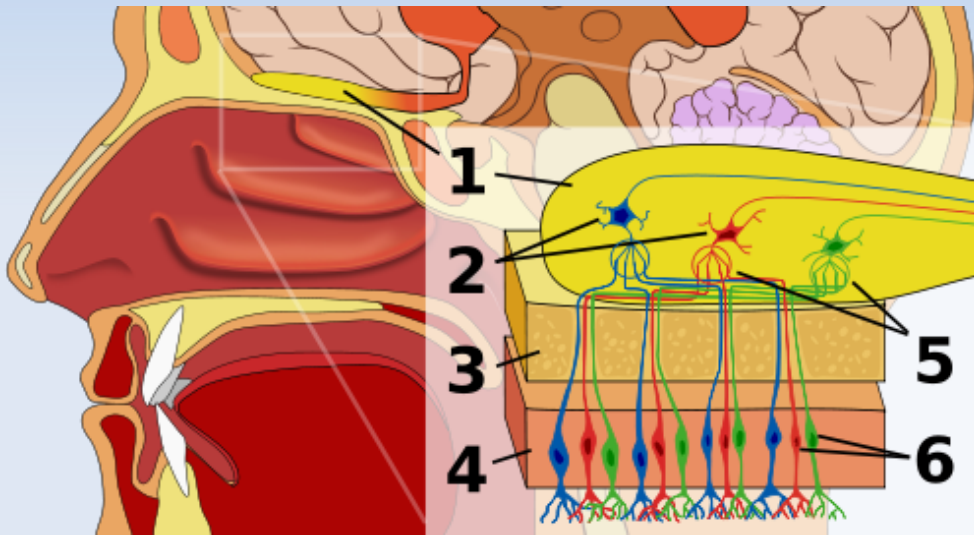


Modeling the olfactory system

- Bernhard Kaplan, Dipl. Phys.
- PhD student in Dep. for Comp. Biology, supervisor: Anders Lansner
- Current work: Neurochem/BrainScaleS projects
 - Development of a large-scale model of the mammalian olfactory system with spiking neurons
 - Study its performance in pattern recognition, segmentation tasks
 - Compare with biological system and abstract system (non-spiking units)

The olfactory system

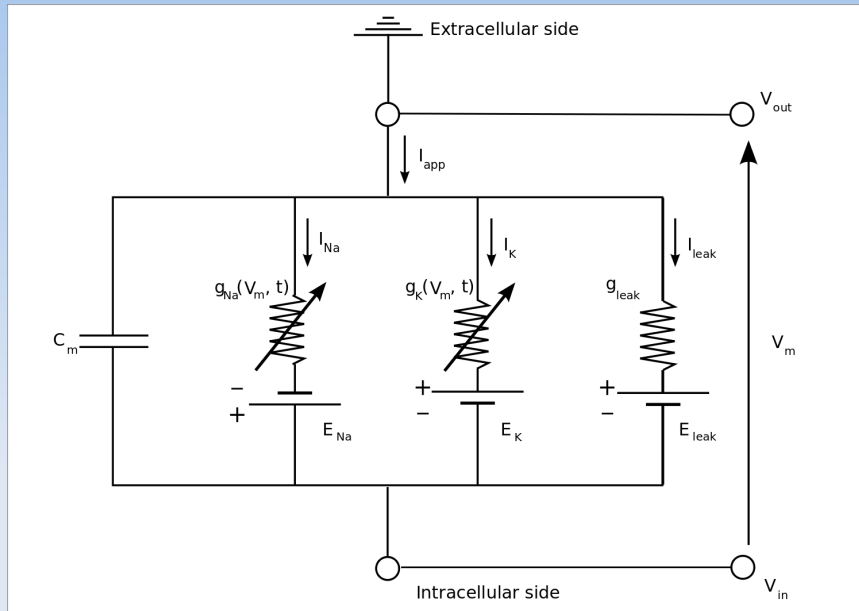


source: Wikimedia commons, Patrick J. Lynch

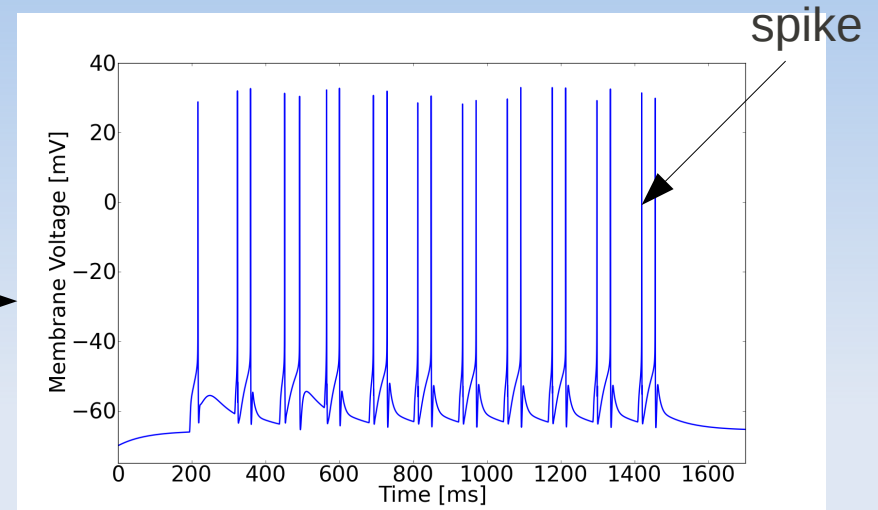
1. Olfactory bulb (OB)
2. Mitral cells (MIT)
3. Bone
4. Nasal epithelium (OE)
5. Glomerulus
6. Olfactory receptor cells (ORN)

The OB projects to many brain areas, we focus on projections to the olfactory cortex

Computational neuroscience

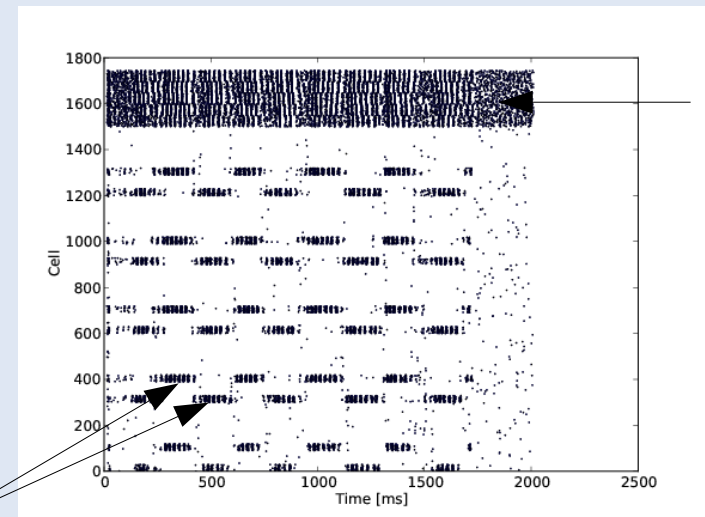


Simulating equivalent electric circuit



Membrane potential

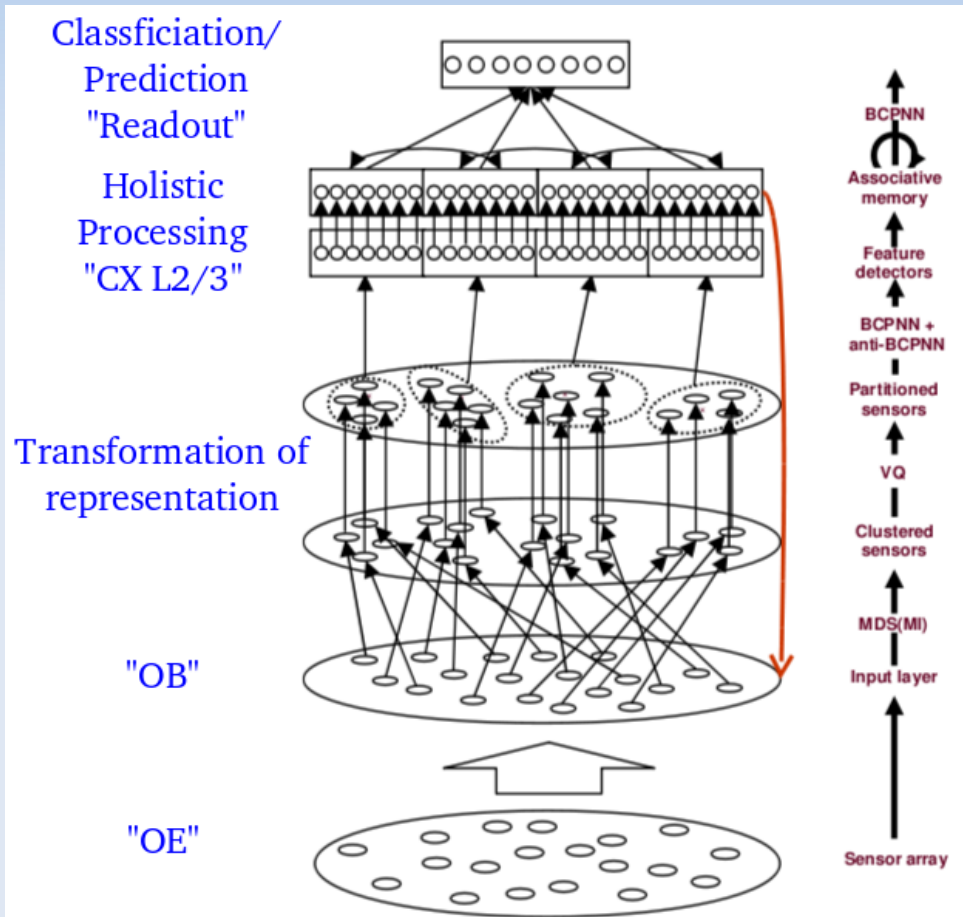
Only spikes are transmitted to other neurons



Rasterplot

two odorants

Research questions and applications



- Pattern recognition:
How can we distinguish many different odours?
- How does learning of odour discrimination abilities work?
- How are cells connected?
- Does biological plausibility help?
- Electronic nose, medical applications,...