

Dangerous Creatures

A Visit to the CDC Insectary

[Sofi] Oh, hello. I'm Sofi and I'm here at the Centers for Disease Control studying one of the world's most dangerous creatures. Wanna guess what it is? A lion? Good guess . . . but it's much smaller. A snake? Could be . . . but think much, much smaller. Here it is. Still can't see it? Look closer. It's a mosquito. This little tiny thing is one of the world's most dangerous creatures because it can spread diseases that cause sickness and death around the world. But, I'm gonna show you how the CDC is helping to fight one of those diseases . . . malaria.

If you live in the United States, you may not have even heard of malaria. It was eliminated in the US way before I was born. But in Africa, hundreds of thousands of children die every year after being bitten by mosquitos that carry malaria parasites. Inside the CDC Insectary, researchers are working on ways to keep people healthy by reducing the transmission, or spread, of malaria in areas where it occurs, and to ensure this disease doesn't return to the places where it no longer exists. Now, your first question might be, "What *is* an insectary?"

[Paul] An insectary is a specialized lab where we breed the mosquitos. Because most of the major malaria vectors are from tropical areas, we keep these rooms warm and humid year round. Let me show you how we breed some of the most dangerous creatures in the world.

[Sofi] Wait a second. Did he just say breed mosquitos?

[Paul] Now you're probably wondering why we breed mosquitos in the first place? Well it's safer, easier, and cheaper to breed the large number of mosquitos we need to conduct our assays on controlling mosquitos in the wild. The mosquito, which spends half its life in water and half on land, is an insect, just like the butterfly, with four distinct stages: egg, larvae, pupae, and adults.

[Sofi] Thanks, Paul. So what do they do with all those mosquitos? One thing is testing insecticide treated bed nets.

[John] Insecticide treated bed nets are one of the main tools used to prevent malaria. Millions of these nets have been distributed worldwide. Bed nets are effective because most of the mosquitos that transmit malaria feed late at night when people are asleep. By sleeping under a net, people can dramatically reduce their chances of getting bitten by a mosquito. However, nets will eventually acquire holes through which mosquitos can fly. We are studying how this happens to help us determine when to replace nets or how to design nets that last even longer.

[Sofi] Now the cool thing about these nets, even if they do have a few small holes, they're still effective because of the insecticide. How do they know which insecticide works best?

[John] We test the nets by exposing laboratory reared mosquitos inside special plastic cones. We then observe how many mosquitos die after being exposed to the nets.

[Sofi] Wondering what that straw looking thing is that she's using? Me, too.

[John] It is called an aspirator, and it is the easiest way to transfer the live mosquito from a cage to the cone without harming them. The mosquitos are sucked into this tube, but a HEPA filter prevents mosquitos, wing scales, and other particles, even bacteria, from going any further. We then gently blow the mosquito into the cone. We not only use these cones to test nets but also to test insecticides sprayed on walls to kill mosquitos that transmit malaria. When we do these tests in the laboratory, we use mosquitos that should die when exposed to the nets, but in the real world, many mosquitos are becoming resistant to insecticides.

[Sofi] What *is* insecticide resistance?

[Ellen] Some mosquitos are naturally able to survive a treatment with a given insecticide. Variations in their physiology prevent the insecticide from killing or harming them. These physiological traits are generally passed from parent to offspring. With continued insecticide use, the resistant mosquitos increase in the population. The spread of insecticide resistance is a major threat to all insecticide-based control methods, including the bed nets that we test here.

[Sofi] What's being done about insecticide resistance?

[Ellen] We've developed a simple, inexpensive method for detecting resistance called the CDC Bottle Assay. In this assay, we coat the inside of a bottle with an insecticide. We then place mosquitos into the bottle and observe the number that die. Mosquitos that do not die are resistant. Once we know resistance is present in a population, we take measures to control these mosquitos, such as changing to another insecticide.

[Sofi] You know, it wasn't long ago, controlling malaria in Africa seemed impossible. Now, thanks to global malaria control, there are fewer deaths from malaria—and one day we can even hope to eliminate malaria. For now, it's important to know that the research at CDC is helping to control this deadly disease. I hope you will learn more about malaria and the CDC by visiting this website.