Study shows city life may cause permanent change in circadian clock for blackbirds

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Turdus merula. Credit: Andreas Trepte / Wikipedia

(Phys.org) —An international team of researchers working in Germany has found that blackbirds that live in the city tend to have different circadian rhythm cycles than do blackbirds that live in a nearby forest. In their paper published in *Proceedings of the Royal Society B*, the researchers describe the results of their field and lab study comparing activity times of the two groups of birds.

Researchers and most people who live in cities have known for some time that birds that live in cities tend to become active earlier in the morning than do birds that live in the country—or in this case a forest. In this new effort, the researchers wanted to know if birds that live in the city had permanent changes to their circadian cycle.

To find out, they captured six blackbirds that lived in Munich and another six that lived in a forest approximately 25 miles away. Each bird was outfitted with a radio transmitter that allowed the researchers to monitor their activity. Each of the birds was then released back into the environment where it was found. Birds from both groups were monitored for a week then were all recaptured and taken back to a lab. In the lab, all of the birds were put into isolation chambers where ambient light was held fixed and sound was cut off. Inside, the birds were unable to determine the time of day. Their activity was monitored for ten days, after which the birds were released back to where they had been captured.

In analyzing the data obtained from their efforts, the researchers found that blackbirds native to the city became active on average 29 minutes before the sun came up in the morning. Forest birds on the other hand, rose with the sun. They also found that the city birds tended to keep busy for approximately 6 minutes longer at the end of the day than their forest dwelling city cousins.

In the lab, the isolation was meant to determine if the differences in activity were specifically tied to temporal city life or whether the changes had become permanent. Watching the birds indicated the change was more likely the latter. The city birds demonstrated faster biological clocks—they went through their circadian day on average 50 minutes faster than did the birds from the forest. The researchers also found their behavior rhythms tended to weaken faster as well.

The research team acknowledges that their sample size is too small to form definite conclusions, but add that their findings do suggest that city living may impact biological cycles. For that reason, they suggest more research be conducted to discern whether there is a similar difference for people and if so, what impact it might have.

More information: Clocks for the city: circadian differences between forest and city songbirds, Published 5 June 2013 doi: 10.1098/rspb.2013.0593

Abstract
To keep pace with progressing urbanization organisms must cope with extensive habitat change. Anthropogenic light and noise have modified differences between day and night, and may thereby interfere with circadian clocks. Urbanized species, such as birds, are known to advance their activity to early morning and night hours. We hypothesized that such modified activity patterns are reflected by properties of the endogenous circadian clock. Using automatic radio-telemetry, we tested this idea by comparing activity patterns of free-living forest and city European blackbirds (Turdus merula). We then recaptured the same individuals and recorded their activity under constant conditions. City birds started their activity earlier and had faster but less robust circadian oscillation of locomotor activity than forest conspecifics. Circadian period length predicted start of activity in the field, and this relationship was mainly explained by fast-paced and early-rising city birds. Although based on only two populations, our findings point to links between city life, chronotype and circadian phenotype in songbirds, and potentially in other organisms that colonize urban habitats, and highlight that urban environments can significantly modify biologically important rhythms in wild organisms.