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### What does it take for a small mammal to make it in the big city?

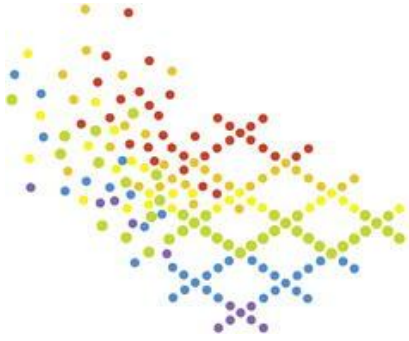
Author: Dr. Valeria Mazza, University of Potsdam



*Common vole (Microtus arvalis). Photo: Valeria Mazza*

We have all heard of the old Aesop's fable of the city mouse and the country mouse, paying each other a visit and having a horrid time because of the food, the nest structure, and the many dangers they were not used to. Each mouse could not adjust to the other's habitat and both agreed they'd better stay where they knew how to get around. How accurate was Aesop's description? Ongoing work at the [Animal Ecology group at the University of Potsdam](#) is uncovering the foundations of this old tale, and investigating the behavioural adjustments required from small mammals to make it in the big city.

In general, cities do not represent an appealing dwelling place for most wild animals. Beside the air, water, soil, light, and noise pollution, there are high densities of humans and cars (dangers in themselves), cement cover everywhere in the guise of houses, roads and parking lots, that make it almost impossible to find some green quiet place to nest. Plus, food resources are not the ones most animals are familiar with. And finally, domestic animals such as cats and dogs add to the list of predators. Because of these challenges, many species stay well away from urban agglomerates. The result is a severe biodiversity loss that matches urban expansion worldwide. A few species, however, managed to find their own niche, living beside humans (or despite them). And, as Aesop already noticed, there are often differences in behaviour between country- and city-dwellers of the same



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species. Several scientific studies reported this phenomenon in birds like sparrows or corvids, but knowledge on small mammals is still in its infancy.

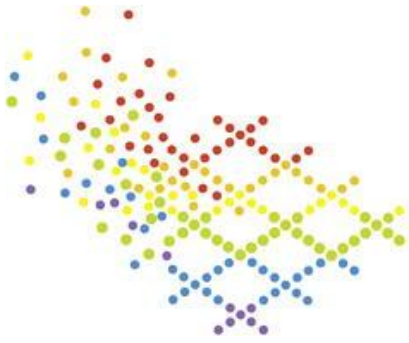
This study focused on common voles (*Microtus arvalis*), tiny rodents of the Cricetidae family that inhabit many of Berlin's city parks and green areas, and are strictly non-commensal (you'll never find them interested in the food in your pantry). In the summer of 2018, a total of 52 city voles from four different green areas within the [CityScapeLabs](#) were captured in small cage-like traps. Their behaviour was assessed regarding their willingness to take risks and their propensity to explore new spaces, as these behavioural traits very likely aid voles in colonising and/or persisting in urban habitats. City voles were accompanied by 42 country voles, originating from three [AgroScapeLabs](#) in the Uckermark region, whose fallow plots and meadows, together with the lowest human density in Germany, are representative of the classical habitat of the species. Individual differences between conspecifics, indicative of risk-taking and exploration, are commonly measured by quantifying how much time the animals spend hiding in a dark shelter before emerging into an unfamiliar, illuminated and exposed (therefore dangerous) open area, as well as the time spent exploring this unfamiliar space. Behavioural tests took place directly in the field, shortly after the voles were trapped. Afterwards, the voles were transported to the animal holding facility at the University of Potsdam, where they were kept for approximately three months, so they could get used to the new environment. Then they were asked again (twice) how fast they move into an unknown space and how eager they are to explore it, using the exact same protocol as in the field.



*Typical trapping site in the Uckermark (left) and a very urban site in Berlin (right). Photo: Valeria Mazza*

When tested on the field, in their own home environment, urban voles were more risk-taking and more explorative than rural conspecifics. This is likely because city animals are faced with numerous new challenges in their everyday life, and have to deal with higher levels of disturbance. In order to "make it", they have to respond to these challenges by being bolder and more active. Similar findings are reported in the bird scientific literature.

Results from the lab were instead quite a surprise: while the country common voles had maintained comparable levels of risk-taking and exploration propensity, city dwellers had performed a

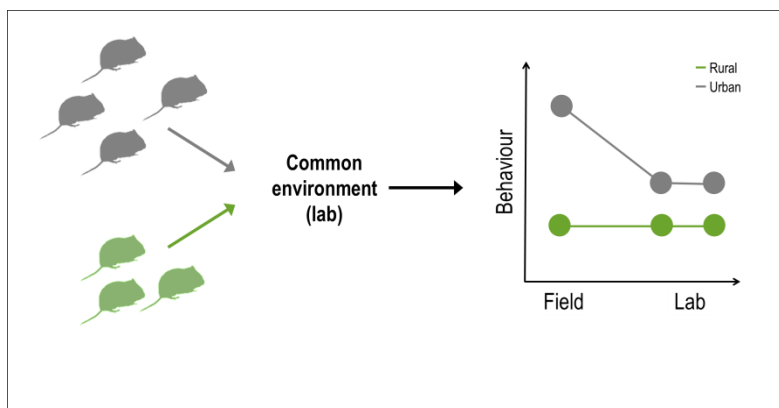


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considerable shift in their responses, which now resembled those of the country conspecifics. Additionally, the new levels of risk-taking and exploration activity were quite stable across the two tests in the lab. In other words, urban common voles were not only more risk-taking and explorative, they were also more flexible in their behavioural responses. This ability to adjust behaviour to current circumstances might be in fact what determines the success of the individuals that arrive and survive in the city. In fact, for a tiny rodent preyed upon by almost everyone else, from raptors to weasels, foxes and rats, it might not be a good idea to be consistently risk-taking and consistently explorative. The capacity to express a broader range of behavioural responses, and adjust these responses to match frequently-varying circumstances, might be what ultimately enables common voles to thrive in the many forgotten corners of the big Berlin city.

The study was published in the journal *Global Change Biology* in August 2020 and supports [previous observations conducted exclusively on the field](#) on another non-commensal small mammal species, the striped field mouse. Both studies were the product of a collaboration between scientists Valeria Mazza, Jana A. Eccard, Annika Schirmer, Melanie Dammhahn, Claudia Göttsche and Elisa Lösche, in the Animal Ecology group of Jana A. Eccard at the University of Potsdam.



*We investigated behavioural responses associated to risk-taking and exploration of rural and urban adult common voles (*Microtus arvalis*) from seven sub-populations. While still in the field, urban common voles were bolder and more explorative than rural ones. When tested after three months in the lab, under common environmental conditions, urban dwellers altered their behaviour considerably and were consistently shyer and less explorative than when tested on the field. Rural*

*individuals maintained stable behavioural responses, suggesting differences not only in behavioural traits but also in the degree of behavioural flexibility between animals living under different degrees of anthropogenic disturbance. Figure: adapted from Mazza et al. 2020.*

Source: Mazza, V., Dammhahn, M., Lösche, E., & Eccard, J. A. (2020). Small mammals in the big city: Behavioural adjustments of non-commensal rodents to urban environments. *Global Change Biology*, 26(11), 6326-6337.