

THE AMERICAN BIOLOGY TEACHER



About Our Cover

If looks could kill, then this female paper wasp (*Polistes metricus*) is a formidable guardian of her lone egg. Powerful mandibles and an ovipositor modified as a stinger is certainly a threat to an invader. In contrast to most bees, paper wasps can sting multiple times and won't hesitate to do so. Fortunately, most wasp species are not aggressive unless provoked—the most notable exception being species of yellow jackets that seem to have an axe to grind with anyone near their ground-based nests! Nevertheless, even seemingly docile paper wasps protecting a nest should never be trifled with.

Genus *Polistes* spp. includes 300 or more species worldwide, including 22 in North America. All of these species construct a nest made from chewed wood mixed with saliva to form paper-like, waterproof, hexagonal cells. The nest shown here is a single, stalked cell indicating that the female is a “foundress” beginning construction of a new colony. Others may join the growing colony, but adult numbers are typically fewer than 30. Not surprisingly, this foundress has chosen to build under the eave of a house. Unfortunately for human residents, eaves and ledges of houses offer convenient locations for wasps seeking easy access, moderate protection, and nearby moisture for their nests.

All paper wasp species are predatory, and beneficially control other insect species, especially caterpillars. A successful hunting expedition provides stung and often paralyzed prey items for easy transport and storage or processing into food for developing larvae. The powerful jaws of a wasp can ingest body fluids and “malaxate” the remainder of the prey, meaning the tissue is methodically chewed, softened, and ground into a homogenous pulp ideal for feeding growing larvae.

This photo was taken under the eave of a garage in central Texas by Dr. Darrell S. Vodopich, Biologyimaging.com, using a Canon D60, 100 mm macro lens with flash, 1/200 sec, f/32 at ISO 100.

Contents

Feature Articles

The Mysterious Murder of Christa Worthington

Students conduct a hands-on activity extracting DNA from wheat germ to simulate how DNA would be isolated from crime scene samples

Kevin M. Bonney, Lori Nicholas 702
Available online at <https://www.nabt.org/ABT-Online-Current-Issue>

Science in Action! Outreach Program Promotes Confidence in Teaching Science

Participation in SIA! deepened pre-service teachers' understanding of the scientific method & increased their confidence in being able to teach science

Rachel Zack, Edward F. Vacha, Nancy L. Staub 711

Research on Learning

An In-House Biology Placement Test Improves Success in Majors Introductory Biology

Diagnostic BPTs have an effective place in advising and retention strategies

Sarah M. Boomer, Michael J. Baltzley, Angela Z. Poole, Kristin L. Latham-Scott,

Jesse P. Poole 720

Effects of Phylogenetic Tree Style on Student Comprehension in an Introductory Biology Course

Students performed significantly better with bracket phylogenetic trees for some, but not all, interpretation tasks

Jonathan Dees, Danielle Freiermuth, Jennifer L. Momsen 729

Inquiry & Investigations

Smartphones for Teaching Plant Movement

A simple teaching lab to illustrate the dynamic qualities of plant movement using smartphones to create movies of gravitropism and circumnutation

Eric D. Brenner 740



Understanding Reversible Molecular Binding

A simple, reliable & colorful laboratory model for introducing beginning biology students to the principles underlying reversible binding

George P. Smith 746

Exploring Predatory Nematode Chemotaxis Using Low-Cost and Easy-To-Use Microfluidics

An inexpensive, quantitative experiment to explore important aspects of microbial symbiosis, pathogenesis & ecology

Matthew D. Stilwell, Julia F. Nepper, Elizabeth D. Clawson, Val Blair, Travis Tangen,

Douglas B. Weibel 753



Using Molecular Biology and Bioinformatics to Investigate the Prevalence of Mislabeled Fish Samples

Students investigate the authenticity of fish products purchased in local markets & restaurants by DNA sequence analysis of a segment of the mitochondrial COI gene

Madeline L. Arnold, Drew Holman, Stephan G. Zweifel 763

Tips, Tricks & Techniques

Sabotaging Presentations to Generate Fundamental Questions and Integrate Theory & Practice

A dynamic and interactive presentation exercise that challenges students to share their expertise with their peers via a unique motivating structure

Rachel K. Thiet, Jimmy Karlan 769

Modeling Activity on Blood Filtration in the Nephron

A hands-on activity to model the blood filtration process using a syringe filter

Sun Mi Yun, Shinyoung Lee, Heui-Baik Kim 774

Departments

From the Editor • *A Season of Science: April to August 2017* • William E. McComas 701

Book Reviews • Amanda L. Glaze, Department Editor 778

Classroom Materials & Media Review • Remy Dou, Department Editor 784

2017 Index for Volume 79 of The American Biology Teacher 787

Index to Advertisers 792