

## INTRO TO MANAGING BED BUGS IN HOMELESS SHELTERS

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TEXAS A&M AGRILIFE EXTENSION SERVICE



## TODAY'S PROGRAM

- Welcome
- Intro to bed bugs
  - Myths about bed bugs
  - Biology of bed bugs
  - Health issues
  - Case studies
- Hands On exercises
- Developing a strategy for managing bed bugs in shelters
- Q&A and evaluation



## INTRODUCTIONS

- Your Name and the Organization or Shelter you work for
- Your job role at the shelter
- What you hope to get from the training



## MYTHS ABOUT BED BUGS

**Bed bugs are too small to see**




## ADULT BED BUG

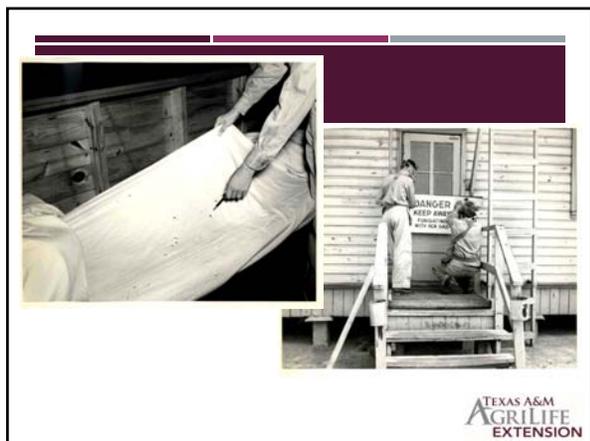
- Range in size from size of pin head to apple seed
- Flattened, oval to pear-shaped body
- Reddish brown




## MYTHS ABOUT BED BUGS

Bed bugs weren't a problem until they were brought from \_\_\_\_\_.



### A LITTLE HISTORY... BED BUGS IN WWII

**START FROM** *Scratch!*  
EXAMINE YOUR BUNK AND IMMEDIATE AREA FOR BEDBUGS

BE ESPECIALLY WATCHFUL AT NIGHT AND ALLOW NONE TO PASS AT ANY TIME-DON'T LET A BED BUG PUT THE *Bite* ON YOU! SEEK, SIGHT, AND DESTROY!

WWII Army educational flier for soldiers

### WHY CURRENT INFESTATION?

- Current resurgence likely due to multiple factors
  - Increased international travel
  - Loss of older, effective insecticides
  - Resistance to newer pesticides

### PYRETHROIDS AND DDT

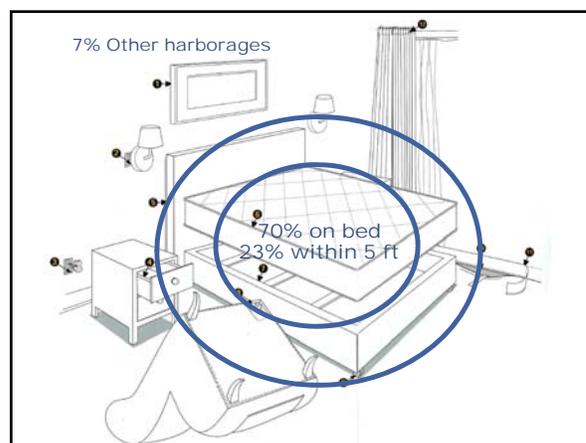
- Initially, bed bugs well controlled with DDT (1940s), but resistance seen within 8 years of its use
- Today, resistance well-documented and widespread to DDT, pyrethroid insecticides
- Pyrethroids remain primary control tool for bed bugs among pest management professionals

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### MYTHS ABOUT BED BUGS

You get rid of bed bugs by discarding infested mattresses

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**MYTHS ABOUT BED BUGS**

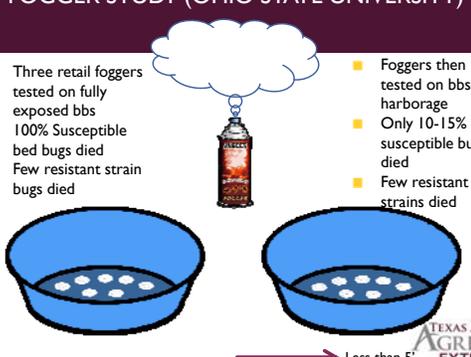
You can get rid of bed bugs by setting off foggers (the more the better)



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**FOGGER STUDY (OHIO STATE UNIVERSITY)**

- Three retail foggers tested on fully exposed bbs
- 100% Susceptible bed bugs died
- Few resistant strain bugs died



- Foggers then tested on bbs with harborage
- Only 10-15% susceptible bugs died
- Few resistant strains died

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**MYTHS ABOUT BED BUGS**

It's best to wait until guests complain



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**PEOPLE AND BED BUG BITES**



- Prefer feeding during darkness
- Bites painless
- More than 50% of people in multifamily housing with bed bug infestations will not report a problem
- Perhaps 1 in 20 people react obviously to bed bug bites

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**MYTHS ABOUT BED BUGS**

Dirty, messy people get bed bugs



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**A LITTLE BED BUG BIOLOGY**



### BED BUG LIFE CYCLE

**Note:** Bed bug takes 3-10 minutes to complete feeding. Must feed on blood to develop.

- Life cycle as short as 50 days
- Feed every 3-7 days
- Five nymphal life stages last 4-24 days each
- Adults live 3-12 months
- Females lay 3 to 5 eggs per day, up to 500 over lifetime.

Illustration by Scott Charlesworth (Purdue University), based in part on R. L. Genger (1966) Monograph of Cimicidae

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### NYPHHS

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### THE FEEDING PROCESS

Start	3 mins	9 mins	12 mins

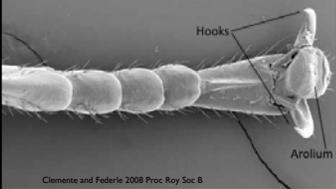
Photos by Whitney Cranshaw

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**BED BUG FEET** Bed bug feet lack pads for smooth surfaces

Cockroach feet adapted for smooth or rough surfaces



Hooks  
Arolium

Photo by Adam Nadell Polaris and <http://content.sime.com>

Clemente and Federle 2008 Proc. Roy. Soc. B

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A slide from a presentation. It features a title 'BED BUG FEET' and a subtitle 'Bed bug feet lack pads for smooth surfaces'. Below this, it compares cockroach feet, which are adapted for smooth or rough surfaces, showing a diagram of a foot with 'Hooks' and an 'Arolium'. The slide includes a photo of a cockroach, a citation 'Clemente and Federle 2008 Proc. Roy. Soc. B', and the 'TEXAS A&M AGRILIFE EXTENSION' logo.



**NOT BED BUGS**

Brown banded cockroach nymph

Dermestid beetle larva

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**SOME FACTS ABOUT BED BUG BEHAVIOR**

- Prefer darkness but will feed in daytime if necessary
- May travel 20 feet from hiding place to feed...even farther if necessary
- Seem to prefer humans over pets
- Can live for months without feeding
- Feeds from 3 to 12 minutes depending on age

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**SOME FACTS ABOUT BED BUG BEHAVIOR**

- Attracted to humans by body odor, body heat, carbon dioxide
- May hide in different locations each day
- Excellent hitchhikers in luggage, used furniture, bedding, clothing
- Adults and large nymphs may walk out door of one apartment and into another
- May enter adjoining rooms via wall voids or cracks in wall

Early instar bed bug smashed on a piece of tape

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**BED BUG BITES**

- Not all people react
- May bite multiple times
- Some people react severely

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**SLIGHT REACTION MOST COMMON**



### CASE STUDY A

- Shelter faced increasing complaints from residents over bed bugs
- Instituted screening, resident education at time of check-in, restricted personal items allowed in dorm
- Replacing wooden beds for metal beds
- Trying Kevlar® mattress covers
- Active and engaged shelter manager with high level of concern



### CASE STUDY A

- Began monitoring bed bugs in dorm with approximately 40 beds
- Used four monitor systems
  - Climbup® interceptors
  - Blackout™ interceptors
  - BDS® sticky traps
  - Verifi® bed bug monitors



Blackout™ interceptors under metal beds



### TRAPS USED

- Verifi, Climbup and BDS system




### HOW A CLIMBUP TRAP WORKS



- Smooth, talcum powdered plastic unclimbable for bbs
- Bb drawn to bed climbs rough outside of cup, falls into moat
- Fabric tape or roughened plastic outside cup



### HOW A BDS TRAP WORKS



- Bed bugs wander up ramps
- Bed bugs caught in glue
- Textured base attractive to bed bugs



### HOW A VERIFI WORKS



- Human scent and CO2
- Smooth vertical-wall pitfall trap
- Textured harborage on back
- Slo-release odor and CO2 pac



### BDS DETECTORS

- Placed on bed frame, floor, between mattress and box springs
- Sturdy design, easy to place
- Glue inside catches and holds bed bugs
- Caught fewest bed bugs



### VERIFI STATIONS

- Placed on walls next to bed, between headboard and mattress, and on floor near bed
- Difficulty keeping stations in place and upright
- Highest rate of missing data



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### CLIMBUPS

- Catch bed bugs coming to or exiting bed
- Caught highest numbers of bed bugs in study
- Provide some protection to sleeper



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### CLIMBUPS

- Difficult to install in all corners of some beds, especially with clutter
- Difficult to install under bunk beds



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### CLIMBUPS

- Counting bed bugs is time consuming and involves need for handlens and expertise in recognizing smaller life stages



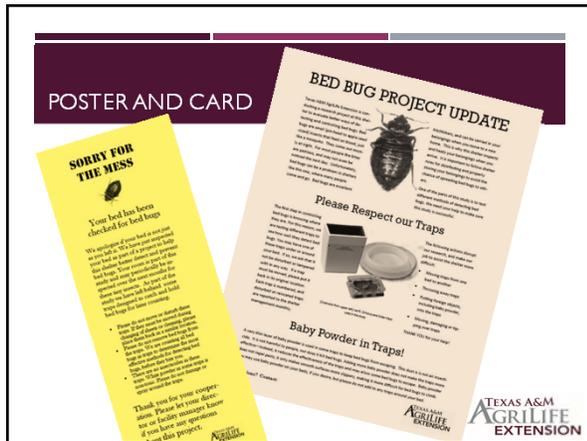
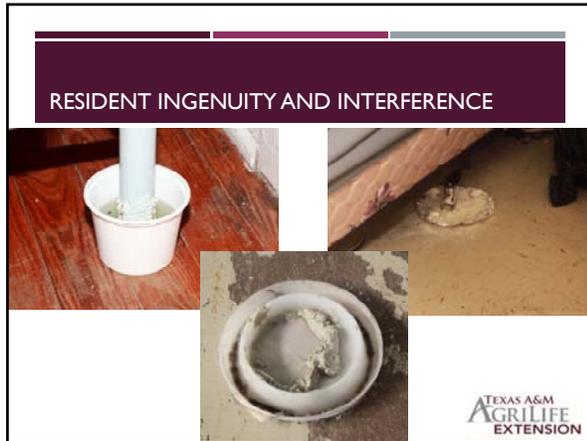
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### UNEXPECTED ISSUES

- Disappearance and mysterious movement of interceptor traps
- Residents bought and added talcum powder to traps
- Pouring liquids in Climbups
- Important that everyone treated equally and educated about monitoring program



talcum powder applied by resident to bed to discourage bed bugs



### CASE STUDY A

- Relied on pest control company to spot-treat monthly in response to complaints and our reports
- Chronic, low-level infestation remained throughout year. Bed bugs never eliminated
- At end of study
  - Moved all residents to other dorm space, vacating study area
  - Had pest control company spray all bed frames
  - bought interceptor cups for every bed in dorm

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### CASE STUDY B

- Two older homes converted to shelters
- Mostly individual bedrooms with 3-8 beds per room
- Metal and wooden beds, wooden furniture
- No A/C in summer

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### CASE STUDY B

- Bed bug problem chronic and well established in most areas of homes
- Some beds with high populations
- Verifi stations caught high numbers in some traps
- Pest control done in-house, though little spraying attempted

**CASE STUDY B**

Infested harborage on back of Verifi station



Another use for Verifi cups—jewelry holder



**CASE STUDY B**

- White painted furniture facilitated inspection
- Metal bed components also infested




**CASE STUDY B**

- Maintenance director chose to invest in heat treatment training and equipment



Propane heater unit

**CASE STUDY B**



Instruction book



Remote thermometer



Electric heaters

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**CASE STUDY B**

- Heat treatment resulted in some reduction in bed bug numbers
- Found that repeated and ongoing heat treatment was needed
- Heat is not a complete fix or permanent solution, especially in older wooden structures



**BREAK**



Team members Drs. Charlie Helpert and Paul Nester take a break from counting bed bugs

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