Cori Bargmann, Ph.D.

VICE PRESIDENT FOR ACADEMIC AFFAIRS • TORSTEN N. WIESEL PROFESSOR, LULU AND ANTHONY WANG LABORATORY OF NEURAL CIRCUITS AND BEHAVIOR

Genes, the environment, and experience interact to shape an animal's behavior. *Caenorhabditis elegans*, a roundworm with just 302 neurons, shows considerable sophistication in its behaviors, and its defined neuronal wiring and genetic accessibility make it an ideal subject in which to study these interactions. Using *C. elegans* as a model, Bargmann's laboratory characterizes genes and neural pathways that allow the nervous system to generate flexible behaviors.

How do genes and the environment interact to generate a variety of behaviors? How are behavioral decisions modified by context and experience? The Bargmann lab addresses these questions in the nematode *C. elegans*, whose nervous system consists of only 302 neurons with reproducible functions, morphologies, and synaptic connections. Current studies examine the interplay between genes, circuits, and behaviors in odor recognition and odor preference, the circuits and neuromodulatory systems that regulate innate behaviors, and natural variation and evolution of behavior.

C. elegans has a rich olfactory sense; it detects hundreds of different odors and pheromones, discriminates among them, and generates a variety of innate and learned responses to the odor cues. Each sensory neuron has dynamic responses that reflect both the identity and the history of the odor, enabling it to perform a set of computations that are stereotyped in a single neuron, but differ among neurons. The sensory neurons synapse onto integrating neurons, which also use stereotyped cell type-specific computations to combine sensory inputs. Finally, groups of integrating neurons coordinate their activity to generate reliable systems-level dynamics coupled to behavior. The lab characterizes the effects of specific molecules, neurons, and circuits across these levels of integration, asking what functional properties arise at each level of analysis.

In addition to the fast processing of sensory information by fast neurotransmitters, behavior is reversibly modified over longer timescales by neuromodulators such as serotonin, dopamine, and neuropeptides. Neuromodulators are highly conserved in evolution, and implicated in human as well as animal motivational and emotional states. The lab has identified roles for neuromodulators in spontaneous behaviors, learned behaviors, and age-specific behaviors of *C. elegans*. These wireless, distributed neuromodulatory signals rapidly rewire the functional properties of the fixed *C. elegans* nervous system, dynamically changing the flow of information across synapses and circuits. Ongoing projects in the lab examine the cell biology of neuropeptides and neuromodulators, their regulation by physiological signals such as dietary quality and pathogen exposure, and their roles in behavioral homeostasis.

A wide diversity of nematode species can be cultivated in the lab, allowing studies of their characteristic neuronal and behavioral adaptations. Bargmann lab members are now applying methods adapted from *C. elegans* to species that can survive in extreme arsenic-rich environments, as well as species that use different reproductive strategies.

EDUCATION

B.S. in biochemistry, 1981
The University of Georgia

Ph.D. in cancer biology, 1987
Massachusetts Institute of Technology and the Whitehead Institute

POSTDOC

Massachusetts Institute of Technology, 1987–1991

POSITIONS

Assistant Professor, 1991–1996
Associate Professor, 1996–1998
Professor, 1998–2004
University of California, San Francisco

Professor, 2004–
Co-director, Shelby White and Leon Levy Center for Mind, Brain and Behavior, 2005–2016
Vice President for Academic Affairs, 2023–
The Rockefeller University

Investigator, 1995–2016
Howard Hughes Medical Institute

Head of Science, 2016–2022
Chan Zuckerberg Initiative

AWARDS

Kemali International Prize for Basic and Clinical Neuroscience, 2004

Richard Lounsbery Award in Biology and Medicine, 2009

Perl-UNC Neuroscience Prize, 2010

Dart/NYU Biotechnology Achievement Award, 2012

Kavli Prize in Neuroscience, 2012

Breakthrough Prize in Life Sciences, 2013

Benjamin Franklin Medal in Life Sciences, 2015

Edward M. Scolnick Prize in Neuroscience, 2016

Salk Institute Medal for Research Excellence, 2021

Gruber Neuroscience Prize, 2024

HONORARY SOCIETIES

National Academy of Sciences

National Academy of Medicine

American Academy of Arts and Sciences

American Philosophical Society

Fellow, American Association for the Advancement of Science

Associate Member, European Molecular Biology Organization

SELECTED PUBLICATIONS

Ebert, M.S. and Bargmann, C.I. Evolution remodels olfactory and mating-receptive behaviors in the transition from female to hermaphrodite reproduction. *Curr. Biol.* 11, 969–979 (2024).

Marquina-Solis, J. et al. Antagonism between neuropeptides and monoamines in a distributed circuit for pathogen avoidance. *Cell Rep.* 43, 114042 (2024).

Scheer, E. and Bargmann, C.I. Sensory neurons couple arousal and foraging decisions in *C. elegans*. *Elife* 12, RP88657 (2023).

Cheng, D. et al. Insulin/IGF signaling regulates presynaptic glutamate release in aversive olfactory learning. *Cell Rep.* 41, 111685 (2022).

Levy, S. and Bargmann, C.I. An adaptive-threshold mechanism for odor sensation and animal navigation. *Neuron* 105, 534–548 (2020).