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Do Some Birds Cheat to Avoid Inbreeding?

Hillary Mayell
for National Geographic News
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An international team of biologists is offering more evidence that when it comes to mate selection, genes count.

In a study of three species of monogamous shorebirds, the researchers found that "illegitimate" chicks were found overwhelmingly in the nests of partners with a high degree of genetic similarity.

"We discovered that female sandpipers 'cheat' and seek extra-pair matings if they are closely related to their mate—a behavioral adaptation that would minimize the deleterious effects of inbreeding," said Brett K. Sandercock, an avian ecologist at Kansas State University, and co-author of the study published in the October 10 issue of the journal *Nature*.

How are species able to recognize a genetically similar partner?



A western sandpiper, *Calidris mauri*, forages for food along the Atlantic coastline at the Chincoteague National Wildlife Refuge, Virginia, USA.

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Some species—rodents and humans, for instance—can tell by smell. One study has shown that human females prefer men whose major histocompatibility complex (MHC) genes are the least similar to their own, which they can tell by body odor. The ability to make this distinction was muted among women taking birth control pills. [See sidebar.]

But among birds, how they recognize genetic incompatibility remains a mystery.

Seeking Evolutionary Success

The ability to test DNA and conclusively identify parents and their young forced a change in scientific thinking as mounting evidence showed that most species are not monogamous.

"One of the first papers to mention the fact that females in many species are actively involved in promiscuity was published in 1988," said Olivia Judson, author of a recently published book on the evolutionary biology of sex.

For years, scientists believed that the war between the sexes was based on opposing strategies to achieve reproductive success: monogamy for her, multiple partners for him.

From an evolutionary standpoint, success is having your young survive to adulthood and then reproduce themselves.

Females can give birth to only a limited number of offspring, so to enhance their chances for survival it would be to her benefit to seek a good provider—whether he's offering protection, food, or territory—and to keep him to herself. Conversely, males would reap evolutionary success

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Smelly T-Shirt Test

To test whether women could assess genetic incompatibility by smell, researchers had men wear a T-shirt to bed for two nights without using any fragrances—no soap or deodorant.

Women in the experiment were then presented with six T-shirts; three worn by men with major histocompatibility complex (MHC) genes similar to hers, and three with a different MHC.

The women chose the T-shirts from the men that had different MHC from their own, suggesting that body odor may contribute to your choice of a mate.

Women taking birth control pills, on the other hand, chose T-shirts with MHC genes similar to their own. Researchers speculate that because birth control pills make the body think it is pregnant, women on the pill may find smells that remind them of relatives—a father or brother—more comforting.

by mating with as many females as possible.

That assumption fell by the wayside as DNA testing showed that female promiscuity is far more common than monogamy.

"Since [1988] there's been a gradual recognition that females must be getting some benefit from seeking multiple partners," said Judson. "In the last five years there's been a quite vigorous search to explain the reasons for cheating on part of either partner."

One explanation is the "good gene" theory; females might want to pair up with a guy who will be a good provider, but if she can also mate with the guy with the brightest feathers, the longest tail, the biggest horns—and get away with it—she'll go for the good genes, too.

The shorebirds study suggests that avoiding genetic incompatibility is another.

Extra Pairing in Shorebirds

Researchers from six countries studied three shorebird species—western sandpipers, Kentish plovers, and Common sandpipers—that are both socially and genetically monogamous. Partners in the three species share incubation duties, and males provide parental care after hatching.

"Social monogamy is about who's tending the nest; genetic monogamy is what's going on in the clutch," said Sandercock.

Chicks with mixed paternity—not the offspring of both partners tending the nest—were found in less than 8 percent of western sandpiper nests, 5 percent of Kentish

The bottom line is that it's possible that women taking birth control pills may be attracted to men they wouldn't be attracted to otherwise.

plover nests, and 20 percent of Common sandpiper nests.

"This is quite different from some socially monogamous songbirds like tree swallows, where you might find up to 40 percent of the chicks in a nest are the result of extra pair matings," said Sandercock.

What would drive a normally monogamous bird to seek additional mating opportunities?

"Incestuous matings bring on infidelity," said Sandercock, in summing up the research. "What's amazing is that we found this to be consistent across all three species."

Figuring out the different reasons that mates cheat will no doubt occupy scientists for years to come.

"Of all of the different hypotheses to explain what benefits females are getting from cheating on their mates, I think avoiding genetic incompatibility will prove to be the most widespread," said Judson, whose book, *Dr. Tatiana's Sex Advice To All Creation* documents the numerous strategies different species have adapted to achieve reproductive success.

"Incest is one form of incompatibility," she said. "But I think that we'll find many instances in which neither partner in a couple is sterile, but the partners together are genetically incompatible."

The shorebird study suggests several avenues for future research, said Sandercock. Identifying the consequences of inbreeding, the social constraints that cause genetically similar individuals to become partners, and how the birds identify a closely related mate are all missing pieces to the puzzle, he said.

Judson has her own question.

"Why is it that these birds are usually monogamous?
They're living in colonies, and have the chance to cheat;
what are the possible disadvantages to cheating?"

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