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## Summary

House mouse (*Mus musculus* sensu lato) is one of the most studied mammals, but the attention is paid mostly to laboratory (strictly speaking domesticated), or commensal populations. But there are also non-commensal populations, living in totally different conditions and under totally different selective pressures, so the knowledge concerning commensal/laboratory populations can not be generalized. The evolution of commensalism definitely caused large changes in house mouse life history, behaviour, morphology and social organization. The aim of this study was to, at least partially, fill in this gap in knowledge about house mouse, really interesting and well adaptable species.

The thesis focuses on the non-commensal populations of *Mus musculus domesticus* from the Near East. The results are compared with the knowledges about the commensal population of both *M. m. domesticus* and *M. m. musculus* and also discussed with the information about another European and Near Eastern species of the genus Mus (aboriginal species *M. spicilegus, M. macedonicus, M. spretus*).
The results of this thesis show that commensal and non-commensal populations of a single species can significantly differ in various aspects of their biology.

The PhD thesis is based on the following papers:

### 1 AGGRESSION AND COMMENSALISM IN HOUSE MOUSE: A COMPARATIVE STUDY ACROSS EUROPE AND THE NEAR EAST

Frynta D., **Slábová M.**, Váchová H., Volfová R. & Munclinger P. (2005). Aggressive Behavior 31 (3): 283 – 293.

Species specific differences of house mouse social behavior compared to its closest relatives (aboriginal species *Mus macedonicus*, *Mus spicilegus*, and *Mus spretus*) have recently been suggested. However, substantial variation of behavioral traits between mouse populations has been also evidenced. Agonistic behavior of laboratory-born house mice from five commensal populations (*Mus musculus musculus*: central Czech Republic, *Mus musculus domesticus*: Bulgaria, Greece, Turkey, and natural *Mus m. musculus/domesticus* hybrids from the Czech part of the hybrid zone) and five non-commensal populations of *M. m. domesticus* (C. Syria, E. Syria, Jordan, Iran, Libya) was studied. Dyadic interactions in a neutral cage were performed and the effects of sex and population on time spent by agonistic behavior evaluated. In all studied populations, the male-male interactions were more agonistic than the female-female ones. Male-male behavior gradually increased from the least agonistic population of *M. m. musculus* from Central Europe to the Near East populations of *M. m. domesticus* exhibiting the highest scores of agonistic behavior. Between-population differences were even

stronger when female-female encounters were considered. While females of commensal populations belonging to both *M. m. musculus* and *M. m. domesticus* were tolerant of each other, those coming from non-commensal populations of *M. m. domesticus* were highly agonistic, reaching even the level of aggression between the females of some aboriginal mouse species. This phenomenon may be attributed to increased competition for food in non-commensal populations when compared to commensal ones supplied by superabundant resources. Social behavior of house mice, therefore, appears to be pliable rather than rigid and species specific. It can be changed rapidly according to ecological needs and such adaptability allows house mice to colonize various habitats.

## 2 Morphometric variation in nearly unstudied populations of the most studied mammal: The non-commensal house mouse (*Mus musculus domesticus*) in the Near East and Northern Africa

**Slábová M.** & Frynta D. (2007). Zoologisher Anzeiger 246: 91-101.

The phenotypic consequences in the house mouse (*Mus musculus domesticus*) of the transition from an ordinary field-dwelling rodent to a species that is dependent on human populations was studied by investigating the morphometric variation of non-commensal populations of *Mus musculus domesticus* from Syria, Jordan, SW Iran, and Libya and comparing them with that of conspecific commensal populations from Eastern Turkey, Greece, and Bulgaria. Commensal populations of *M. m. musculus* from the Czech Republic were used as an outgroup. 849 adult specimens of *Mus musculus* were analysed by multivariate procedures based on standard molar, skull and body measurements. As expected, there was considerable variation among the studied populations and a good correspondence between morphometric and geographic distances. The resulting morphometric tree was consistent with the hypothesis that the original radiation of *M. m. domesticus* took place somewhere in the Near East. Commensal populations of *M. m.*

*domesticus* form a single derived branch. Specimens originating from four different sites in eastern Syria showed the greatest similarity to one another and possessed relatively bigger molars than the other studied populations. Commensal populations were characterised by longer tails when compared to non-commensal populations, which suggests an adaptation for living in a more three-dimensionally heterogeneous environment for commensal populations.

## 3 SEXUAL SIZE DIMORPHISM IN FREE-LIVING POPULATIONS OF *MUS MUSCULUS*: ARE MALE HOUSE MICE BIGGER?

Slábová M., Munclinger P. & Frynta D. (2008). Submitted to Contributions to Zoology.

We studied sexual size dimorphism (SSD) in free-living commensal and non-commensal house mice. While females of commensal populations and most strains of laboratory mice are more or less tolerant to each other, females from non-commensal populations are as highly aggressive as their male conspecifics. As body size considerably contributes to fighting success, we addressed the question whether the male larger sexual size dimorphism known in commensal mice can be attributed to the switch to the commensal way of life. For this purpose, we performed a laboratory common garden experiment in which non-commensal populations of *Mus musculus domesticus* from Jordan and SW Iran were compared with Greek commensal mice belonging to the same subspecies. *M. m. musculus* and natural hybrids of these subspecies from the Czech Republic, were also included. Growth of 102 litters and 592 juveniles born during the experiments was recorded and SSD calculated on the basis of within litter comparisons between the sexes. Males were considerably larger (SSD = 1.05) at the age of 35 days. This size difference between the sexes was established gradually starting from nearly monomorphic state at the age of two weeks. Male newborns tend to be also larger than female ones. We found no significant differences in SSD among studied populations at any age. Hence, we suppose that the present SSD in house mouse should be

explained by selective forces operating in non-commensal way of life, which is ancestral with respect to the commensal one.

## 4 WHY HAVE MALE HOUSE MICE SO SMALL TESTES?

Frynta D., Slábová M. & Vohralík V. (2008). Submitted to Zoological Science.

We studied testes size in free-living and laboratory born commensal and non-commensal populations of various *Mus* species (*M. musculus musculus, M.m. domesticus, M. spicilegus, M. spretus, M. macedonicus* and laboratory mice).

We found no apparent differences between wild caught and laboratory born individuals, as well as between commensal, non-commensal and laboratory populations of *M. musculus*. There were, however, considerable differences between studied species. The highest values of relative testes size were found in aboriginal species *M.spicilegus* (4.4 % and 2.9 % for wild and laboratory populations, respectively), followed by those of *M.macedonicus* (from 1.7 % to 0.9 % for various samples) and *M.spretus* (1.5 %). All the thirteen samples representing various populations of *Mus musculus* exhibited smaller testes (0.7 - 1.0 %), and finally three smallest mean values come from laboratory mice (0.5 - 0.7 %). It is really surprising that aboriginal species, in particular *M. spicilegus,* which is widely considered to be monogamous, have relatively larger testes than polygynous/promiscuous *M.musculus.* This result is in apparent contradiction to the current views on evolutionary forces affecting testes size and suggests that there could be another uncontrolled factor obscuring the relationship between testes size and multiple paternity. It raises the question concerning proper interpretation of social organisation in the genus *Mus*.