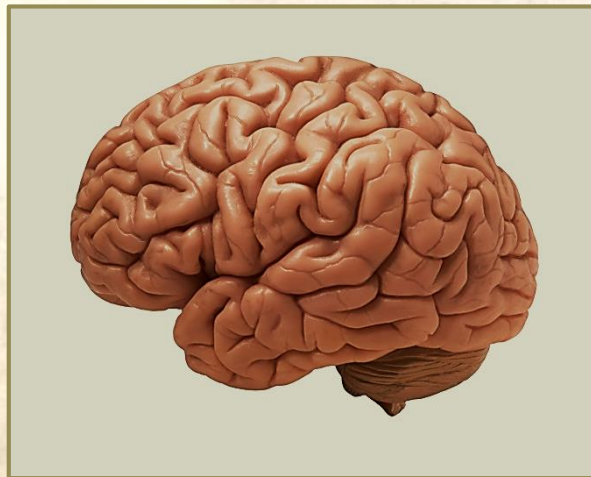


LOW CONCENTRATIONS OF COUMAPHOS DO NOT AFFECT BRAIN DEVELOPMENT AND FUNCTION

HOJNIK Nataša, ČEH Katerina, MAJDIČ Gregor



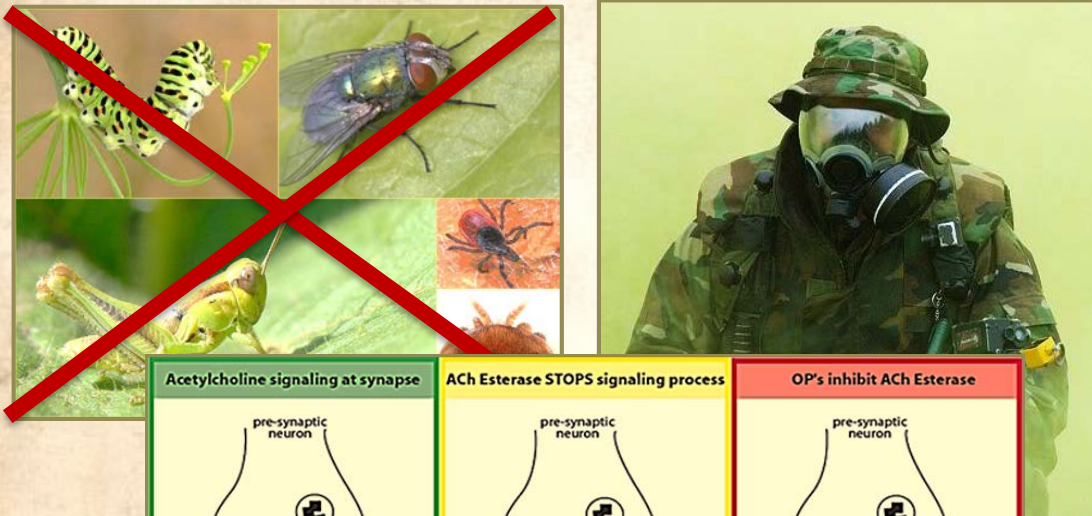
2nd SloLASA, Ljubljana, 2014

ORGANOPHOSPHATES (OP)

main representatives of insecticides

• organic compounds with phosphorus

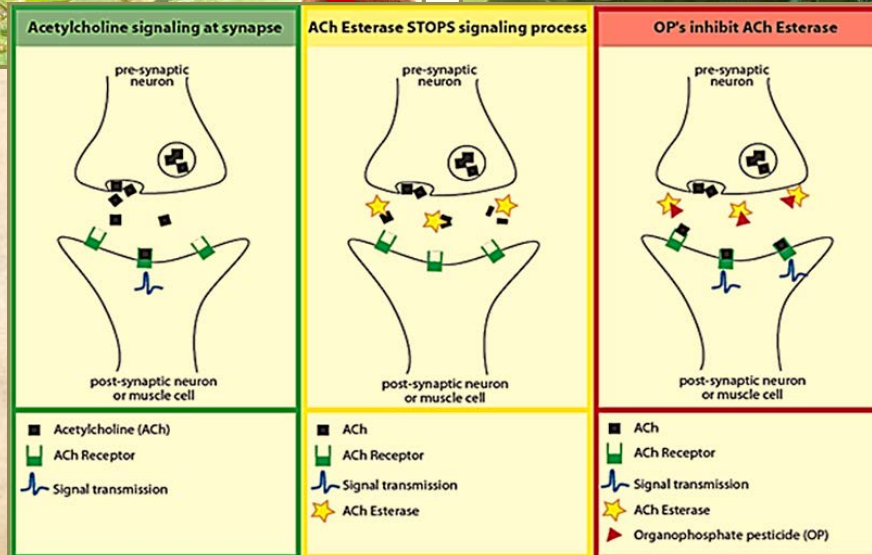
→ phosphatic bind (P=O) and thiophosphatic bind (P=S)



→ INSECTICIDAL

ACTIVITY:

irreversible
inhibition of enzyme
acetylcholinesterase
(AChE)



AChE is important
component of the
human nervous
system → poisoning

THE EFFECTS OF CONSTANT EXPOSURE TO LOW CONCENTRATIONS OF OP

Intensive use of OP → contamination of the environment



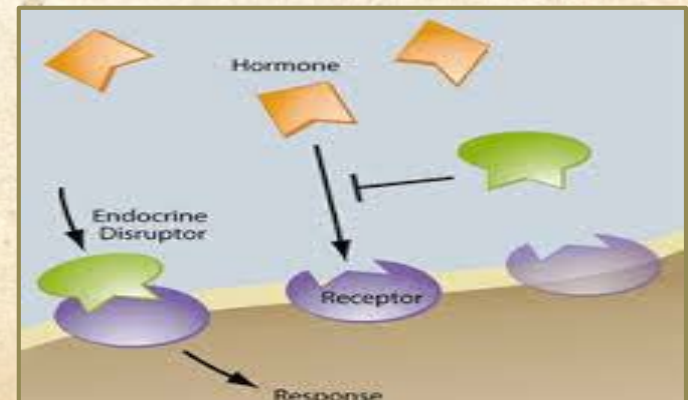
- High sensitivity during development → abnormalities later in life

MECHANISMS = ?

- Effects on the developing fetus:

- Oxidative stress
- Increased permeability of blood-brain barrier
- Migration, proliferation, differentiation of the Ach target cells
- Other brain proteins

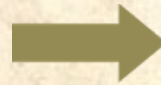
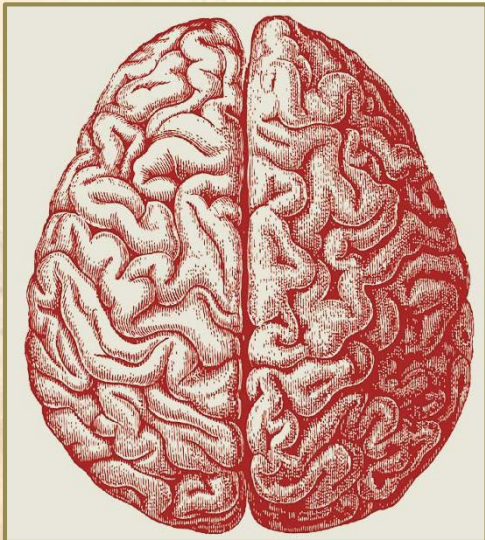
- Endocrine disruptor





BEHAVIOUR

- Cognition abnormalities (memory)
- Mental disorders (anxiety, depression,...)
- Abnormal social behaviour (autism)



COUMAPHOS

Organophosphate insecticide:

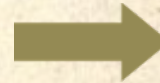
- Extermination of the mite *Varroa jacobsoni* – beekeeping (EU) ; Extermination of ticks carrying *Babesia bigemina* - cattle (USA)
- Relatively safe representative of OP

→ Found in honey: **RISK**

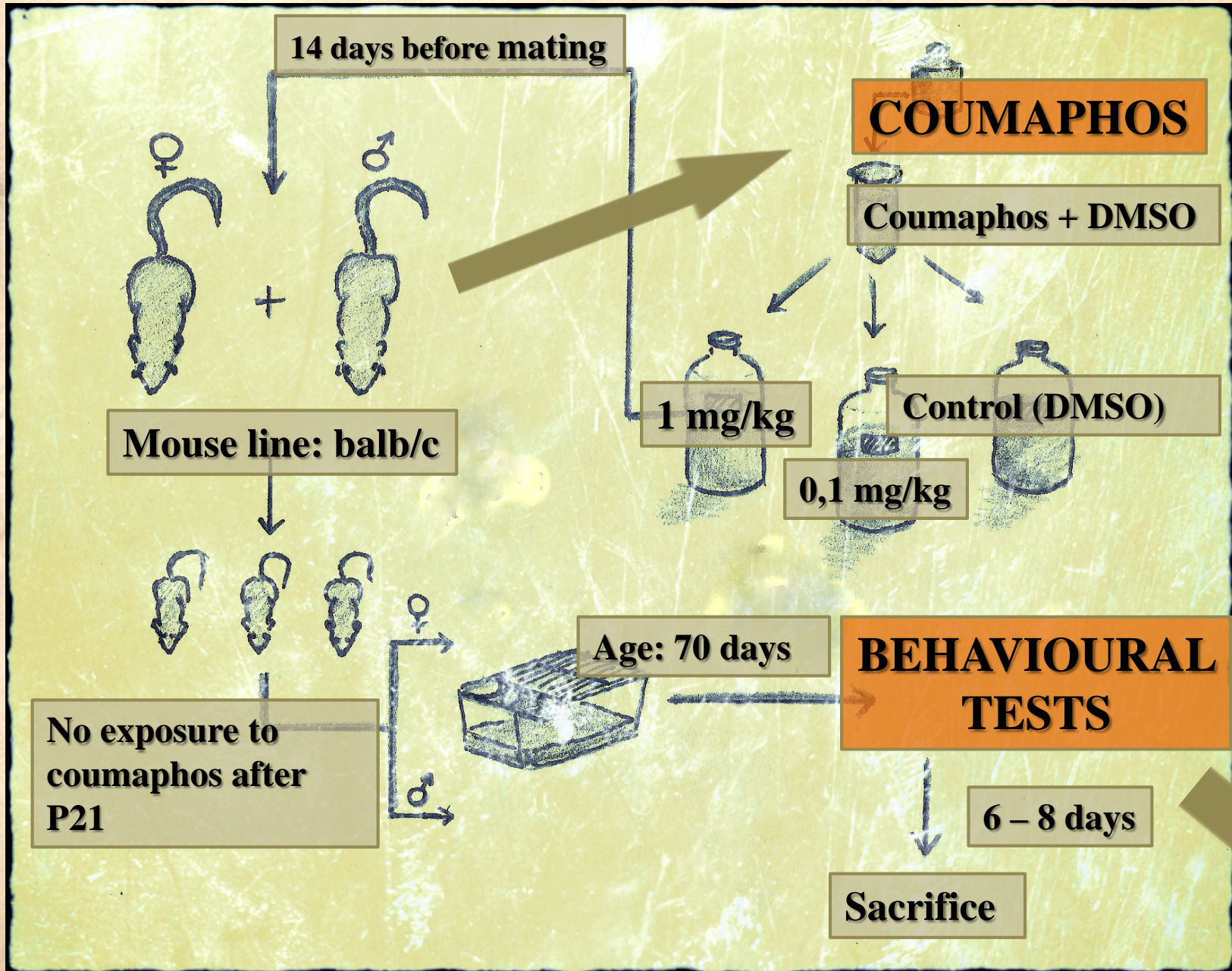


THE AIM OF OUR STUDY

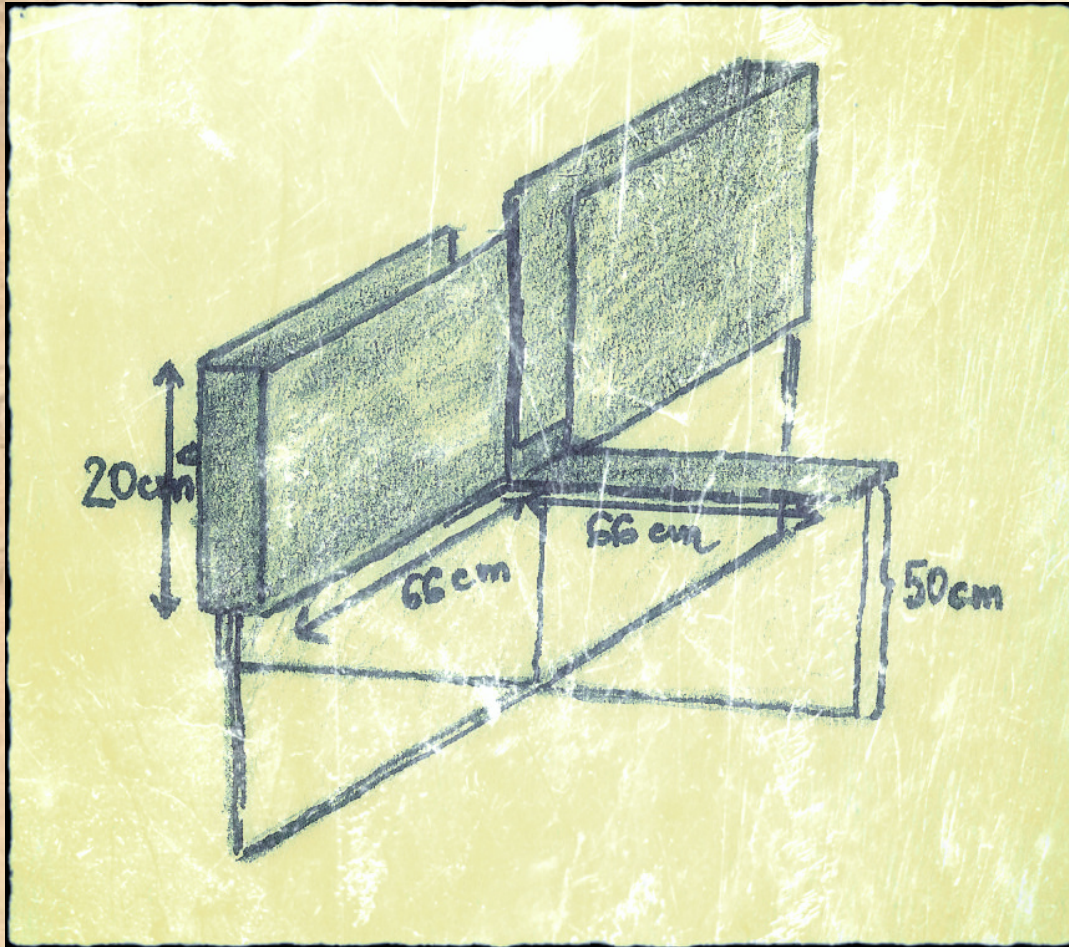
- to examine consequences of long-term exposure to low doses of coumaphos during fetal development → neuropsychiatric disorders
- **Behavioural differences in adult mice:** standard behavioural tests



METHODOLOGY



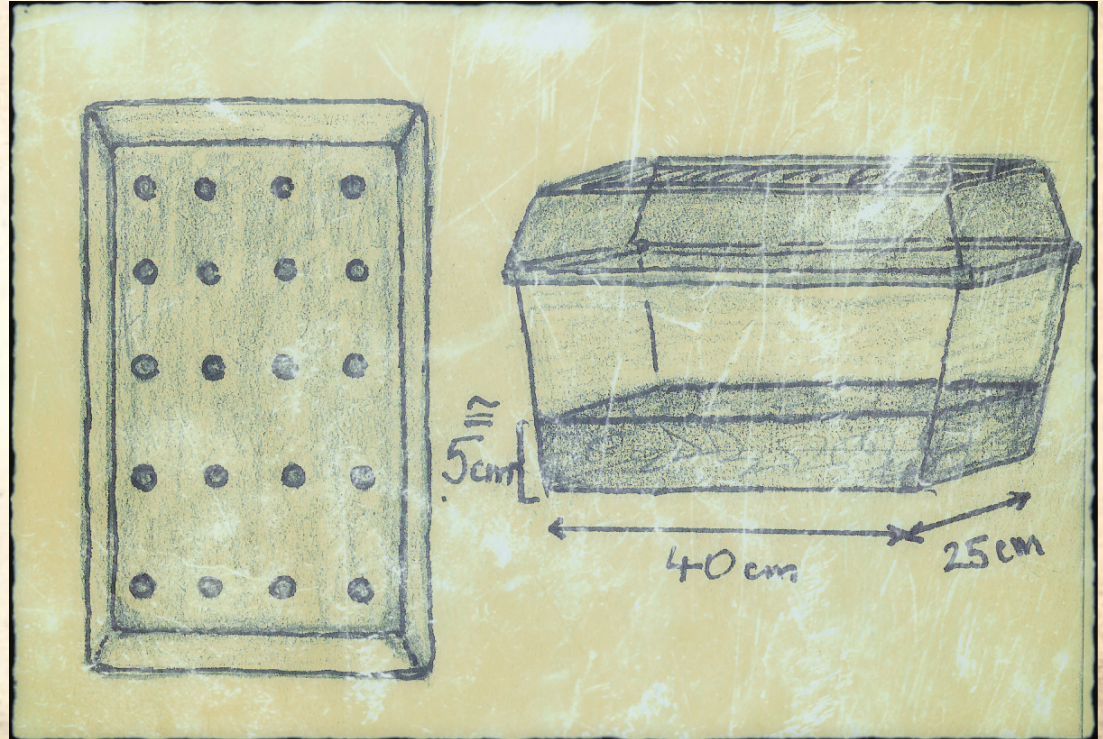
1) ELEVATED PLUS MAZE (EPM)



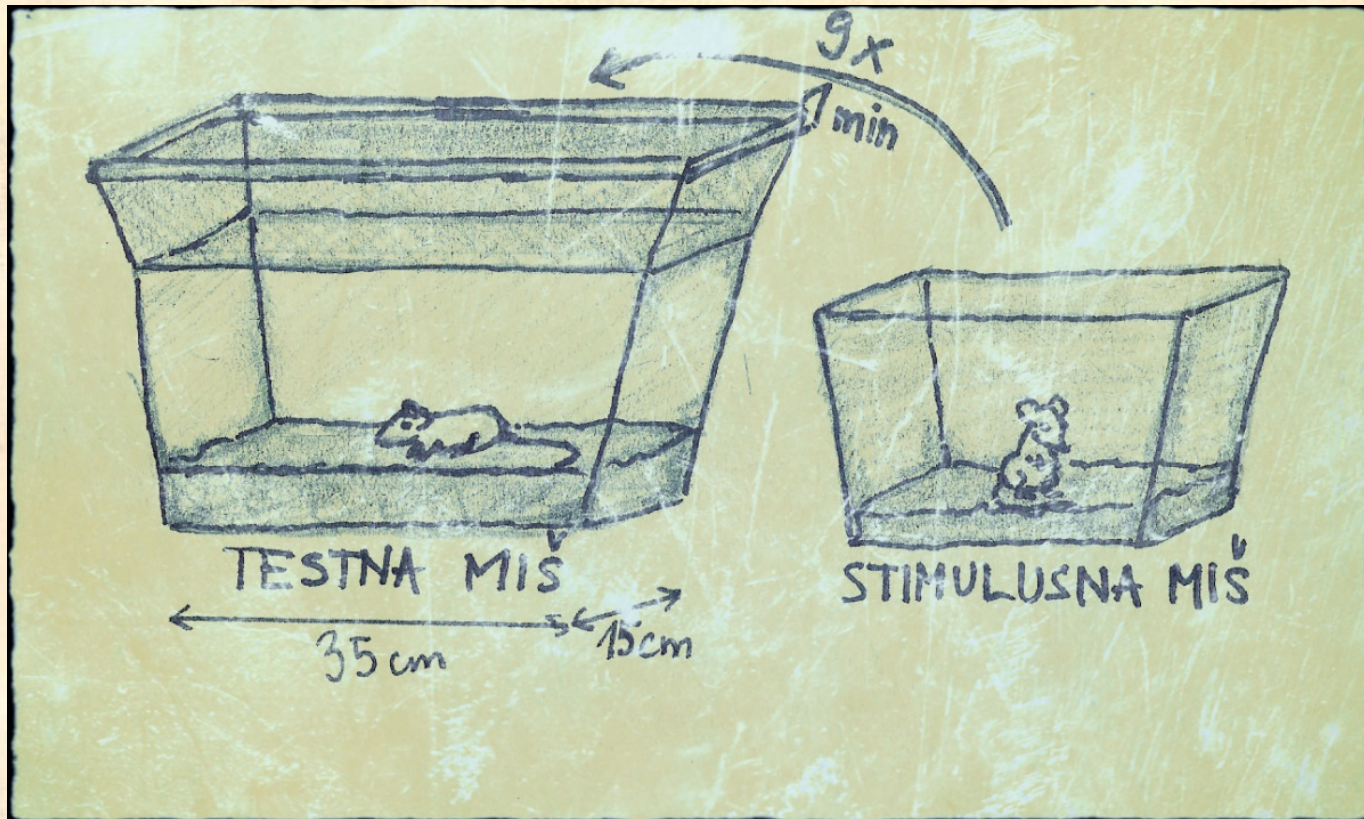
- Anxiety-like behaviour
- Time spent in closed/open arms

2) MARBLE BURRYING TEST

- Anxiety-like behaviour
- Number of buried marbles

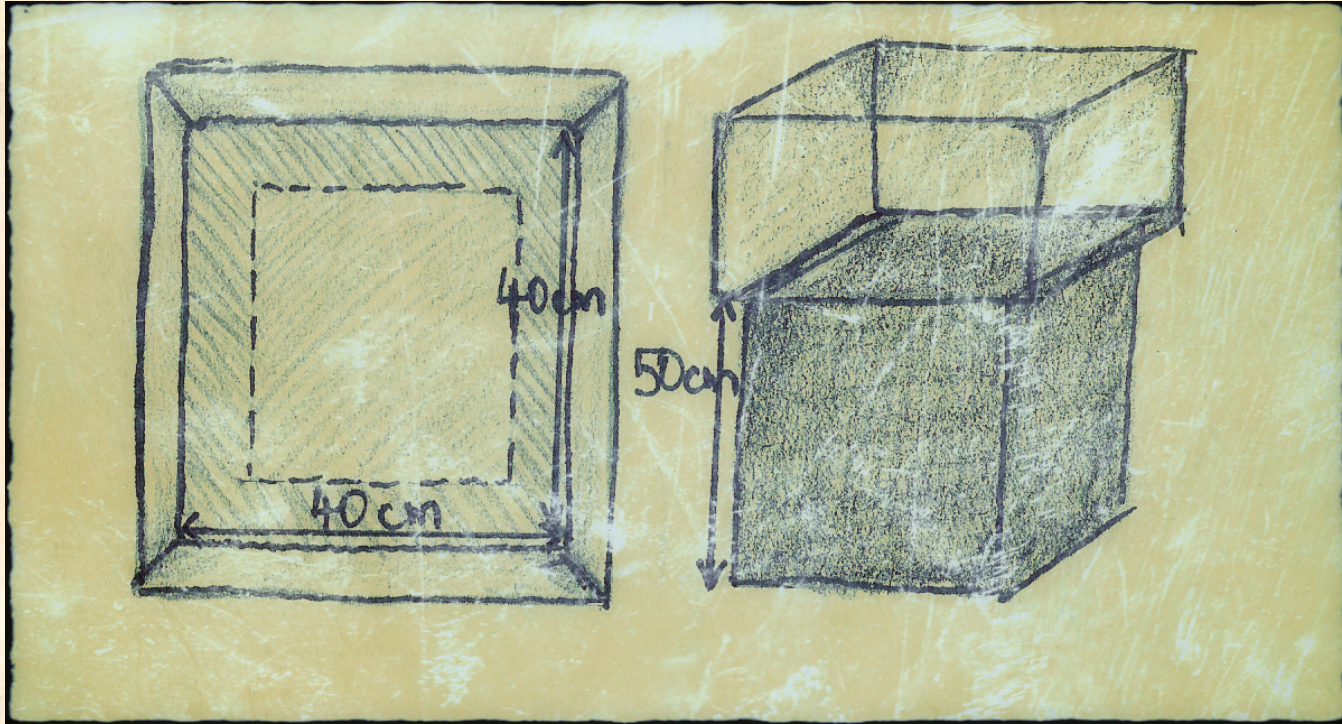


3) SOCIAL RECOGNITION TEST



- Social memory
- Interest in stimulus mouse

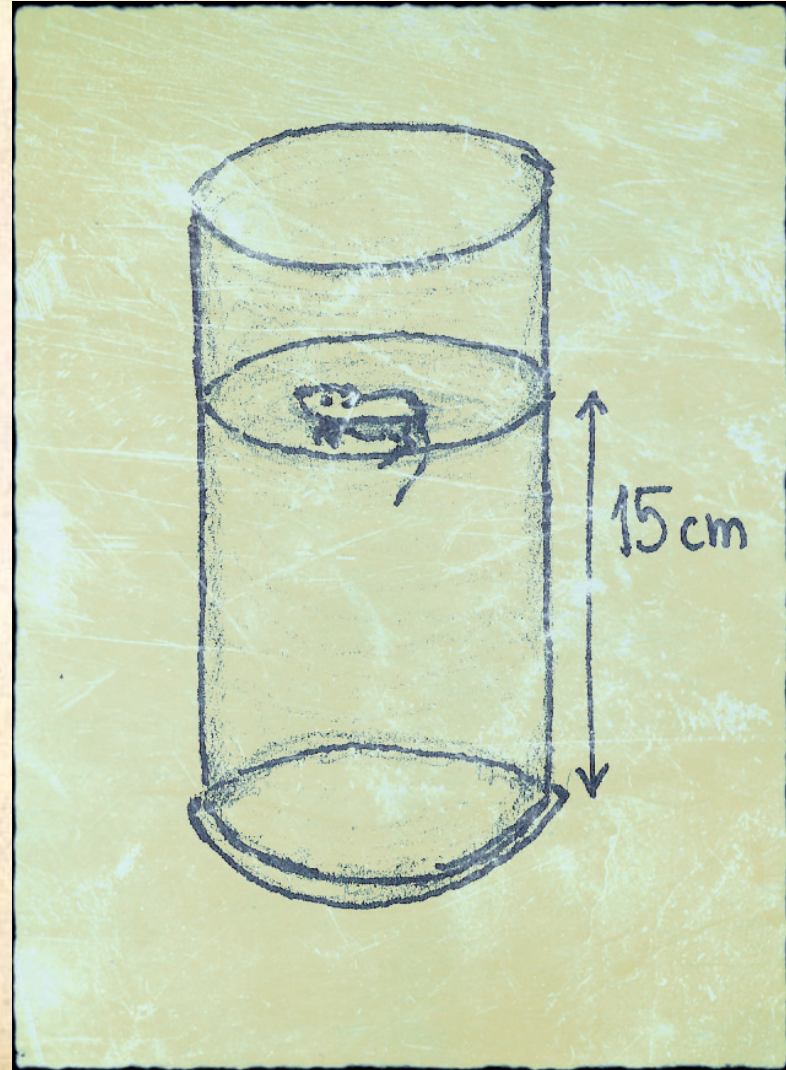
4) OPEN FIELD TEST (OFT)



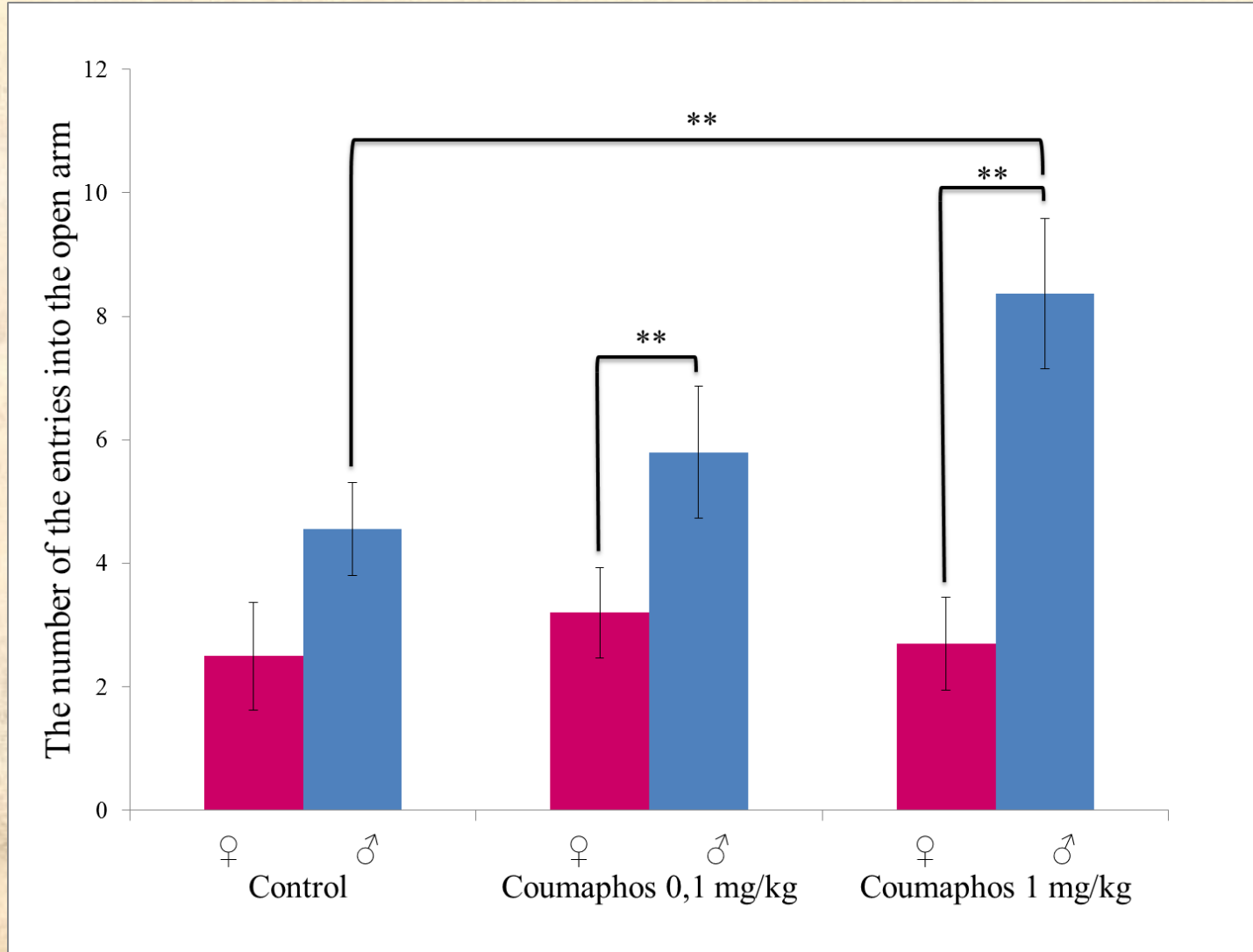
- general activity, anxiety-like behaviour
- Time spent in outer/inner zones

5) FORCED SWIM TEST (FST)

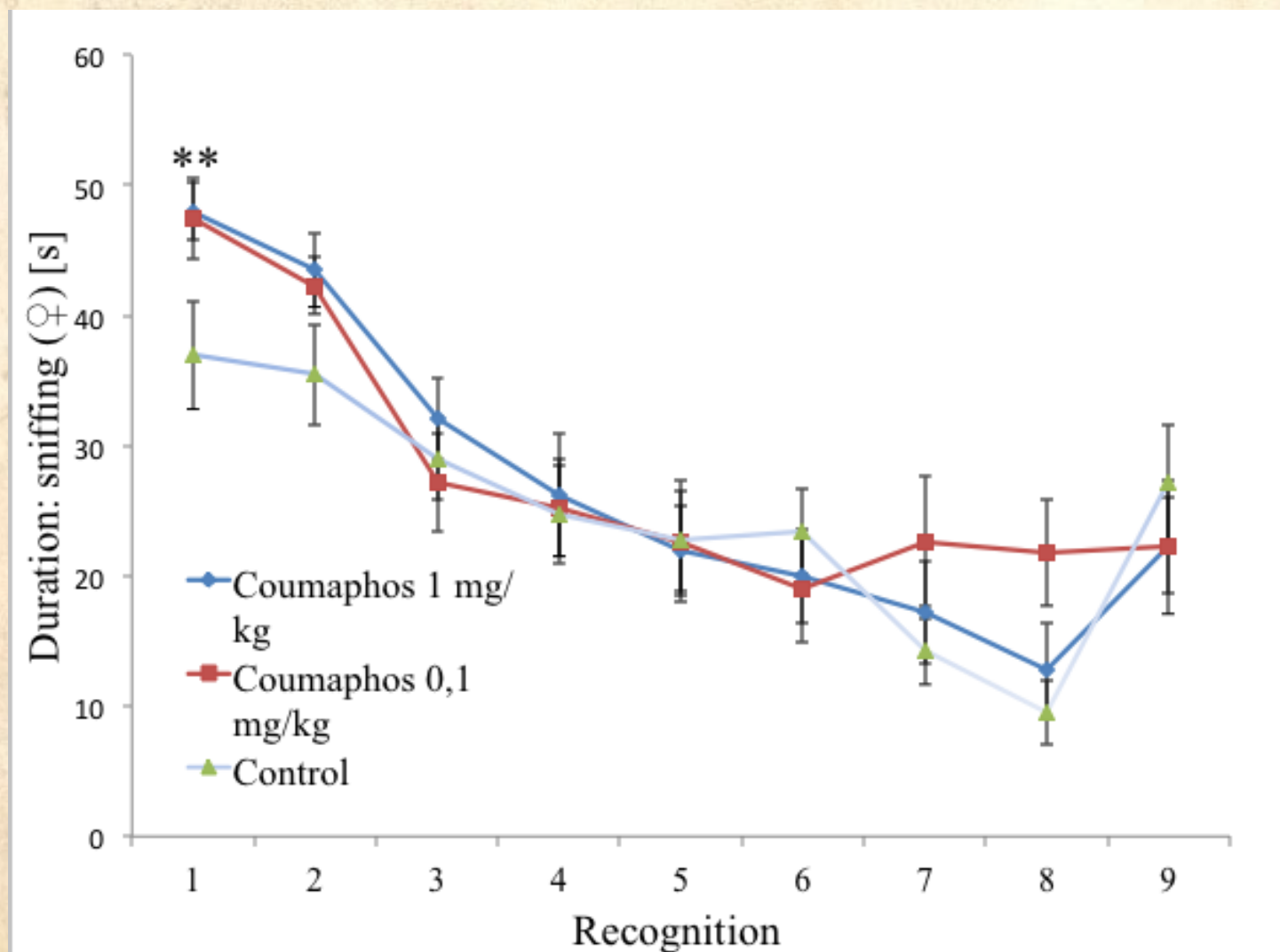
- depression-like behaviour
- Floating/ swimming



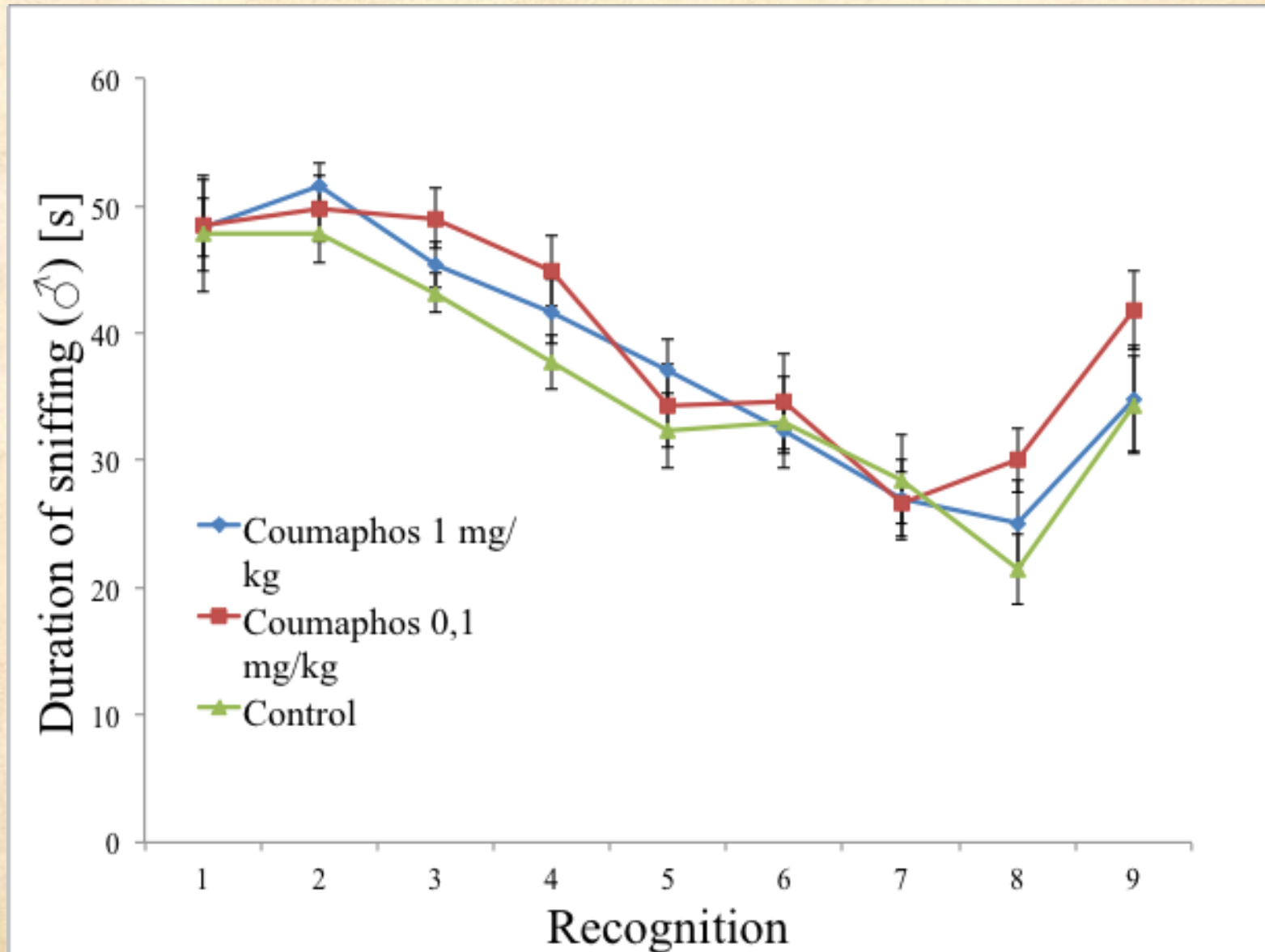
EPM – The number of the entries into the open arm



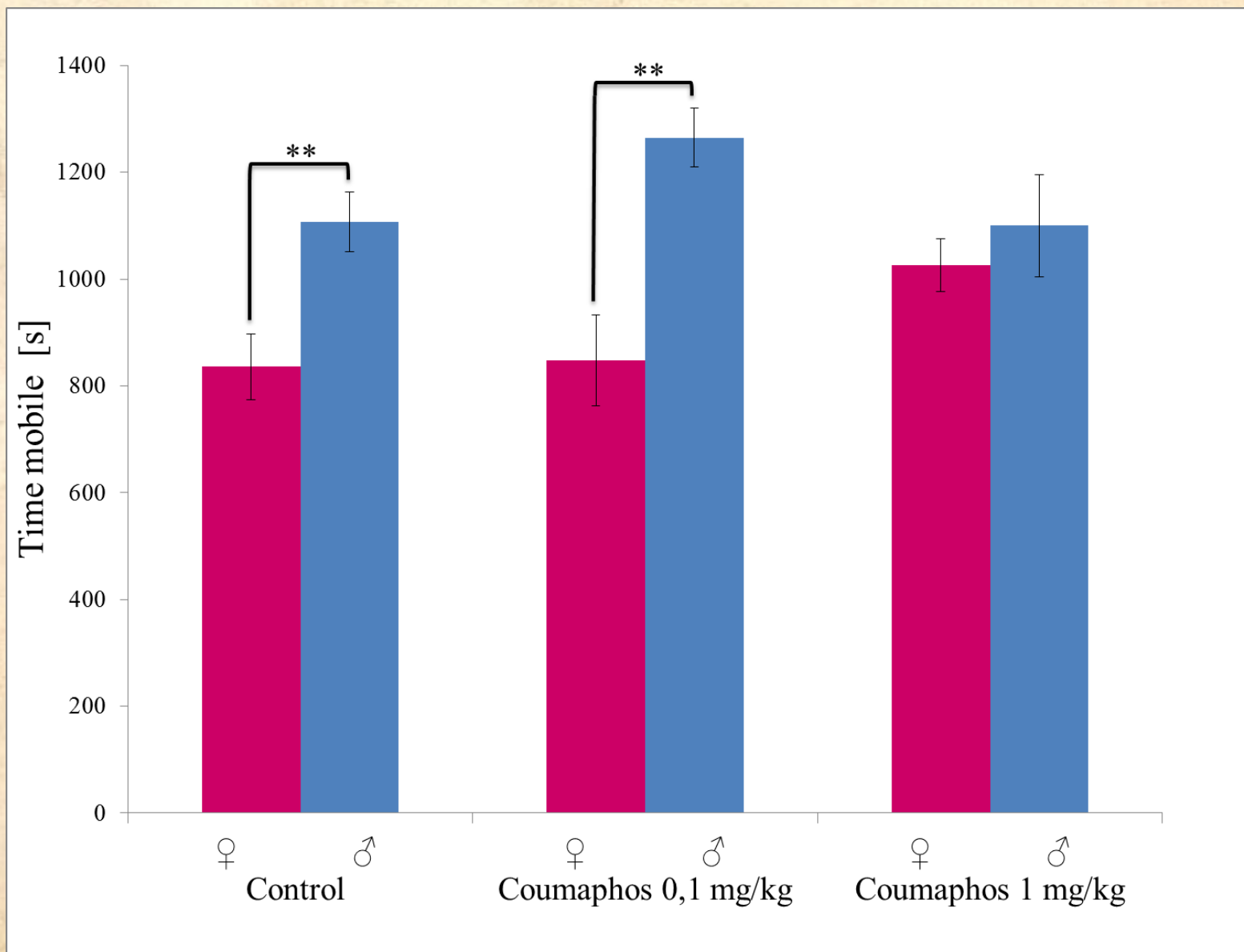
Social recognition test: duration of sniffing - female



Social recognition test: duration of sniffing - male

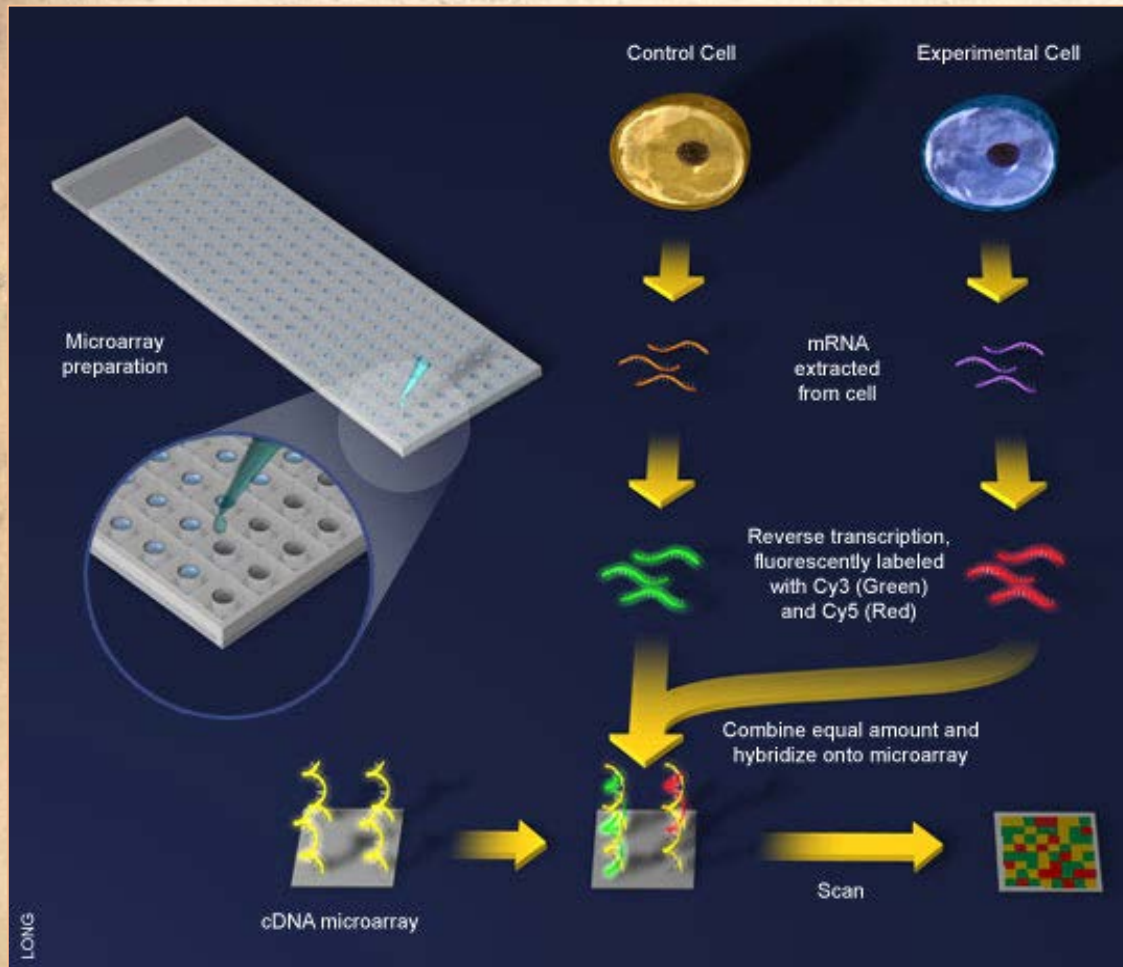


OFT – Time mobile



DIRECTLY EXPOSED ANIMALS IN ADULT LIFE

Results consistent with results presented



In July cDNA Microarrays



CONCLUSION



- females: significant trend for anxiety-like behaviour
- *EPM: anxiolytic effect of coumaphos - ?
- **Sex differences → expected difference;**
 - EPM: the difference between sexes is increasing with higher doses