

2015 Neuroscience Research Symposium Summary

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On January 15th, 2015, the Neuroscience Training Program (NTP) held the Neuroscience Research Symposium at Promega Corporation and the BioPharmaceutical Technology Center Institute (BTCI).

After a temporary hiatus since the last Symposium in 2010, the Neuroscience Research Symposium came back in full swing to include a whopping 16 research talks by NTP-affiliated faculty and graduate students, an afternoon poster session, and a keynote speech by a Distinguished Alumnus Lecturer. According to NTP Director Mary Halloran, the symposium stems from a 20-year sponsorship with BTCI. Frank Fan, Director of Research at Promega, spoke to the “high content and high efficiency” of the program for the day.

The fifteen-minute talks were divided up into four sessions covering hot topics in Neuroscience, starting with Plasticity and Development. Faculty members Xinyu Zhao, Marc Wolman, and Reid Alisch showcased cutting-edge research from their labs on protein regulation of neurogenesis in diseases such as Fragile X (Zhao, Department of Neuroscience), gene regulation of habituation learning in zebrafish (Wolman, Department of Zoology), and epigenetic mechanisms underlying anxious temperament (Alisch, Department of Psychiatry). In the final talk for the session, NTP fourth-year student Robert Nichol described his research on the molecular mechanisms underlying axon guidance. His work from the lab of Tim Gomez, shows that the proteins Semaphorin-3A (SEMA3A) and Brain Derived Neurotrophic Factor (BDNF) serve as repulsive and attractive agents, respectively, during the axon’s growth trajectory during neuronal development.

The second session on Cellular and Molecular Neuroscience began with a presentation by Erik Dent, faculty member in the Department of Neuroscience. Dent presented on how cellular materials are packaged and shuttled into dendritic spines as the synapse undergoes changes during experience and learning. His collaboration with Edwin Chapman’s lab made it possible to visualize vesicle release and recycling through a technique called Synapto-pHluorin. Cynthia Czajkowski, also a faculty member of the Department of Neuroscience, explained how her work on understanding GABA-A receptor structure can open doors for finding safer and more effective drugs of neuronal inhibition that target GABA-A receptor binding sites. The third talk of the session by NTP third-year student Aditya Rayasam featured his work from the lab of Zsuzsanna Fabry, linking the cytokine (protein) interleukin-21 to brain injury following ischemic strokes in mice. NTP fourth-year student Rikki Hullinger (lab of Luigi Puglielli) concluded the session with her presentation on the role of endoplasmic reticulum protein acetylation in autism.

The first two sessions were followed by a speech from keynote speaker Jeremy Teissère, Stanley Road Professor of Neuroscience and Directory of the Neuroscience Program at Muhlenberg College. In his talk titled “Disruptive Innovation: Some strategies for staying fresh and defeating old-fogyism in Neuroscience and Life,” Teissère laid out the four “disruptions” to a conventional neuroscientific curriculum to increase the chance of an undergraduate’s success in graduate school. These disruptions included turning the curriculum upside down, encouraging interdisciplinary collaborations, forcing a student to troubleshoot hard problems, and being honest about the limitations of studying something as complex as the brain.

Teissère carried over his research interests on the GABA-A receptor from his doctoral work in Cynthia Czajkowski’s lab to encourage critical thinking and unique approaches for studying the brain at Muhlenberg. “The [research] theme is a smokescreen to get the student interested in the process,” Teissère said of the students’ independent Neuroscience research projects. His students are currently studying natural plant products, such as the ones found in calming herbal teas, as potential modulators of the GABA-A receptor.

Teissère’s presentation was followed by the third session on Higher Order Systems. Melissa Rosenkranz, a researcher at the Center for Investigating Healthy Minds, used neuroimaging to observe the brain’s response to acute stress in patients with mild asthma, since stress is known to exacerbate inflammation in asthma. By studying primates in Luis Populin’s lab, NTP graduate student Abigail Rajala showed that methylphenidate (i.e., Ritalin), reduced impulsive behaviors in a test where the subject had to choose between small immediate rewards and larger, delayed rewards. NTP third year graduate student Sofiya Hupalo spoke about her work in Craig Berridge’s lab looking at the effects of the peptide hormone corticotropin-releasing factor (CRF) on cognitive abilities ascribed to the prefrontal cortex (PFC), such as working memory and attention. Rats that received CRF injections in a subregion of the PFC called the caudal dorsomedial PFC showed decreased working memory as they navigated a T-maze in search of food. Finally, Katie Yang, a third year NTP student in Michelle Ciucci’s lab, described her use of a genetic knockout rat model of the PINK1 gene thought to be involved in the vocal deficits seen in Parkinson’s Disease.

The final session, preceding the afternoon poster session, touched on Clinical Implications, with presentations by Department of Medicine, Geriatrics and Adult Science faculty Barbara Bendlin on her work linking insulin resistance to pre-clinical Alzheimer’s, Department of Comparative Biosciences faculty Masatoshi Suzuki on stem cell therapy for treating neuromuscular disorders such as Amyotrophic Lateral Sclerosis, NTP third year student Annie Racine’s work in the lab of Sterling Johnson linking CSF markers of neural injury and pre-clinical Alzheimer’s, and NTP second year student Joseph Wszalek’s work in Lyn

Turkstra's lab highlighting the implications of criminal proceedings involving juveniles with Traumatic Brain Injury.

The day served as a celebration of the NTP's commitment to cutting-edge innovation in Neuroscience research, enthusiastic collaborations between students and faculty, and the ongoing impact that NTP alumni can have on the scientific community.