

# Mercury Causes Homosexuality in Male Ibises

Environmental Pollutant Radically Changes Birds' Mating Behaviour.

by Joseph Milton



Mercury affects the mating behaviour of white ibises. Winfried Wisniewski/Minden Pictures/FLPA

Exposure to mercury pollution could be hitting some wild birds' reproductive prospects hard by causing males to pair with other males. American white ibises (*Eudocimus albus*) from south Florida that consumed methylmercury (MeHg), the most toxic and easily absorbed form of mercury found in the environment, were more likely to engage in same-sex pairings — a phenomenon unknown in wild populations of this species with no exposure to the pollutant.

The main sources of mercury globally are coal-fired power plants and gold mining though in Florida, mercury was likely to have been released by the burning of medical and municipal waste. The metal is converted into methylmercury by some species of bacteria, usually found in wetlands that also tend to be home to many different bird species.

Peter Frederick, an ecologist at the University of Florida, Gainesville, and his colleagues collected 160 white ibis nestlings from breeding colonies in south Florida in 2005, and split them into four groups, each composed of 20 males and 20 females. Once the birds were 90 days old, the researchers began adding methylmercury to their feed. Three of the groups were given low, medium or high doses of mercury based on levels ranging from 0.05–0.3 parts per million recorded in the wild, while the fourth group were given no mercury.

Over the next three years, the researchers measured mercury levels in the feathers and blood of the ibises, and observed their mating behaviour.

## **Mismatched Mates**

The team found that the levels of mercury built up in the birds over time, and that exposure resulted in roughly 13–15% more nests failing to produce any offspring. A high proportion of these failed nests were found to be male-male pairings.

Birds exposed to any mercury displayed courtship behaviour less often than controls and were also less likely to be approached by females when they did. As the level of mercury exposure increased, so did the degree and persistence of homosexual pairing. Males that engaged in homosexual pairings were also less likely to switch partners from year to year, which Frederick says ibises tend to do if they have been unsuccessful in mating during their first breeding season.

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Because the levels of methylmercury used in the experiment were typical of those found in the birds' natural wetland habitats, "the implication is that this is probably happening in wild bird populations", says Frederick. In terms of the total number of chicks produced, dosed males and females tended to produce fewer nestlings than the control group. However, although females exposed to the highest levels of mercury fledged about 33–35% fewer chicks than the control group, the results were not statistically significant.

The team's results are published in *Proceedings of the Royal Society B* today<sup>1</sup>.

Methylmercury seems to cause these behavioural changes by affecting the endocrine system, which controls the release of hormones in the body. That effect alters levels of the sex hormones testosterone and oestradiol in male ibises, says Frederick. A parallel study, which he says will be published soon, shows that there are significant differences in endocrine expression between exposed birds and controls. "Mercury is a known endocrine disruptor, but this is the first study of endocrine disruption in birds," adds Frederick.

## Quick Fix?

Heinz Köhler, head of the Animal Physiological Ecology Department at the University of Tübingen in Germany, says studies that convincingly link the effects of endocrine disruptors on sex hormones with decreases in reproductive output are rare. "This study links detrimental effects on biochemistry to decreased reproductive success very plausibly, through altered pairing and courtship behaviour," he says. However, Frederick and Köhler both caution that the findings cannot simply be extrapolated to other species, even of birds. "Their behaviour may be less fragile and more robust to methylmercury," says Köhler. Frederick is concerned that "people will read this and immediately jump to the conclusion that humans eating mercury are going to be gay. I want to be very explicit that this study has nothing to say about that," he says.

The next step for the researchers is to check whether the pollutant is having the same effect in the wild. But in the meantime, Frederick says we can and must tackle the problem of mercury pollution. "Most mercury sources are local rather than global — local enough that we can do something about it, such as installing scrubbers on smoke stacks. Ecosystems respond very quickly to regulatory action when it comes to mercury."

## References

1. Frederick, P. & Jayasena, N. Proc. R. Soc. B. [doi:10.1098/rspb.2010.2189](https://doi.org/10.1098/rspb.2010.2189) (2010).