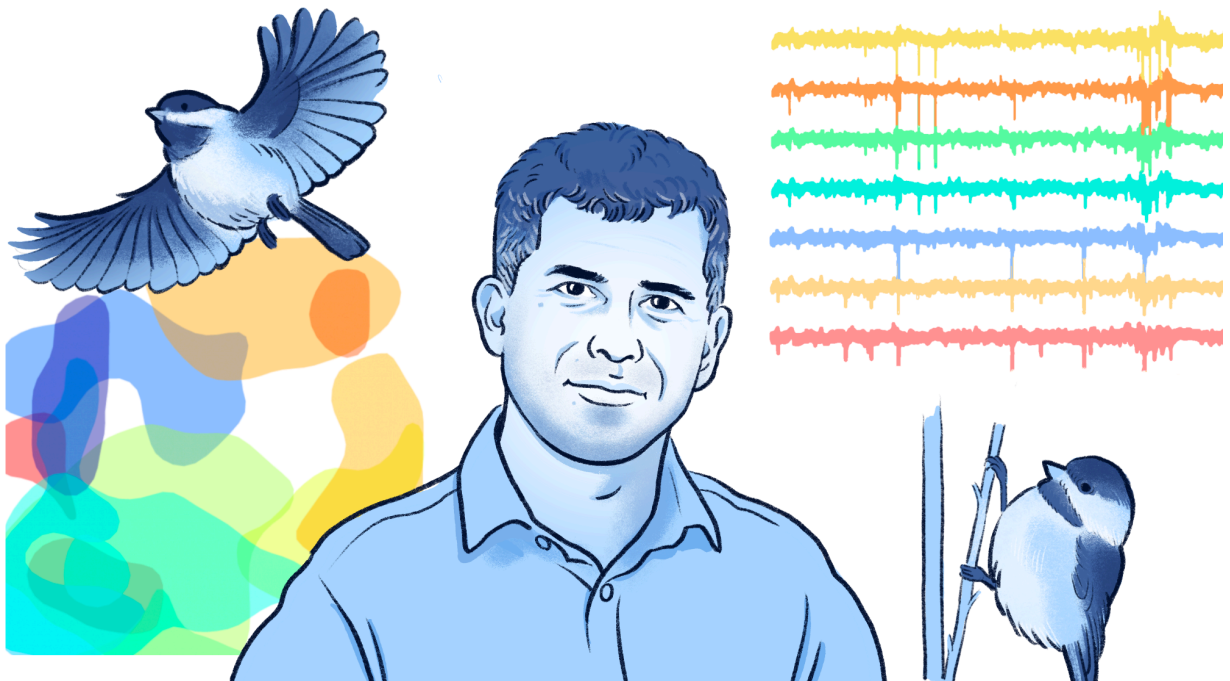


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Zuckerman Institute Memory Expert Named an HHMI Investigator; Prestigious Program Supports Top Researchers

Dr. Dmitriy Aronov's discoveries about chickadees may help solve mysteries about the inner workings of memory



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NEW YORK – [Dmitriy Aronov](#), PhD, a neuroscientist at Columbia's Zuckerman Institute, is known for his research with chickadees that memorize thousands of locations of stashed morsels of food. He has now been named a Howard Hughes Medical Institute Investigator.

The [HHMI Investigator Program](#) awards roughly \$9 million to each recipient over a renewable seven-year term. More than 30 current or former HHMI Investigators have won Nobel Prizes. We asked Dr. Aronov, also an assistant professor of neuroscience at Columbia's Vagelos College of Physicians and Surgeons, about what birds might teach

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us about the brain, his inspiration and how the HHMI Investigators Program is likely to influence his scientific journey.

You study memory and black-capped chickadees. What can these birds teach us about the brain?

Dr. Aronov: A chickadee is a tiny bird that can hide 5,000 bits of food per day and remember where it stored, or cached, each of these bits. This is one of the most extraordinary abilities in the natural world. We are fascinated by this behavior and want to understand how it works! Chickadees are also an amazing model of episodic memory — the brain's ability to remember specific events. Episodic memory really forms the basis of who we are as humans, and it's disrupted in terrible diseases that impact so many of us, such as Alzheimer's. These birds promise to give us unprecedented insights into memory.

How did you become interested in researching chickadees?

In grad school, I studied birdsong, a behavior that neuroscientists are now able to understand very well at the level of neural activity. For my postdoc, I switched to rats and studied a brain structure critical for memory, the hippocampus.

A problem with studying episodic memory is that it is covert — it's not something you can easily observe. A rat may be forming and recalling memories all the time, but you don't know what exactly it's remembering — you can't just ask it! So a lot of research into the hippocampus hasn't directly addressed episodic memory. This was a problem I kept coming back to every time I tried to plan my future research.

But from my work in birds, I knew a little about chickadees. These birds constantly cache and retrieve food, and their behavior is easy to interpret — you know exactly when a chickadee forms or recalls a memory. I kept telling my lab mates and friends how, if only I could study something like a chickadee, I could directly address episodic memory. At some point, one of my friends said, "You talk about chickadees so much; why don't you just study them?" And it kind of clicked.

This was a wild idea because chickadees had never been studied for this kind of neuroscience research. It certainly wasn't an easy road to get here. In the beginning, we faced daunting problems with nearly everything. It can also be lonely, academically, to be the only lab conducting this type of research with chickadees. During this time, I often worried that all the amazing students and postdocs who joined my lab were making some grave mistake with their careers. There were several terrifying years

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before things started to fall into place. But it was also exhilarating to work on something so new and to figure things out about our incredible birds.

How might becoming an HHMI Investigator improve your vital memory research?

Dr. Aronov: We now have a working research system and a basic understanding of what a [memory signal](#) might look like. In the chickadee hippocampus, we found activity patterns, which we liken to barcodes, that represent specific episodic memories. The door is now wide open for us to figure out how this system works. How are the memory barcodes generated in the hippocampus? How do these signals drive the bird to recall a cached seed, go to a correct location, and retrieve it? What types of brain cells produce these memory signals; how do these cells interact; how do connections between these cells change during memory? HHMI support will give us a chance to develop a complete understanding of the mechanisms underlying episodic memory.