

Enabling Identification and Impact of Synaptic Weight in Functional Networks

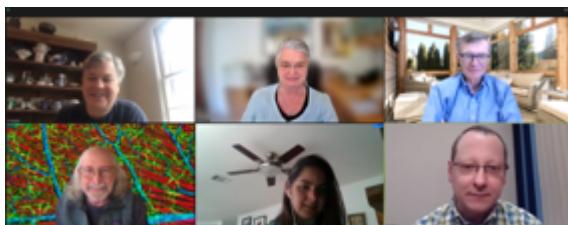
Kristen M. Harris

Silvio Rizzoli (IRG1 lead); Mark Ellisman (IRG2 lead); R. Clay Reid (IRG3 lead); Terrence Sejnowski (IRG4 lead)



Activities

- Launched program virtually in Fall 2021.



PI, IRG leads, and project manager

- Had 6 workshops on synaptic mitochondria. (recordings: <https://3dem.org/workshops/>)

Tracing Challenges

Inner Membrane Invagination

- Cristae can appear as...
 - ...visible folding within a section.
 - ...disconnected internal shapes.

Membrane Visibility

- Can be difficult to distinguish between membrane and proteins.
- Both sides of the membrane can rarely be seen.

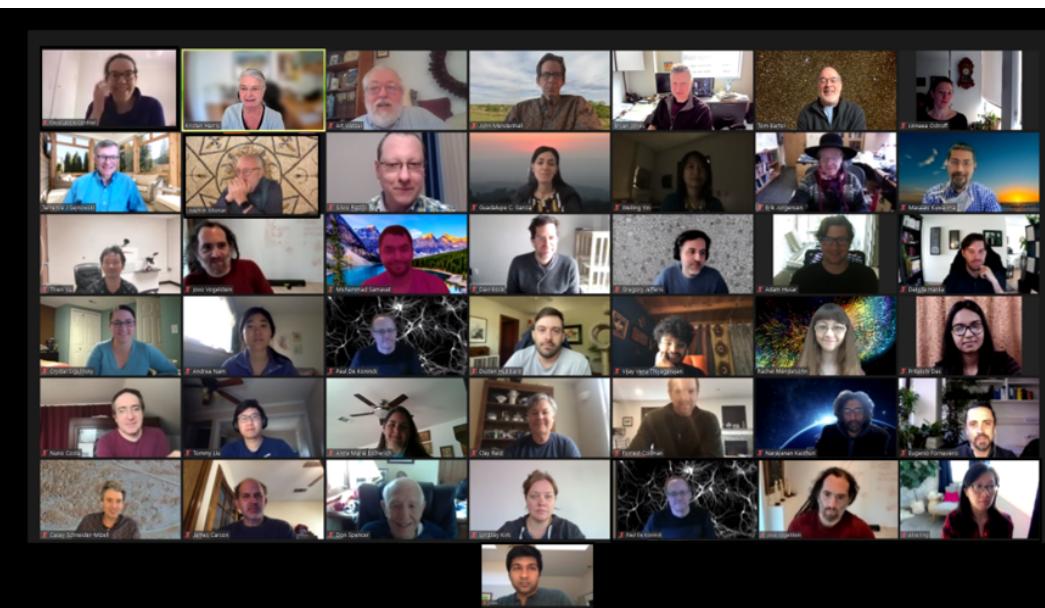
Mitochondria workshop

featuring an undergraduate student

Trace the cristae as a separate, protruding object.

Trace the outer leaflet of the OM, inner leaflet of the IM.

- Initiated within-, cross- IRG collaborations.



- Coordinating cross-IRG technical workshops.
- Data tools, workshops are developed and shared at 3DEM.org.

3Dem

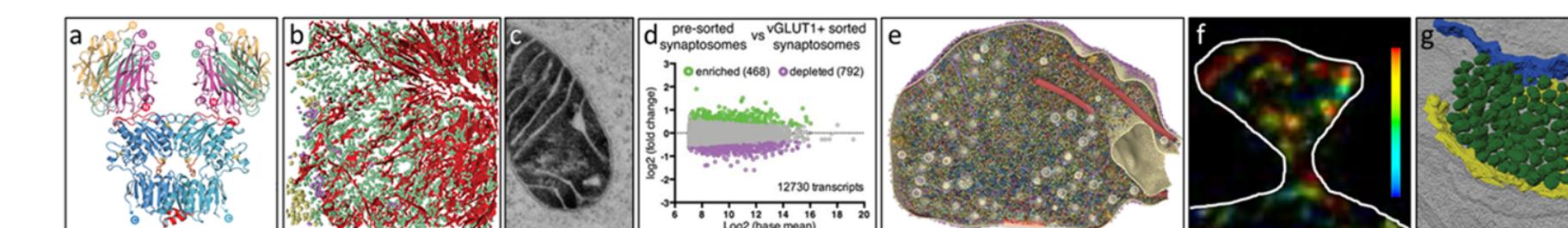
Public Data Shared Data Atlas Help About Workshops Log in

3-D ELECTRON MICROSCOPY

A web-based research platform focused on developing and disseminating new technologies for enhanced resolution 3-dimensional electron microscopy.

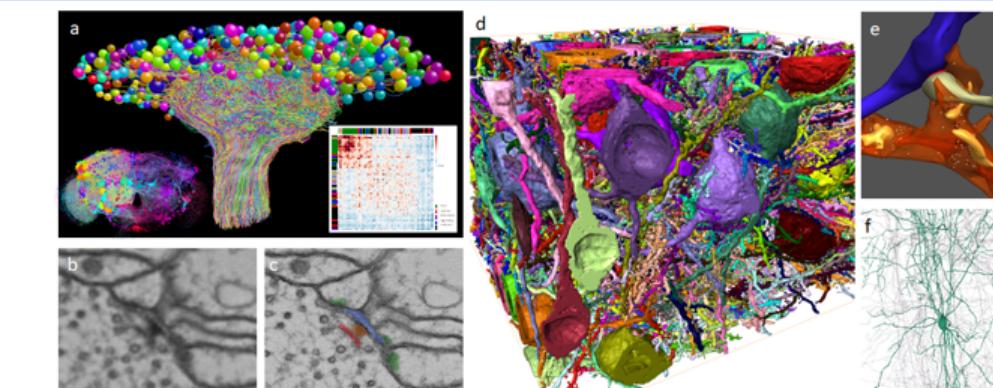
What constitutes synaptic weight, what role does it play in shaping neural circuits, and how does it change during growth and plasticity?

IRG1: Molecular determinants and manifestations of defined synapse states



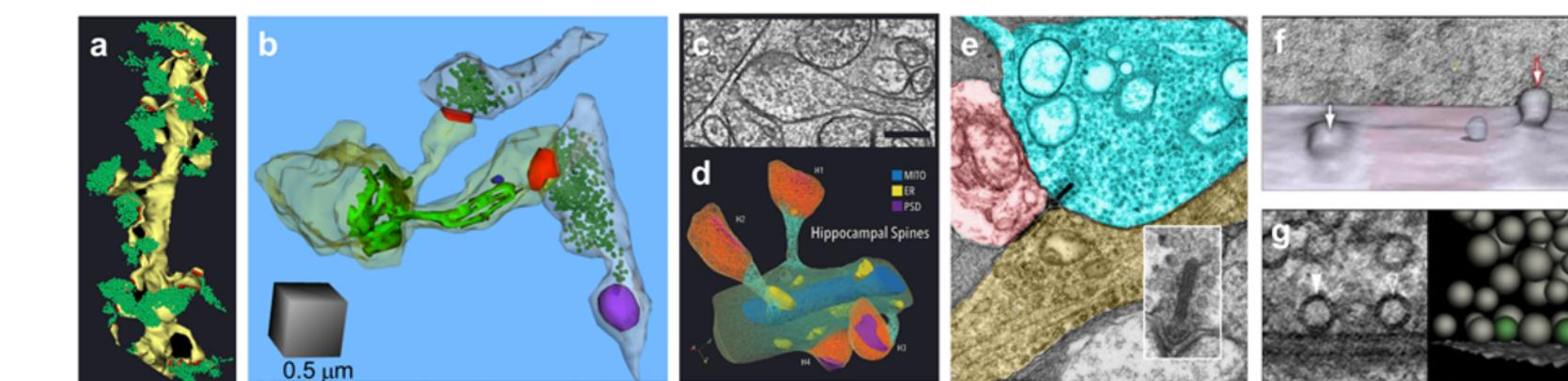
- Silvio O. Rizzoli (IRG1 Lead), Univ. Göttingen Med. Ctr. (Germany)
- Erin M. Schuman, Max Planck Inst. (MPI) for Brain Research (Germany)
- Alexandru Radu Aricescu, Cambridge (UK)
- Alice Yen-Ping Ting, Stanford (US)
- Volker Haucke, Leibniz FMP, (Germany)
- Stephan Sigrist, Freie Universität Berlin (Germany)
- Paul De Koninck, Université Laval (Canada)
- Ruben Fernandez-Busnadio, Univ. Göttingen Med. Ctr. (Germany)

IRG3: Ultrastructural motifs of synapses in neural circuits with defined states



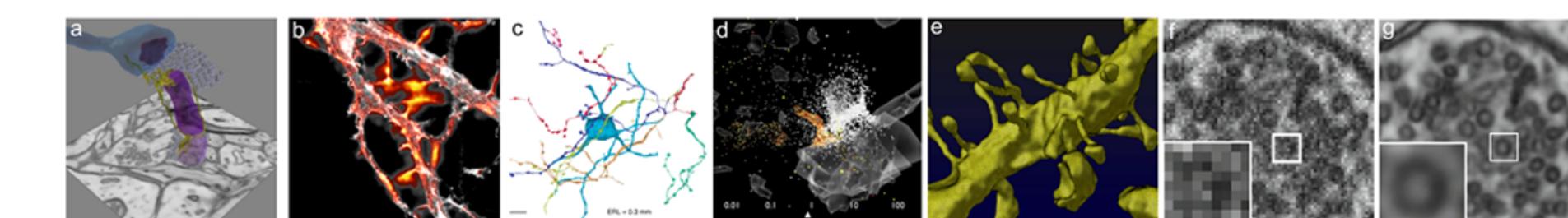
- R. Clay Reid (IRG3 Lead), Allen Brain Institute (US)
- Davi Bock, Univ. Vermont (US)
- Gregory S. X. E. Jefferis, Cambridge (UK)
- Moritz Helmstaedter, MPI for Brain Research (Germany)
- Narayanan Kasthuri, Argonne Nat. Lab., Univ. Chicago (US)
- Linnaea E. Ostroff, Univ. Connecticut - Storrs (US)

IRG2: Subcellular constituents and manifestations of defined synapse states



- Kristen M. Harris (Lead PI), Univ. Texas, Austin (US)
- Mark H. Ellisman (IRG2 Lead), Univ. California, San Diego (US)
- Bryan W. Jones, Univ. Utah (US)
- Erik M. Jorgensen, Univ. Utah (US)
- Christian Rosenmund, Inst. Neurophysiol., Charité Gottingen (Germany)
- Nils Brose, MPI Experimental Medicine, Gottingen (Germany)

IRG4: Cyberinfrastructure to enable multiscale discovery in diverse neural circuits



- Terrence J. Sejnowski (IRG4 Lead), The Salk Institute (US)
- Uri Manor, The Salk Institute (US)
- Joshua Vogelstein, Johns Hopkins Univ. (US)
- Flavie Lavoie-Cardinal, Université Laval (Canada)
- James P. Carson, Director 3DEM.org, Univ. Texas, Austin (US)
- Viren Jain, Google (US)