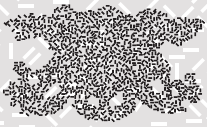
VISIONS OF THE BRAIN – A TRIBUTE TO TORSTEN WIESEL



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The Young Academy of Sweden 2013
Graphic Design: Fräulein Design
Printed by: Åtta45

VISIONS OF THE BRAIN – A TRIBUTE TO TORSTEN WIESEL

The Young Academy of Sweden proudly presents the exciting neuroscience symposium *Visions of the Brain – A tribute to Torsten Wiesel*. Torsten Wiesel is an outstanding scientist, academic leader and an Honorary Member and the Scientific Patron of the Young Academy of Sweden. The symposium coincides with the 50th anniversary of Torsten Wiesel's and David Hubel's studies, demonstrating the plasticity of circuits in the cerebral cortex, acknowledged by the Nobel Prize in Physiology or Medicine 1981.

CONTENT

PROGRAM
VISIONS OF THE BRAIN
– A TRIBUTE TO TORSTEN WIESEL

09:00–09:05	**WELCOME ADDRESS** **Christian Broberger**, M.D., Ph.D., Karolinska Institutet, Stockholm, and the Young Academy of Sweden
09:05–09:15	**INTRODUCTORY REMARKS** **Anna Sjöström Douagi**, CEO, the Young Academy of Sweden
09:15–09:25	**REMARKS** **Anders Hamsten**, President, Karolinska Institutet, Stockholm
09:25–10:25	**USING FIXED CIRCUITS TO BUILD FLEXIBLE BEHAVIORS** **Cori Bargmann**, Investigator, HHMI, Torsten N. Wiesel Professor, Rockefeller University, New York
10:25–10:45	**COFFEE BREAK**
10:45–11:15	**PSYCHIATRIC DISEASE – A PLASTICITY PROBLEM?** **Maria Lindskog**, Ph.D., Karolinska Institutet, Stockholm, and the Young Academy of Sweden

11:15–11:45	**MOLECULAR IDENTIFICATION OF THE ELUSIVE GHB RECEPTOR** **Petrine Wellendorph**, Ph.D., University of Copenhagen, and the Young Academy of Denmark
11:45–12:15	**CEREBROSPINAL FLUID – MORE THAN A SHOCK ABSORBER FOR THE BRAIN** **Henrik Zetterberg**, M.D., Ph.D., University of Gothenburg, and the Young Academy of Sweden
12:15–13:25	**LUNCH**
13:25–13:55	**THE SELF AND ITS BODY** **Simone Schütz-Bosbach**, Dr, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, and the Young Academy of Germany
13:55–14:25	**ENGINEERED NEURAL NETWORKS: ORDERED ENOUGH TO KNOW BETTER** **Yael Hanein**, Professor, Tel Aviv University, and the Young Academy of Israel
14:25–15:10	**COFFEE BREAK**
15:10–15:40	**TIDAL WAVES: NETWORK MECHANISMS IN NEUROENDOCRINE CONTROL** **Christian Broberger,** M.D., Ph.D., Karolinska Institutet, Stockholm, and the Young Academy of Sweden
15:40–16:40	**THE DOPAMINERGIC AMACRINE CELL, RETINA'S JACK OF ALL TRADES** **Elio Raviola**, Bullard Professor of Neurobiology, Harvard University, Boston
16:40–16:45	**CONCLUDING REMARKS** **Martin Högbom**, Professor, Stockholm university, and President, the Young Academy of Sweden
16:45	**RECEPTION** at the Nobel Forum for all participants

TORSTEN WIESEL

Torsten Wiesel, a Swedish neuroscientist and physician, is the Scientific Patron and Honorary Member of the Young Academy of Sweden. In 1981 Wiesel was awarded the Nobel Prize in Physiology or Medicine jointly with David H. Hubel (the other half awarded to Roger Sperry). They were awarded the prize for their studies of how visual information is transmitted to and processed in the brain's visual cortex and how the underlying circuits are established during development. It has been observed that Hubel and Wiesel's work "… *provided the greatest single influence on the ways neuroscientists thought about and prosecuted studies of the brain during much of the second half of the twentieth century.*" *. Hubel and Wiesel revolutionized our understanding of how the brain creates an internal representation of the world around us. This work has also had significant clinical implications, e.g. for the treatment of children with impaired vision.

Wiesel was born in 1924 in Uppsala, Sweden, the youngest of five children. His father, Fritz S. Wiesel, was chief psychiatrist and head of Beckomberga Hospital, a mental institution located

* D. Purves in "Brains: How they seem to work", FT Press, 2009

on the outskirts of Stockholm. The family lived at the hospital and Wiesel's mother Anna-Lisa (b. Bentzer) raised the children there. Wiesel graduated 1954 from Karolinska Institutet, Stockholm, Sweden. After graduation he taught at the department for physiology at the Karolinska hospital and worked in the child psychiatry unit. In 1955 Wiesel moved to USA and the Johns Hopkins University Medical School in Baltimore, Maryland. The following year he started his 24-year long career at Harvard Medical School, Boston, Massachusetts, where he was central to forming its now legendary Department of Neurobiology, first as a professor and from 1973 as head of the department.

1983 Wiesel began his position as Vincent and Brooke Astor Professor and head of the Laboratory of Neurobiology at the Rockefeller University, New York. In 1991 Wiesel was appointed president of Rockefeller University, a position he held until 1998. During his term, Wiesel e.g. was instrumental in the establishment of six interdisciplinary research centers and the formation of the collaborative relationship between the Aaron Diamond AIDS Research Center and The Rockefeller University. Moreover. Professor Wiesel made it a priority to address a gender imbalance in the sciences and at Rockefeller. He appointed one of the first female 'full professors' at the university, Mary E. Hatten. He is currently co-director of the Shelby White and Leon Levy Center for Mind, Brain and Behavior at Rockefeller and co-chairs the Board of Governors of the Okinawa Institute of Science and Technology

Torsten Wiesel's extraordinary scientific achievements are paralleled by a lifetime of outstanding scientific leadership as a committed advocate for science and its internationalization. He is advisor to several countries and organizations, mainly helping to create opportunities for young scientists to carry

out independent research. He has also served as the secretary general for the Human Frontier Science Program where he reshaped scientific programs to be more effective instruments for interdisciplinary science.

Wiesel has done much work as a global human rights advocate. He is a founding member of the International Human Rights Network of Academies and Scholarly Societies as well as the Israeli-Palestinian Science Organization, a nonprofit alliance to support collaborative research between scientists in Israel and Palestine. Moreover, Wiesel served for 10 years as chair of the committee on human rights of the National Academies of Sciences of USA.

In 2007, a research institute for the prevention and treatment of eye diseases was established by the World Eye Organization at West China Hospital in Chengdu, China, dedicated to Wiesel; the Torsten Wiesel Research Institute.

Wiesel's daughter, Sara Elisabeth was born in 1975, and he has two grand children: Owen Thomas Cullen, born 2007, and Sean Karl Cullen, born 2009. In 2008 Wiesel married Lizette Mususa Reyes, they presently divide their time between Stockholm and New York.

SPEAKERS

KEYNOTE SPEAKERS

CORI BARGMANN

ELIO RAVIOLA

SPEAKERS

CHRISTIAN BROBERGER

YAEL HANEIN

MARIA LINDSKOG

SIMONE SCHÜTZ-BOSBACH

PETRINE WELLENDORPH

HENRIK ZETTERBERG

KEYNOTE SPEAKER CORI BARGMANN

Investigator, HHMI, Torsten N. Wiesel Professor, Rockefeller University, New York

Using fixed circuits to build flexible behaviors

Dr. Bargmann was recruited during Dr. Wiesel's tenure as President at Rockefeller University, where she is the Torsten N. Wiesel Professor and Head of the Laboratory 2 of Neural Circuits and Behavior. She is a Howard Hughes Medical Institute Investigator, and has been awarded the Kavli Prize in neuro science (2012) and the Breakthrough Prize in Life Sciences (2013).

Much of nervous system function is specified by structure; the precise synaptic connections between neurons in circuits. In pioneering work using the worm *C. elegans* as a simplified model system, Dr. Bargmann has elegantly identified key organizing principles for axon guidance, synapse formation, and neuronal differentiation. Importantly, she has demon strated the developmental role of sensory input in settingcircuit parameters.

Parallel evolution of domesticated Caenorhabditis species targets pheromone receptor genes. McGrath PT, Xu Y, Ailion M, Garrison JL, Butcher RA, Bargmann CI, 2011. Nature; 477:321-5.

KEYNOTE SPEAKER ELIO RAVIOLA

Bullard Professor of Neurobiology,
Harvard University, Boston

The dopaminergic amacrine cell, retina's Jack of all trades

Elio Raviola is the Bullard Professor of Neurobiology at Harvard Medical School. In the 1970's he worked with Dr. Wiesel to develop a classical and highly cited monkey model of myopia, and their collaborative efforts are ongoing.

The retina offers an attractive model to study central nervous circuitry because of its location, distinctive neuronal morphology, modular organization, and the properties of its inputs and outputs. Dr. Raviola has shown how dopamine/GABA cells, through both faster and slower modulation of other retinal neurons, aid in forming the visual representation of the outside world and dark-adaptation.

Corelease of dopamine and GABA by a retinal dopaminergic neuron. Hirasawa H, Betensky RA, Raviola E, 2012. The Journal of Neuroscience; 32:13281-91.

SPEAKER
CHRISTIAN BROBERGER

M.D., Ph.D., Karolinska Institutet, Stockholm
Member of the Young Academy of Sweden

Tidal waves: network mechanisms in neuroendocrine control

Associate Professor, Karolinska Institutet and recipient of an ERC Starting Investigator Grant (2010). President, the Young Academy of Sweden, 2012–2013.

Dr. Broberger is interested in the cellular and circuit mechanisms that allow the hypothalamus to orchestrate basic survival functions. His group has discovered a network oscillation involved in the dopaminergic control of pituitary reproductive hormone release.

A slow oscillation in tuberoinfundibular dopamine (TIDA) neurons: Switch to tonic firing via thyrotropin-releasing hormone (TRH). Lyons DJ, Horjales E, Broberger C, 2010. Neuron; 65: 217-29.

Photo: Markus Marcetic

SPEAKER
YAEL HANEIN

Professor, Tel Aviv University
Member of the Young Academy of Israel

Engineered neural networks: ordered enough to know better

Professor at the School of Electrical Engineering, Tel-Aviv University, Israel, and recipient of an ERC Starting Investigator Award (2012).

Dr. Hanein uses nanotechnology to engineer neuronal micro-circuits. Her work has identified novel aspects of the relevance of modular structures in the patterning of network output.

Innate synchronous oscillations in freely-organized small neuronal circuits. Shein Idelson M, Ben-Jacob E, Hanein Y, 2010. PLoS One; 5:e14443.

SPEAKER
MARIA LINDSKOG

Ph.D., Karolinska Institutet,
Stockholm
Member of the Young Academy
of Sweden

Psychiatric disease – a plasticity problem?

Associate Professor, Karolinska Institutet. Ingvar Carlsson Award (2007).

Work in Dr. Lindskog's laboratory is focused on the mechanisms of synaptic plasticity involved in mood regulation. Recent work in animal models has revealed that an imbalance in glutamatergic transmission may underlie depression.

Dysfunctional astrocytic regulation of glutamate transmission in a rat model of depression. Gómez-Galán M, De Bundel D, Van Eeckhaut A, Smolders I, Lindskog M, 2013. Molecular Psychiatry; 18:582-94.

Photo: Markus Marcetic

SPEAKER
SIMONE SCHÜTZ-BOSBACH

Dr, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig
Member of the Young Academy of Germany

The self and its body

Head of the "Body and Self" Research Group at the Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany.

Dr. Schütz-Bosbach studies the constituents of the sense of agency and the sense of self in relation to the physical body. Through psychophysical and imaging techniques, she seeks to elucidate how we perceive and represent our own body and the bodies of other persons.

The self in action effects: selective attenuation of self-generated sounds. Weiss C, Herwig A, Schütz-Bosbach S, 2011. Cognition; 121:207-18.

SPEAKER
PETRINE WELLENDORPH

Associate Professor, Ph.D., University of Copenhagen
Member of the Young Academy of Denmark

Molecular identification of the elusive ghb receptor

Associate Professor at the University of Copenhagen.

Dr. Wellendorph's research is aimed at understanding the molecular pharmacology of GHB (a.k.a. Fantasy), a naturally occurring signal substance and recreational drug. She and her colleagues have identified the GABAA receptors as endogenous molecular targets for GHB, which may explain its therapeutic effects and potential for abuse.

α4βδ GABA(A) receptors are high-affinity targets for γ-hydroxybutyric acid (GHB). Absalom N, Eghorn LF, Villumsen IS, Karim N, Bay T, Olsen JV, Knudsen GM, Bräuner-Osborne H, Frølund B, Clausen RP, Chebib M, Wellendorph P, 2012. PNAS, Proceedings of the National Academy of Sciences USA; 109:13404-9.

Photo: Michael Petri

SPEAKER
HENRIK ZETTERBERG

M.D., Ph.D., University of Gothenburg
Member of the Young Academy of Sweden

Cerebrospinal fluid – more than a shock absorber for the brain

Professor, Sahlgrenska Akademin, Göteborgs Universitet. Recipient of the Erik K. Fernström prize for young scientists (2011).

Work in Dr. Zetterberg's productive laboratory concerns the pathological changes in degenerative and traumatic brain disorders. His research has identified novel biomarkers for diagnosis of e.g. Alzheimer's disease and traumatic brain injury.

CSF biomarkers for Alzheimer's pathology and the effect size of APOE ε4. Andreasson U, Lautner R, Schott JM, Mattsson N, Hansson O, Herukka SK, Helisalmi S, Ewers M, Hampel H, Wallin A, Minthon L, Hardy J, Blennow K, Zetterberg H, 2013. Molecular Psychiatry. doi: 10.1038/mp.2013.18. [Epub ahead of print]

Photo: Markus Marcetic

THE NOBEL PRIZE IN PHYSIOLOGY OR MEDICINE 1981

In 1981 David H. Hubel and Torsten N. Wiesel were awarded The Nobel Prize in Physiology or Medicine for explaining how the brain assembles information from the eye's retina to produce detailed visual images of the world.

Excerpt from the press release of 9 October 1981, sent out from the prize awarding institution The Nobel Assembly at Karolinska Institutet:

"Of all the sensory impressions proceeding to the brain, the visual experiences are the dominant ones. Our perception of the world around us is based essentially on the messages that reach the brain from our eyes. For a long time it was thought that the retinal image was transmitted point by point to visual

centers in the brain; the cerebral cortex was a movie screen, so to speak, upon which the image in the eye was projected. Through the discoveries of Hubel and Wiesel we now know that behind the origin of the visual perception in the brain there is a considerably more complicated course of events. By following the visual impulses along their path to the various cell layers of the optical cortex, Hubel and Wiesel have been able to demonstrate that the *message about the image falling on the retina undergoes a step-wise analysis in a system of nerve cells stored in columns. In this system each cell has its specific function and is responsible for a specific detail in the pattern of the retinal image*."

Dr. David Hubel passed away 22 September 2013 at the age of of 87.

David Hubel and Torsten Wiesel in 1981.

THE YOUNG ACADEMY OF SWEDEN

The Young Academy of Sweden is an independent academy founded in 2011 at the initiative of the Royal Swedish Academy of Sciences. The Young Academy of Sweden provides young scientists in Sweden with a cross-disciplinary forum and a platform to influence research policy. Members are selected following an open call on the basis of excellence in science and a commitment to active participation towards the Academy's goals of scientific outreach to the public, interdisciplinary collaborations, research policy advocacy and interactions with other young academies of the world.

The Academy currently has 34 members and has, during its brief existence established itself as an attractive forum for young science leaders and a powerful voice among policy makers.

OUTREACH A central aim for the Academy is to interact outside of the scientific community to talk not only about the research we do, but also about how scientists work in different disciplines, how science can (and cannot) be used to inform public policy, and the importance of the scientific method to society. We believe that being relatively early in our career offers particular possibilities to reach young people, and give

voice to the excitement and satisfaction offered by a career in science. In 2013 the Academy arranged a summer research school for high school students. This year, we also published a book, *Vägar till vetenskapen* (Pathways to Science), where members of the Academy describe their lives as researchers and what made them choose their particular career path. The Academy harbours many talents for outreach; Academy member Marie Dacke, *e.g.*, won, for the second year in a row, the Researcher Grand Prix award for to her ability to present her research to the lay public in an enlightening and entertaining manner.

INTERDISCIPLINARITY In a world where scientific investigation is getting more and more specialized, the Academy provides its members with unique opportunities to interact with leading researchers from other fields. Indeed, this is one of the driving factors propelling the global young academy movement. To accomplish this, the Academy welcomes scientists from all disciplines to apply for membership, resulting in a community where *e.g.* a philosopher can meet a nuclear physicist, a statistician or a microbiologist. The Academy also arranges specific activities to stimulate new connections, such as transdisciplinary "speed dating" events where members sit down in pairs, and during five minutes, on a rotating schedule, have to come up with at least one idea for a joint project; a creative exercise that has resulted in many exciting ideas.

SCIENCE POLICY One of the first activities of the Academy was to submit a ten-point proposal to the Swedish government as it was preparing the *2013–2017 Research and Innovation Bill*. This proposal, which was also published as an op-ed article in the largest Swedish morning paper, received considerable attention and led to invitations to speak in front of the

Parliament's *Committee on research and higher education* as well as the Deputy Prime Minister's *Commission on Research*, and a private meeting with the Minister himself. Importantly, several of the Academy's proposals were echoed in the final bill. The Academy also has a networking program with the Parliament that joins one Academy member and one MP who visit each other's work places, as a means of increasing communication between policy makers and scientists. This year, to respond to the alarming absence of sustainable tenure tracks systems in Swedish academia, the Academy put forth a proposal for a career system for junior research leaders. This proposal was sent out to all Swedish universities and has prompted an intense debate on how to design a process for selecting and supporting a new generation of scientists as a means of increasing the quality of research. Advocacy is not limited to Sweden: on several occasions we have lobbied different European Union agencies to contribute to improved research policies. .

As we write this, the Young Academy of Sweden has just taken the step to full independence by becoming a self-governing foundation. As such, the Academy is no longer a part of the Royal Swedish Academy of Sciences but acts as an independent entity. The agenda is filled with a number of exciting activities to enrich the professional lives of our members and interact with other parts of society. It gives us particular joy that our networks and collaborative efforts with sister academies in the world is steadily increasing, taking the form of *e.g.* bilateral visits and joint symposia. The channel to other talented young scientists around the globe is truly an added value of the young academy movement.

The Young Academy of Sweden is an independent forum for some of the most talented young researchers in Sweden, representing all disciplines. The Academy was founded on 27th May 2011 at the initiative of the Royal Swedish Academy of Sciences, with funding from the Ragnar Söderberg Foundation.

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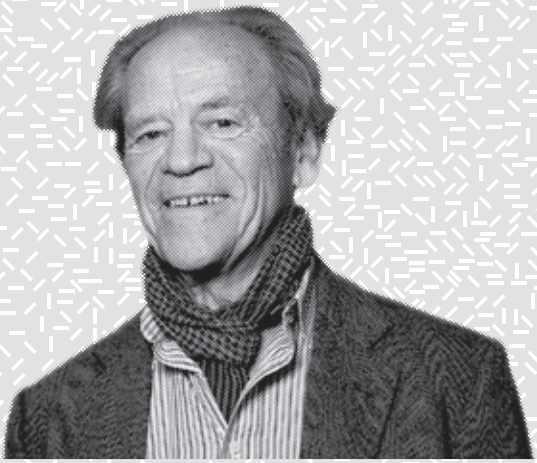

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