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, then mix 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.

Photography

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.

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

..........................................................500

Classroom Materials & Media Reviews

..........................................................506

Sacred Bovines

..........................................................509

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........................................................................................................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 Aguiler, Jesse Schreier, Cassandra Satow.........................................................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

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. Rome........................................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

Contents