A Closer Look at Insects

Teacher notes

This guide includes additional information for each of the lessons in A Closer Look at Insects

Soybean Insect Classification
Part 1 may be set up as a scavenger hunt, where students have to look at pictures around the room and write down the identity of the insect on a separate piece of paper. You may offer a 'reward' of some kind for the group that correctly identifies the most insects.You may also assign parts 2 and 3 at the same time and have the groups share out via a slideshow or just at their desks.

Insect identification answers

A. Bean leaf beetle
B. Green cloverworm
C. Japanese meetle
D. Seedcorn Maggot
E. Soybean aphid
F. Soybean stem borer
G. Stink bug
H. Fall armyworm
I. Corn earworm
J. Kudzu bug
K. Soybean leaper
L. Saltmarsh caterpillar
M. Three cornered afalfa hopper
N. Thrips
O. Dectes stem borer
P. Striped blister beetle

Bug BLASTer: Exploring insect diversity using DNA Analysis
This activity helps students to understand bar coding regions in DNA and how DNA can be used to identify the diversity of insects in a field. Not all insects are destructive to crops, and some may help to keep desctructive insect populations in check.

The scenario is as follows:

> Crooked Lane Farm is having trouble with production of soybeans and scouting has revealed considerable insect damage in the field. The farm manager elects to survey the field for insects by sweeping nets through the foliage. All netted insects were preserved in a jar of ethanol and submitted to a diagnostic laboratory for identification. Unfortunately, many insects were smashed during the collection, making visual identification difficult. Instead, the laboratory performed a DNA extraction and barcode sequencing on the bulk insect sample. The laboratory produced a report that contained the most common DNA sequences from insects within the bulk sample. Your job as a DNA analyst (bioinformatician) is to help the farm manager identify the species, using the given sequences of DNA, through the use of public databases and basic bioinformatic tools.

Students identify the insects and determine if the insect is native or invasive, harmful or beneficial, then recommend any control strategy.

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Gram staining protocol
The Gram staining technique requires relatively few reagents, is well defined, and can be successfully practiced with a few simple steps. Utilize beakers (or cups) of water rather than rinsing over a sink to avoid shearing force that can clear the bacteria off of the slides. Also, a tea candle can be utilized if alcohol burners or bunsen burners are not available. This protocol has been amended to include both gram negative bacteria (E. coli) and a mix of Gram negative and positive (greek yogurt). *** Crazy ideas: swabbing door knobs, water fountains, phone receivers etc.

Safety: gloves, safety glasses, Gram stain material can be disposed of according to *Flinn* Suggested Disposal Method #26b in the *Flinn Scientific Catalog/Reference Manual*

Helpful resources
Virtual Resource: https://learn.chm.msu.edu/vibl/content/gramstain.html
Image: https://cen.acs.org/articles/93/web/2015/04/New-Spin-Old-Gram-Stain.html
Image: https://theory.labster.com/steps-gramstain/

Antibiotic Susceptibility Assay Protocol (Disk Diffusion Susceptibility Test)
Use the set of antibiotic disks from Carolina (#805081). Be sure students do not handle antibiotics (or those derived from) they are allergic to!

Safety: gloves, safety glasses, disinfect all plates and surfaces with 10% bleach solution. (Soak plates in bucket for >4 hours)

Helpful Resources
https://learn.chm.msu.edu/vibl/content/antimicrobial.html
https://learn.chm.msu.edu/vibl/content/streakplate.html