



## Percival Scientific *Drosophila* Chambers for Investigating the Impact of Heavy Metal Exposure



CASE STUDY

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As all geneticists know, *Drosophila* (fruit flies) ironically make perfect test subjects for researching human genetic traits. Their DNA matches ours so closely it's incredible we don't look more related. Not only do fruit flies share about 75 percent of the same disease-causing genes as humans, but their entire genome has been mapped. This helps researchers isolate genetic variants that cause problems for humans and work toward therapeutic solutions.

Stuart Macdonald, Ph.D., professor and associate chair of the Department of Molecular Biosciences at the University of Kansas\*, has been investigating genetic trait variation in *Drosophila* for 25 years. By breaking down trait variation into molecular pathways, Macdonald and his lab team are gaining a greater understanding of the human body's response to disease or exposure to harmful environmental toxins.

### Using *Drosophila* to Understand Effects of Heavy Metal Exposure

Macdonald and his colleagues are currently funded to study *Drosophila* as a model system for understanding the impact of toxic heavy metal exposure on human health. Using Percival *Drosophila* incubators, Macdonald's team can quickly measure genetically identical flies from hundreds of strains while precisely controlling their environment and eliminating outside influences on the results of their experiments. After exposing the flies to heavy metals such as lead and cadmium through their diet, they study any behavioral or molecular changes in the population.

"Our research reveals a network of genes that we know flies use to respond to heavy metal exposure," he says. "If we identify a gene in that network that we think has a large impact on a fly's response, we can use CRISPR genome editing to validate our theory and figure out why the gene is malfunctioning."

Macdonald also examines resistance to heavy metals by comparing the genomes of fly populations that are more or less susceptible to the harmful effects of metal exposure and identifying genes that cause this difference.

"It's good to understand what happens biologically and what goes wrong or doesn't go wrong at the genetic level," he explains. "Our discoveries may assist in designing effective drugs to help people who've been exposed to heavy metals such as lead in their drinking water."

### An Incubator Essential for Trait Measurement

Testing the effects of heavy metal exposure on large populations of people with identical genes is obviously unsafe and unfeasible. With flies, however, it's easy and highly efficient, resulting in precise, reproducible trait measurement.

"The near-perfect temperature, humidity and light cycles offered by Percival incubators have been essential for this work, particularly for difficult-to-measure behavioral traits," says Macdonald. "We have now conducted screens for dozens of traits in our Percival incubators."

### Maintaining Precise Water Balance for *Drosophila*

Macdonald purchased his first Percival incubator 15 years ago, based on a colleague's recommendation. He realized he needed two more to maintain the required temperature of 25°C and 50 percent relative humidity for his large populations of flies in a lab that was greatly affected by changing Kansas weather. "Water balance is a huge issue for flies, and these chambers are incredibly useful for that reason," he says.

### Chambers That Can Take Heavy Use

Macdonald cites the reliability of Percival incubators as one of their most important features. "They are durable machines with surprisingly few problems compared to other equipment. And when I've had a problem, Percival's been good about resolving it," he says. "We use them a lot, and to a certain degree we abuse them because they're on 24-7 for months at a time. I would absolutely recommend them. They're good machines – they really are."

For more information, please visit [www.percival-scientific.com](http://www.percival-scientific.com), call 1.800.695.2743 or email [info@percival-scientific.com](mailto:info@percival-scientific.com).

\* Stuart Macdonald's views do not represent those of the University of Kansas. The information in this case study reflects his individual, real-life experience regarding the use of Percival Scientific chambers. Macdonald received no goods, services or incentives of any kind from Percival Scientific in exchange for information or opinions regarding Percival Scientific products and/or services.

