

DATE: Day 20 Month 04 Year 2019

**SUMMARY of
2018 RESEARCH RESULTS REPORT
For International Collaborative Research with IPR, Osaka University**

Research Title		Establishing an occasion setting task and single-cell genomic profiling from neurons activated by food cues
Applicant	Name	Eisuke Koya (Hans Crombag, co-applicant)
	Affiliation	School of Psychology, University of Sussex
	Present Title	Reader (Associate Professor) in Behavioural Neuroscience
Research Collaborator (Host PI)		Professor Takatoshi Hikida
<p>Summary</p> <p>This visit sponsored by the collaborative research grant was very fruitful for the two PIs from Sussex (Crombag and Koya), for Ella Margetts-Smith (Dr. Koya's research technician), and for Prof. Hikida's laboratory. First, Dr. Crombag had the opportunity to discuss implementation of the occasion-setting behavioral task. This is an ideal procedure used to examine how contextual cues can modulate the behavioral impact of cues and critically, probe impairments in hippocampal function. Prof. Hikida's laboratory members appreciated his advice and breadth knowledge since he has over 20 years of research experience developing and implementing procedures to probe complex appetitive learning as a behavioral neuroscientist. Moreover, many of the critical parameters that were necessary to implement single-cell PCR were determined during this visit. As such, we have recently managed to identify key gene transcripts whose protein product modulates intrinsic excitability from single nucleus accumbens neurons (e.g. K⁺ ion channels). This approach will help us identify the phenotype of the neurons that we record from, and allow us to directly assess the link between plasticity and neuronal phenotype.</p> <p>We also had the valuable opportunity to learn more about Prof. Hikida's research programme on the role of basal ganglia systems in psychiatric disorders. We had the chance to interact with Dr. Tom Macpherson and Inscopix representatives about the usage of the fluorescent miniature microscope in examining neuronal ensemble activity <i>in vivo</i> to investigate the mechanisms of cue-evoked appetitive behaviors. Also, Prof. Hikida and his laboratory members learned about some of the novel and advanced neuroscience tools used in our laboratories to probe the function and plasticity changes of sparse sets of neurons that encode learned cue-reward associations called 'neuronal ensembles'. We discussed chemogenetic and electrophysiology tools that could manipulate and characterize these neurons, respectively. Overall, we believe as a result of the knowledge exchange that took place, the Sussex and Osaka IPR labs can greatly benefit from potentially implementing methods and conceptual understanding that were not previously present in our research programmes.</p> <p>Finally, there were knowledge exchanges on a daily level during our stay. I (Koya) had the possibility to interact with Prof. Hikida's students and discuss my previous work in great detail. I also gave a seminar regarding my research on the role of neuronal ensembles in appetitive behaviors such as food seeking and how their physiological properties change as a function of extinction learning, devaluation, and conditioning. This impactful seminar was attended by many students and senior investigators not only from IPR, but from the wider Osaka neuroscience community, which consisted of molecular biologists, <i>in vivo</i> electrophysiologists, and neuroscientists interested in basic learning and memory mechanisms.</p>		