

THE AMERICAN BIOLOGY TEACHER



About Our Cover

While many think that the 17-year periodic cicada (*Magicalcica septendecim*) is the longest-lived insect, that honor belongs to the African mound-building termite queen, which lives 50+ years as an adult, while her workers typically live only a year or so. And there is a species of longhorn beetle that spends 35+ years as a nymph foraging in decaying wood. Still, the periodic cicada is a rather amazing creature, spending all but a month or so of its 17-year life as a nymph, burrowing underground looking for root xylem fluid. It emerges in great numbers (an average of 0.5 metric tons per hectare) with clockwork regularity every 17 years in a period of 7–10 days from mid-April through June. There are some 30 broods of periodic cicadas in the United States, each with a unique schedule. At times, some or all members of a brood get off schedule and emerge early for reasons not fully understood, typically 4 years ahead of schedule. The pictured cicada was a member of brood X, scheduled to reemerge in 2021. This cicada was true to off-schedule form, emerging 4 years early in 2017. Mating typically begins within 5–18 days of emergence, the males awaiting the hardening of their tymbals (the sound-producing organs used to attract mates) and the females their ovipositors. Once these structures have hardened, the males gather in “chorus centers” where they make their tremendous sounds to attract females. After mating, the females use their ovipositors to lay 200–600 eggs in distinctive egg nests, each containing 20–30 eggs, near the ends of twigs in surrounding trees; 6–8 weeks later, the nymphs emerge, drop to the ground, and immediately burrow into the ground in search of root xylem fluids to begin their 17-year journey to adulthood, carrying on the tradition, while both adult males and females die shortly after mating and laying eggs. The image was taken by Bob Ford, Frederick Community College, Frederick, Maryland.

Contents

Feature Article

- The Riddle of the Voodoo Tree: An Exercise in Ecological Thinking, Using the Example of the Honey Locust (*Gleditsia triacanthos*)**
Examining relationships between plants and animals through object-based learning
Marcel Robischon 146

Research on Learning

- Let's Talk Biology – Developing a Model for Incorporating English-Speaking Experts into the (Bilingual) Science Classroom**
Using a video exchange model to use English as the common language in science instruction
Nina Meyerhöffer, Daniel C. Dreesmann 152
Available online at <https://www.nabt.org/ABT-Online-Current-Issue>

Inquiry & Investigation

- DNA Barcoding & Macroinvertebrate Identification**
Integrating ecological or environmental analysis with genetic analysis and DNA extraction techniques to prepare students for next-level education or employment
Miranda Jackson, Br. Albert S. Gahr 162
- “Invasive Aliens”: A Student Citizen-Science Activity Using DNA Barcoding to Investigate Concepts in Ecology & Molecular Biology**
Enhancing student understanding of fundamental molecular and ecological concepts through applied use of DNA sequencing technologies
Jeff Eble, John Pecore 169
- Using Shapes & Codes to Teach the Central Dogma of Molecular Biology: A Hands-On Inquiry-Based Activity**
Using an engaging activity to support high school students learning the details of translation and molecular genetics
Michael I. Dorrell, Jennifer E. Lineback 202
- Exploring Nutraceuticals to Enhance Scientific Literacy: Aligning with *Vision and Change***
A demonstration of the value of scientific teaching, using class data and evidence-based practices to persist beyond the implementation dips that come with adopting new curricula
Nathaniel Buteyn, Ye In Oh, Jonathan Knott, Paige Stephens, Jillian Konyndyk, Jenna Tenney, Amy Wilstermann, Herb Fynewever, David Koetje 176
- Heating Up Enzyme Kinetics: A Safe, Inexpensive & Quantitative Inquiry Activity**
Providing insight into enzyme function through a practical laboratory exercise
Kushal Bhatt, Ann M. Davis, Shazia A. Ahmed 187



Tips, Tricks & Techniques

- Handy DNA Nucleotide Model**
Using the human hand to create a model for the study of DNA
James Middleton 193
- A Quick & Simple Single-Antibody Immunoassay for the Student Laboratory**
Introducing students to the important concepts of specific and nonspecific binding used in a variety of ways in different immunoassays
Paul L. Guy 197

Departments

- Guest Commentary • Seven Pillars of Biology Literacy: A Proposal for What Secondary School Teachers Might Teach & What College Instructors Should Reinforce • Dr. Paul Narguizian** 145
- Book Reviews • Amanda L. Glaze, Department Editor** 210