

# Bean beetles: Can they improve laboratory learning?

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SPECIALS TO THE SUN

We expected them to be bigger, more the size of a cockroach, and perhaps colorful like a ladybug. But as Dr. Blumer handed out the Petri dishes, we soon realized we had grossly overestimated their size and beauty.

As we removed the lids to the Petri dishes, a musty odor escaped; a slight tap on the lid was enough to prevent the same for our more lively subjects. Other subjects were playing dead or had already lost their vitality among the half-eaten and hole-riddled mung beans.

We're talking about bean beetles.

Bean beetles, known scientifically as *Callosobruchus maculatus*, are insects of Africa and Asia that range throughout the tropical and subtropical world. Yet we traveled to Emory University in Atlanta, not to study these pests' role in agriculture, but to learn how to use these beetles in the classroom.

We learned that adult bean beetles have a lifespan of a mere one to two weeks. During this limited lifetime they do not require food or water; rather they spend their entire existence mating and laying eggs on beans. The eggs are laid on the bean surface, and during development the larvae burrow through the seed-



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Amanda Lovelace (left), a master's in biology student at ASU; and undergraduate psychology major Zahwa Al-Humaidan prepare Petri dishes filled with mung beans and bean beetles for upcoming laboratory exercises.

coat and feed inside the bean.

To the beetles not all beans are equal. Provided a choice of beans, the beetles prefer mung beans, black-eyed peas and azuki. In addition, these beans all show high success rates for larval development. Although bean beetles will lay eggs on other beans, such as lima, kidney and garbanzo, or even glass marbles, development of eggs laid on these beans is less likely to proceed to completion of the life cycle.

Depending on environmental conditions, such as temperature, humidity and bean type, larvae can take between 3 and 10 weeks to develop. Long after their parents are gone, the beetles will emerge as fully formed adults and immediately seek a mate.

It's rather easy to tell who's who. Typically, the female is black in color, larger and with dark stripes at the end of the abdomen. The smaller male is brown and lacks the distinctive stripes.

Both sexes have wings but do not fly unless their housing conditions become overcrowded.

We are accustomed to working with warm furry creatures. Had we not been selected to participate in a national workshop sponsored and fully supported by the National Science Foundation designed to improve laboratory courses, it's likely we would have never encountered the fascinating bean beetle.

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## **BIOLOGY:** Students to develop, test new learning activities at ASU

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The "Bean Beetle Curriculum Development Workshop," hosted by Drs. Larry Blumer and Chris Beck, is a year-long venture for us that will build on the successful development of the bean beetle as a model system for inquiry-based laboratory courses in ecology, evolution and animal behavior. Our students at Arkansas State University will raise new questions about the physiology and behavior of the bean beetle, design experiments to find answers for those questions, learn to analyze their data and publish the results.

Thus, throughout this

year we will work as a team along with Dr. Anne Grippo, associate professor in biology, to develop and test new learning activities in physiology, neurobiology and cell biology laboratory courses, and we will assess how these new exercises impact student understanding of the nature and process of science.

For more information contact the ASU Department of Biological Sciences at [biology@astate.edu](mailto:biology@astate.edu).

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