

# THE AMERICAN BIOLOGY TEACHER



## About Our Cover

Students in the Honors Genetics class of Fulton High School in Fulton, Missouri, are making an agarose gel for their first DNA gel electrophoresis lab. During the second semester of this class, students carry out 5 to 6 different gel electrophoresis experiments. Since the quality of the gel can make a big difference in the final appearance of the DNA bands after running, it is important that students learn how to make the gel correctly the first time.

Proper gel creation starts with accurate measurements for the agarose, concentrated buffer, and distilled water. Students mass the flask, gel components, and plastic wrap prior to heating. The plastic wrap helps reduce loss of water but should have a hole poked in it to allow escape of steam. Then, as students use the microwave to heat the agarose mix, they must watch carefully to prevent boiling over. Short bursts of 15–30 seconds or less in the microwave work best. After a few minutes of heating, students must carefully observe the liquid to ensure the agarose has fully dissolved. It works best to hold the flask up to light, as the students in the photograph are doing, and swirl the flask to look for any undissolved particles of agarose. Once the agarose is fully dissolved, students allow the mix to cool to about 65°C and then mass the flask again. They add hot water to bring the mass up to the original measurement, which keeps the agarose concentration where it should be, and then swirl the mix again. Finally, when the temperature has cooled down to 50–55°C, students carefully pour the gel into the gel bed, which has the combs already in place. Slow, steady pouring of the gel helps prevent air bubbles from forming and is followed by leaving the gel undisturbed to harden.

The photograph was taken with a Canon EOS 5D Mark III camera body with a 70–200mm f/2.8L IS USM lens. The focal length was 110 mm with a shutter speed of 1/250 and an f-stop of 3.5. ISO was 5000 with exposure compensation +2/3. The photographer is Carol Robertson, who retired from Fulton High School in 2016 and is now an adjunct professor at Westminster College in Fulton, Missouri.

## Contents

### Feature Article

**The Study of Animal Behavior Provides Valuable Opportunities for Original Science Fair Projects: Recommendations from The Animal Behavior Society, Education Committee**

*The study of animal behavior is critically important in understanding our living world*  
Stan Braude, Susan Margulis, E. Dale Broder

RECOMMENDED  
FOR AP Biology

438

### Research on Learning

**Beyond Reflection: Using ePortfolios for Formative Assessment to Improve Student Engagement in Non-Majors Introductory Science**

*ePortfolios stimulate student response to feedback & improve the quality of their work*

Karla Fuller

Available online at <http://www.nabt.org/websites/institution/index.php?p=762>

442

**Using Iterative Group Presentations in an Introductory Biology Course to Enhance Student Engagement and Critical Thinking**

*Enhancing learning by mimicking the scientific process of inquiry & discovery through group presentations*

Anna Aguilera, Jesse Schreier, Cassandra Saitow

450

### Inquiry & Investigations

**Designing an Interdisciplinary Management Plan as a Capstone Experience in a Conservation and Wildlife Management Class**

*Enhancing student understanding of conservation & wildlife management through design of an interdisciplinary management plan*

Brian FM. Olechnowski

455

**An Innovative Approach to Incorporating the Use of Cadavers in High School Human Anatomy and Physiology Courses**

*Providing high school students a unique experience to enhance their study of human anatomy & physiology*

Kim Achilly

460

**Inquiry-Based Laboratory Experiences Using Ecosystem Microcosms**

*A cooperative learning, inquiry-based lab experience that also helps students gain appreciation for the effects of pollution or nutrient runoff on ecosystems*

Roger Sauterer

466

RECOMMENDATION

**Teaching Osmosis to Biology Students**

*Osmosis is a fundamental concept of great importance to understanding natural biological, physical & chemical processes*

Arthur Louis Odom, Lloyd H. Barrow, William L. Romine

473

**Models in the Biology Classroom: An In-Class Modeling Activity on Meiosis**

*A hands-on method that helps students to understand the mechanism of meiosis using a fictitious organism*

Natalia B. Hubbs, Kristin N. Parent, Jon R. Stoltzfus

482

### Tips, Tricks & Techniques

**Socratic Seminar with Data: A Strategy to Support Student Discourse and Understanding**

*A Socratic seminar can be a powerful tool for increasing students' ability to analyze & interpret data*

Joan Griswold, Loren Shaw, Maureen Munn

492

**An Interactive, Instant Polling Exercise to Allay Student Anxiety in Science Courses**

*A simple instant polling exercise to stimulate dialogue about students' experiences with course content*

Rachel K. Thiet

496

### Departments

**Message from the NABT Board of Directors • NABT: Teaching Biology in the Age of "Alternative Facts" •**

Susan Finazzo, Bob Melton, Elizabeth Cowles, Steven D. Christenson, Sherry Annee, Margaret Carroll,

Cindy Gay, Brenda Royal, Jaclyn Reeves-Pepin

433

**Letters to the Editor**

435

**Book Reviews •** Amanda L. Glaze, Department Editor

500

**Classroom Materials & Media Reviews •** Remy Dou, Department Editor

506

**Sacred Bovines •** *Is an Apple Living?* • Douglas Allchin, Department Editor

509