



**NATURAL  
SCIENCES**

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## JSRIUE INTRODUCTION TO STUDENT ARTICLES ABOUT INVESTIGATING GENES OF UNKNOWN FUNCTION IN YEAST

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This special section of the JSRIUE presents the work of biology students who completed undergraduate research projects during the fall semester of 2023. As part of the Molecular Biology Laboratory course, supported by the IU East School of Natural Science and Mathematics and a grant from the Women's Philanthropy Leadership Council, students carried out research and wrote papers to showcase their findings. Using bioinformatics tools and laboratory experiments, each research team investigated a gene of unknown function, or GUF, in the budding yeast, *S. cerevisiae*. Although this yeast is commonly used to bake bread and brew beer, scientists study yeast to learn more about how genes and cells function. For example, insights from *S. cerevisiae*, a single-celled eukaryotic organism, established our understanding of the cellular machinery that human cells use to grow and divide.

The papers in this collection present results of four research projects, completed by nine students. Students followed a general plan for the research project, while also making some choices for the laboratory experiments and gaining novel insights. Each research team of 2-3 students chose a yeast GUF and used gene information to search biological databases. Using results of their bioinformatics investigations, students developed hypotheses about the potential function of their GUFs and how yeast might be affected if the GUF was missing. Next, they used a PCR-based strategy to knock out their GUF from yeast and confirm success. Finally, they used growth assays to test the behavior of their knockout yeast strain under different

environmental stress conditions. After completing their project, each team wrote a research paper to describe their experiments, present their data, and discuss their results. Students also highlighted some of their results on research posters that were presented at the end of the semester. Through this experience, students engaged more fully with the scientific community, gained valuable scientific knowledge, and strengthened their critical thinking skills.

In their papers presented here, each research team has described some of their results from their bioinformatics investigations, the knockout of their GUF, and the growth of yeast lacking their GUF. Two research teams, Hemp & Lewis and Eiler & Haynes, investigated the yeast gene *YDL167c*. They each examined growth of their *YDL167c* knockout yeast under various environmental stress conditions and found no significant growth differences between normal (wildtype) and knockout yeast strains. The paper by Russell and Schindler shows that yeast lacking *YJR118c* were more resistant to caffeine than wildtype yeast. Coddington, Fasbinder, and Stubblefield found that knockout of *YHR039c* increased the sensitivity of yeast to the antifungal drug Nystatin. ■