



 COLLEGE OF AGRICULTURE & LIFE SCIENCES
 COOPERATIVE EXTENSION

ITCHY BUG COMPARISON- BED BUGS, BODY LICE, SCABIES


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Some images may be disturbing





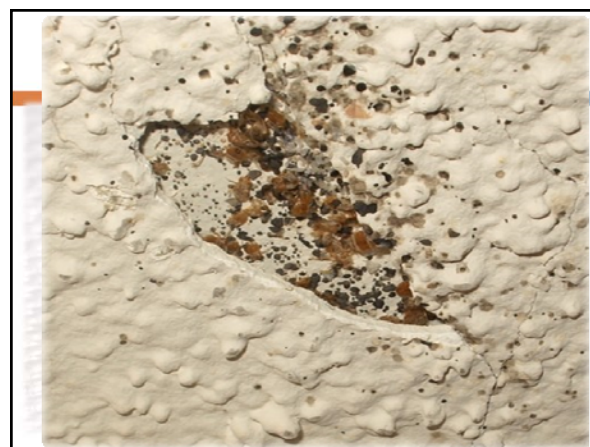
Bed bugs – *Cimex lectularius*

- Blood feeding ectoparasites
- Hitch-hike in on belongings that come from homes with infestations
- Size of an apple seed

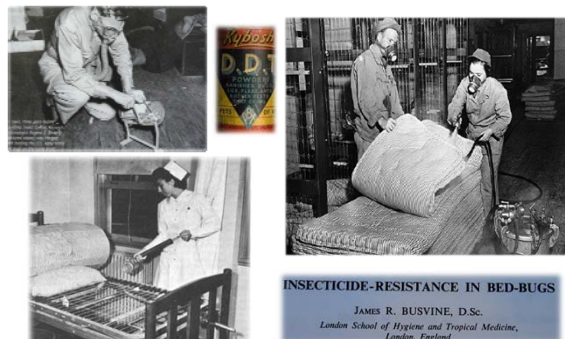


Bed bugs

- Bugs fall off clothing or bags and may be found roving on surfaces
- Transfer from one person to another is unlikely

Bed bugs were almost eradicated from the U.S. in 1940-50




INSECTICIDE-RESISTANCE IN BED-BUGS
 JAMES R. BUSVINE, D.Sc.
 London School of Hygiene and Tropical Medicine,
 London, England

Springing mattress of bed with DDT in America for bed bugs. 1948. photograph


Resurgence
 2001 Arizona
 Some communities remain unaware of chemical exposure risks

Beds in school dorms were sprayed with diazinon weekly

Diazinon registration for in-home use withdrawn by manufacturer in 2004



- **Limited** mostly to **hotels** and **remote communities** prior to 1999, then quickly spread into mainstream residential sectors of developed countries
- 99.6% of nationwide surveyed pest management professionals have encountered a bed bug infestation in 2012 (2013 Bugs Without Borders)
- **Overall increase in the U.S. of 20% between 2012 and 2013**



- Increase in global and domestic travel
- **Increased resistance to insecticides**
- **Changes in technology**

Bedbug boom blamed on increased foreign travel

SCIENTIFIC REPORTS | ARTICLE | OPEN

Bed bugs evolved unique adaptive strategy to resist pyrethroid insecticides

Fang Zhu, Hemant Dugar, Jennifer R. Gordon, Kenneth F. Haynes, Michael F. Potter & Subba R. Palli

Affiliations | Contributions | Corresponding author

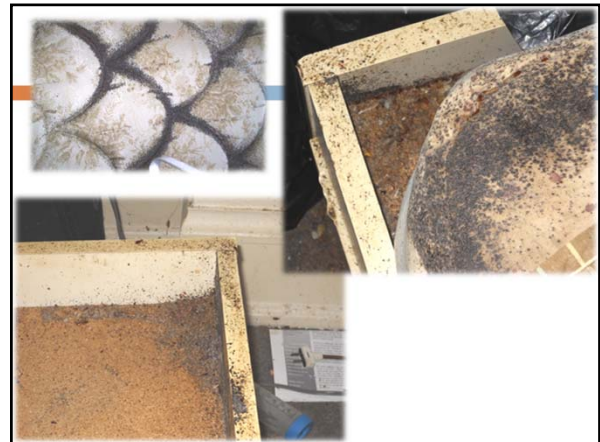
Scientific Reports 3, Article number: 1456 | doi:10.1038/srep01456
 Received 28 December 2012 | Accepted 25 February 2013 | Published 14 March 2013



The poor are at greatest risk

Increasing number of people reporting long-term infestations (beyond a year)



Reactions to bites

- Bites **may** occur in lines
- usually on exposed skin
- Saliva can cause a person to **itch** and cause **swelling**
- Scratching can lead to **secondary infections**
- **Adults over 65 years of age tend to react less or not at all**

Emotional impact

- Loss of sleep
- Nightmares
- Stress/anxiety
- Feeling isolated
- Loss of self esteem
- Feelings of depression
- Cannot relax
- Loss of friends and family connections
- Etc., etc.

<http://cals.arizona.edu/apmc/public-health-IPM>



Places where people rest for hours at a time

Beds, sofas, bedside tables, recliners, picture frames...

● = Hot Spot

- Most products will kill **some** bed bugs
- Killing bed bugs **we can see** is never going to eradicate bed bugs from a home

1 exterior
3 partial
16 internal

Not all aggregations are obvious

Effective Chemical Tools

<https://www.pctonline.com/article/pct0312-temprid-transport-insecticides-testing> and <http://www.pctonline.com/article/pct0814-silica-gel-research-bed-bugs>

Temprid SC (beta-cyfluthrin + imidacloprid)
<http://www.backedbybayer.com/pest-management/general-insect-control/temprid-sc>

Tandem (Thiomethoxam and Lambda-Cyhalothrin)
www.syngeantamp.com/tandem

Transport GHP (bifenthrin + acetamiprid)
<http://www.fmcagsolutions.com/Home/PestLibrary/BedBugs/Integrate/TransportGHP.aspx>

Phantom Aerosol (chlorfenapyr)
<http://pestcontrol.basf.us/reference/literature/smartsolutions-bed-bug-solution-guide.pdf>

CimeXa (amorphous silica gel)
<http://www.rockwelllabs.com/CimeXaInsecticideDust.shtml>

Alpine Dust (dinotefuran + DE)
<http://pestcontrol.basf.us/reference/literature/smartsolutions-bed-bug-solution-guide.pdf>

Collaborative Strategy on Bed Bugs

Prepared by
The Federal Bed Bug Workgroup
February 2015

This Collaborative Strategy on Bed Bugs was developed through the efforts of the National Bed Bug Workgroup, a coalition of the following: Federal and State Agencies, the Strategic and Operational Bed Bug Research Centers, the National Bed Bug Workgroup, and the National Bed Bug Workgroup. The work group was established by the U.S. Environmental Protection Agency (EPA) in 2010 to coordinate and coordinate the efforts of the various agencies and organizations involved in bed bug research and control.

If a bed bug is discovered in a room...

- Do not panic or cause panic!
- Usually, it will be a stray, **single** roving bug
- Carefully collect it for identification
- No need to evacuate
- Thoroughly inspect, clean and monitor the room

Passive monitors or traps

- 12 Volcano Trap
- 4 Climb Up Interceptors
- 4 Bed Moat
- 12 Blackout BB Detector
- BEAP BED BUG LURE ATTRACTANT

Canine detection

- ❑ Excellent detectors
- ❑ Can distinguish between live and dead bugs
- ❑ Expensive and require constant training
- ❑ Are only as good as their handler
- ❑ **Good defense in litigation cases – so is having a bed bug procedure protocol**



Whole Home Heat

- ❑ Propane or electric
- ❑ Temperature ~140°F
- ❑ Time 4 hours



Mattress encasements are not the same as pesticide impregnated (Permethrin) mattress liners



Modern Woman Digest

Disinformation

Disturbing New Trend:
Kids Are Now Smoking Bed Bugs To Get High

“Just when us adults thought that the children of today couldn’t get any more stupid, they come up with a new and amazing way to get high, rewriting the definition of probably a bad idea.”

This fad originated in Arizona, where a group of kids thought up the bright idea of capturing bed bugs, crushing up the bodies, and inserting the pieces into “bongs”. The children then light the bongs and inhale the fumes.



Inhaling the smoke coming off of the bed bug pieces, they experience visual and auditory hallucinations. Bed bugs are known in the scientific community to secrete an active hallucinogenic chemical, that produces a feeling that resembles “walking on wet concrete.”

Resources

1. <http://www2.epa.gov/bedbugs>
2. <http://cals.arizona.edu/apmc/public-health-IPM>
3. <http://www2.epa.gov/sites/production/files/2015-02/documents/fed-strategy-bedbug-2015.pdf>
4. <http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1563.pdf>
5. <http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1625-2014.pdf>
6. <https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1642-2014.pdf>



Centers for Disease Control and Prevention
CDC 24/7: Saving Lives. Protecting People™



United States Department of Agriculture
National Institute of Food and Agriculture

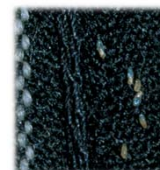
Body lice - *Pediculus humanus corporis*

- Can (but don't often) transmit pathogens causing typhus, trench fever, epidemic relapsing fever
- Hygiene improvements and laundering are usually sufficient to resolve infestations
- **Transfer to care staff may occur if they have prolonged physical contact with person, clothing, or bedding**
- Larger than head lice (2.3-3.6 mm)



Body lice - *Pediculus humanus corporis*

- If temperature/humidity is high, lice move to the outsides of clothing increasing transfer chance
- Lice can survive several days off the host and nits can be viable for over a week



Symptoms of body lice

- Severe itching of the skin particularly in the hip, groin and upper thigh areas
- Scratch marks, open sores and healing wounds on the skin
- Discolored, rough patches of the skin which may be thickened and hyperpigmented (Vagabond's disease)
- Insects crawling on skin or clothing
- Nits on clothing
- Pubic lice (*Phthiriasis pubis*) or "crabs" (<2 mm)

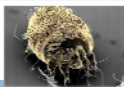


Trench fever and body lice



- *Bartonella quintana*
- *B. quintana* transmitted in the feces of body lice
- Homelessness, poverty, HIV, alcoholism

Scabies mites



- Human scabies - human itch mite *Sarcoptes scabiei* var. *hominis*
- Female scabies mite burrows into the **upper layer of the skin** where it lives and lays eggs
- The scabies mite usually is spread by direct, **prolonged skin-to-skin contact**



Scabies mite burrow track

Scabies mites



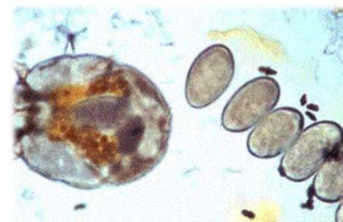
- Optimal environments for the spread of scabies:
 - Crowded living conditions
 - Hospital and medical care facilities
 - Childcare schools and adult daycare facilities
- **Mites can not survive longer than 3 days off the host**
- Mites can only be eliminated from a host using **prescription treatments – no resistance issues**
- **Rx are different from head lice products**

- Scabies is an intensely pruritic
- Moderately contagious
- Adults are 1/3 millimeter long
- Mites are inactive below 20°C (68°F)
- At 20°C mites can persist for 2 weeks

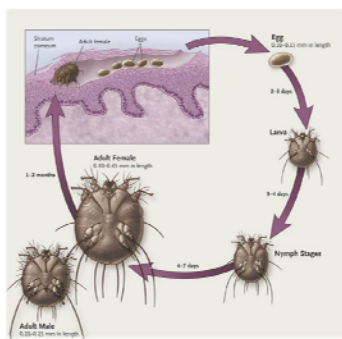


SPREAD

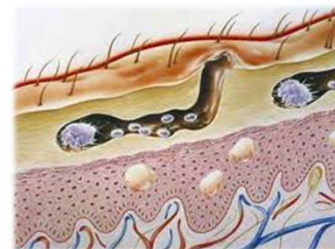
- The mite remains viable for 3 days on inanimate objects; transmission via articles such as clothing, towels, or bedding, is possible, but **not likely**



Infection occurs due to the direct transfer of a single fertilized female



- After mating, the male mite dies
- The female mite transfers or burrows into the epidermis of the host (30 minutes) using her jaws and front legs, then she lays up to 3 eggs per day
- Life cycle 10-17 days



- Burrows are often not seen but check in the webbing of fingers or on the inside of wrists
- Malformed fingernails (nails should be clipped short if undergoing treatment)



- An affected host harbors only **10-15 adult mites** - typical infestation
- **Skin scrapes** are the only way to positively identify mites



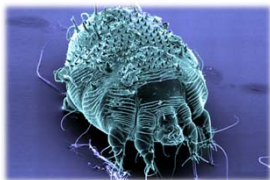
- A delayed type IV hypersensitivity reaction to the mites, molts, eggs, or scybala (packets of feces) occurs approximately 30 days after initial infestation



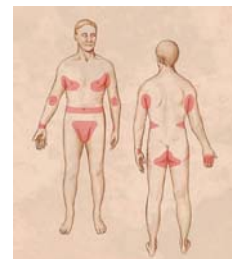
- Scabies disproportionately affects **women and children**
- **Pruritus is most severe at night**
- Secondary bacterial infection is most commonly due to *Staphylococcus aureus*, group A β -hemolytic *Streptococci*, or *Peptostreptococci*



- Scabies is unlikely to cause a long-term disease state in healthy individuals
- Lesions and associated **pruritus may last for weeks to months** without adequate treatment
- **The immunocompromised are likely to develop crusted scabies, which may be impossible to fully eradicate**



- In adults, lesions are usually confined below the neck and involve the web spaces between the fingers, flexor surfaces of the arms, wrists, axillae, and the waistline
- The umbilicus, nipples, penis, and scrotum may also be affected



TREATMENTS

- Permethrin (e.g. Elimite) is a neurotoxin that causes paralysis and death of the mites
- It is the most common treatment used today for scabies
- **The lotion should be applied over the entire body from neck down**
- **It should be left on for 8-12 hours and then rinsed off**



- Reapplication of permethrin one week later is advised; however, no controlled studies exist that show that 2 applications are better than one
- **No cases of permethrin resistant scabies documented**



- Crotamiton (e.g. Eurax; Crotan) frequent treatment failure has been reported with crotamiton
- **Lindane lotion is NOT recommended, but not all doctors are aware of this**



- The antihistamine diphenhydramine (Benadryl), can be useful in helping provide relief from itching
- **Itching often becomes worse after the mites are killed, and can be intense for a few weeks before abating**



Norwegian (crusted) scabies

- In 1848, the Norwegians Danielssen and Boeck described a highly contagious variant of scabies that occurs in **immunocompromised** patients
- Crusted or hyperkeratotic scabies, is an overwhelming scabies infestation that can be **very difficult to control**



- Rare form of scabies occurs in the elderly or mentally incompetent patients
- Because of an impaired antibody response, these individuals can be infested with thousands to millions of mites



Inappropriate things

- Pesticides applied to rooms
- Pesticides applied to transportation buses
- Sterilants and high level disinfectants applied to room surfaces incorrectly



The Service You Provide is Important

Clean or Wait - Monitor – Repeat

So why are all these delightful creatures increasing in incidence?

Why are cases increasing?

- Immigrants from developing countries where ectoparasite incidence is much higher (e.g., 50% population have head lice)
- Hair extensions and wraps
- Busier parents and guardians
- Fashion trends



Who was really behind the evolution of the “selfie”?



Society reliant on quick-fix solutions

- 6th century nit comb from Egypt
- 21st century Terminator nit comb



Social fashions impact ectoparasites

- Head lice in hair braids



Social fashions impact ectoparasites



- Will the pubic louse become an endangered species due to habitat destruction?



Comparison of human parasites				
	Bed bugs	Head lice	Body lice	Scabies
Organism	True bug	Louse	Louse	Mite
Food	Blood	Blood	Blood	Skin cells
Survival off host	Months	2 days	1 week	3 days
Remediation methods	EPA pesticide/heat	FDA pediculicide/heat	Heat/hygiene	FDA acaricide
Transmission	On/in items	Head-to-head	On/in clothing, bedding	Skin-to-skin

