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Neurons in Action

[by Cate House](#)

Used to be that neurobiology students spent hours at a time performing individual experiments on nerve cells. To see how a nerve cell responded to a drug, for example, they would have to do a new experiment for each change in drug concentration.

Now, thanks to a husband-wife scientist team, students have a more efficient way to run experiments — on CD-ROM. Developed by Ann Stuart, professor of cell and molecular physiology, and her husband John Moore, professor emeritus of neurobiology at Duke University, "Neurons in Action" is an interactive learning tool that simulates laboratory experiments on these cells.

Stuart says the idea for the CD-ROM came from her husband, who along with Michael Hines (now at Yale University) had written a simulator called NEURON, which computational neuroscientists use to model nerve function. Designed for professionals, NEURON is normally too complex for students. "My husband had the idea of coupling the power of a browser with that of NEURON to make tutorials. The browser could then link text to NEURON simulations, customized by us," Stuart says.

"Neurons in Action" includes 17 tutorials organized into progressive levels of difficulty so that it can be used by undergraduate, graduate, or medical students. Students perform experiments by specifying a variety of conditions such as the neuron's geometry, channel density, environmental temperature, and ionic

environment. A simulator then displays movies of changing voltage patterns at each point throughout a nerve cell.

Since the tutorials are formatted in HTML and displayed by an Internet browser, students can click on the various hyperlinks provided in the text, which will take them to background information as well as original classic papers to help them understand their observations. Included in those papers is a discussion of the origin of the Hodgkin-Huxley equations formulated in the 1950s — and still used today — that describe the electrical signals generated in the nerve cell.

"For scientific subjects that can be described quantitatively, I think this represents the wave of the future," Stuart says. "It gives students the chance to explore important neurophysiological problems in far greater depth than is offered in conventional textbooks and to correct misconceptions on the spot."

A demonstration of "Neurons in Action" can be found at <http://neuron.duke.edu/niasite/>. The CD-ROM is published by Sinauer Associates.

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