

THE AMERICAN BIOLOGY TEACHER



About Our Cover

This monarch butterfly (*Danaus plexippus*) chrysalis (pupa) was attached to a common milkweed (*Asclepias syriaca*) plant found in Westminster West, Vermont. The monarch chrysalis starts as a pale green color, speckled with glistening dots of gold, and becomes transparent just before the adult butterfly emerges. When this specimen emerged it was easily identified as a male by the black oval scent patch located on each hindwing.

In mid- to late May, monarchs arrive in New England from the wintering grounds in the Sierra Madre of central Mexico. Once they reach their summer habitat, they lay eggs on the underside of milkweed leaves. One female can lay up to five hundred eggs in her lifetime. The caterpillar will spend up to two weeks eating and growing before transforming into a chrysalis.

The adult butterflies born in New England in late July and August do not reproduce immediately because of decreasing light and dropping temperatures. Instead they spend their time feeding on nectar in preparation for the arduous migration south. During the fall months this generation of adults migrates to the overwintering sites in Mexico. In early spring, the overwintered generation will begin the journey north and lay eggs to begin a new generation. It can take as many as three or four generations before the monarchs reach New England again, making the ones that arrive the great and great-great grandchildren of the overwintering monarchs.

This photo was taken by Abigail P. Littlefield, Professor of Natural Science (retired) at Landmark College (Putney, Vermont), using an Olympus E-M10ii with a macro lens, F8, ISO 800.

Contents

Feature Article

- Chronic Fatigue Syndrome & Other Difficulties: Introducing a Modern Scientific Controversy to a Biology Classroom**
Using an open-inquiry case study on chronic fatigue syndrome to increase high school and college students' critical-thinking skills and understanding of scientific method
Jun Liang, Igor V. Zaitsev 387

Research on Learning

- Cultural-Historical Activity Theory (CHAT) as a Practical Lens to Guide Classroom Action Research in the Biology Classroom**
Enabling teachers to become more reflective practitioners by using a rigorous tool for analyzing data
Josef De Beer 395
- The First Line of Contact: How Course Syllabi Can Be Used to Gauge & Reform Learner-Centeredness in a College Classroom**
Using syllabus scoring metrics to evaluate how learner-centered course syllabi are and to make modifications accordingly
Ashley B. Heim, Emily R. Aldor, Emily A. Holt 403

Inquiry & Investigation

- Hands-on Research Reaching across Disciplines**
Reinforcing the importance of interdisciplinary collaboration through a research project for undergraduate students involving microbiology and public health
Miryam Z. Wahrman, Corey H. Basch 412
- Modeling Tropical Diversity in the Undergraduate Classroom: Novel Curriculum to Engage Students in Authentic Scientific Practices**
Implementing modeling-based inquiry curriculum in a postsecondary ecology course
Jana Bouwma-Gearhart, Sarah Adumat, Allyson Rogan-Klyve, Andrew M. Bouwma 417
- Protein Structure Analysis: Introducing Students to Rational Drug Design**
Using free online resources to introduce students to the topics of bioinformatics and computer modeling in the context of rational drug design
Agnieszka Szarecka, Christopher Dobson 423
- Investigating the Effects of an Energy Drink on Flatworms**
Teaching middle school students to use a student-designed and implemented investigation to learn how substances can directly and negatively affect an organism
Rhea Miles, Tonya Little 430
- Understanding the Role of Diffusion in Synaptic Transmission through Inquiry-Based Learning & Quantitative Reasoning**
Developing a deeper understanding of the underlying concept of chemical synaptic transmission
Günther K. H. Zupanc 435
- A Project-based Biology Unit: Star Athlete Collapses on the Football Field**
Introducing students to health science careers through a project-based unit that integrates ultrasound technology into the classroom as a teaching and diagnostic technique
Christine Lotter, Richard Hoppmann, Stephanie Bailey, Nathan Carnes, Daniel A. Kiernan 442
Available online at <https://www.nabt.org/ABT-Online-Current-Issue>



Tips, Tricks & Techniques

- Using Retrospective Research Questions and Database Mining as a Basis for an Inquiry-Based Lab in an Undergraduate Human Physiology Course**
Providing students experience in designing retrospective research questions, database management, and teamwork while learning standard physiologic principles
Cassy Cozine 449

Departments

- Guest Commentary • We the Teachers: Cultivating Classroom Connections & Leadership** 385
- Sherry Annee, NABT President** 453
- Book Reviews • Amanda L. Glaze, Department Editor** 459
- Classroom Materials and Media Reviews • Jeffrey Sack, Department Editor** 459