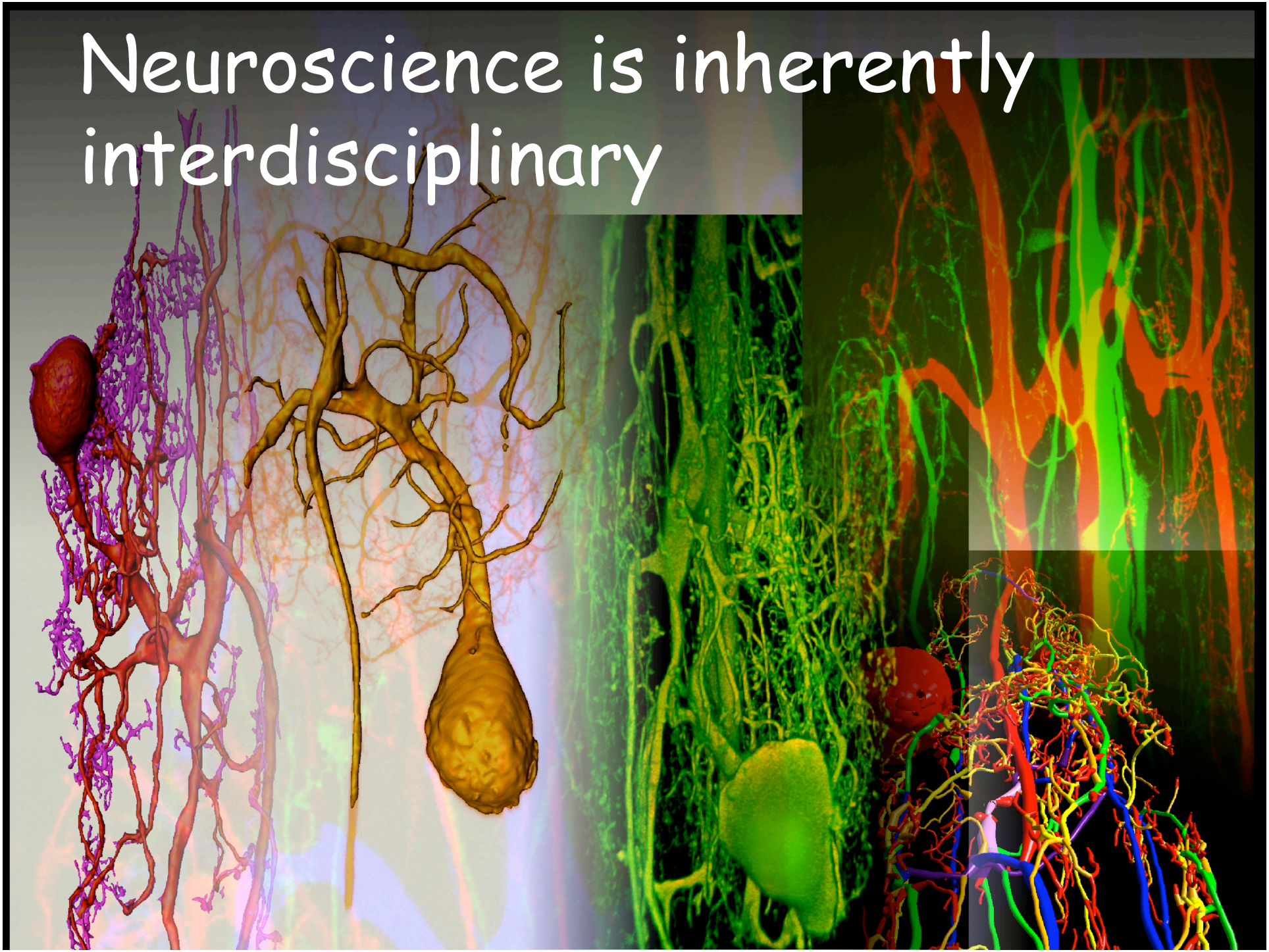
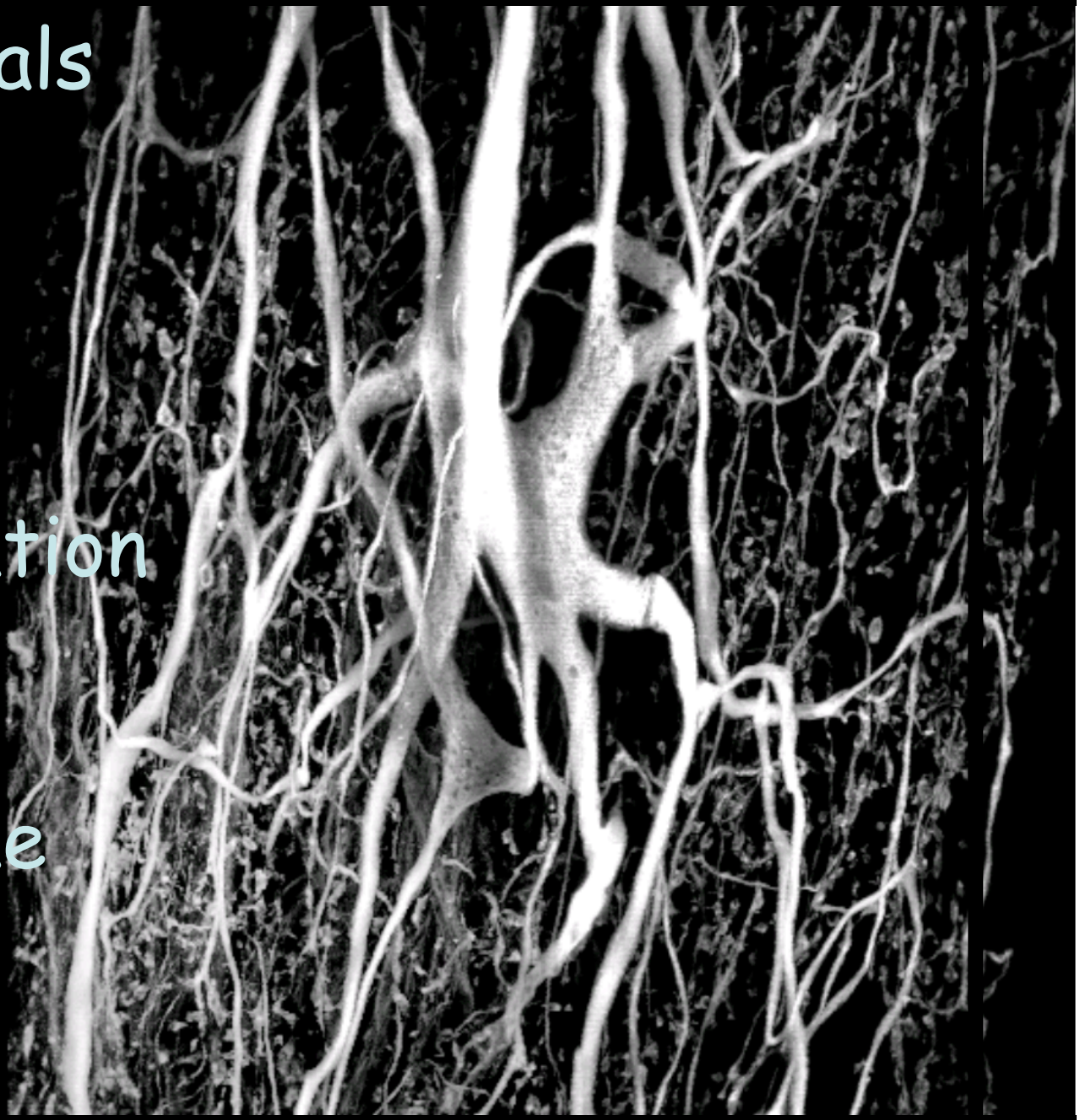
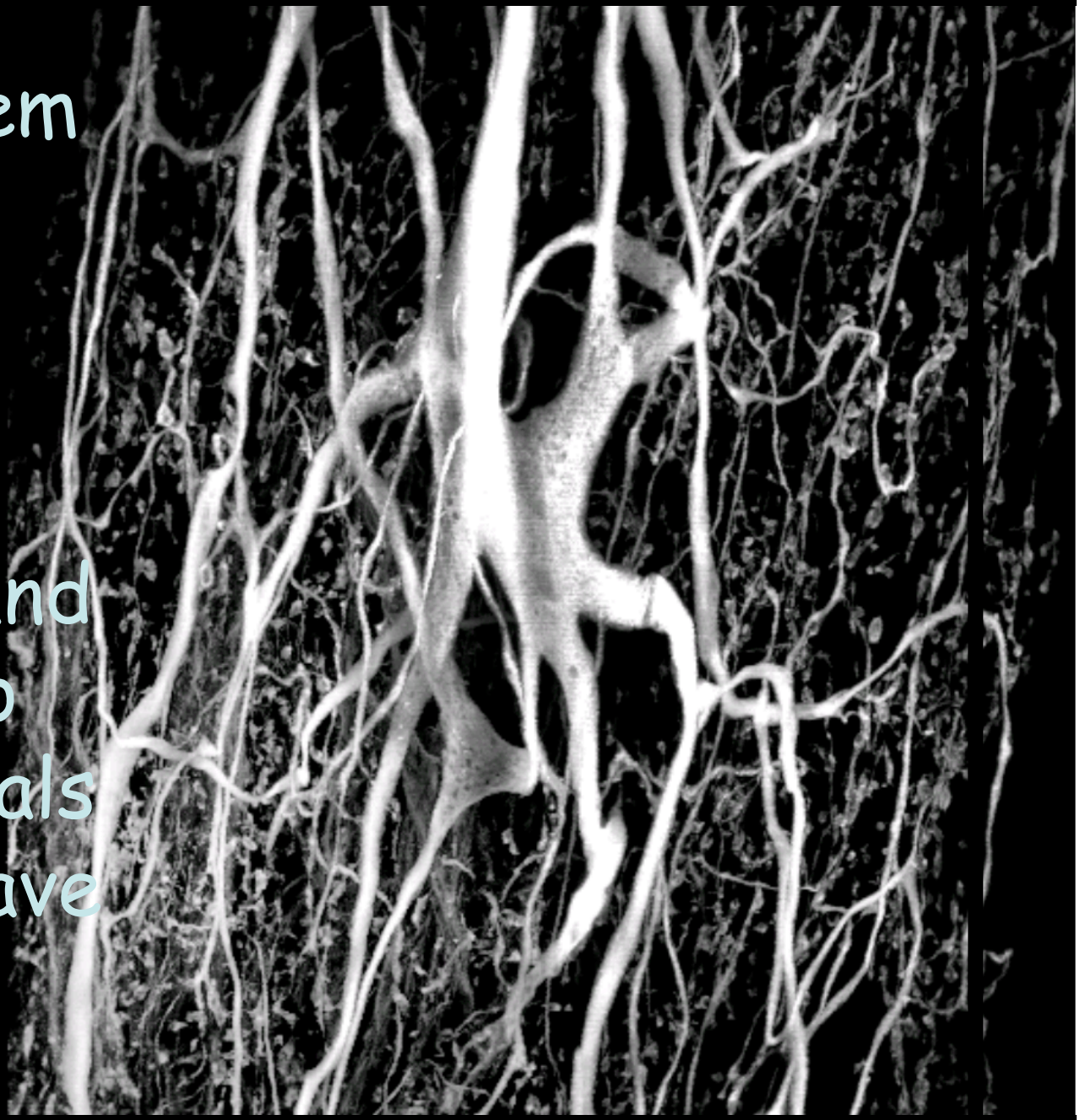
# Neuroscience is inherently interdisciplinary



How do animals combine information from their environment with information about their internal state to make decisions and act?



How is the nervous system constructed during development using genetic information and experience to produce animals that can behave in the world?



The consolidation of neuroscience research into the study of a few model organisms runs the risk that we lose our ability to understand how evolution has influenced behavior.

Animal diversity provides an enormous opportunity for understanding nervous system development and function.

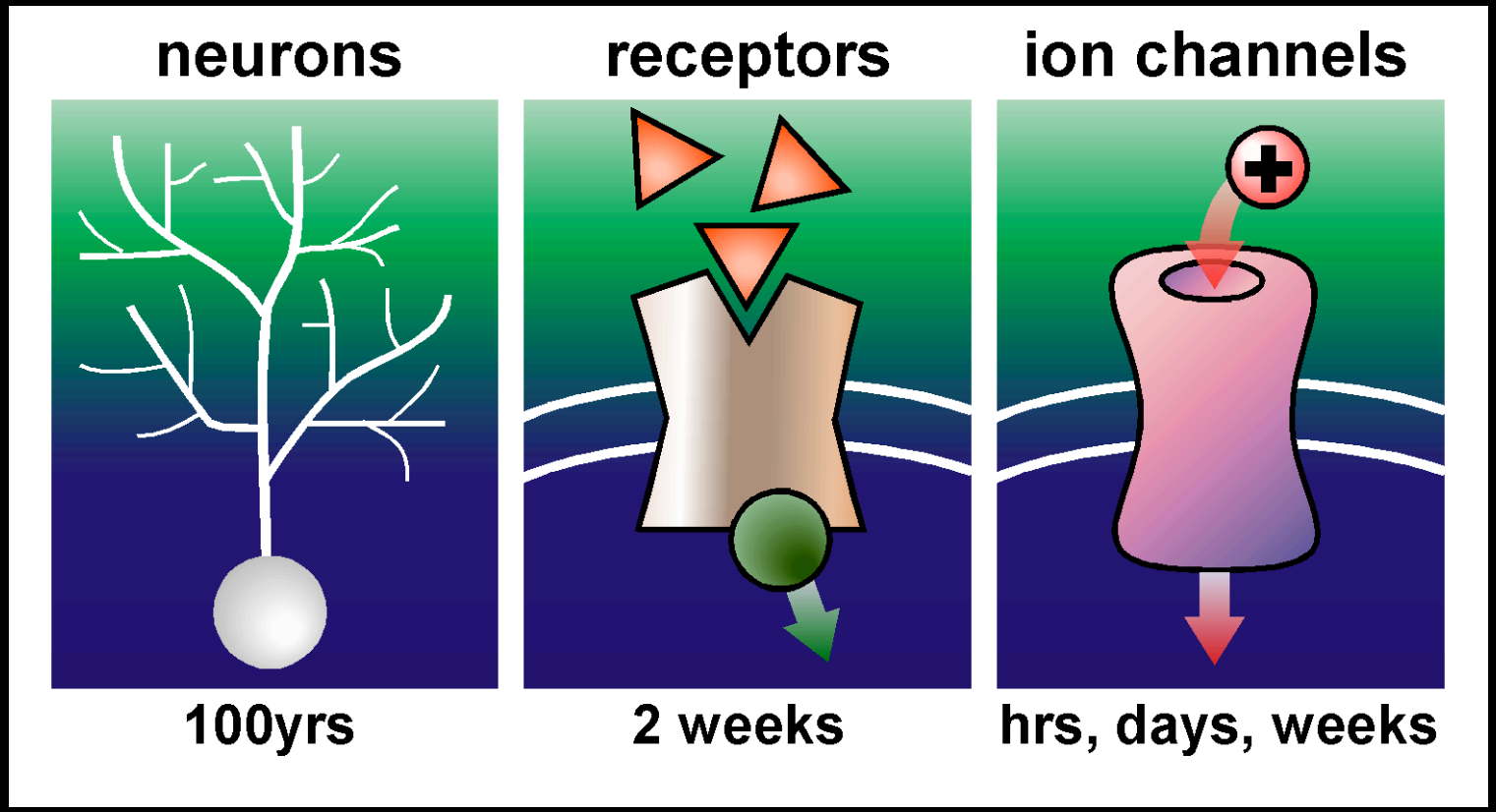
The tiny parasitic fly, *Ormia*, locates and tracks crickets by their calls using a biologically unique tympanum to localize sound.

This novel tympanum design has been used by engineers to make miniaturized highly directional hearing aids.

*Ormia ochracea* between two hearing aids
*Photo: Ron Hoy*

Using the nervous system to explore issues of robustness, compensation, variability, and homeostasis that are general to all biological systems.

-The components of functional circuits are not static, but are constantly turning over rapidly during the lifetime of a neuron

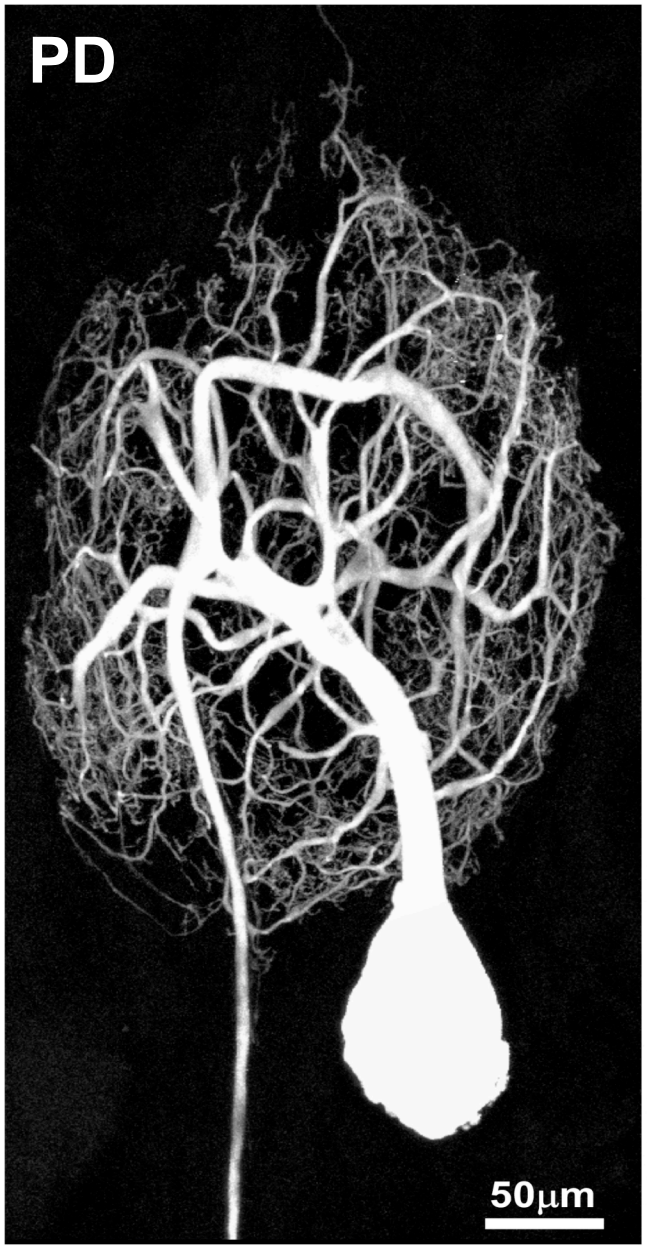



-How is function maintained while the nervous system is constantly rebuilding itself?

How does genetic noise contribute to noise in network function?

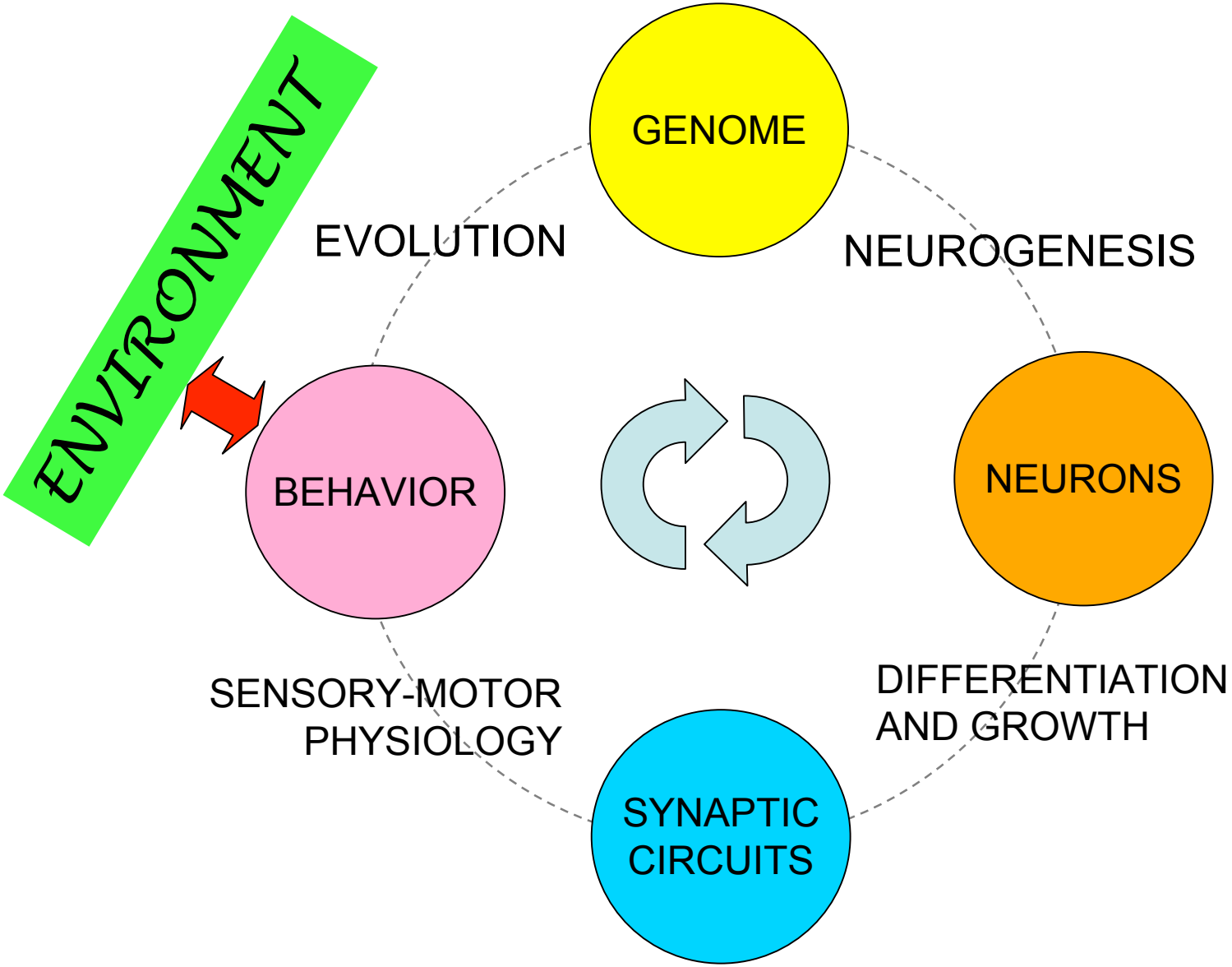
- Phenotypic variability can arise from stochastic variations in gene expression
- When does this variability have consequences for network function?

A new chemistry is needed to deal with anchored molecules in very small spaces.




Bucher & Taylor, 2004

# From Genes to Behavior and Back



Exploring the richness of nervous system function in diverse animals is pivotal for:

- catalyzing new technologies in chemistry, engineering and computer science.
- understanding how animals interact with their environments and each other
- decreasing the number of unanticipated negative consequences of human activity on animal life on our planet.