

## **Whole-brain representation of imprinted scents**

Animals have evolved a wide range of approaches to attract and select opposite sex partners, and most of these strategies rely on the integration of courtship cues across multiple sensory modalities. In rodents, male mice attract females using a combination of olfactory (i.e. pheromones and molecules contained in their urine and scents) and acoustic (i.e. ultrasound vocalizations, USVs) cues. Interestingly, past works demonstrated that during early life females can establish memories of both odors and sounds of their father and siblings, a process called sexual imprinting. Females can later recall these imprinted memories to find the most suitable partner, avoiding mating with their close relatives and thus reducing inbreeding. Despite sexual imprinting has been largely studied, the neuronal mechanisms underlying the formation and the recall of imprinted memories is unknown. Here we focus on the brain representation of sexual odors in adult female mice, and compare how the brain represents imprinted versus unfamiliar opposite-sex olfactory cues. By using whole brain immunolabeling of immediate early genes (cFOS), iDISCO tissue clearing, and light sheet microscopy we identified several brain regions activated by both imprinted and unfamiliar odors and, interestingly, a subset of hypothalamic areas which were activated only by unfamiliar, but not familiar, odors. Our data thus set the basis to understand how exposure to ethologically relevant odors early during life shapes neuronal circuits in adults, and how these circuits are recruited and help females to find their best mating partner.