Bed Bugs 101

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Which of these are bed bugs?

[Images of bed bugs with URLs below each image for identification]

https://entomology.ca.uky.edu/ef636
https://solutionsforyourlife.ufl.edu/bed_bugs/identifying.shtml
http://bedbugmutts.com/bed-bug-pictures/69hs916m6zhmkv0r92xnykf2thym1
http://bedbugmutts.com/bed-bug-pictures/69hs916m6zhmkv0r92xnykf2thym1
Bed Bug Lifecycle

- 5 developmental stages before becoming an adult
- Must eat before moving to the next stage
- Shed their exoskeleton between life stages
- Egg to an adult in about 37 days (in optimal temperatures)
- Adults have life span of about 1 year
- On average bed bugs will die within 70 days without food (maybe longer in cooler temperatures)

http://bedbug-inspector.com/portfolio/775-2/
Bed Bug Lifecycle

http://www.bcbedbugexpert.com/bed-bug-photos/
Mating Behavior

- Unique method of mating called traumatic insemination
- Females that mate only once will produce 25% more eggs than females that are mated repeatedly
- A single mated female brought into a home can cause an infestation without having a male present
- Female will eventually run out of sperm and have to mate again to fertilize her eggs
Egg Production

- Must have a blood meal to produce eggs
- Produces 1-7 eggs per day for about 10 days after a single blood meal
- Will not reproduce again without feeding
- In optimal conditions, 97% of eggs hatch successfully
- Bed bug population can double every 16 days
- Lab studies show that more than 80% of all eggs survive to become reproductive adults
Feeding Behavior

- Come out from hiding to eat, typically at night
- Attracted to CO2 and heat
- Probe skin several times before finding good bloodflow, resulting in several bites from same bug
- Feed for 5-10 minutes
- Spend most of their time in hiding, digesting food
- Usually feed every 3-7 days

http://www.thesocialsilo.com/2012/12/07/bed-bugs-its-war/
Bed Bug Bites

- Bites suggest bed bugs but are not definitive
- One study found only 30% had a reaction to bed bug bite
- Another study indicated that 96% had reactions
- Reaction will vary depending on your immune system and number of bites
- More evidence is needed than bites to confirm bed bugs

http://bedbugbites.xyz/bed-bug-bites-pictures/
http://eastsidexterminators.biz/bed-bugs/bed-bug-bites.html
Bed Bug Bites

- My technician’s arm one week after feeding 1000s of bed bugs.
- My arm one week after feeding 60 2-3rd instar bed bugs.
- My student’s arm 1 year after feeding mixed stage bed bugs.
Bed Bug Evidence—Fecal Spots

- Blood that has been digested by bed bugs AKA bed bug poop
- Mattress seems and box spring
- Bed frame/behind headboard
- Along tops of baseboards
- Wall junctures and ceiling
- Behind pictures on the wall
- At & behind electrical outlets
- In curtain seems

Sources:
- https://bedbugscontrol.wordpress.com/2013/02/04/bed-bugs-on-the-ceiling/
- http://www.bed-bugs.com
- http://www.apexpestcontrol.net/?page_id=1320
Bed Bug Evidence—Molted Skins & Bugs

- Molted skins found in bed bug aggregations or by themselves
- In a new infestation, bed bug evidence may be very hard to find
- Only way to confirm an active bed bug infestation is to positively identify actual bed bugs

http://www.ennykpestcontrol.com/bed-bugs.html
How bed bugs get into our homes

- Hitch hiker bug!
- Travel
- Used furniture
- Bed Bugs don’t discriminate against rich or poor, clean or dirty

Health Effects

- Not known to transmit diseases
- Itching may lead to excessive scratching that may lead to a skin infection
- Stress
  - Sleeplessness
  - Destruction of self-image
  - Throwing out belongings
- Misusing pesticides
Inspecting for bed bugs
BED BUG HIDING SPOTS

Distribution of bed bugs found in 13 infested apartments

Source: University of Kentucky

http://www.amcopest.com/bed-bug-control
Inspecting for bed bugs

http://www.bedbugcentral.com/bedbugs101/early-detection

http://www.bedbuggeneral.com/Professional_Bed_Bug_Inspection_s/98.htm

http://www.bedbugbully.com/inspect-bed-bugs-boxspring/

http://ehs.iu.edu/topics/pest-management/bed-bugs/

http://www.bedbugbully.com/detox-your-home-of-bed-bugs-in-20-steps/
Prevention while traveling

- Inspect the mattress and box spring
- If possible, remove the headboard from the wall and inspect the back of it
- Inspect the luggage stand and place your luggage on it
- Keep your clothing in your bag; do not place belongings in drawers

Protecting your home

- Upon returning home, unpack your luggage immediately
- Launder all your clothing and dry on high heat for at least 30 minutes
- 122°F will kill eggs and all bugs
- Inspect your bag
- Using a soft duffel style bag will allow you to wash and dry it
Inspect Yourself

- Before & after leaving an infested home or area
- Check around buttons, pockets, seams, cuffs, zippers, shoe tread
- Check your purse, backpack, etc.
- Wear simple clothing
- Minimize hiding spots!

http://www.bedbuginfo.com/pictures-of-bed-bug-infestations/
Tools for DIY bed bug eradication

- Flashlight
- Garbage bags
- Mattress encasements
- Sealant/Caulk
- Monitoring device(s)
- Vacuum
- Clothes dryer
- Steamer
- Portable heating device
- Desiccant dust (Diatomaceous earth or CimeXa)
- Tool for applying desiccant dust
- N-95 masks

http://www.kdlg.org
Flashlight

- Use flashlight to inspect dark, hard-to-reach areas
- Check along mattress seams, box spring, bed frame, headboard of bed, along the wall or floor
- Also useful for squishing any bugs you might find
Garbage Bags

- Clutter provides lots of places for bed bugs to hide
- Reducing clutter will greatly improve your chances of eliminating bed bugs
- Throw away any items you no longer use
- Place clothes into bags for laundering
- Inspect items that can’t be thrown away or laundered and bag them up. Leave them in bags until your bed bug nightmare is over.
- Seal bags airtight so that bed bugs cannot enter.
Mattress Encasements

- Keep you from having to throw your bed away and prevent new bed bugs from infesting your mattress and box spring
- Make inspection easier
- Not all covers protect!

Sealant/Caulk

- If you own your own home, or have permission from your landlord, seal off cracks and crevices with caulk
  - Around baseboards, cracks in walls, door frames, etc.
- Eliminates hiding places and paths of travel
- Helpful to have a caulking gun, it can be a messy job!
- Always follow the instructions on the label!

Climb-Up Monitoring Device

- Traps used to detect the presence of bed bugs
- Place under bed and furniture legs to detect and intercept bed bugs as they attempt to climb bed legs to feed on you
- Can also be placed along walls to capture bed bugs in their path of travel
- Should be cleaned out monthly to remove any debris
  - Reapply a light layer of desiccant dust or talcum powder to the inner walls

Vacuum

- Makes inspections easier
- Seal used vacuum bag and dispose of outdoors after each cleaning
- If using a vacuum without a bag, consider using an attachment covered with a panty hose to prevent bed bugs from infesting the vacuum cleaner

http://tominsonbomberger.com/how-to-kill-bed-bugs/

http://www.mypmp.net/2016/05/19/recommend-this-method-to-bed-bug-afflicted-clients/
Clothes Dryer

- All bed bugs and eggs will die immediately at 122°F
- A loosely filled dryer set on “high” is capable of killing all bed bug life-stages and their eggs in 30 minutes
- Using a removable shelf allows you to treat items that can’t be tumbled, like leather shoes, handbags, even books.

http://laundry.reviewed.com/content/lg-dhxl4072w-heat-pump-dryer-review
Steamer

- Internal temperature of items being steamed needs to reach 122°F
- The steam head must be large
- Steaming is slow and labor intensive
- Steam treatment is a good way to use heat on large furniture that can’t be placed in a clothes dryer
Portable Heating Devices

- Used to treat luggage, backpacks, clothing, sleeping bags, tools, books, shoes, purses, pillows, furniture, etc.
- Collapsible devices with an interior heater and exterior heat monitor so that you can see the temperature inside the unit
- Takes hours to treat infested items
- Should be monitored at all times for fire safety
- Check owners manual of any electronic devices before putting them inside a heating device
Desiccant Dust-Cimexa

- CimeXa is a non-repellent low toxicity engineered silica dust
- Bed bugs walking on dusted surfaces will become covered in the dust
- Dust absorbs the water and oil on the exoskeleton of the bed bug, causing rapid dehydration and death
- Kills adults, nymphs, and eggs
- Typically kills within 24 hours of contact
- MUST READ AND FOLLOW THE LABEL!!
Figure 5. Number of live bed bugs found in six different apartments before and after treatment with silica gel dust. A second application was applied to a few areas in some units as depicted by arrows ( ).

Efficacy of Silica Gel (6 Apartments)

- **Unit 1**
- **Unit 2**
- **Unit 3**
- **Unit 4**
- **Unit 5**
- **Unit 6**

Number of Bed Bugs vs. Weeks After Treatment
Can be applied to cracks and crevices along baseboard, interior framework of bed frame, mattresses and box springs, carpets, etc.

- Evenly disperse dust using a hand duster tool
- Thin layer of dust does the job
  - Bugs don’t want to climb mountains!
- Can be applied to Climb-Up monitoring devices as well
- Should not be used in areas with high air current (walkways, vents, etc.)

- Remove people with respiratory illnesses from the area when applying.
N-95 masks

- N-95 masks should be used when applying desiccant dust
- Can help reduce inhalation of any airborne particles
- Place the respirator over the nose and mouth and place straps behind the head, then pinch the nice piece
  - Cup hands around mask and breath out. If you can feel air flowing air, readjust.
  - People with asthma, COPD, or other respiratory issues should consult their physician before wearing an N-95 mask.
What’s wrong with chemical products?

- Most products will kill some bed bugs if applied directly to the bugs
- Sprays have low residual efficacy
- “Bug bombs” move bugs out of one room only to infest another
- Consumers don’t realize that killing bed bugs we can see is not the problem. Why not just hit each bug with a hammer?
- Bed bugs are highly resistant to a number of insecticides, and their eggs are impervious to most insecticide formulations
- Even most, if not all, pest management professionals use some non-chemical methods for bed bug management
- Bed bugs don’t make you sick, but the poisons used to kill them can!

READ & FOLLOW THE LABEL!
Read the small print

- Does it have an EPA registration number?
- Is it intended for indoor use?
- Is it effective against bed bugs?
- If a concentrate, do you know how to properly mix it?
- Where and how is it supposed to be applied?
READ THE LABEL FIRST!

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Read and follow all label directions.

BEFORE YOU USE: Read these restrictions before using.

RESTRICTIONS: For indoor use only.
- Do not contact treated surfaces until dry.
- Do not apply to furniture or upholstery where prolonged contact with humans will occur.
- Do not spray bed linens or other materials which come in direct contact with occupants of the bed.

HOW TO USE
SHAKE WELL BEFORE USE. Hold can 12 to 15 inches from the surface to be treated. Squeeze trigger to dispense product and spray until surface is slightly wet but not to the point of run off.
Hot Shot® Fogger with Odor Neutralizer creates a fine, penetrating mist that reaches deep into cracks and crevices to flush out and kill hidden bugs on contact. When used as directed, the clear, non-staining formula will not harm drapes, upholstery, fabrics, carpeting, bedspreads, floor tiles, wood floors, lures, furniture, walls, clothing, ceilings, shades or blinds. Kills both flying and crawling insects on contact.

QUICK FACTS
- Fast acting - works in two hours
- Non-staining, no messy residue
- Coverage: Each can covers 2,000 cu ft of unobstructed space (15.5 ft x 16 ft with 8 ft ceiling). Do not use in rooms 5 ft x 6 ft or smaller. Instead, allow fog to enter from other rooms.

KILLS
- Ants (except Fire Ants)
- Black Carpet Beetles
- Brown Dog Ticks
- Crickets
- Earwigs
- Firebrats
- Fleas
- Flies
- Grubs
- Horseshoe Flies
- Mosquitoes
- Palmella Bugs
- Pillbugs
- Rice Weevils
- Roaches
- Saw Toothed Grain Beetles
- Silverfish
- Small Flying Moths
- Spiders
- Waterbugs

WHERE TO USE
In enclosed spaces such as:
- Apartments
- Attics
- Basements
- Boat Cabins
- Campers
- Crawl Spaces
- Garages
- Homes
- Households
- Sheds
- Storage Areas
- Trailers

Does not control Bed Bugs.
Acute Illnesses Associated With Insecticides Used to Control Bed Bugs — Seven States, 2003–2010

United States and internationally (3,5). Bed bug infestations often are treated with insecticides, but insecticide resistance is a problem, and excessive use of insecticides or use of insecticides contrary to label directions can raise the potential for human toxicity. To assess the frequency of illness from insecticides used to control bed bugs, relevant cases from 2003–2010 were sought from the Sentinel Event Notification System for Occupational Risks (SENSOR)-Pesticides program and the New York City Department of Health and Mental Hygiene (NYC DOHMH). Cases were identified in seven states: California, Florida, Michigan, North Carolina, New York, Texas, and Washington. A total of 111 illnesses associated with bed bug–related insecticide use were identified; although 90
Symptoms of pesticide poisoning include headache, nausea, vomiting, diarrhea, dizziness, and muscle tremors.
Take home message

- Take actions to PREVENT getting bed bugs
- If you have an infestation, don’t rely on store-bought chemical products to eliminate the bed bugs
- If you do use chemicals, READ AND FOLLOW THE LABEL
- Best to take a multifaceted, IPM approach to eliminate bed bugs
Questions?

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