

Circadian activity and learning in wild rodents: A comparison of two species in the Intellicage system

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Wild-trapped rodent species (bank voles, *Clethrionomys glareolus* and long-tailed wood mice, *Apodemus sylvaticus*) were compared in the Intellicage system over nine days. The Intellicage is a newly-developed group-housing cage which allows continuous activity recording and operant and spatial learning paradigms. The two species were compared for their daily activity patterns, exploration in novel environments, place learning and reversal learning abilities. Findings were that bank voles show a polyphasic activity pattern whereas wood mice are more nocturnal than voles. During the first 90 minutes after entering the cage, wood mice were substantially more exploratory than the bank voles ($p < .001$). However, after five hours, the voles became more active than the wood mice and remained substantially more active for the remainder of the nine days. Despite these activity differences, wood mice showed more rapid learning and sustained preference for the correct corners in place learning and reversal paradigms, with more rapid extinction of previously reinforced places. In a previous study, we have collected data showing higher baseline neurogenesis in the dentate gyrus of *Apodemus* species (*flavicollis* and *sylvaticus*) compared to bank voles, and suggest that this might be related to their superior ability to learn and re-learn.

Conclusions are that the Intellicage serves as an ideal arena to compare the activity and learning abilities of small wild mammals which are otherwise nearly impossible to assess in laboratory tasks, let alone perform comparative studies in cognition between species which show dramatically different responses to handling and novel environments.

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