

# Learning, memory and behavior in rodents: Relevance for animal models of human disorders



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# Neurophysiology of Memory

- Aim of the research is to extend our knowledge about learning and memory phenomena in animals and humans as models of higher cognitive functions and translational and applied research derived from cognition studies.
- Contemporarily the department focuses on spatial navigation in **dynamic and moving environments**.
  - Legacy of MUDr. Jan Bureš, DSc
- Today the lab is a larger group of young researchers and several PhD and undergraduate students.
- Traditional research areas – **learning & memory research, neural and neurochemical substrate of cognition** (and associated animal models of CNS disorders, especially schizophrenia, OCD and neurodegeneration, neurogenesis)
- **Application of memory tests into development of sensitive diagnostic tests in cognitive disorders.**

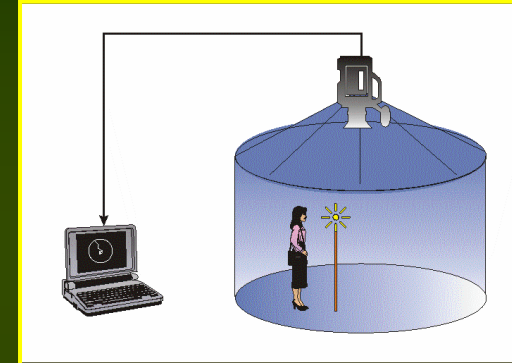
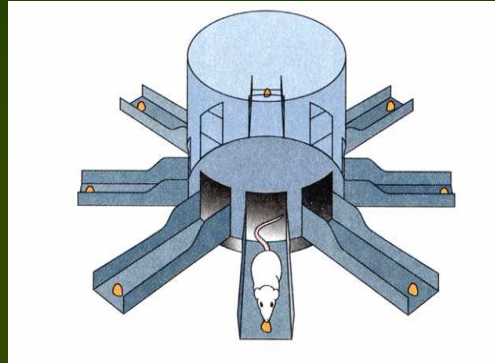


# Animal models of CNS disorders

- Our models
  - Schizophrenia-like behaviors induced by MK-801 (dizocilpine)
  - Excitotoxic damage induced by NMDA
  - Cholinergic screening model of dementia
  - OCD-like behavior – quinpirole (QNP) sensitization
  - (schizophrenia-like endophenotypes – CIMH, ETH)
- Planned models
  - Samaritan model of AD
  - McGill transgenic rats (AD)
  - Ontogenetic clomipramine (TCA) model of OCD



# Methods overview



## Basic lines of research

**Cognitive neuroscience** – understanding of basic mechanisms of navigation and memory; development of cognitive tests – Virtual and real tests

**Neuropharmacology and animal models** – focus on animal models of CNS disorders, pharmacological influences upon memory formation and is related to neuropsychiatric research (animal model of schizophrenia, AD; OCD and other behavioral disorders), neurogenesis.

**Electrophysiology and behavior** – traditional area, almost abandoned a few years ago, now revitalization - unit activity, EEG, effect of MK-801 upon firing of hippocampal cells, intramural cooperation with an epileptological laboratory



# Outlooks and possibilities for potential partners

- **Beside** behavioral, neuropharmacological, surgical and immunohistochemistry methods, we are establishing neurogenesis manipulation and visualization experiments (cooperation with Gerd Kempermann from Dresden), microCT/PET, electrophysiology, phenotyping
- **We elaborate animal models** (Prague Psychiatric Center, McMaster University, CA, University of Zurich) and compare to clinical situation in patients (cooperation with Prague, Psychiatric Center, fMRI, PET, magnetic resonance spectroscopy-OCD)
- **We seek partners experienced or interested in**
  - **Optogenetics and viral transfects**
  - **Transgenesis and molecular genetics**
  - **Comorbidities in animal models and in patients (epilepsy – depression etc.)**
  - **Animal models and translation from animals to patients**
  - **Neurotoxicology**
  - **Time perception**
  - **Interested scientists with a different focus are welcome, we are quite flexible.**
- We are ready to apply for CZ09 in the June call.



# Acknowledgements



Thank you for your attention!