

# New research on bedbug insecticide resistance

Since I mentioned bedbugs recently, I thought I would also cover this paper:



*Kyong Sup Yoon, Deok Ho Kwon, Joseph P. Strycharz, Craig S. Hollingsworth, Si Hyeock Lee, J. Marshall Clark (2008). Biochemical and Molecular Analysis of Deltamethrin Resistance in the Common Bed Bug (Hemiptera: Cimicidae) Journal of Medical Entomology, 45 (6), 1092-1101 DOI: [10.1603/0022-2585\(2008\)45\[1092:BAMAOD\]2.0.CO;2](https://doi.org/10.1603/0022-2585(2008)45[1092:BAMAOD]2.0.CO;2)*

One of the biggest issues in bed bug control right now is the development of resistance to insecticides. In fact, the New York City population of bedbugs used in this study was **264-fold more resistant** to 1% deltapermethrin compared with a population collected in Florida!

To put it another way: the Florida bed bugs were killed in 19 minutes; the New York bedbugs took 5,048 minutes, or over 3.5 days, to die. Uh Oh.

The research paper itself is a rather technical evaluation of just how and where, in terms of molecular biology, the mutation that makes the bed bugs resistant occurs. Interestingly, it's *kdr* resistance once again! (*kdr* stands for "Knock-Down Resistance.")

I've mentioned [kdr mutations](#) several [times](#) here at the Bug Blog in discussions about DDT. Basically, most insecticides act as a nerve poison for insects. Insecticides block [ion flow \(alternate animation\)](#) across a nerve membrane by attacking sodium channels. If the nerve can't [depolarize](#), the cell (and animal) is effectively paralyzed.

*Kdr* mutations are usually [point mutations](#) — a tiny change in one amino acid in a giant string of DNA. It makes just enough of a change to make the bugs resistant.

*Kdr* mutations are also problematic because they often make a bug resistant to more than one insecticide. This means that an already difficult to control insect just got a lot harder to kill, since your tools (insecticides) wear out faster.

The conclusion of the paper:

*"This evidence suggests that the two mutations are likely the major resistance-causing mutations in the deltamethrin-resistant NY-BB through a knockdown-type nerve insensitivity mechanism."*

AND:

*"Because DDT has been used indiscriminately to control many insect pest species including bed bug, the widespread and frequent use of DDT is likely to have predisposed bed bug populations to pyrethroid resistance through the neuronal insensitivity mechanism."*

So, what does this new information tell us?

- DDT will be utterly useless against bed bugs, so people should stop asking for it.
- We're going to need a lot more research on ways to kill bedbugs other than just poisoning them with the usual pesticide suspects.
- In cities where there are active bed bug populations, insecticide choice for resistance management will be very important in urban entomology.
- Bedbugs are not going to go away, and you should probably be getting a little paranoid.

If, you know, you weren't *already* paranoid when you read [stuff like this](#). What a nightmare.

This entry was written by [Bug Girl](#) and posted on February 5, 2009 at 11:14 pm and filed under [Entomology](#), [Insects](#), [Science](#) with tags [bed bugs](#), [cimex](#), [DDT](#), [insecticide](#), [kdr](#), [lectularius](#), [resistance](#). Bookmark the [permalink](#). Follow any comments here with the [RSS feed for this post](#). Both comments and trackbacks are currently closed.