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Chernobyl Hits Birds Hard

By Krista Zala
ScienceNOW Daily News
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Entire populations of birds have dwindled because of radiation from the nuclear power plant in Chernobyl, but some species are declining in number at a rate far greater than others are, a new study finds. The greatest drops are in species whose lifestyle or appearance, such as vibrant plumage, calls for plenty of antioxidants--a substance also needed to protect against radiation.



Ionizing radiation creates free radicals that can wreak havoc on a cell's DNA, sometimes killing the organism. A class of antioxidants called carotenoids, however, can swoop in and neutralize free radicals. Carotenoids also perform lots of other functions in many birds, such as coloring dazzling plumage, sustaining metabolism during long migrations, and nourishing the eggs birds lay. Some evidence suggests birds that make heavy use of carotenoids have lower levels of carotenoids--for example, birds that have just completed a migration.

An event like the Chernobyl disaster mobilizes a body's antioxidant supply to quell the sudden surge of free radicals. Evolutionary ecologists Anders Møller at Pierre and Marie Curie University in Paris and Tim Mousseau at the University of South Carolina in Columbia wondered if bird species that rely heavily on carotenoids for other purposes may suffer more from radiation exposure. The two decided to investigate whether radiation had different effects on different bird communities within 50 km of the reactor.

Similar color, different fates. The great tit (*top*), which doesn't stray far, had similar numbers across the Chernobyl region. But the number of migrating yellow buntings (*bottom*) declined in high radiation areas.

Credit: Tim Mousseau

Møller recorded all birds seen or heard in a span of 5 minutes at 254 places near Chernobyl, with some of the places having high levels of radiation and some of them having normal levels of background radiation. They counted half as many brightly colored orioles, blackbirds, and blue tits, for example, than predicted from bird counts in the places with little radiation. Yet birds with duller plumage--such as tree pipits, coal tits, and chaffinches--had roughly the same size populations throughout the area. Similar patterns held for migratory birds: Orioles, blackbirds, and robins had reduced numbers, whereas homebodies like great tits, coal tits, and song thrushes didn't, Møller and Mousseau report today in *Journal of Applied Ecology*.

Interestingly, resident birds fared better than those that migrate in and out of the Chernobyl area. Mousseau suggests it's because migrating birds exhaust so much of their antioxidant supply on their high metabolism. "It's not the exposure to radiation that's most important," he explains. "It's whether defenses"-

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-carotenoid stores--"are diminished."

Based on earlier studies of barn swallows, they theorize that the birds either died out or had drops in reproduction, and did not simply settle in other areas with lower radiation. Mousseau says they hope to test that theory by tracking populations of birds and measuring their carotenoid levels.

Jonathan Blount, a physiological ecologist at the University of Exeter in Cornwall, U.K., agrees that the research "shows certain species of birds are more vulnerable than others to effects of radiation." He adds that plumage color may serve as an indicator of population health, which would offer an easy way to monitor vulnerable species.

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