BME Seminar
Friday, November 22nd, 2013
ROWE 320 at Storrs & Videoconference to UCHC-Low Learning Center
12:20-1:10 pm

“Temporal Coding in the Olfactory Bulb: an Optogenetic-Behavioral Exploration and its Relevance to Retronasal Smell”

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Abstract:
We know from recent optical imaging studies with high temporal resolution that odorants evoke distinct spatio-temporal patterns in the olfactory bulb (OB). Our lab recently showed that those temporal patterns differ between orthonasal (sniffed) smells and retronasal (intra-oral food ingestion) smells. Further, we found that retronasal odor concentrations can be encoded by response latency as well. It was recently reported that temporal patterns from the olfactory bulb can be encoding by the olfactory cortex. If time is indeed a neural coding parameter it would expand the information encoding density of the olfactory system by orders of magnitudes. We therefore sought to evaluate the behavioral relevance of the temporal dynamics. We projected static versus dynamic movies onto the olfactory bulb made light-sensitive by expressing channelrhodopsin in mitral (output) cells, while these thy-1-chr2 mice performed a go-no-go discrimination task. Movies were either based on real biological OB dynamics, or synthetic biologically-inspired patterns. Mice were able to discern the temporal information down to ~17ms accuracy and further detected the absence of temporal information from biological patterns. We conclude that time plays a significant role in the encoding of odors.

Biography:
Justus got his PhD in Neuroscience under Dr. Tom Scott, exploring gustatory coding in the the taste thalamus. He worked for 4 years with Dr. Edmund Rolls exploring the orosensory representations in amgydala, taste cortex and OFC in macaques. As post-doc under Dr. Matt Wachowiak’s guidance he explored OB sniff responses in awake rats using optical imaging. In his current lab at At the John B. Pierce Laboratory Justus uses rodents to explore flavor coding and behavior.