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**PRIZE FOR**  
**NEURO**  
**BIOLOGY**

Christopher Zimmerman, Ph.D.  
Postdoctoral Fellow  
Princeton Neuroscience Institute



## 2020 Winner: Christopher Zimmerman, Ph.D.

Christopher Zimmerman received his undergraduate degrees in neuroscience and bioengineering from the University of Pittsburgh and his Ph.D. in neuroscience from the University of California, San Francisco. His thesis research in the laboratory of Dr. Zachary Knight focused on the neural mechanisms that govern thirst and drinking behavior. He discovered that sensory signals originating throughout the body come together within individual neurons in the brain to produce the sense of thirst and control drinking behavior on a moment-by-moment basis. Christopher is currently a postdoctoral fellow in the laboratory of Dr. Ilana Witten at the Princeton Neuroscience Institute, where he continues to study the neural processes underlying motivated behaviors.

### The Origins of Thirst

We experience thirst every day, but where does this sensation come from? Traditionally, thirst was thought to arise from dedicated dehydration-sensing neurons in the brain. However, natural drinking behavior is regulated on a fast, moment-by-moment basis that cannot be explained by slow changes in blood dehydration levels. How does the brain bridge these disparate timescales to dynamically adjust thirst? Dr. Christopher Zimmerman, under the mentorship of Dr. Zachary Knight, aimed to address this longstanding question by recording the activity of the brain's thirst-promoting neurons for the first time. His experiments in mice revealed that layers of signals arise throughout the body—including the mouth, throat, and gut—during eating and drinking and then converge onto the brain's dehydration-sensing cells. He demonstrated that this new class of body-to-brain signals predicts changes in hydration before they occur and, as a result, adjusts our level of thirst preemptively. This anticipatory regulation provides a neural mechanism to explain long-enigmatic aspects of everyday human experience, including the speed of thirst satiation, the prevalence of drinking during meals, and the thirst-quenching power of oral cooling.

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