Bed Bugs 101 - Back to the Basics

Presented by

Gene White, B.C.E.
Director of Education & Training

Cuyahoga County Bed Bug Task Force
2012 Fall Conference
November 15, 2012
Bed Bugs

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Gene White, B.C.E.
Rose Pest Solutions
Troy, MI

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Hello Boys!!!
We’re Back!

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Rose Pest Solutions
Troy, MI

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Presentation Overture

1. The Demise and Rise of Bed Bugs
2. Identification, Biology & Behavior of Bed Bugs
3. Program Strategies that work...
4. Inspection: professional visual, canine, & monitoring devices.
5. Education components: Who needs to know?
6. Treatment strategies: Advantages and Disadvantages for each.
The Bed Bug - *Cimex lectularius*
*The Ultimate Human Ectoparasite*
Bed Bug Importance

- **Financial & Legal Considerations**
  - Homeowners, tenants
  - Associations...

- **Physical & Mental Health Issues**
  - Human disease vector
  - Sensitivity / inflammation / itching
  - Nuisance / sleeplessness
  - Secondary infections
  - Loss of blood (8 ug or less)

- **Public perceptions**
  - Brand Name Protection
“The Demise”

• In 1950, 5% DDT was the product of choice
• In 1956, Malathion was registered for Bed Bugs
• Katz in 1957 reported BB resistance
• Improved sanitation practices in modern hotels
• Modern appliances such as washers, dryers & vacuums aided in sanitation
• Change in furniture styles and materials
PROTECT YOUR CHILDREN
Against Disease-Carrying Insects!

TRIM Z DDT
KILLS FLIES, MOSQUITOS, ANTS
...as well as moths, bedbugs, silverfish and other household pests after contact!

MEDICAL SCIENCE KNOWS many common insects breed in fifth, live in fifth and carry disease. Science also recognizes the dangers that are present when these disease-carrying insects invade the home. Actual tests have proved that one fly can carry as many as 6,000,000 bacteria! Imagine the health hazard—especially to children—from flies seriously suspected of transmitting such diseases as scarlet fever, measles, typhoid, diarrhea... even dread polio! Some types of mosquitoes carry malaria and yellow fever. And any mosquito bite is painful and easily infected when scratched.

Non-hazardous to children or adults, to pets or clothes. Recommended by Parents' Magazine.

GUARANTEED effective against disease-carrying insects for 1 year. Actual tests have proven the insect-killing properties still effective after 2 years of use.

NO SPRAYS! NO LIQUIDS! NO POWDERS! So convenient, so safe because the DDT is fixed to the paper. It can't rub off!

BEAUTIFUL! "Jack and Jill" or "Disney Favorite"—gay new patterns that protect as they beautify a child's room.

DDT CEILING PAPERS, TOO! Extra protection for every other room in the house. Choice of two tests.

TRIMZ READY-PASTED WALLPAPER

The great expectations held for DDT have been realized. During 1946, exhaustive scientific tests have shown that, when properly used, DDT kills a host of destructive insect pests, and is a benefactor of all humanity.

Penskehite produces DDT and its products in all standard forms and is now one of the country's largest producers of this amazing insecticide. Today, everyone can enjoy added comfort, health and safety through the insect-killing power of Penskehite DDT products... and DDT is only one of Penskehite's many chemicals which benefit industry, farm and home.
“The Rise”

- Bed Bug population dynamics
- International and national travel
- International package delivery
- Less general application of insecticides within structures...
- Inexperienced PMP’s in the area of Bed Bug management
- More & more hotels with longer and longer stays
- Revival of elegance in bed framing and furniture, etc.
- Cutting corners in sanitation as the result of “environmentalism” attitudes
  - i.e. – not washing sheets for the duration of a traveler’s stay
Bed Bug Identification

1. Masked Hunter - *Reduvius personatus*
2. Boxelder Bug - *Boisia trivittata*
3. Bed Bug - *Cimex lectularius*
4. Leaf Footed Bug - Family Coreidae
Bed Bug Identification

- **92** described species of Bed Bugs & their relatives worldwide
- **16** species are reported in the continental United States and Canada
- **Three species** are considered ectoparasites of humans:
  - The Bed Bug – *Cimex lectularius* (all **50** states)
  - Eastern Bat Bug – *Cimex adjunctus*
  - Tropical Bed Bug – *Cimex hemipterus*
Alternate Names for *Cimex lectularius*, the Bed Bug

- Bat Bug
- Bed Louse
- Cloth bug
- **Crimson Rambler**
- House Bug
- House Louse

- Mahogany Bug
- Mahogany Flat
- Night Crawler
- Red Coat
- Wall-louse
- **Wallpaper Flounder**
Bed Bug Identification

- **Color:** pale yellow to mahogany brown
- **Shape:** oval, dorsoventrally flattened
- **Size:**
  - Adults measure 3mm across and 5mm long
  - Nymphs are as small as 1mm in length
- **Mouthparts:** piercing-sucking; rests in a ventral groove

Antennae: 4 segmented, with the 3\textsuperscript{rd} segment longer than 2\textsuperscript{nd} or 4\textsuperscript{th}
- **Wings:** without functional wings
- **Legs:** three segmented tarsi
- **Abdomen:** segmented and highly expandable

**Special Note:** In Bat Bugs, hair (setae) on the pronotum longer than the width of the eye
Comparison Between
The Bed Bug – *Cimex lectularius* (all 50 states) (L)
Eastern Bat Bug – *Cimex adjunctus* (R)
Bat & Bed Bugs Head & Pronotum
Bed Bug Biology

• Gradual Metamorphosis

Egg → Nymphs → Adult
Bed Bug Biology: “The Egg”

- 1mm long, white
- Operculate; having a circular rim and “lid”
- Eggs are laid in cracks and crevices where BB hide
- Female produces a cement and “glues” the eggs to surfaces (hatch side up)
- Eggs hatch in 6 – 10 days
- Humidity does not seem to affect egg hatch
- Temperature extremes below 55.4°F and above 98.6°F cause egg hatch failure
Bed Bug Biology: “The Nymph”

- At emergence nymphs are white to pale yellow
- Nymphs pass through 5 instars, each requiring a blood meal
- Completion of nymphal stages under ideal conditions is 35-48 days
- Nymphal stages may last as long as 156 days
Bed Bug Biology: “The Adult”

- Adult life span is six to **seven** months, but is known to live up to 1 ½ years
- Reports of a female BB living for 560 days without food at 44.6°F and 90% humidity
- Males inflict **traumatic insemination** of females
- Egg production is maximized at temperatures from 70°F to 82°F
- Female will lay 200+ eggs in her lifetime with repeated feeding.
Bed Bug Behavior
Bed Bug Habits

- Gregarious
- Ectoparasites: feed on the blood of mammals
- Nocturnal
- Peak Activity 2 – 3 AM
- Feed 3 – 15 Minutes
- Deposit feces on the skin while feeding
- Produce a specific odor
- Travel up to 100 Feet
Bed Bug Bites

- Front legs grasp forward and hind legs to the rear and sides with abdomen raised
- **Stylets** of the mouthparts are inserted:
  - Anesthetic / vasodilator used
  - Anticoagulant / anti-clotting agent
- Females take about 8 ug of blood
- No noticeable reaction in 31% of bite victims
- Inflammation / itching not common
- Sensitivity changes may occur
# The Sensitivity Spectrum

<table>
<thead>
<tr>
<th>Years of Age</th>
<th>Bite Reactivity</th>
<th>No Bite Reactivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>65 +</td>
<td>58%</td>
<td>42%</td>
</tr>
<tr>
<td>55 to 65</td>
<td>71%</td>
<td>27%</td>
</tr>
<tr>
<td>41 to 54</td>
<td>73%</td>
<td>29%</td>
</tr>
<tr>
<td>21 to 40</td>
<td>75%</td>
<td>25%</td>
</tr>
<tr>
<td>11 to 20</td>
<td>77%</td>
<td>23%</td>
</tr>
<tr>
<td>1 to 10</td>
<td>59%</td>
<td>41%</td>
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</tbody>
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## The Sensitivity Spectrum

<table>
<thead>
<tr>
<th>Where were you bitten?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Arms</td>
<td>84%</td>
</tr>
<tr>
<td>Legs</td>
<td>75%</td>
</tr>
<tr>
<td>Chest/Back</td>
<td>50%</td>
</tr>
<tr>
<td>Neck</td>
<td>40%</td>
</tr>
<tr>
<td>Hands</td>
<td>40%</td>
</tr>
<tr>
<td>Feet</td>
<td>38%</td>
</tr>
<tr>
<td>Face</td>
<td>21%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Have you had symptoms besides bites?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Insomnia - Sleeplessness</td>
<td>29%</td>
</tr>
<tr>
<td>Emotional Distress</td>
<td>22%</td>
</tr>
<tr>
<td>Anxiety</td>
<td>20%</td>
</tr>
<tr>
<td>Stress</td>
<td>14%</td>
</tr>
</tbody>
</table>