessee (2007 – 2008)

I developed lab protocols, including methods for germinating cycad (*Zamia*) pollen on growth medium, calculating ovule to pollen grain ratios in basal angiosperm species, and inducing modified root growth in *Arabidopsis* seedlings. In addition, I collected data for research on the evolution of pollination biology in basal angiosperm species. This entailed microscopy and digital image analysis of plant tissue samples in order to measure pollen tube pathway length and other variables.

Lab Technician and Field Assistant: Dr. Mackenzie Taylor, University of Tennessee (Summer 2007)

In the field, I performed pollination biology experiments and collected plant tissue samples from aquatic plant species (*Brasenia*, *Cabomba* and *Nymphaea*) at several sites in Tennessee and Alabama. This included tagging and caging individual plants, hand-pollination, and collection of fertilized ovules. In the lab, I preserved and processed field-collected materials, maintained seed cultures, and gathered morphological data.

Lab Technician: Dr. Leslie Hickock, University of Tennessee (2004 – 2007)

I conducted research on the model plant *Ceratopteris richardii* ("C-fern"). This work involved inducing mutations and screening for phenotypes that could be used for educational purposes. I also developed alternative forms of C-fern growth media, maintained plant cultures, and harvested and processed spores. In addition, I maintained cultures of parasitic wasps.

Teaching Experience

Graduate Teaching Assistant: Division of Biology, University of Tennessee (2008 - 2012)

Courses: Genetics Laboratory – 5 semesters
Biodiversity Laboratory – 1 semester
Botany I Laboratory – 1 semester
Botany II Laboratory – 1 semester

Additional Work Experience

Bookkeeper: Spring City Resort & Marina (2007 – 2008)

I set-up an electronic invoicing system and performed monthly billing of customers for boat slip rentals and other services.

Business Manager: Center for Economic Development and Resource Stewardship (CEDARS) (2004 – 2007)

I assisted in obtaining 501(c)3 non-profit status, designed the company logo, and performed accounting duties such as the creation of invoices, payment of contract workers, and filing of taxes.

Bookkeeper: English Department, University of Tennessee (2004 – 2007)

I reimbursed employee travel and moving expenses, and served as the administrative assistant for several scholarly journals including *Restoration: Studies in English Literature and Culture. 1660 – 1700* and *The Journal of Second Language Writing*.

Abstracts & Presentations

Becker, Anna K. and Randall L. Small. 2009. "Preliminary population genetics of *Penstemon tenuiflorus* and *P. hirsutus*." Association of Southeastern Biologists Conference: April 2009, Birmingham, AL.

Becker, Anna K. and Randall L. Small. 2009. "Preliminary population genetics of *Penstemon tenuiflorus* and *P. hirsutus*." Botany & Mycology 2009 (Botanical Society of America Annual Meeting): July 2009, Snowbird, UT.

Becker, Anna K. and Randall L. Small. 2010. "Population genetics of *Penstemon tenuiflorus* and *P. hirsutus*." Association of Southeastern Biologists Conference: April 2010, Asheville, NC.

Becker, Anna K. and Randall L. Small. 2010. "Population genetics of *Penstemon tenuiflorus* and *P. hirsutus*." Botanical Society of America Annual Meeting: July 2010, Providence, RI.

Grants & Awards

Web of Knowledge Ideation Challenge, \$1000 – Thomson Reuters (April 2013)

Innovative concepts regarding new ways users can interact with content and tools in Web of Knowledge. My proposal has since been implemented as WoS Citation Mapper.

<http://sciencewatch.com/articles/thomson-reuters-web-knowledge-ideation-challenge-winners-qa>

Graduate Research Assistantship, \$3600 – Office of Research, University of Tennessee (Summer 2010)

Graduate Student Summer Research Funding, \$1100 – Ecology & Evolutionary Biology, University of Tennessee (Summer 2010)

Travel Funds, \$300 - Ecology & Evolutionary Biology, University of Tennessee (April 2010)

Graduate Student Support Award, \$236 – Association of Southeastern Biologists (April 2010)

Travel Funds, \$100 - College of Arts & Sciences, University of Tennessee (April 2010)

Hesler Fund Travel Award, \$700 - Herbarium, University of Tennessee (July 2009)

Graduate Student Summer Research Funding, \$500 – Ecology & Evolutionary Biology, University of Tennessee (Summer 2009)

Travel Funds, \$200 - Ecology & Evolutionary Biology, University of Tennessee (April 2009)

Spring Travel Award, \$125 – Graduate Researchers in Ecology, Behavior and Evolution, University of Tennessee (April 2009)

Travel Funds, \$100 - College of Arts & Sciences, University of Tennessee (April 2009)

Publications

Furches, A. and M.S. Furches. Phylogenetic and population genetic patterns in *Penstemon* reflect varying roles of pollinator-driven selection in morphological divergence. (In Preparation)

Furches, M.S. and **A. Furches**. Nuclear and chloroplast genomes reveal contrasting patterns of diversity in North American Pitcher Plants. (In Preparation)

Furches, M.S., R.L. Small and **A. Furches**. 2013. Genetic diversity in three endangered pitcher plant species (*Sarracenia*) is dramatically lower than widespread congeners. *American Journal of Botany* 100 (10): 2092-2101.

Furches, M.S., R.L. Small and **A. Furches**. 2013. Hybridization leads to interspecific gene flow in *Sarracenia*. *American Journal of Botany* 100 (10): 2085-2091.

Becker, A.K. 2013. Genetic variation and dispersal in *Penstemon hirsutus* and *P. tenuiflorus*. Master's Thesis, University of Tennessee. (Available: http://trace.tennessee.edu/utk_gradthes/1592)

Von Arnim, A., C. Boake, R. Ganguly, M.A. Handel, L. Hickok, K. Hughes, B. McKee, S. Madison and **A. Becker**. 2010. Biology 240 Lab Manual. R. Patterson, ed. Version: Fall 2010. The University of Knoxville: Knoxville, TN.

Von Arnim, A., C. Boake, R. Ganguly, M.A. Handel, L. Hickok, K. Hughes, B. McKee, S. Madison and **A. Becker**. 2011. Biology 240 Lab Manual. R. Patterson, ed. Version: Spring 2011. The University of Knoxville: Knoxville, TN

Reviews

Fedukovich, C. and M. Keene. A Practical Guide to Writing Dissertations and Publications in STEM. (In Preparation)

Software: Genome Compiler. Genome Compiler Corporation, Los Altos, CA (<http://www.genomecompiler.com/>). A quote from my review was featured in the August 2015 newsletter (not my spelling error, however): <https://s3.amazonaws.com/gccnewsletter/12082015/NewsletterHTML.inlined.html>

Professional Affiliations

American Society of Plant Taxonomists (2010 -)

Southern Appalachian Botanical Society (2010 -)

Association of Southeastern Biologists (2009 -)

Graduate Researchers in Ecology, Behavior and Evolution (2008 - 2013)

Darwin Day at the University of Tennessee (2008 -2013)

Botanical Society of America (2007 -)

-- Women in Science (2009 -)

-- Planting Science (2008 -)

Service & Outreach

Representative: Darwin Days at UT, Information Booth (February 2010)

Mentor: Student Science Research Projects, BSA PlantingScience Program (Spring 2010)

Mentor: Student Science Research Projects, BSA PlantingScience Program (Fall 2009)

Invited Speaker: Mary Blount Elementary 3rd Grade, "Plant Adaptations" (Sept. 24, 2009)

Tutor: Thornton Athletics Education Center (2007 – 2008)

Note-taker for students with disabilities: Thornton Athletics Education Center (2007–2008)