

## Models and Mindsets for Teaching Neurophysiology

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Charlie is currently a Professor of Zoology and Genetics at Iowa State University. His research areas include neurobiology, comparative physiology, and neurotoxicology of invertebrates. He teaches courses in neurobiology, invertebrate biology, and bioethics. In 1996, he was a guest instructor at the Woodrow Wilson Foundation's summer institute in Neurobiology for high school biology teachers held at Princeton University.

This mini-workshop presentation involves hands-on activities in which participants put together and manipulate home-made, 3-D models of voltage-gated spike channels (both Na<sup>+</sup> and K<sup>+</sup> channels). The models are made of common, everyday materials. They have moveable activation and inactivation gates whose workings tie in closely with the known behavior of voltage-gated channels that mediate Na-based action potentials in neurons and other electrically excitable cells, as presented in physiology texts.

Physiological properties of voltage-gated channels, as illustrated by the models, are contrasted and compared to those of Na/K pump molecules and models. Common misconceptions about the physiological properties of channel and pump molecules are addressed.

The mini-workshop also introduces other simple models relating to spatial proportions and structure-function relationships of neurons and their parts. An illustrated booklet, along with samples of the models, is given to each participant. A free copy of the booklet entitled, "*Models and Mindsets for Teaching Neurophysiology*," is available, upon request, at the address above. In addition, a listing of other neurobiology-related education materials, developed by the author and available upon request, is provided at the WWW address given above.

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