

“Hotel Nematoda” Transcript

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MATT CHURGIN: So you're kind of plopped down into a small room. There's food all around you-- as much food as you could possibly want for the rest of your life. You are now in the WorMotel. And then you, kind of, just go on living your life, moving around, eating as much as you want-- until you die.

My name is Matt Churgin and I'm a post-doctoral associate at the University of Pennsylvania in the bioengineering department. So the WorMotel is an array of 240 wells that we can use to monitor individual animals for long periods of time. They're one millimeter long, free-living nematodes. We culture them on agar plates which are just-- it's kind of like a gel-- and they eat E. Coli bacteria.

They live about 2 to 3 weeks and they're kind of a popular model organism to study aging. We know a lot of genes that affect lifespan and healthspan but there are 20,000 genes in the worm's genome-- which is pretty similar to humans. And for a lot of those genes, we have no idea what those genes do. So the ultimate goal is to understand better the aging process.

We ended up creating a 3D printed mold. And then we can easily cast WorMotels with a silicone rubber. We add augur to each well then add bacteria on top of the augur. And then we have a device that automatically shoot a single animal into each well. So the worms eat bacteria. And we can engineer the bacteria such that in each well, the bacteria turn off a specific gene in each worm. And that way, we can see what the effect of turning off that gene is on the animal's lifespan and their health during the aging process. Basically everything is controlled. So the size of the well is controlled for each worm. The amount of food is controlled. The temperature is controlled.

There's a carousel which has a bunch of plate stacks, which is where the WorMotels actually live for most of their lives. Then right next to that, there is a robot tower that can spin around and grab a plate out of the carousels. And then spin to the other side of the robotic tower where there's three imaging stations. And then once per day, it will image it for 10 minutes to turn a blue light on to wake the worms up, image for another 10 minutes, and then pick the plate up from the camera and move it back to the stack.

The more a worm moves, the more pixels will have changed. And we use the amount of movement as a proxy for how healthy each worm is. It's certainly the most simple measurement of health because we don't have to do any more complicated, invasive, sort of, procedures. About 500 of these 240-well plates will fit in the robot system. So we probably end up testing 2 million animals. What's not really been possible to monitor changes in behavior for so many animals automatically. I don't think it's possible without the WorMotel.

You know, manipulating all these worms lives, you do sometimes feel like an all-powerful being. Kind of watching over thousands of helpless creatures. But yeah, it's definitely a lot cushier than in the wild. In some ways these worms are pretty privileged, I would say.

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