Krieg Cortical Kudos 1998

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In September 1997, Dr Wendell Krieg died at the age of 91. He was well recognized for his many scientific contributions that appeared in the *Journal of Comparative Neurology* and in books from his publishing house, Brain Books. As part of his legacy, Dr Krieg also founded the Cajal Club, and he and his wife, Roberta, established the Krieg Cortical Kudos prizes to recognize scientists who have made particularly noteworthy contributions to understanding the organization and function of the cerebral cortex. The donations made by the Kriegs have endowed a nonprofit foundation, the proceeds of which are designated specifically for the *Krieg Cortical Kudos Awards* to talented scientists working on cortical organization or function. The three categories of awards — Cortical Discoverer Award, Cortical Explorer Award and Cortical Scholar Award — were personally designed and named by Dr Krieg to reward scientists at different stages in their careers. These awards are presented at the Cajal Club meetings, which traditionally have occurred in conjunction with the annual meeting of the American Association of Anatomists. This year, in addition to a monetary award and travel expenses, each prize winner was the recipient of one of Krieg's original books. These books were typeset by Wendell Krieg and include his beautiful original illustrations of brain dissections rendered in three-dimensional perspective. These unique treasures were provided as a special additional gift to the winners by Roberta Krieg in memory of her husband. This year's Cajal Club Awards Committee consisted of Vivien A. Casagrande (President), David G. Whitlock (Secretary/Treasurer), Dennis D. M. O'Leary, Jennifer S. Lund and Stewart H. Hendry.

The *Cortical Scholar* prize ($1000) is given to a predoctoral fellow who is typically at the stage of completing the doctoral dissertation.

The *Cortical Explorer* prize ($3000) is usually given to a scientist at an intermediate career stage.

The highest level award, the *Cortical Discoverer* prize ($5000), is given to a senior scientist who has made outstanding contributions to our understanding of the cerebral cortex. Former recipients of the Cortical Discoverer award include I. T. Diamond, E. G. Jones, J. Kaas, P. Goldman-Rakic, M. Merzenich, M. Marin-Padilla, D. Pandya, A. Peters, P. Rakic, P. Somogyi, J. Lund, D. Fitzpatrick, C. Gilbert, L. Ungerlieder, H. Killackey and E. White.

The Cortical Scholar Prize: Dun H. Ha and Frank A. Middleton

This year two outstanding students received equivalent votes from the Cajal Club Awards Committee for the Cortical Scholar Award. Therefore, two Cortical Scholar prizes were given.

The first winner of the Cortical Scholar prize was Mr Dun H. Ha. He received his Bachelor of Science in Biology, graduating *cum laude* from San Diego State University. Mr Ha is now in the final stages of completing his dissertation under the direction of Drs Richard Robertson and John Weiss at the University of California — Irvine in the Department of Anatomy and Neurobiology. He began his scientific career as a medical research fellow in 1993. His experiences during that summer program led him to apply and be accepted into the MD/Ph.D. program at Irvine. Since 1993, Mr Ha has been very productive, studying developmental aspects of interactions between the cerebral cortex, and the basal forebrain cholinergic system in slice-cultural preparations. His main effort has focused on understanding the trophic interactions between these two systems. In his first publication, Mr Ha was able to demonstrate that basal forebrain cholinergic neurons specifically target cortical neurons in dissociated cell cultures and form synapses with cortical neurons. He also demonstrated that there is a critical period during which the survival of basal forebrain neurons are dependent on nerve growth factor (NGF). In a second paper, Mr Ha was able to demonstrate that basal forebrain cholinergic neurons depend upon cortical neurons for trophic support. The latter study could eventually lead to interesting new strategies that could prevent or, perhaps alleviate, problems associated with Alzheimer's disease by intervening to preserve cholinergic neurons. In the course of his dissertation work, Mr Ha has developed, or perfected, a number of new techniques including electron microscopy of dissociated cultures, and *in situ* hybridization in dissociated and slice cultures. Mr Ha has already received a number of honors from the medical school and graduate school for his accomplishments. He was recognized for these and other contributions to the study of cortical neuronal development by being the co-winner of the Cortical Scholar Award. Mr Ha received $1000, an inscribed certificate, an original Krieg book, as well as a copy of *Cajal on the Cerebral Cortex* by Javier De Felipe and Edward G. Jones, autographed by the authors.

The second Cortical Scholar prize winner was Mr Frank A. Middleton. Mr Middleton received his master's degree for studies of basal ganglia and hippocampal involvement in motor and cognitive performance under the direction of Dr Jeanne Ryan in the Department of Biology at SUNY College of Arts and Sciences — Plattsburgh. He is currently completing his dissertation under the direction of Dr Peter L. Strick, Professor of Neurology and Physiology at SUNY — Syracuse. Mr Middleton has already published several research papers. He has examined the anatomical connections between the basal ganglia, cerebellum and prefrontal cortex using the unique characteristics of the retrograde transneuronally transported herpes simplex virus type 1 to define neural circuits. Mr Middleton has demonstrated that multiple areas of the prefrontal cortex receive topographically organized projections from the globus pallidus and substantia nigra as well as the dentate nucleus of the cerebellum. In addition, Mr Middleton has shown that the output of the basal ganglia is more widespread than was formerly believed.

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Figure 1. Recipients of the 1998 Krieg Awards. From left to right: Mr Dun H. Ha, Dr Nelson Spruston, Dr Tamas F. Freund and Mr Frank A. Middleton. Photo courtesy of Erickson Biographical Institute.

Interestingly, he has shown that the basal ganglia are indirectly but closely connected with higher-order visual areas in the inferotemporal cortex among other regions of cortex. Mr Middleton has already received a number of honors and fellowships in recognition of his accomplishments. For these unique contributions, he was chosen the co-winner of the Cortical Scholar prize and received $1000, an inscribed certificate, an original Krieg book, as well as a copy of *Cajal on the Cerebral Cortex*, by Javier De Felipe and Edward G. Jones, autographed by the authors.

The Cortical Explorer Award: Nelson Spruston

The winner of the Cortical Explorer prize this year was Dr Nelson Spruston. Dr Spruston received his Ph.D. in Neuroscience in 1991 from the Baylor College of Medicine under the direction of Dr Dan Johnston. Dr Spruston was among the first investigators to apply patch-clamp technology to neurons in brain slice preparations. As a graduate student he studied the electrical properties of branching dendrites focusing on patch-clamp recordings of hippocampal neurons. His outstanding thesis work was published in the *Journal of Neurophysiology* and also was reviewed in an article in *Trends in Neurosciences*. Dr Spruston continued his studies of the properties of dendrites of hippocampal neurons as a postdoctoral fellow with Dr Bert Sakmann in Hiedelbereg, Germany. One publication that resulted from his postdoctoral efforts on the properties of glutamate-gated synaptic channels on the dendrites of the hippocampal neurons is considered by the *Journal of Physiology* to be one of its top 50 publications in its 100 year history! In addition, Dr Spruston's postdoctoral work has resulted in a seminal paper published in *Science*. Dr Spruston has, indeed, pioneered a new era in the study of the function of neuronal dendrites. Dr Spruston is currently an Assistant Professor at Northwestern University's Neuroscience Institute where he has been on the faculty since 1995. In the short time that he has been there, he has already established a first-rate laboratory, received grants from NIH, the Human Frontiers in Neuroscience Program, and has been the recipient of an award from the Sloan Foundation. Elegant work continues to flow from his laboratory. For his contributions, Dr Spruston received the Cortical Explorer Award of $3000, an inscribed certificate and an original Krieg book.

The Cortical Discoverer Prize: Tamas F. Freund

The highest award given by the Cajal Club in Krieg's name is the Cortical Discoverer prize. Dr Tamas F. Freund received his Ph.D. degree in 1984 from Eötvös Loránd University in Budapest, Hungary. Dr Freund is currently Head of the Department Functional Neuroanatomy, and Deputy Director of the Institute of Experimental Medicine, Hungarian Academy of Sciences, Budapest where he has been since 1990. Dr Freund is uniquely deserving of this very special level of recognition. Dr Freund was already recognized for his many contributions in 1991 when he won the Cortical Explorer award at the age of only 30. Dr Freund has also been recognized for his brilliant work by being the recipient of numerous international grants and awards, including awards from the Human Frontier Science Program, the Howard Hughes Medical Institute, the Volkswagen Stiftung, the FIDIA Research Foundation and the Finnish Academy of Sciences among others. Dr Freund comes from a most distinguished lineage having been mentored by Professor Janos Szentagothai, whose work was also well known to Dr Krieg. Dr. Freund's work is truly in the Cajal tradition. He has published more than 100 major papers and chapters on the anatomical and physiological organization of the forebrain, focusing primarily on the neocortex and, most recently, on the hippocampus. Dr Freund's career has been distinguished by many major achievements. He has worked systematically and imaginatively in an effort to understand cortical microcircuits using a variety of approaches, including light and electron microscopy, intracellular recording and immunocytochemistry among other techniques. In his early work on the cortex, Dr Freund and colleagues characterized the patterns of termination of thalamocortical afferents and the synaptic connections involving these afferents. Dr Freund has made a number of major discoveries. Perhaps his most significant contributions concern the organization of local circuits

involving GABAergic neurons. Most recently, Dr Freund and his colleagues discovered that some GABAergic hippocampal local circuit neurons innervate each other exclusively. This type of innervation suggests that a powerful new type of synaptic interaction is in operation controlling neural networks in this and likely other brain areas. In addition, Dr Freund discovered that the GABAergic pathways from the septum also can directly modify the activity of hippocampal GABAergic neurons. Dr Freund and his group now have developed a combined septo-hippocampal *in vitro* slice preparation and provided physiological evidence for the disinhibitory nature of the septo-hippocampal GABAergic projection. Most interestingly, they have demonstrated that the latter pathway is able to produce theta-pattern oscillations in the hippocampus even under *in vitro* conditions. Finally, Dr Freund has made a number of important additional contributions to our understanding of the role of dendritic and perisomatic inhibition through his detailed intracellular recordings in hippocampal slices. Tamas Freund is, indeed, a most creative scientist with unique and imaginative approaches to the difficult problems associated with unraveling the role of cortical synaptic interconnections. The Cortical Discoverer prize is a well-deserved award for Dr Freund's many pioneering contributions to neuroscience. The Krieg Cortical Discoverer prize given to Dr Freund consisted of the Cajal medal, an inscribed certificate, a portfolio on the Architectonics of Human Cerebral Fiber Systems authored by Krieg, a check for $5000, and an invitation to publish a research review in *Cerebral Cortex*.

Readers are encouraged to join the Cajal Club as well as to nominate candidates for the Krieg Cortical Kudos Awards by writing to David Whitlock, Department of Cellular and Structural biology, 4200 East Ninth Avenue, Box B-111, Denver, CO 80262, USA. The web site for the Cajal Club is http://www.anatomy.org/anatomy/cajal2.htm.