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Cross-training biologists in technology

CEWiT and NCGAS work together to bring women and biology to tech fields.

There is no question that **tech needs more diversity**. Currently only a quarter of **employed computer scientists and computer science students** are female. Innovation is driven by diversity, and technical innovation is in high demand – especially in biological fields.

We face an urgent need to scale agriculture and solve problems in personalized medicine, climate change, and environmental remediation. Cross-training biologists in technology helps address this need for biological innovation in technical fields, while at the same time introducing diversity by drawing on the female majority in biological fields.

A synergistic relationship between biology and tech may also help alleviate problems facing biologists today, such as limited funding in academic biology and a **high attrition rate among female biologists**.

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**National Center for
Genome Analysis
Support (NCGAS)**

Such a synergistic relationship has come from a recent collaboration between the National Center for Genome Analysis Support (NCGAS) and the Center for Excellence for Women and Technology (CEWiT).

Center of
Excellence for
Women in
Technology
(CEWiT)

Indiana University

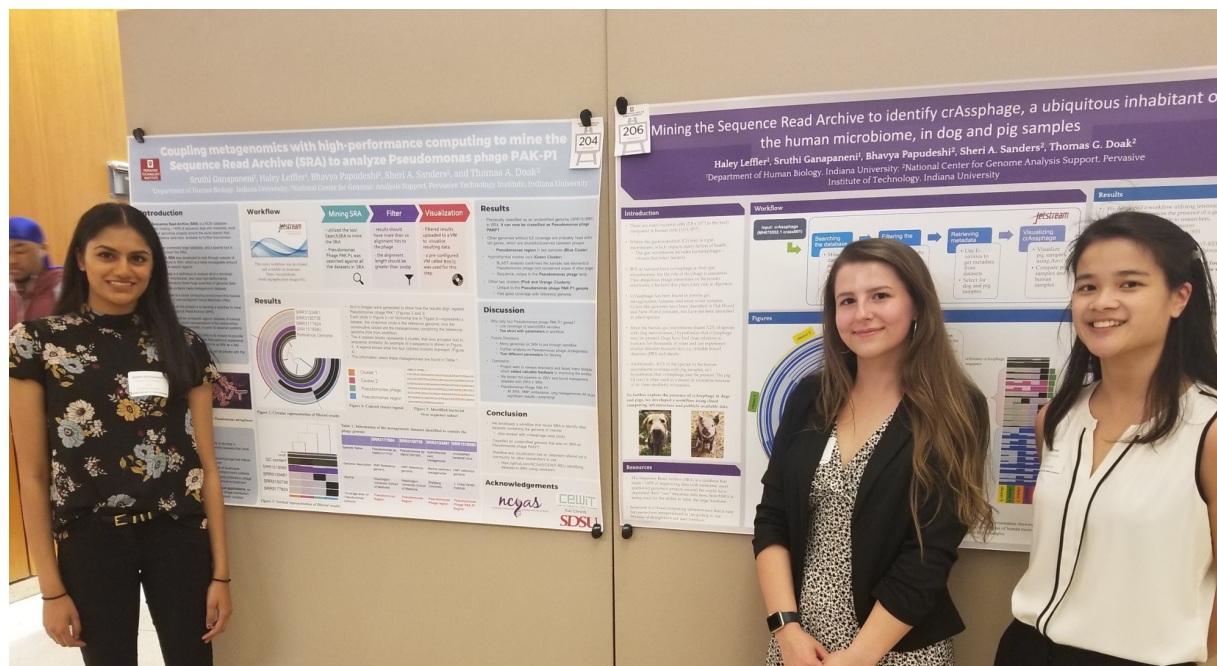
Jetstream

Biology

Genomics

Diversity

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NCGAS is a leader in cross-training biologists in technology, helping them work with high-throughput computing and deal with growing data demands in biology. NCGAS staff helps biologists leverage the problem-solving skills inherent to scientific training in order to approach computational

problems outside of their formal training, with significant success.

Less domain specific, CEWiT focuses on decreasing the gender gap in technology and technology-adjacent jobs, with the expressed mission to empower, encourage, and advance women through mentoring, technical skills training, and promotion of accomplishments.

Dovetailing CEWIT's mission of helping women build technical skills with NCGAS's mission of helping biologists (who happen to be largely female) get trained in computing resulted in NCGAS sponsoring three undergraduate women in biology-related majors through the [CEWiT REU](#) program.

NCGAS has spent the past academic year guiding the REU students through developing two entirely novel analytical workflows for the biology community. Two students are [mining national sequence repositories](#) with Rob Edwards,

streamlining searches for microbial presence in published datasets on an **XSEDE Jetstream Cloud** image, which in turn allows for easy analysis of much larger sample sizes.

Another student is working to automate remote audio data capture and analysis for field stations (i.e. **FrogWatch** frog call surveys), using Raspberry Pis and the Jetstream Cloud. Automation of survey data can dramatically increase coverage of location, allowing for better information about amphibian populations that are in worldwide decline. The students have learned new technical skills and biological analyses together, bolstering their confidence in approaching novel technology in the future.

By the end of the program the students will have picked up an impressive number of skills like using R to perform statistical analyses common in data science, installing software and managing data on Unix systems, scaling analyses to automation, and troubleshooting command lines.

They also learn new biological skills such as microbiome analysis and bioacoustics.

These skills are all **highly transferable** to both biology and technical fields, providing the students with an advantage in future projects. The REU program ends with a poster session to showcase their work, but because the projects involve building NCGAS community tools, the students' work will be featured by NCGAS in upcoming conferences and publications. These tools will also be used and cited by many in the community – a great boost to an early career for these women!

The partnership of CEWiT and NCGAS has been a successful one, combining the missions of the two organizations to bring much needed diversity (and biologists) into tech fields, while building much-needed tech tools for the biological community. These students have gained the confidence and competence that is transferable to both fields,

preparing them for a future when diversity, innovation, and biotechnology are in high demand.

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