Detection and Control of Bed Bugs

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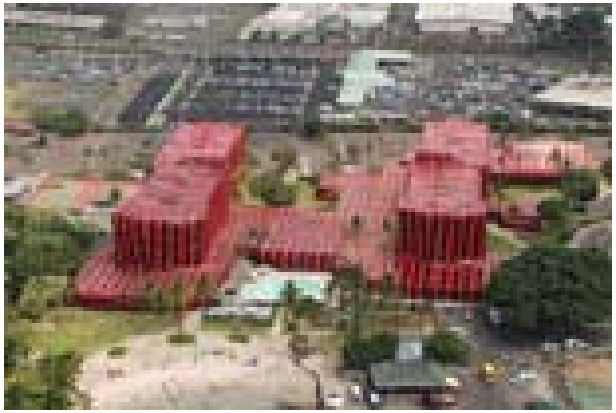
The More Things Change, the More They Stay the Same

1906: B. H. Walden, a station entomologist, used hydrocyanic acid to fumigate a house. After achieving total eradication, 5 more houses were treated.

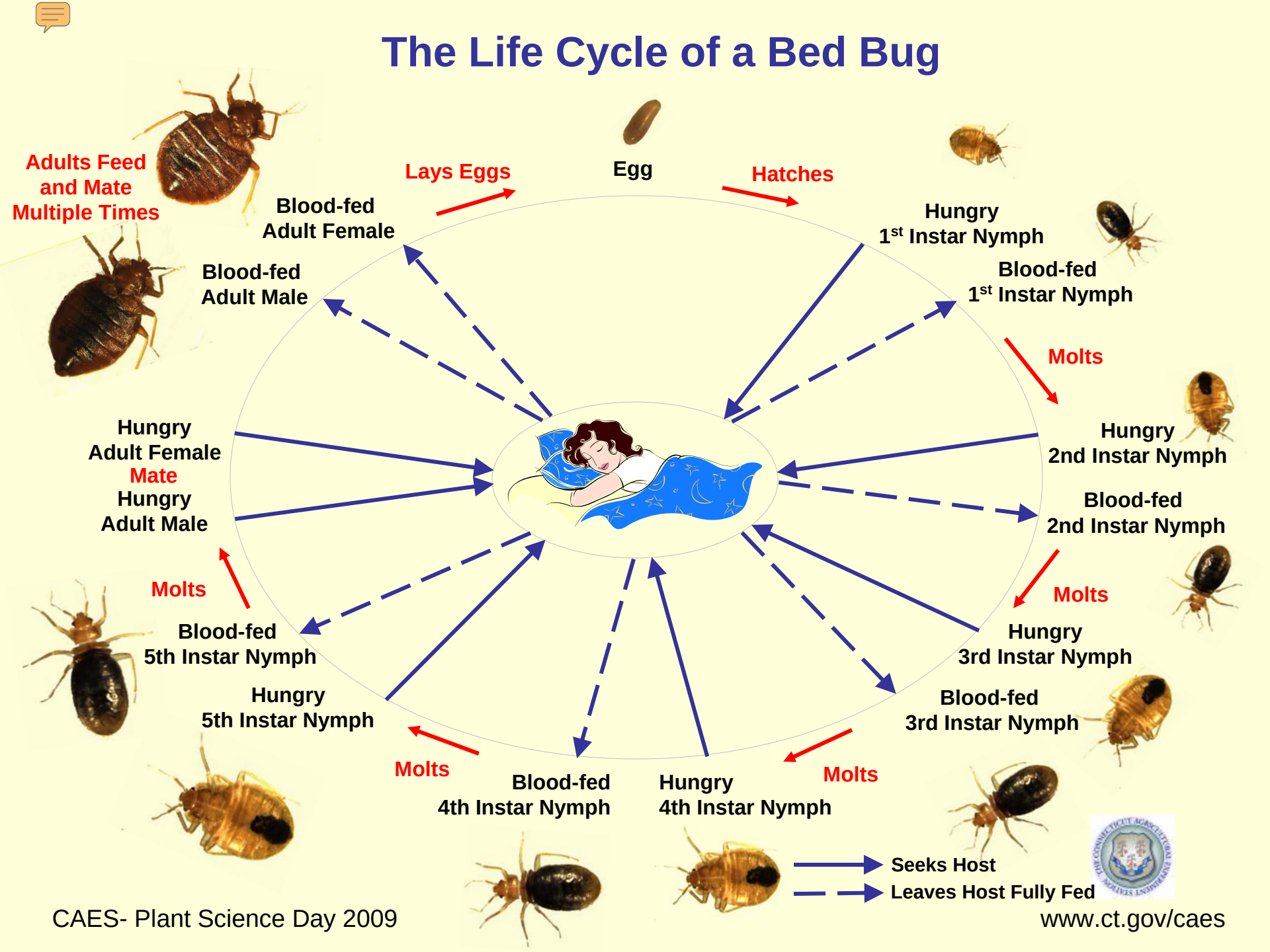
USDA pamphlet, 1947

1945: Practical trials were conducted at the Experiment Station using DDT against bed bugs.

2008: Fumigating a hotel complex for bed bugs in Hawaii



The Life Cycle of a Bed Bug



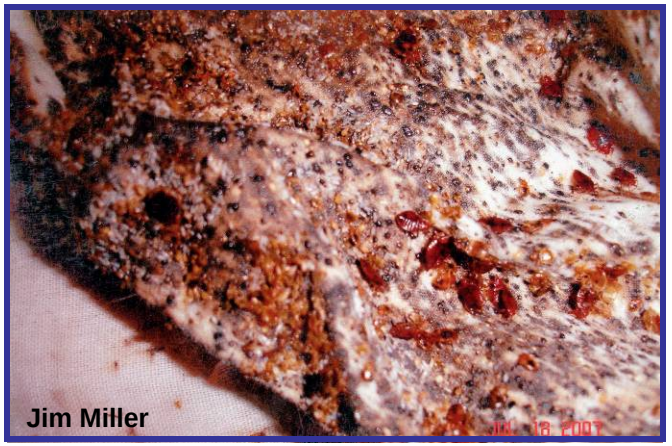
Don’t Let the Bed Bugs Bite!

Bites on Arm Showing Rounded Swellings with Diffuse Redness

Forearm Showing Linear Blisters

Forearm Showing Multiple Blisters from Bed Bugs in a Sleeping Bag

New Haven Apartment, 2007



White sheet on bed

Bed bugs in refrigerator

A carbon dioxide, heat and chemical lure trap for the bedbug, *Cimex lectularius*

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Abstract. A trap for the collection of bedbugs, *Cimex lectularius* Linnaeus (Hemiptera: Cimicidae), is described. The trap was baited with CO_2 (50–400 mL/min), heat (37.2–42.2 °C) and a chemical lure comprised of 33.0 μg proprionic acid, 0.33 μg butyric acid, 0.33 μg valeric acid, 100 μg octenol and 100 μg L-lactic acid, impregnated into a gel. Laboratory studies, conducted in a square arena measuring 183 cm on each side, showed that traps with and without baits captured adult bedbugs, but traps with CO_2 emissions of 50–400 mL/min caught significantly ($P < 0.05$) more bedbugs than traps without CO_2. In an infested unoccupied apartment, traps with heat and with or without the chemical lure were tested without CO_2 on 29 trap-days and with CO_2 on 9 trap-days. The numbers of bedbugs captured were 656 and 5898 in traps without and with CO_2, respectively. The numbers of bedbugs of all development stages captured were significantly greater in traps with CO_2 ($\chi^2 = 15\,942$, d.f. = 1, $P < 10^{-9}$). A non-parametric two-way

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Infested Apartments

Furniture removed from apartment

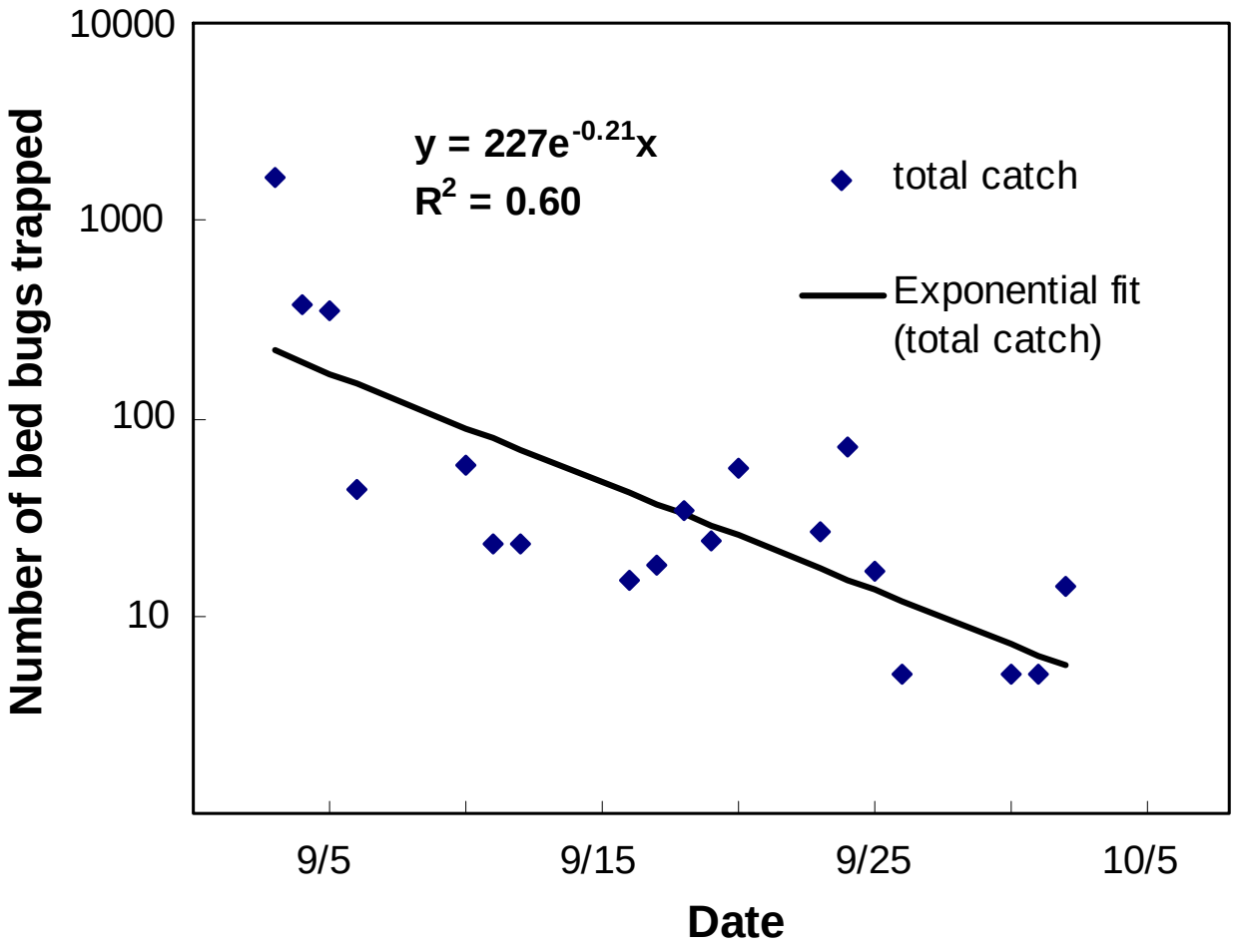
Apartment with furniture

Nonparametric two-way analysis of variance of data from 6 different types of bed bug traps tested in an unoccupied apartment without furniture

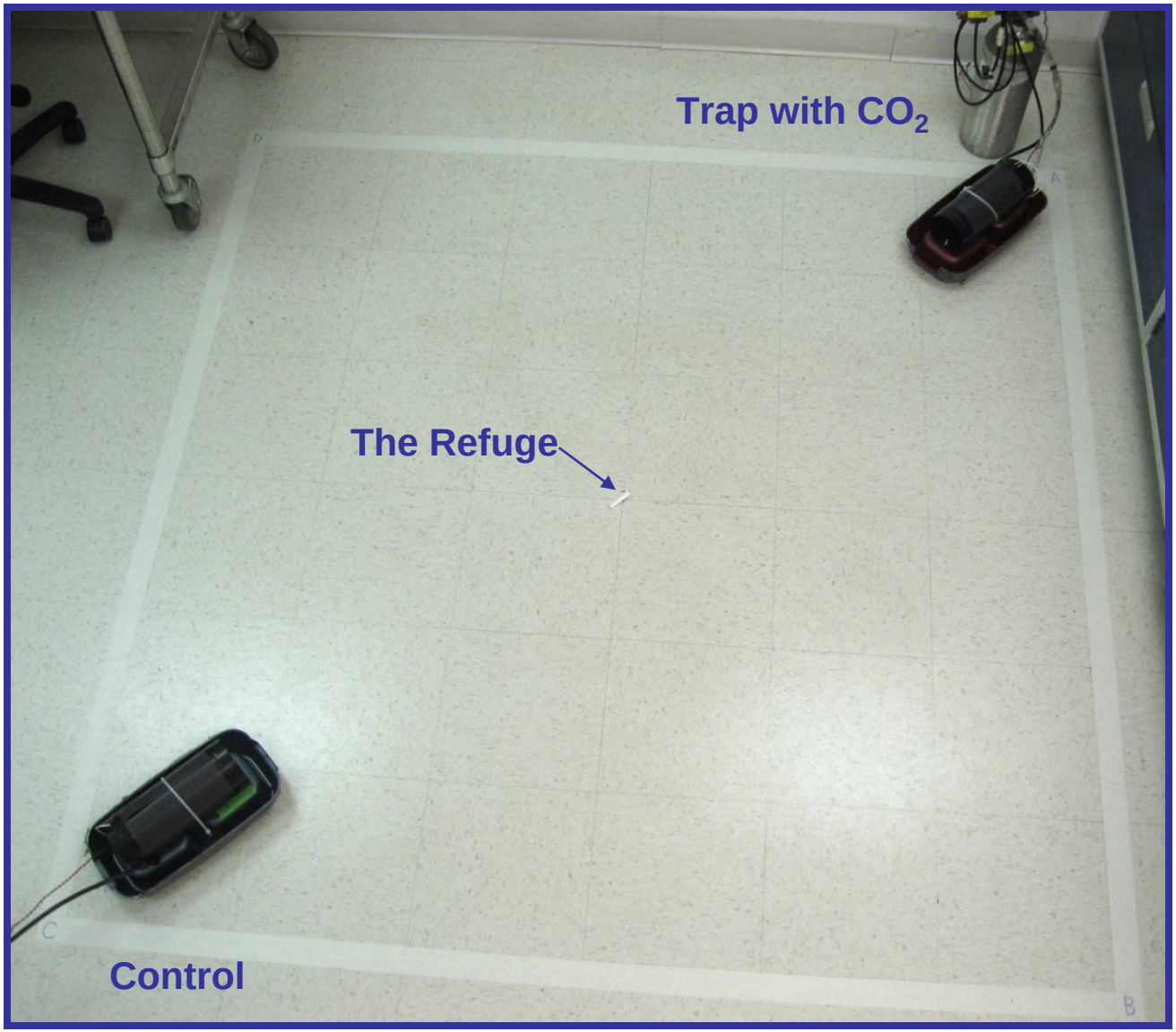
Trap Type				No. Bed Bugs Collected	Mean Rank[1]	
Trap No.	CO_2	Heat	Lure		Total	
1	x[2]	x	x	1,476	5.14	a
3	x	x	0	668	4.10	ab
4	x	0	0	336	3.62	b
5	0	0	x	179	3.57	bc
2	0	x	0	80	2.48	cd
6	0	0	0	94	2.10	d
				2,833	$p<10^{-7}$	

[1] Ranks followed by the same letter are not significantly different ($p<0.05$).
[2] x = bait present; 0 = bait absent.

Decline of Numbers of Captured Bed Bugs in a Naturally Infested Apartment, September 4 - October 5, 2007



The Bed Bug Arena



Number of bed bugs captured in traps placed in the laboratory arena

Experiment No.	Treatment[a]		Replicates	Total bed bugs			
	Trap 1	Trap 2		Released	Trap 1	Trap 2	Not captured
1	50 CO_2	0	4	40	31[b]	2	7
2	0	50 CO_2	4	40	4	28	8
3	100 CO_2	0	8	80	60	8	12
4	300 CO_2	0	4	40	26	6	8
5	400 CO_2	0	8	80	60	7	13
6	400 CO_2	400 air	4	40	26	6	8
7	400 CO_2, H, L	400 air	4	40	30	5	5
8	H	0	8	80	37	12	31
9	L	0	4	40	10	12	18

[a]Numbers indicate flow rate (mL / min) of released gas in trap (CO_2 or air), H signifies heated trap, L signifies the use of the chemical lure, and 0 indicates that an attractant was absent.
[b]Counts in blue are significantly ($p<0.05$) larger than the catch in the other trap.

Residual Insecticides Registered for Control of Bed Bugs on Surfaces other than on Mattresses

Shelves of insecticides designed for bed bug control at Karp's Hardware, Hope St., Stamford, March 10, 2008

lambda-cyhalothrin

permethrin

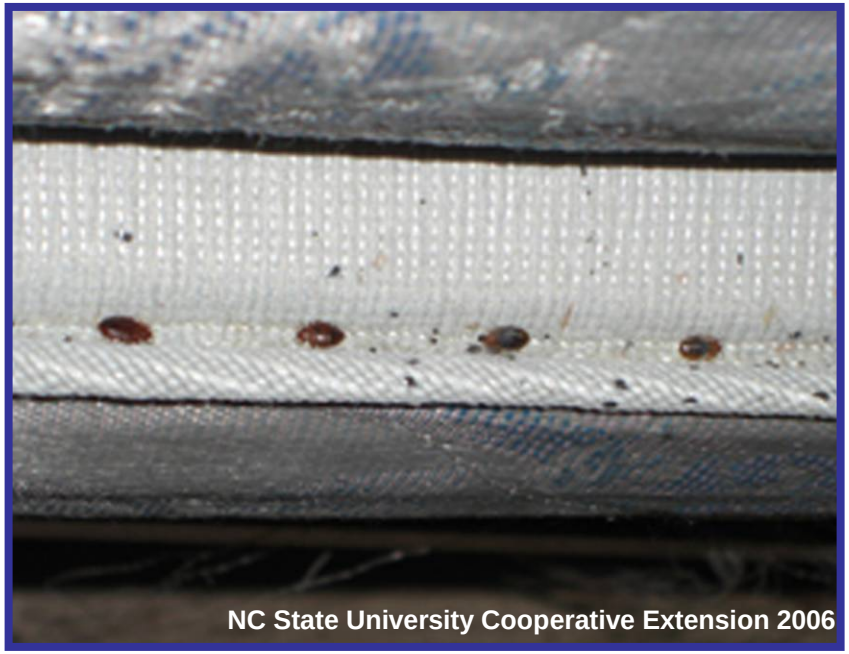
(s)-hydroprene

bifenthrin

fenvalerate

propoxur

Insecticides Registered for Control of Bed Bugs on Mattresses



Residual Chemicals

deltamethrin

cyfluthrin

silica

ground limestone

permethrin

pyrethrins

Contact Chemicals

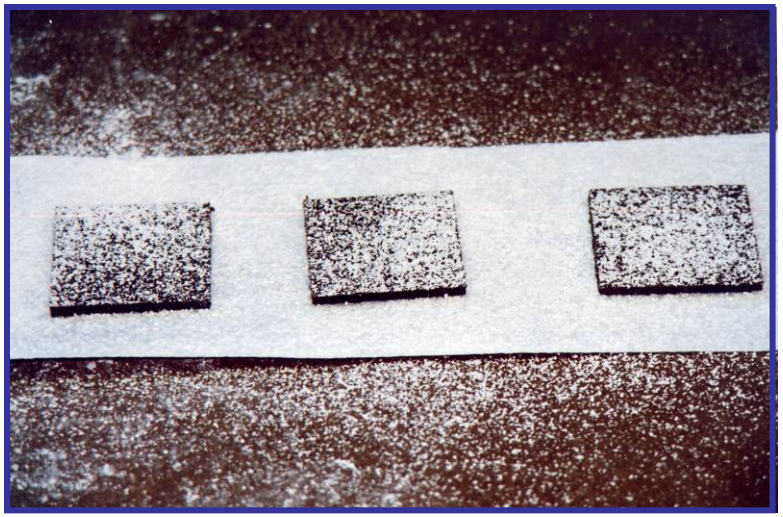
pyrethrins

d-phenothrin

alcohols

Richard Cowles Applying Residual Chemicals to Filter Papers, Hardboards, and Mattress Covers

Applying Drione® to a soil sifter



Hardboards treated with Drione®

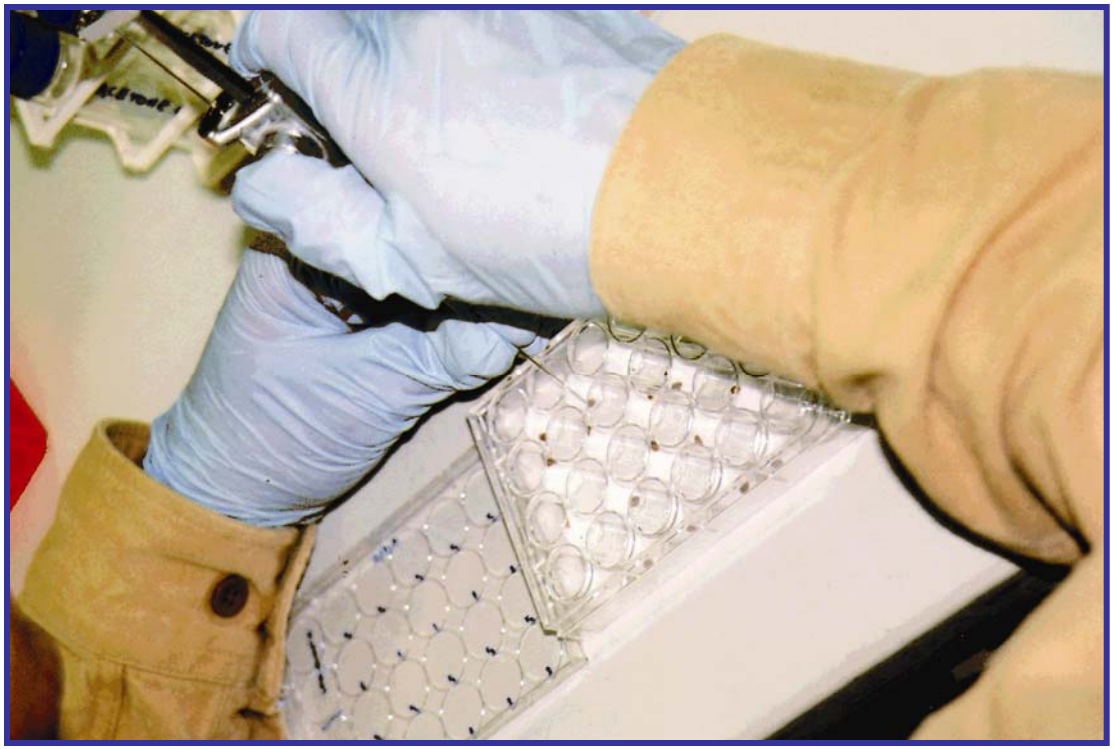
Applying D-Force™

Percent Mortality of Bed Bugs Exposed to Insecticidal Residues

Treatment	Age of residue (days after treatment application)			
	1	15	36	56
Acetone	10	2.2	6.7	1.7
Bedlam	15.6	0	Not Done	Not Done
D-Force HPX	86.7	47	33	27
Drione dust	100	100	100	100
Delta dust	100	100	100	
Tempo dust	100	100	100	
SSG dust	100	100	100	
Cyonara	82	77	52	

Application of Pyrethroids to Bed Bugs

Dr. Cowles assembling Hamilton Repeating Dispenser



Placing a small drop of a pyrethroid insecticide on a bed bug

Two Promising Pyrethroid Insecticides

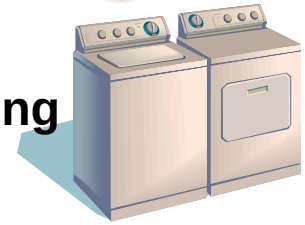
- **λ Cyhalothrin**
- **Cyfluthrin**

Non-chemical Control of Bed Bugs

Vacuuming

Reducing clutter

Laundering & Drying



Steam Treatment

Filling Cracks & Crevices

Thermal Treatment

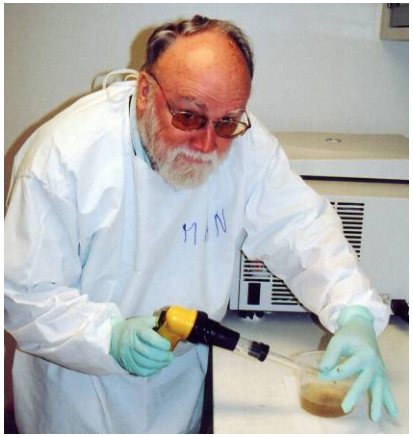
Mattress encasement

Cold Treatment (including Cryonite)

The Bat Bug: *Cimex adjunctus* Barber

Little brown bat infested with bat bugs, 2008

The Virus Lab at the Connecticut Agricultural Experiment Station

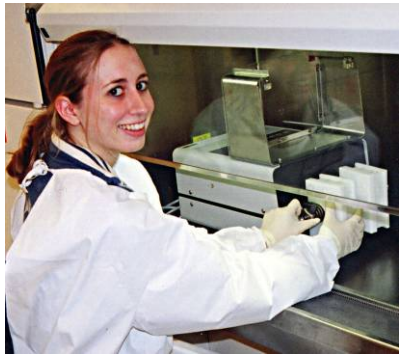


Andy Main

Bonnie Hamid

Mike Vasil

Tanya Petruff



Angela Penna

John Anderson

Mike Misencik

Available Publications

The following publications are available in the Entomology Department of the Connecticut Agricultural Experiment Station

or

Visit our website at www.ct.gov/caes and click on "Bed Bugs"

- **A Home Owner's Guide to the Human Bed Bugs *Cimex lectularius* L., *hemipterus* Fabr. (Cimicidae: Heteroptera)**

  -English Version: (198.78KB, 5 pages, PDF Format)

  -Spanish Version: GUIA DE CONTROL PARA CHINCHE DE CAMA (133.44kb, 5 pages, PDF Format)

  -Mandarin Version: (618.81kb, 7 pages, PDF Format)

- **A Home Owner's Guide to Bed Bugs, Gale E. Ridge (620.45kb, 19 pages, PDF Format)**

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