

# THE AMERICAN BIOLOGY TEACHER



## About Our Cover

Orderly and freshly rinsed feathers are a must for this active blue-winged teal (*Spatula discors*). Along with bath time comes a flash of his blue shoulder patch and white facial crescent as healthy alerts to nearby rivals and potential mates. Teal species common in North America include cinnamon and green-winged teals and comprise a polygeneric group of relatively small dabbling ducks (350–450 g). Their acrobatic flight skills – among the best of all ducks – frustrate photographers and hunters alike.

Blue-winged teals forage by tipping tail-up and dunking their heads to “dabble” with spatulate bills in shallow water to gather bits of plant material and the occasional small invertebrate. The proportion of protein-rich invertebrates in their diet rises substantially for females preparing to lay eggs. In contrast to dabblers, species of diving ducks completely submerge and swim to catch their food.

These abundant teals summer as far north as the Canadian tundra and migrate farther than most ducks to winter in Central America, in the Caribbean, and as far south as Peru and northern Brazil. As is true for all migrating birds, it's a treacherous flight.

Blue-winged teals number as many as 9 million in the Americas and are sought-after and tasty game birds. Currently, the population is considered stable and is protected by the Migratory Bird Act. Bag limits are carefully regulated, with losses of 200,000 to 500,000 per year to hunting. Human trash, power lines, and pesticides also take their toll, but wetland draining and habitat conversion to agriculture are likely the biggest threat to this population.

The male pictured on our cover was spending a lazy day alternately sheltering among nearby cattails and venturing in open water and sunlight to feed and socialize in a protected wetland of Texas.

The photo was taken by Darrell Vodopich (<https://www.biologyimaging.com>) using a Canon 7D II, Canon 560mm at ISO 1000, F10, 1/1600 sec.

## Contents

### Feature Article

#### Wild Bird Workshop: A Professional Development Opportunity for Educators

*Using hands-on activities in field techniques and real-world research to boost environmental education in primary and secondary schools*

Janel L. Ortiz, April A. T. Conkey, Leonard A. Brennan, La Vonne Fedynich, Marybeth Green . . . . . 3

#### Reaching Rural Students: CARE Principles to Promote Student Engagement in College Biology Courses

*Addressing the unique backgrounds of rural students and their strengths while enhancing scientific literacy in rural populations*

Julie A. Birt, Marcelle A. Siegel . . . . . 11

### Research on Learning

#### Strategies to Promote Effective Student Research Teams in Undergraduate Biology Labs

*Improving student satisfaction and success while reducing instructor guesswork and stress regarding student teams*

Kendra Spence Cheruvelil, Angela De Palma-Dow, Karl A. Smith . . . . . 18

Available online at . . . . . <https://www.nabt.org/ABT-Online-Current-Issue>

### Inquiry & Investigation

#### Solving the Mystery of an Outbreak Using the One Health Concept

*Teaching high school or college students about zoonotic disease outbreaks through a case-based lesson demonstrating collaboration between scientists and health professionals*

Andrew W. Bartlow, Tanya Vickers . . . . . 30

#### Searching for the Source of Infection: A Website to Help Teach the Principles of Infectious Disease

*Providing teachers with a good method for teaching how sources of infection are tracked down in real-world disease outbreaks*

Jie Shen, Zhu Xiang, Yang Peijing, Zhou Zixuan . . . . . 37

#### Science Fair Was One of the Highlights of My Middle School Life: Using Science Fair to Develop NGSS Practices

*Connecting students to the practices of science and to the nature of science as they develop an awareness of how science helps to solve problems and build knowledge*

Cynthia Welsh, Mary Hedenstrom, Michele Hollingsworth Koomen . . . . . 43



### Tips, Tricks & Techniques

#### A Hands-On Set for Understanding DNA Replication, Transcription & Polymerase Chain Reaction (PCR)

*Making an easy and inexpensive tool to support visual learning and tactile modeling*

Ladislav Merta, Tomáš Pinkr, Vanda Janšťová . . . . . 49



#### Advancing Cognitively Demanding Tasks in Undergraduate Classrooms: Using Graduate Student Discussion Groups & the Task Analysis Guide in Science (TAGS) as Leverage

*Highlighting the importance of the cognitive demands of tasks for engaging students in active and rigorous opportunities for science learning*

Eve A. Humphrey, Andrew C. Merwin, Miray Tekkumru-Kisa . . . . . 53

### Departments

Guest Commentary • *Tackling Old Issues with New Approaches* • Sharon B. Gusky . . . . . 1

The ABT BioMystery . . . . . 2

Book Reviews • Amanda L. Glaze, Department Editor . . . . . 58

Classroom Materials and Media Reviews • Jeffrey D. Sack, Department Editor . . . . . 62