Curriculum Vitae

Maxwell (Xiangheng) Chen

Education

September 2021—September 2022
Degree: Master of Science in Neuroscience
Where: University College London, London, UK
Grade: Distinction

September 2017—March 2021
Degree: Bachelor of Science in Cognitive Neuroscience, Biology Minor
Where: University of California, San Diego, La Jolla, CA, USA
GPA: 4.0 of 4.0 (Major GPA)

Technical Skills

Laboratory Skills
Patch Clamp Electrophysiology, Stereotaxic Surgery, Confocal Microscopy,
Whole Brain Serial Two-Photon Tomography Imaging (Brainsaw),
Immunohistochemistry, Mice perfusion, Mouse Handling

Software
Brainreg, Cellfinder, Brainrender, vesSAP
Napari, Fiji, DeepLabCut, CinePlex
Python, Jupyter Notebook, Java, Linux shell, Bash
Final Cut Pro, Adobe Lightroom

Hardware
Brainsaw (Whole Brain Serial Two-Photon Tomography Imaging), Vibratome
Keyence Microscope, Microtome, Cryostat
Drone Cinematography, DSLR, Professional Three-Axis Gimbal

Experience

September 2021—Present
Project: Investigating the Neural Ontogeny of Parental Behaviour
State-dependent Neural Processing Lab, The Francis Crick Institute
Advisor: Dr. Jonny Kohl
Contributions:

- The project aims to elucidate the underlying mechanism behind the onset of parental behaviour in juvenile mice. Focusing on MPOAGal neurons as well as its downstream projection targets as a key node for experimental design, I am assessing if the proper development of MPOA projections to its downstream region is critical for the onset of parental behaviour at approximately P15. I am conducting a multi-level investigation to

assess the changes from the synaptic level to the circuitry level and ultimately confirming the developmental changes using in-vivo optogenetics experiments.

- I created a pipeline to analyze data produced by Brainsaw, a whole brain serial two-photon tomography imaging device. The pipeline utilizes Brainglobe Suite to reconstruct the brain, warp the standard allen brain atlas onto slice space, detecting neurons of interest, and conduct region specific voxel analysis.
- I employed Channelrhodopsin-assisted circuit mapping (CRACM) to elucidate functional connectivity between different cells
- Details for current projects are listed in the **Work History** section

November 2020— June 2021

Project: Investigating the pattern separation circuitry in hippocampus
Neural Crossroads Lab, Dept. of Cognitive Science, UC San Diego
Advisor: Dr. Lara Rangel
Contributions:

- The project hoped to study the underlying circuitry behind the hippocampal pattern separation in the hippocampal CA3 and dentate gyrus areas.
- I spearheaded the project by using DeepLabCut to assist with rodent behavior tracking and analysis.
- I also created an efficient pipeline procedure for video scoring, splitting, and data analysis using python and FFmpeg package.
- I assisted the graduate students with in-vivo electrophysiology recording as well as drive making.

January 2019— January 2021

Project: Investigating the cellular loci of striatal Mu opioid receptors
Banghart Lab, Center for Neural Circuits and Behavior
Advisor: Dr. Matthew Banghart
Contributions:

- My project sought to gain a better understanding of the role mu-opioid receptors (MOR) carry within the various projections to the VTA dopamine neurons. I conducted various retrograde tracing experiments using CTB and retrobeads, along with fluorescence in situ hybridization, immunohistochemistry, and fluorescence microscopy. Ultimately, my results helped map out various neural pathways involving MOR to the VTA and ventral striatum, which helped guide the later region-targeted photo-uncaging experiments.
- I created an intra-cranial molecule diffusion model using Java and Python to better assist a graduate student's two-photon uncaging project.
- I independently engaged in mice perfusion, brain cryosectioning, fluorescent imaging, and behavioral data analysis.

- I created behavioral paradigm experiments for the pharmacological and cognitive pain modulation project.

Nov 2017— Dec 2018

Project: The Vocal-Vagal Communication Hypothesis in ASD Patients
Reinagel Lab - Kavli Institute for Brain and Mind
Advisor: Dr. Pamela Reinagel
Contributions:

- The project hypothesized that vagal innervation of the vocal apparatus is a key component of the spontaneously produced emotional tone in vocal communications for people with autism.
- I conducted primary data collection and developed a concise python protocol for systematic data cleaning, all done in collaboration with the Autism Center of Excellence, San Diego.
- I assisted with and built machine learning models that help with the prediction of the autistic level using primary audio samples from therapy sessions of children with autism.
- I helped build an operant conditioning paradigm for behavioral experiments that aims to "Train Rats Using Water Rewards Without Water Restriction" (Reinagel et al., 2018).

June 2018— August 2018

Project: Investigating SHP2's role in lung cancer and pulmonary fibrosis
Ke Cancer Lab - Zhejiang University School of Medicine
Advisor: Dr. Yuehai Ke
Contributions:

- During this honor summer research program, I worked with graduate students to investigate the role of Shp2, Protein Tyrosine phosphate 2 (SHP2) at the SRC homology region 2 (SH2) in various kinds of cancer, diseases (lung cancer, Leukemia, Noonan Syndrome, etc). The project aims to seek SHP2's potential in becoming a new target of next-generation anti-neoplastic drugs.
- I trained and conducted polymerase chain reaction, Western and Northern Blot, TRIZOL RNA isolation. I also independently performed rat perfusion and femur bone marrow extraction.

Work History

September 2022— Present

Position: Research Officer
Where: The Francis Crick Institute, Kohl Lab, London

- Assisting 2 PhD students and 1 post-doctoral researcher with their projects while running my own exploratory behavioural experiment.

- My main duty includes running behavioural experiments involving social hierarchy and dominance, hormonal regulation's influence on parental behaviour, and the ontogeny of allo-parental. I also conduct various brain imaging with whole-brain serial two-photon tomography and confocal microscopy. Additionally, I also conduct patch-clamp electrophysiology for Channelrhodopsin–2-assisted circuit mapping (CRACM).
- I am also using various deep learning packages to analyze rabies virus tracing data and whole-brain vasculature data to conduct cell-detection and circuit tracing analysis.

July 2020— Present

Position: Writer, Translator, Video Editor
Where: Neureality, Remote/Beijing, China

- Wrote scientific review articles, translated primary research, and edited videos at Neureality, a Chinese non-profit neuroscience news organization that commits to promoting the goal of better public understanding and participation in science.

October 2017— June 2021

Position: Executive Board Chair, Event Coordinator, Cinematographer,
Where: The Health and Medical Professions Preparation Society (HMP3)

- Led and served the largest pre-health organization at UC San Diego for four years. Mentored students, conducted fundraisers, and created a dozen events that catered to low-income, and minority background students.
- Planned annual MEDS Conference in collaboration with the UC San Diego School of Medicine, a conference that is specifically designed to close the disparities seen in both medical education and health care. Filmed and edited multiple promotional videos for the conference.
  - MEDS Conference 2019-2020 https://www.youtube.com/watch?v=AAAMMq1jE5k&ab_channel=MaxwellChen
  - MEDS Conference 2018-2019 Promotional https://www.youtube.com/watch?v=qSknKZ7rtU0&ab_channel=MaxwellChen

February 2018— June 2018

Position: Event Photographer, Cinematographer
Where: Dean's Office, the Division of Arts and Humanities, UC San Diego

- Shot and edited the UC San Diego annual Transfer Triton Day Video for the Arts and Humanities Department. Created multiple PR videos for the Dean's Office of Arts and Humanities Department. Worked as an event photographer for several Arts and Humanities Department's events.

July 2015—

Position: Supervisor, Volunteer Trainer, Counselor Assistant

June 2019 **Where:** Galaxy Autism Center, Wenzhou, China

- Trained and led volunteers from different universities every summer to better assist therapists and provide care for the children.
- Volunteered and assisted classes and therapy sessions, and supervised children with autism during recess. Helped teachers create and prepare lesson plans and class materials.

Publications and Poster

- A Neural Circuit for Prepubertal Alloparenting. Bradley B. Jamieson, **Maxwell Xiangheng Chen**, Grace M. K. Chattey, Johannes Kohl, International Congress of Neuroendocrinology (2022).
- Neural Ontogeny of Alloparental Behaviour. **Maxwell Xiangheng Chen**, Bradley B. Jamieson, Johannes Kohl, University College London Neuroscience Poster Symposium (2022).
- Endothelial deletion of SHP2 suppresses tumor angiogenesis and promotes vascular normalization. Nature Communication (2022). (My preliminary data was used in this project)
  https://www.nature.com/articles/s41467-021-26697-8
- A review on the Synergy between amyloid-beta and tau in Alzheimer's disease. **Maxwell Xiangheng Chen**, Neureality (2021).
  https://mp.weixin.qq.com/s/bomwdDK63aiPqU0YvOXIrw

Honors and awards

- University of California Provost Honors (2017, 2018, 2019, 2020)
- Chinese National Medical Documentary Award, Second Place (2018)
  Produced a 40 minutes educational medical documentary on abortion prevention and recovery.
- California State National History Day Documentary Award (2016, 2017)
  Truffaut: Art of Film(2016)
  Ida Tarbell: Combating the Standard(2017)