PSI: Pest Scene Investigation

- Encompasses Forensic Entomology and Forensics with Pests and Integrated Pest Management

Background:

General: This program will teach children 4th – 7th grade about pests and pest management and how they relate to or have similarities to the field of forensic science.

Forensic Entomology: Misuse of pesticides can lead to unsatisfied customers who don't receive the result they wanted, damage to property, or even death. Civil cases involving wrongful death from use of incorrect pesticides, pesticides used incorrectly in food handling or storage facilities, or products meant to control a property damaging pest (such as termites) that is applied improperly can all lead to lawsuits. This important aspect of forensic entomology is important to be aware of and to emphasize the importance of reading a pesticide label and applying pesticides properly. THE LABEL IS THE LAW.

Dead animals…flies are biggest insect group associated with dead animals as they help recycle organic matter. If you see blowflies around your home or school, it is likely there is a dead animal somewhere and this should be investigated.

PPE: Express the importance of wearing personal protective equipment (PPE) to protect yourself and others when applying pesticides. It is also important to preserve evidence too so need to wear gloves to handle certain types of evidence.

Insects as Criminals: Animals (insects, birds, mammals) and plants (weeds) become pests when they appear where they are not wanted and compete with humans for food or space, or damage human property or threaten human health and safety. Pests are criminals too…they do things that are "against the law" by invading our homes, biting us, or eating our food. It's our job to make sure justice is served and make the pests pay for their crimes!

Lab methods: Just as in forensic science, we can detect where pests have been….rat urine can be seen under black light! Like a rodent fingerprint (not an insect, but makes a great point)!

Pesticide residues can be easily spread around if you don't wear PPE or be careful in your daily activities as an applicator. Glitterbug florescent tracer powder under black light can be used to show how this spreads…scientific way to show something that can't be seen otherwise!

You can identify pests by capturing them and putting them under the microscope.

Pest Scene Investigation: Program Activities

(The number of activities can be adjusted according to time allotted.)

Wear a lab coat or detective trench coat for these programs just to give it "atmosphere." Cover the information in each outline and then follow up with visual examples or hands-on activities.

1) **Pests**
    a. What are pests? Pests are like a criminal! What crimes do they commit?
        i. They eat/damage our food, homes, etc.
        ii. They live in places that we don't want them
        iii. They bite or sting us
    b. What do pests need to live? Resources
        i. Food
        ii. Water
        iii. Shelter

Associated Hands on Activity:

- **What's that Pest?:** Show examples of live pests (if available), preserved specimens, pest photos, or pest toys. Pass around the examples if you'd like and ask kids to tell what they are and why they can be considered pests based on what you have discussed with them.

2) **Crime Scene**
    a. Search along walls, under appliances and furniture
    b. Visit attics, basements and crawl spaces that are rarely used
    c. Areas of clutter
    d. Under sinks and in cracks and crevices
    e. How do we help pest commit their "crimes" with the things we do?

Associated Hands on Activities:

- **Where's the Crime?:** After explaining where to look for pests and where they hide, address the current room you are in (classroom, etc.) and ask kids where they think pests could hide and what does or does not make the room conducive to pests. If desired, you can manipulate the room with additional clutter or spilled trash to emphasize the point. You may wish to follow up with where pests may be found in the children's homes.

- **To Bee or Not to Bee (Good Guys/Bad Guys):** This activity combines the Pests and Crime Scene categories. Distribute handout for activity. Describe or show photos with examples of insects and ask in what situations these insects are pests, and when they are not (Key: nothing is a pest by nature, it all depends on the situation).

3) **Types of Pest Evidence**
    a. Damage to property or plants (furniture, walls, clothing, leaves)
    b. Infested food
    c. Droppings
    d. Dead pests or pest body parts
    e. Human or animal injury or discomfort (bites, stings, animal scratching)

Associated Hands on Activity:

- **Matching game worksheet:** Match the pests with the type of evidence/damage they leave behind.

4) **Tools to Examine the Evidence**
    a. We can investigate a pest crime scene using many different tools!
        i. Flashlight
        ii. Wall scope (look inside walls)
        iii. Microscope
        iv. Baggies and vials to collect insects and parts
        v. Tweezers to pick up specimens
        vi. Magnifying glass
        vii. Monitoring traps

Associated Hands on Activity:

- **Examine the Evidence:** Pass around various "tools" as you talk about them. Encourage kids to comment on how they are used.

5) **Safety/Evidence Preservation**
    - **a.** PPE: Collecting evidence safely
        i. Gloves
        ii. Face mask or safety goggles
        iii. Disinfectant

(to protect from disease transmission, such as histoplasmosis and hantavirus; mold; allergies)

Associated Hands on Activity:

- **PPE:** Demonstrate PPE such as gloves and safety glasses, tell how they can be used. Pass around gloves that have Glitterbug/Glo-germ inside them, demonstrate this in next section.

6) **In the Lab/Lab tools on site**
    i. Look at insect or insect parts under microscope to determine species
    ii. Use blacklight to see rodent urine; like a rodent fingerprint. This is a non-insect example, but might also be useful in some insect ID, like finding bedbugs. Some insect relatives, such as scorpions, glow under UV light!
    iii. Gather feces from floor or walls and examine to determine species
    iv. Contamination on gloves, etc. with Glitterbug, show under black light

Associated Hands on Activity:

- **Glitterbug/Glo-germ demonstration:**
    - Put Glitterbug lotion inside gloves, then pass them around, let kids try them on, etc.
    - Put Glitterbug on surfaces in the room and have one kid be the "detective" and look around the room with a black light. Places with Glitterbug demonstrate how stains and urine show up under blacklight and indicate where insects or other animals have traveled. Can potentially be used to find bed bugs.

- **Under the Magnifying glass:** Have insect specimens available that kids can look at under a magnifying glass. Explain how scientists use magnifiers and microscopes to identify insect "criminals."

7) **Controlling the Pest and solving the case: Integrated Pest Management (How to catch an insect crook! Describe the various methods to get rid of pests)**

a) Sanitation
b) Exclusion
c) Habitat modification: Remove resources they need to survive
d) Mechanical
    a. Traps (these can catch and help us determine what kind of pest we have…who the "criminals" are)
        i. Sticky
        ii. Wasp
        iii. Fly paper
        iv. Fruit fly traps
    b. Mouse traps (snap and multi-capture)
        i. Make sure to dispose of dead animals right away…or will smell and attract flies (might segue here briefly about how flies would be found on a dead human too)
    c. Fly swatter
e) Biological controls: natural enemies
f) Chemical: Least-toxic best

Associated Hands on Activity:

- **Name that Control Method:** Have photos of various control methods, kids must say what type of control method it is (i.e. show a person mopping for sanitation, or show caulking for exclusion)

- **Catch the Criminal:** Demonstrate various control methods (traps, gel, sticky boards, etc.) and have kids say what they are, and what pests they might catch.

8) **Insects also important in other ways**
    a. Forensic Entomology
        i. Civil
            1. Food production
            2. Pesticide misapplication
            3. Doesn't take care of the problem (such as termites)
            4. Incorrect and cause harm, especially potential for accidental death (case of fumigant in home in Texas)
            5. Neglect
        ii. Criminal
            1. Help solve murders because flies find way to body minutes after death
            2. Important to decomposition…breaking down living tissue back into the earth

Associated Hands on Activity:

- **What's in your Mac and Cheese?:** Show a box of mac and cheese and/or chocolate for demonstration. Ask the kids what ingredients they think are in these food products, then talk about how unsanitary conditions in factories can result in insect parts, rodent hairs, and other things ending up in our foods. Ask kids to suggest ways that can make food production or eating establishments better (controlling pests, keeping things clean, wearing proper clothing like gloves and hairnets, etc.) Stress that it is impossible to keep everything out, but that the FDA has restrictions.