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### 'Evolution proof' agents give mosquitoes a slow death

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INSECTICIDE resistance in malarial mosquitoes could be wiped out for good, paradoxically by using slow-killing agents.

The World Health Organization recommends fast-acting insecticides for [malaria control](#). But such agents stop mosquitoes from reproducing, giving any insect that resists them an enormous competitive advantage. As this drives the evolution of resistance, Andrew Read at Pennsylvania State University in University Park decided to examine what happened if this selection pressure was removed by only killing elderly mosquitoes that had already laid eggs.

This could be achieved using slow-killing insecticides, which should still stop malaria transmission as mosquitoes can't pass on the parasite until it has grown inside them for two weeks, almost a lifetime to a mosquito.

Crucially, using a model, Read found that such an approach is "evolution proof": mosquitoes never evolve resistance to slow-acting insecticides because both resistant and susceptible insects have the same chance of laying eggs, removing the selection pressure favouring resistant mosquitoes (*PLoS Biology*, DOI: [10.1371/journal.pbio.1000058](#)).

Some insecticides that take weeks to kill, such as [insect-killing fungi](#), are already being studied. Read believes these may be the only way to wipe out malaria.

Insecticides that take weeks to kill may be the only way to successfully wipe out malaria



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Thu Apr 09 10:54:53 BST 2009 by **Ross**

But if it kills them after they've all ready reproduced, what's the point? They have a bit less time to go round spreading malaria, but their children will have their own 2 weeks and so on. Presumably if there are less in the wild, there will be less pressure on the individuals to compete for food so their population will increase anyway, just to a younger demographic than before?

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Thu Apr 09 19:55:50 BST 2009 by **Tom Bentley**

The point is that the female mosquitoes will not survive long enough to vector the malaria, but will survive long enough to reproduce. So the mosquitoes won't be under strong selective pressure to develop resistance to the disease (as they are with current practices), but the pesticides will prevent the mosquitoes from transmitting malaria.

This should lead to efficient and evolution-resistant pesticides to prevent mosquito transmission of malaria, with the trade-off that we'll have to live with some mosquito bites. If those bites don't give people malaria, it seems like a worthwhile trade-off to me.

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Fri Apr 10 10:08:19 BST 2009 by **B B King**

Good try, but you meant "develop resistance to the "pesticide\*".

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### What's The Point

Thu Apr 09 11:11:17 BST 2009 by **Paul Taylor**

Neither the New Scientist article nor the abstract of the paper explains very clearly how this is supposed to control Malaria. However, the following paragraph from early in the paper seems to do so:

These facts also mean that the majority of eggs a female will produce in her lifetime are laid in the window before malaria-infected mosquitoes can become dangerous to humans. Thus, in principle at least, public health advances can be achieved with minimal selection for resistance by an insecticide that kills after the majority of mosquito reproduction has occurred but before malaria parasites are infectious. Unlike in agriculture, the aim here is disease control, not necessarily insect control.

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