

Mercury Exposure in Wild Songbirds Associated with Disrupted Parental Care at the Nest

In a study published in the journal *Environmental Science and Technology*, U.S. Geological Survey biologists report that methylmercury concentrations in wild tree swallows (*Tachycineta bicolor*) in the California Central Valley are associated with disruption of parental care.

Methylmercury, the highly toxic form of mercury, is a globally pervasive contaminant that can impair reproduction in birds. Methylmercury may be transferred directly from the mother to her eggs during egg formation, but it may also impair avian reproduction indirectly by altering parental care behaviors of adult birds. In most birds, parents use their body heat to maintain egg temperatures at levels optimal for embryonic development. Less time spent incubating can slow embryonic growth and development, lengthen the overall incubation period, and increase the exposure risk of the eggs to predators. Lower average egg temperatures may reduce the quality of hatched chicks.

To study the relationship between incubation behavior and mercury contamination, the USGS researchers placed small temperature dataloggers into tree swallow nests and used temperature changes at the nest to determine how long females spent incubating their eggs, how often females took breaks from incubating, and how long these breaks lasted. The researchers also measured methylmercury concentrations in maternal blood and in eggs.

Female tree swallows with higher mercury concentrations spent less time incubating their eggs, took more frequent and shorter incubation breaks, and were more likely to take an incubation break that caused a substantial drop in egg temperature. Overall, female tree swallows with the highest mercury concentrations spent almost 35 fewer hours (12% less time) incubating their eggs during the 2-week incubation period than females with the lowest mercury concentrations. These results indicate that after 2 weeks of incubation, the embryos of females with high mercury concentrations would be less developed and not ready to hatch compared to embryos of females with low mercury concentrations.

This is the first study to document differences in incubation behavior associated with maternal mercury concentrations in a wild, free-living songbird. The results illustrate how mercury contamination can indirectly threaten the health of wild bird populations.

This Spotlight Refers To:

Hartman, C. A., Ackerman, J., & Herzog, M. P. (2019). **Mercury exposure and altered parental nesting behavior in a wild songbird.** *Environmental Science and Technology*, 53(9), 5396-5405.

<https://doi.org/10.1021/acs.est.8b07227>



Wild tree swallows perched on an artificial nest box at Cosumnes River Preserve, in California's Central Valley. (Credit: Laura Duval/USGS)

MANAGEMENT IMPLICATIONS

- Mercury contamination may lead to altered parental nesting behavior in wild songbirds, with less time spent incubating eggs associated with higher maternal mercury concentrations.
- Less time spent incubating may slow embryonic development, delay hatch, and increase risk from predators. In wild birds, the effects of mercury may interact with or add to other environmental stressors on nests.
- These results indicate that high levels of environmental mercury contamination may threaten songbird populations indirectly by changing reproductive behavior.

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