CAJAL Course on Advanced Techniques for Synapse Biology 2017

Keynote Speakers

Claudia Bagni received her PhD in Molecular Biology at the University of Rome "Tor Vergata" in 1992. From 2003 to 2007 she was Group leader at the Fondazione Santa Lucia, Institute for Neuroscience/European Brain Research Institute, Rome, Italy and from 2008 to 2016 Full Professor, Faculty of Medicine at the K University of Leuven, Belgium. Since 2016 she acts as Chair, of Department of Fundamental Neuroscience, University of Lausanne, Switzerland.Claudia Bagni has a long-lasting interest in the study of intellectual disabilities such as Fragile X Syndrome (FXS), Autism (ASD) and Schizophrenia (SCZ) in which the recurring aspect is the dysregulation of the synaptic proteome. The knowledge acquired examining molecular mechanisms at the synapses will offer a major inroad into the understanding of processes that govern, not only learning and memory and human behavior, but a group of disorders called "synaptopathies" that arise from malfunctioning synapses. FXS, ASD and SCZ are still without an effective cure and her lab aims, ultimately with the use of biological models, human stem cells and in collaboration with clinical researchers, to develop possible pharmacological approaches to modulate some aspects of these synaptopathies.

Tim Bliss is a neuroscientist whose work has done much to provide a neural explanation for learning and memory. Studying the hippocampus — the memory centre of the brain — Tim showed that the strength of signals between neurons in the brain exhibits a long-term increase following brief but intense activation, a phenomenon known as long-term potentiation (LTP).

Synapses are specialist junctions between nerve cells, where release of a chemical from one nerve cell influences the excitability of its neighbour. Tim's detailed description of hippocampal LTP, with physiologist TerjeLømo who first noted the phenomenon, confirmed that high-frequency patterns of synaptic firing can induce lasting changes in synaptic strength. LTP is now the most widely studied model of memory storage.

Whilst LTP was discovered in Oslo in the lab of Per Andersen, Tim's subsequent research into the cellular properties of LTP and its relation to memory was conducted at London's National Institute for Medical Research. Tim was a founding Fellow of the Academy of Medical Sciences and has received several international awards for his work. Most recently, Professor Tim Bliss was one of three recipients of The Brain Prize 2016, awarded by the Grete Lundbeck European Brain Research Foundation.

Daniel Choquet Daniel Choquet obtained an engineering degree from EcoleCentrale (Paris, France) in 1984. He then got attracted to neuroscience and completed his PhD in the lab of Henri Korn at the Pasteur Institute (Paris), studying ion channels in lymphocytes. He got appointed tenure Research officer at the CNRS in 1988 and then performed a post-doctoral/sabbatical at the Duke University (North Carolina, USA) in the laboratory of Michael Sheetz where he studied the regulation of integrin-cytoskeletal linkage by force, and demonstrated that cells can sense and respond to extracellular traction. He came back to France to setup his group in Bordeaux at the Institute for Neuroscience where he got a directorship position at the CNRS. He launched an interdisciplinary program on the use of high resolution imaging to study the trafficking of neurotransmitter receptors in neural cells. He is now heading the Institute for Interdisciplinary Neuroscience and the Bordeaux Imaging Center core facility. He is also the director of the center of excellence BRAIN, Bordeaux Region Aquitaine Initiative for Neuroscience.

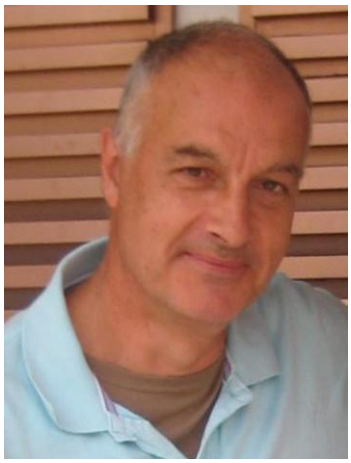
Daniel Choquet has been the recipient of several awards including the 1990 Bronze Medal from the CNRS, the Research prize from the Fondation pour la RechercheMédicale (FRM), 1997, the Grand Prix from the French Academy of Sciences, Prix du CEA and the 2009 Silver Medal from the CNRS. He is a Member of the Institut de France, the French Science Academy since November 2010. He has been awarded two ERC advanced grants in 2008 and 2013.

Graham Collingridgeis the Ernest B. and Leonard B. Smith Professor and Chair of the Department of Physiology at the University of Toronto. He is also a Senior Investigator at the Lunenfeld-Tanenbaum Research Institute, Mount Sinai Hospital in Toronto. Professor Collingridge also holds an appointment at the University of Bristol (since 1994) as a Full Professor of Neuroscience in Anatomy in the School of Physiology and Pharmacology. A leading neuroscientist, Professor Collingridge's research focuses on the mechanisms of synaptic plasticity in health and disease, in particular, understanding synaptic plasticity in molecular terms and how pathological alterations in these processes may lead to major disorders, such as Alzheimer's disease. Professor Collingridge has won several prizes including the Sharpey-Shafer Prize of the Physiological Society, the Gaddam Memorial Prize of the British Pharmacological Society, and the Feldberg Prize. Most recently, Professor Collingridge was one of three recipients of The Brain Prize 2016, awarded by the Grete Lundbeck European Brain Research Foundation.

EckartGundelfinger (PhD) is the scientific director of the Leibniz Institute for Neurobiology (LIN) – Center for Learning and Memory – and Professor of Molecular Neurobiology at the Otto von Guericke University, Magdeburg, Germany. He studied Biology at the University of Stuttgart, performed research for his doctoral thesis at the May Planck Institute for Biology in Tübingen and spent two years as postdoctoral EMBO fellow at the EMBL in Heidelberg. In 1984, he started his research on molecular mechanisms of brain synapses, first as a staff scientist at the Center for Molecular Biology of the University of Heidelberg (with Heinrich Betz) and from 1988 in his own group at the Center for Molecular Neurobiology in Hamburg. Since 1992 he heads the Dept. of Neurochemistry and Molecular Biology at the LIN, and since 2010 he is LIN's Scientific Director. Current research is focused on molecular mechanisms of synaptic plasticity underlying learning and memory.

Johnatan Hell did his Ph.D.with Dr. R. Jahn,showing for the very first time GABA uptake by synaptic vesicles after developing a newprocedure for synaptic vesicle isolation.

During his post-doctoral work with Dr. W. A. Catterall, he expanded his skills in protein analytic and purification, molecular and cell biology and electrophysiology. His research focuses on a detailed mechanistic understanding of synaptic functions, Ca2+ channels, and glutamate receptors and the interdisciplinary use of cutting edge molecular, cellular, and electrophysiological methods. In 2000 he was awarded an AHA Established Investigator award. As a result he established an international network of productive collaborations with other leading PIs on signaling in brain and heart. Because many neurological diseases arise from synaptic dysfunction, synapses are key neuropharmacological targets. His research is of far reaching importance for public health.



Jeremy Henley did his PhD at King's College London and a post-doc at Cornell University in the USA working on neuronal nicotinic receptors and kainate receptors. He returned to the UK to work at the MRC Laboratory for Molecular Biology in Cambridge as a research fellow working on glutamate receptors. He was appointed to a faculty position at the University of Birmingham and spent a sabbatical at Kyoto University, Japan. He then moved to Bristol University. Jeremy served as the Head of Anatomy Department there and Deputy Director of the MRC Centre for Synaptic Plasticity. He has published more than 200 papers in peer-reviewed journals and has been awarded a Royal Society-Wolfson Merit Award and is a Fellow of the Academy of Medical Sciences.

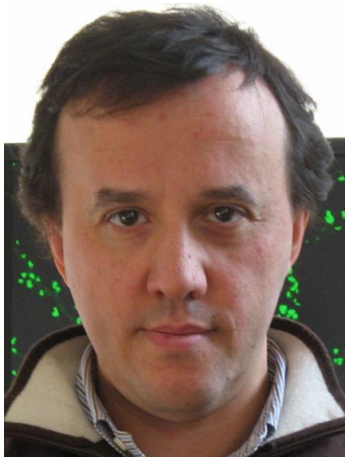
Jeremy's group is interested in the cell biological processes that regulate synaptic function in health and disease, and has used innovations such as the use of yeast-2-hybrid assays to identify AMPA and kainate receptor interacting proteins and the viral expression fluorescent proteins combined with confocal microscopy to monitor protein trafficking in living neurons. His group identified the extranuclearSUMOylation plays fundamentally important roles in synaptic transmission and neuronal viability, and following up these discoveries has been a major research theme in his lab.

Michael Kreutz studied psychology, philosophy and linguistics at the University of Münster, Germany and then performed his PhD studies in Behavioral Neurosciences at the Ruhr University in Bochum, Germany. Subsequently he became research fellow at the Department of Brain and Cognitive Sciences at MIT, USA. From 1990 to 1993 he was staff scientist in the Department of Molecular Neuroendocrinology at the Max Planck Institute for Experimental Medicine in Göttingen, Germany. In 1993 he moved to Magdeburg as head of the Neuroplasticity research group (NPlast) at the Leibniz Institute for Neurobiology. Since October 2015 he has a second appointment at the Center for Molecular Neurobiology (ZMNH) in Hamburg where he is heading the Leibniz Group 'Dendritic Organelles and Synaptic Function'. The team in Hamburg aims to learn more about the contribution of dendritic microsecretory systems to synaptic processes and plasticity.Research in NPlast is concerned with molecular mechanisms of cellular plasticity. Of particular interest are molecular dynamics of the postsynaptic density, signaling from synapse to nucleus and how synaptic control of nuclear gene expression feeds back to plastic properties of neurons.

Richard Morris is one of the leading behavioural neuroscientists in Europe; his research group is endeavouring to play a part in the worldwide endeavour by neuroscientists to understand the making, keeping and losing of memory. Following a long tradition in Europe, he has rigorously identified synaptic plasticity as critical for memory, with a focus of hippocampal N-methyl-D-aspartate receptors. He has also developed a number of innovative techniques, including the watermaze. Taken up by others across the world, including by industry, this has enabled invaluable work on models of neurodegenerative disorders, including Alzheimer's disease. His development of the synaptic tagging and capture hypothesis of memory stabilization and his work the neurobiology of mental schemas both reflect his continuing capacity for innovation in neuroscience.

Richard Morris has received several important international awards for his achievements; ost recently, he was one of three recipients of The Brain Prize 2016, awarded by the Grete Lundbeck European Brain Research Foundation.

Isabel Pérez-Otaño received her Ph.D. from the University of Navarra, Spain where she developed an interest in neuroscience and brain disease. She took postdoctoral training with Professor Steve Heinemann at the Salk Institute for Biological Studies in San Diego, and later worked with Drs. Michael Ehlers and Don Lo at the Neurobiology Department of Duke University on the cell biology of glutamatergic neurotransmission. In 2004, she joined the Neuroscience Department of the Center for Applied Medical Research of the University of Navarra Medical School, which she currently directs. Her lab focuses on identifying cell biological pathways that underlie the proper development and maintenance of synaptic circuits, and on exploring links of these pathways to mood and cognition and to brain disease. She has been a Visiting Scholar at Stanford University (2010) and participates as an independent expert advising the European Commission and UK Welcome Trust on science funding. Recent discoveries from her group identified aberrant reactivation of synaptic pruning as an early cause of Huntington´s disease, and her team is now undertaking a translational effort to translate this knowledge into therapies.



Carlo Salareceived his PhD in Pharmacology and Toxicology at University of Milano, where he started his studies in neuroscience. From 1998 to 2001 he was Postdoctoral research fellow in Morgan Sheng's laboratory at the Howard Hughes Medical Institute, Department of Neurobiology, Harvard Medical School, Boston USA. Since 2001 he is researcher at CNR Neuroscience Institute of Milano

His lab is interested to know how neuronal activity causes long lasting changes in synaptic structure and function that may contribute to learning and memory. He focuses on understanding the function of various proteins that regulate neuronal synapse formation and plasticity, and their association with ASDs and intellectual disability and other neurodevelopmental diseases. He is now extensively studying how synapse activity regulates protein translation and excitation/inhibition balance in normal and pathological conditions.

Carmen Sandi is a Professor at the Swiss Federal Institute of Technology Lausanne (EPFL), Switzerland, where she is the Director of the Brain Mind Institute and leads the Laboratory of Behavioral Genetics. Her goal is to understand how stress and personality affect brain function, behavior and cognition. Her lab is developing a research program combining approaches in rodents and humans to understand the social brain and, particularly, the emergence of violence and social hierarchies. A special emphasis in her current work is placed on the role of brain bioenergetics in the regulation of behavior by stress and anxiety. She serves in several international and editorial boards, and was the founding Editor-in-chief of Frontiers in Behavioral Neuroscience (2007-2014). She has published over 160 research articles and contributed to various books. She was President of the European Brain and Behavior Society (EBBS; 2011-2012) and is currently member of the Executive council of the European Molecular and Cellular Cognition Society (EMCCS) and President-elect of the Federation of European Neurosciences (FENS).

Natalie Sans Nathalie Sans is an INSERM Research Director and leads with M. Montcouquiol the "Planar Polarity and Plasticity' team at the NeurocentreMagendie in Bordeaux. Since 2015, she is also deputy director of the INSERM U1215 and co-chair of the Life Sciences and Health department of the University of Bordeaux. Nathalie Sans obtained her PhD at the University of Montpellier in 1996, studying vestibular compensation. She then worked with Robert J. Wenthold as a post-doc at NIH in Bethesda (USA) for 8 years where she identified several novel components involved in intracellular trafficking of AMPA and NMDA receptors and studies the influence of their traffic on the structure and function of glutamatergic synapses. She has been pioneer in showing that PDZ-protein/receptor interactions occur early in the secretory pathway, and that PDZ-based macromolecular complexes regulate receptor delivery to the synapse. She continues to study intracellular traffic in relation with spine structure and function and develop new projects relying on multidisciplinary approaches to identify and define the specific function of the planar cell polarity signaling in neuronal plasticity and the impact of the disruption of this signaling in pathological context.