Fernando Nottebohm, PhD
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Born in Buenos Aires, Dr. Nottebohm earned his undergraduate degree in 1962 and his Ph.D. in 1966 at the University of California, Berkeley. He spent a year at Cambridge University as part of his doctoral training before joining Rockefeller University in 1967 as assistant professor. He became associate professor in 1971 and professor in 1976.

Dr. Nottebohm's lab was the first to provide irrefutable evidence that new nerve cells are constantly born in an adult vertebrate brain, where they replace older cells of the same kind that have died. His work on the partly overlapping mechanisms that serve development, learning, brain rejuvenation and circuit repair has provided basic insights that have generalized well to mammals, changing the way we think about brains, brain aging, brain repair and learning. To complement his research on animals in the laboratory Dr. Nottebohm conducts field studies at the Field Research Center in Millbrook, New York. The 1,200 acres of natural habitat provide an environment in which to study songbird behavior and brain function under natural conditions. Studies are conducted on canaries, zebra finches and free ranging songbirds and his interests range from the study of genes and stem cells to the ecology, sociobiology and evolution of vocal learning.

In 2006, Dr. Nottebohm was awarded the Benjamin Franklin Medal in Life Science. He received the Karl Spencer Lashley Award of the American Philosophical Society in 2005 and the Lewis S. Rosenstiel Award for Distinguished Work in the Basic Sciences in 2004. In 1999, he shared the Ipsen Foundation Neuronal Plasticity Prize. Dr. Nottebohm received the McKnight Senior Investigator Award in Neuroscience in 1997 and shared the Charles A. Dana Award for Pioneering Achievements in Health Sciences in 1992. He was elected to the National Academy of Sciences in 1988.

Vocal learning: at the threshold

What is the central hypothesis of my presentation?
I will argue that a full and satisfying understanding of adult neurogenesis requires knowledge of how a new neuron is recruited, how it fits into the system to which it is added and what tasks it assumes. Also, is the new neuron part of a net addition or does it replace a pre-existing neuron that died? I suggest that to answer these questions one has to study the choreography of addition / replacement under conditions the animal encounters in nature. My lecture will draw from examples of new neuron addition to various systems in the brain of adult songbirds, material that in the past has predicted well subsequent findings in rodents.

What is the most important observation I will discus?
I will show that: 1) numerical replacement of neurons can succeed yet a function lost when neurons died not be restored; 2) neuron turnover times differ between parts of a same brain region; 3) neurons added to a same brain nucleus can, in one species be part of net addition, in another part of replacement, with very different behavioral outcomes; 4) a novel situation that kills some replaceable neurons promotes the survival of others, depending on their age and location; 5) replaceable and non-replaceable neurons may differ in a number of ways that may be important for understanding brain function, loss of memory, and neurodegenerative disorders. I will suggest that there is a rich natural history that may help understand how different species and different parts of the brain use the recruitment of new neurons in adult brain and that comparisons between taxa may be of the greatest interest.

What is the translational significance?
Successful addition of new neurons to the adult brain -- be it to rejuvenate pathways, rebuild damaged circuits, or as releasers of active substances -- may well benefit from knowledge of how addition and replacement are orchestrated in systems where this happens spontaneously, under conditions encountered in the wild. Our richest information on the natural history and basic biology of adult neurogenesis still comes from songbirds and it will be offered not only for its own interest, but also as a reminder of the very difficult challenges that clinical work is likely to encounter. Clinical needs will, most likely, arise in a context where neurons that died need to be replaced. Birds do this.