



## The 7th Lecture Series by Academia Sinica Academicians

第七屆中央研究院院士講座系列

Jointly Organized by School of Biomedical Sciences Department of Biomedical Engineering Office of Academic Links (China)

Speaker: Professor Chiang Ann-Shyn

Division of Life Sciences, Academia Sinica

中央研究院生命科學組 江安世院士

Title: Visualizing Memory Allocations in the

Drosophila Brain

Date: Thursday, 12 April 2018

Time: 16:00 - 17:30

Venue: G02, Lo Kwee-Seong Integrated Biomedical

**Sciences Building** 

Registration: <a href="http://www.cuhk.edu.hk/oalc/as-2018/">http://www.cuhk.edu.hk/oalc/as-2018/</a>



## 江安世院士簡歷

中央研究院生命科學組江安世院士現任國立清華大學特聘講座教授、生命科學院院長及腦科學研究中心主任專長包括腦科學、神經遺傳學、動物行為學、生醫顯微影像技術。江院士發明生物組織澄清技術,以超高解析顯微影像建構果蠅全腦神經網路連結體,發現長期記憶儲存於特定神經網路的單一腦神經細胞。於 2016年國際神經科學年會主席特邀講座,他倡議要建構人體全身神經連結體。江院士於 2014年當選為中央研究院院士,曾獲得世界科學院院士、教育部國家講座,現為教育部學術審查委員會生命科學小組召集人。江院士為國立中興大學學士、國立臺灣大學碩士、美國羅格斯大學博士,現為美國加州大學聖地牙哥分校 Kavli Institute for Brain and Mind (KIBM) 的國際學者。

## Visualizing Memory Allocations in the Drosophila Brain

Creating long-term memory (LTM) requires allocation of learned information through new protein synthesis to specific neurons and synapses in a neurocircuit. To study circuit mechanisms regulating memory allocation in the whole brain, we need tools for deep-tissue imaging of learning-induced changes in synaptic proteins within individual neurons at single-molecule resolution. Optical super-resolution microscopy allows 3D visualization of single protein molecules, but only within a limited depth because of light scattering and aberration within tissues. Here, we report the deep-tissue super-resolution (DSR) microscopy, achieved single-molecule localizations in the whole Drosophila brain. Applying an improved Bessel beam plane illumination to the optically-cleared brain, the DSR allows deep-tissue localization of spontaneous blinking of single fluorophores tagged to any molecules of interest. Successful mapping individual proteins in the whole brain showed that LTM requires allocation of newly synthesized vesicular monoamine transporter proteins to specific axonal sectors within a single DPM neuron innervating nearly the whole mushroom body, the memory center in the Drosophila brain. Together with the previous findings of postsynaptic dendritic allocation of memory proteins in the specific MB output neurons, our results implicate a sector-specific circuit mechanism involving also presynaptic axonal allocation of learning-induced proteins to regulate LTM formation.

Language: Mandarin / English

ALL ARE WELCOME
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