

A Home Owners Guide to Bed Bugs

Cimex lectularis L., *C.hemipterus* Fabr.

(Cimicidae: Heteroptera)



Photo by Timothy O'Connor

The common bed bug, *Cimex lectularius* L.

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Adult (center) and nymphs



Photo by Mike Vasil

History

- There are approximately 100 bed bugs species worldwide
- There are two species of human bed bugs; the common bed bug *Cimex lectularus* L. and the tropical bed bug *C. hemipterus* Fabr.
- Bed bug association with humans began during the last ice age in the caves of the Middle East (10,000 years ago)
- When people left caves and built villages and towns, bed bugs came along
- Bed bugs became a worldwide human pest. They were described in 2,000 year old literature, even Aristotle wrote about them

Bed bugs and languages

“Bug” is the shortened old English word “Buggie” meaning ghost or sprite because of their spirit-like nocturnal visits to feed on people

English language references to bed bugs include:

Bughouse - Insane asylum

Firebug – Arsonist

Bug eyed - Protruding eyes

Big bug - Important person

Bug juice - Inferior liquor

“Snug as a bug in a rug”

“Sleep tight, don’t let the bed bugs bite”

Most world languages have a unique name for bed bug:

Germany

Slavic

Czech

Africa

India

Hindu

Spanish

Wandlaus (wall louse)

Pluskwa (flat louse)

Stenice (wall)

Tihuani

Uddamas (biter)

Mak hun

Chinche de Cama

Greek

Latin

French

Russian

Arabic

Chinese

Japanese

Coris (to bite)

Cimex

Punaise (stink)

Klop

Buk

Piq-seq (wall louse)

Tokourami (bed louse)

Medical importance

Bed bug feeding:

- Bed bugs feed on blood to grow and reproduce
- In severe infestations they can cause mild anemia
- They can cause allergic skin reaction and secondary bacterial infection from scratching; direct bacterial infection from the bug has not been reported

Disease pathogens:

- Disease pathogens are not known to be transmitted by bed bugs
- Hepatitis B (HBV) DNA has been found in bed bugs up to two weeks after feeding and Human Immunodeficiency Virus (HIV) up to four hours, but bed bugs can not transmit them to humans

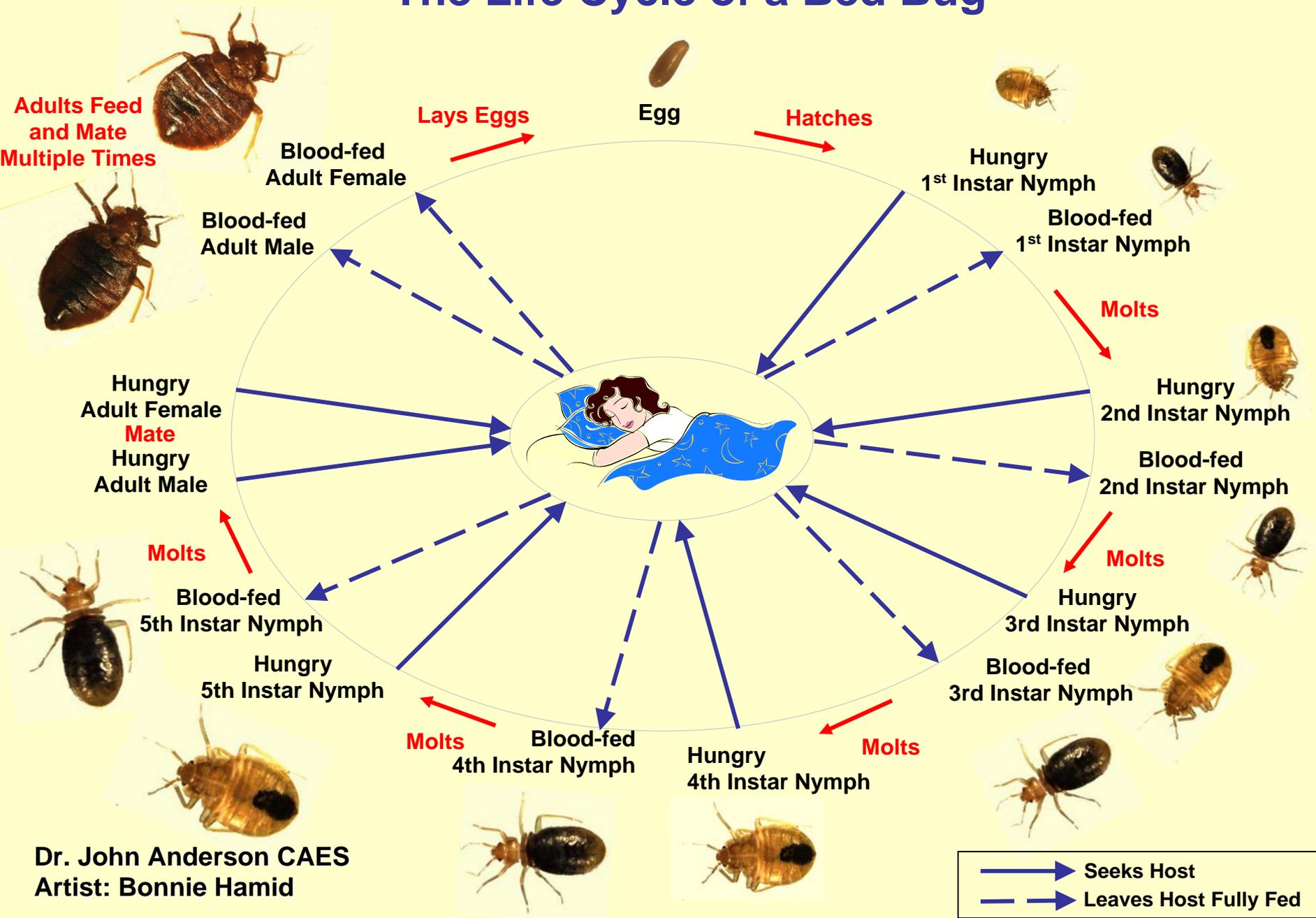
Biology

-  Mating is bizarre and called “Traumatic insemination”. A male saber-like reproductive “clasper” stabs into the female’s underside and a sperm mass deposited into her body. Sperm then swim to her reproductive organs. Mating reduces a female’s lifespan by 30%.
-  After mating, a female may lay an average of 200 eggs in her lifetime. Eggs are small, white, barrel shaped, sticky and hatch in about 10 days
-  The nymphs (immature bed bugs) have 5 molts (stages) before becoming adults. To grow up to the next size they must have a blood meal. Technically they do not bite but suck blood with piercing sucking mouthparts called a beak
-  Adults are lentil or apple seed in size (6-8mm;1/4 inch), chestnut brown and flat. They can live as long as 316 days

Bed bug survival

- **Bed bugs are temperature sensitive**
- **At 86°F (30°C), egg to adult development can occur in 21 days**
- **At 65°F (18°C), development requires 120 days**
- **Adults often become inactive between 55°F (13°C) and 59°F (15°C) but populations can adapt to cold and be active at 45°F (7°C)**
- **Bed bugs are killed at temperatures between 111°F (44°C) and 113°F (45°C)**
- **Bed bugs hide in cracks and crevices during the day near where people sleep or congregate**
- **Feeding lasts 3 – 15 minutes at night, usually before dawn. They usually defecate after feeding leaving brown spots on the bedding or other surfaces**

The Life Cycle of a Bed Bug



Dr. John Anderson CAES
Artist: Bonnie Hamid

Signs of bed bug infestation

- Fecal brown spots on sheets, mattress or adjacent objects



Bed bug fecal spots



Photos by Dr. Ridge
Bed bug on arm (size, 1/4 inch)

- A sweet musty odor is often noticed when populations are high

 **Feeding sights may be either clustered or in rows on exposed skin**



**A common skin reaction to bed bug feeding.
Note how the feeding sites are in a row**

Photo by Dr. Ridge

 **Dead bugs and/or their shed skins present in or near hiding places**

Preventing bed bug entry into a home or apartment

VIGILANCE AND EARLY DETECTION STOPS BED BUG INFESTATIONS FROM GETTING OUT OF CONTROL

- Know sources of bed bugs
- Travel precautions reduce chances of bringing bed bugs home
- Get proper identification of suspected bed bugs



Adult bed bug is 5 mm (1/4 inch) long

Photo by G. Ridge

**Bed bugs can easily enter into homes or apartment.
Be aware that the following can be sources:**

-  Purchased used furniture, TV's, linens, cloths, boxes etc.**
-  Furniture including mattresses, cloths etc., picked up off the street**
-  Gifted furniture, luggage, clothing etc., from a personal acquaintance**
-  Self infesting by bed bugs themselves. Bed bug can walk from room to room; apartment to apartment very easily**
-  Items from self storage facilities**
-  Items carried in rental, delivery or moving trucks**
-  Rented furniture from rental furniture centers**
-  House guests who have traveled or relatives/friends visiting from long-term care**
-  Cruise ship vacationers**
-  Luggage and other items from traveling**

Travel tips

The following tips may reduce your chances of bringing bed bugs home:

-  Travel with clothes that can be laundered in hot water and withstand 30 minutes of hot drying
-  Select hard smooth luggage over fabric luggage. Hard smooth cases have fewer places for bed bugs to hide
-  Pack plastic bags to seal purchased items or to isolate items which may become infested
-  Once at vacation destination, keep luggage off floor and beds. Place on luggage racks; do not unpack cloths; keep luggage closed when not in use; hang business suites and dresses on shower rail

Travel tips

-  **Inspect bed area for brown fecal spots and bugs on mattress seams, headboards, furniture and objects adjacent to the bed**
-  **Before checking out, pack clothing, souvenirs etc., in sealable plastic bags. Check luggage, including shoes, for bed bugs**
-  **On arriving home, unpack luggage outside residence; take cloths in plastic bags directly to washing machine and wash immediately; dispose of empty plastic bag in trash; dry clean delicate clothing; lightly spray empty luggage with a pyrethrum-based insecticide**
-  **Note: Freezing must be for longer than 72 hours to kill bed bugs**

Control history and resurgence

- Starting with DDT after WWII through the 1970's, bed bugs were all but eradicated from the western world
- Reemergence started in the late 1990's because of increased international travel and decline of residual pesticide use in buildings
- Bed bugs are not a reflection of personal hygiene. They are indiscriminate regarding people's socio-economic status or cleanliness and are opportunistic. Anyone can pick them up (see sources).
- Residences and temporary shelters with transient human populations are particularly at risk for bed bugs. They may include homeless shelters, hotels, motels, other multi-type residences, college and university dorms, hostels, halfway houses, correctional facilities, summer camps, churches, airports transit lounges, residential or conference centers, restaurants, and residential charities

Steps for control

- **Step 1: IDENTIFICATION.** Have insects properly identified by an expert. They can be confused with other insects such as carpet beetles and there are other species of bed bugs such as bat bugs which require a different approach for control



Bed bug compared with a carpet beetle larva (left)

Photo by Dr. Ridge

- **Step 2: PICK UP.** Pick up clutter, books, magazines, ornaments, clothing and miscellaneous items, checking for bed bugs. If bed bugs are suspected, put into a ziplock bag and freeze for longer than 72 continuous hours to kill the bugs

Steps for control

- **SECURE BED:** Wash sheets and bedding in hot water and dry in hot dryer for 30 minutes. Dry clean delicates

Pull bed 6" away from wall and wrap legs of bed with clear 2" wide sticky tape, sticky side facing out to catch climbing bed bugs

Vacuum bed frame, mattress, and box spring using a crevice tool

Keep bedroom cool (if possible) at night to slow down bed bug activity

- **Step 5: GET PROFESSIONAL HELP:** Call in a professional pest control operator (PCO) for corrective treatment

- ❖ Eliminating clutter is critical for effective bed bug management by a PCO
- ❖ Not all PCO's specialize or handle bed bug management
- ❖ Control of bed bugs usually requires more than one visit by the PCO
- ❖ A careful inspection is usually the first step before treatment
- ❖ All PCO's must be licensed

Acknowledgments

Bed bug piercing sucking mouthparts
(the beak)

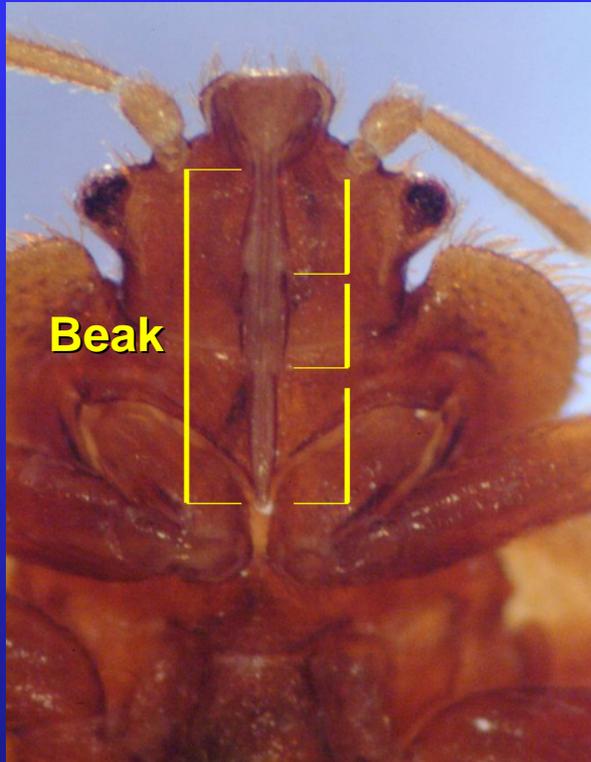


Photo by Rose Hiskes

I thank Dr. Harold Harlan of the Armed Forces Pest Management Board, Maryland and Dr. John F. Anderson, Bonnie Hamid, Dr. Kirby C. Stafford, and Dr. Louis A. Magnarelli of The Connecticut Agricultural Experiment Station, Marty Gilloren and Jim Miller of Yale Pest Elimination, Connecticut, and Patrick F. Callahan of Biosensory for their assistance in writing this fact sheet.

I also thank the photographers Rose Hiskes, Timothy O'Connor, and Mike Vasil for providing images of bed bugs.

References

- Adler M. W. 2001. Development of the epidemic. *BMJ* 322: 1226-9
- Cleary J. C., Buchanan D. 2004. An emerging U. S. infestation. *The nurse practitioner*. Vol. 29. No. 6: 46-48
- Phil, Rick et al. 2007. *Cooper's Travel Guide to Bed Bugs*. Copper Pest Solutions Inc.
- Hwang S. W., et al. 2005. Bed bug infestations in an urban environment. *Emerging Infectious Diseases*. Vol. 11, No. 4
- Jupp P. G., Lyons S. F. 1987. Experimental assessment of bed bugs (*Cimex lectularius* and *Cimex hemipterus*) and mosquito (*Aedes aegypti formosus*) as vectors of human immunodeficiency virus. *AIDS*: Sept., Vol. 1 (3): 171-4
- Potter M. F. 2004. Your guide to bed bugs. *Pest Control Technology*. August
- Schaefer C. W. 2000. Heteroptera of economic importance; chapter 17, Bed Bugs (Cimicidae). CRC Press
- Silverman A. L., Qu L. H. Blow J., et al. 2001. Assessment of hepatitis B virus DNA and hepatitis C virus RNA in the common bed bug (*Cimex lectularius* and kissing bug [*Rodnius prolixus*]). *American Journal of Gastroenterology* Vol. 96: 2194-8
- Usinger R. L. 1966. Monograph of Cimicidae (Hemiptera: Heteroptera). The Thomas Say Foundation Vol. VII
- World Health Organization, vector biology and control unit: WHO/VBC/75.