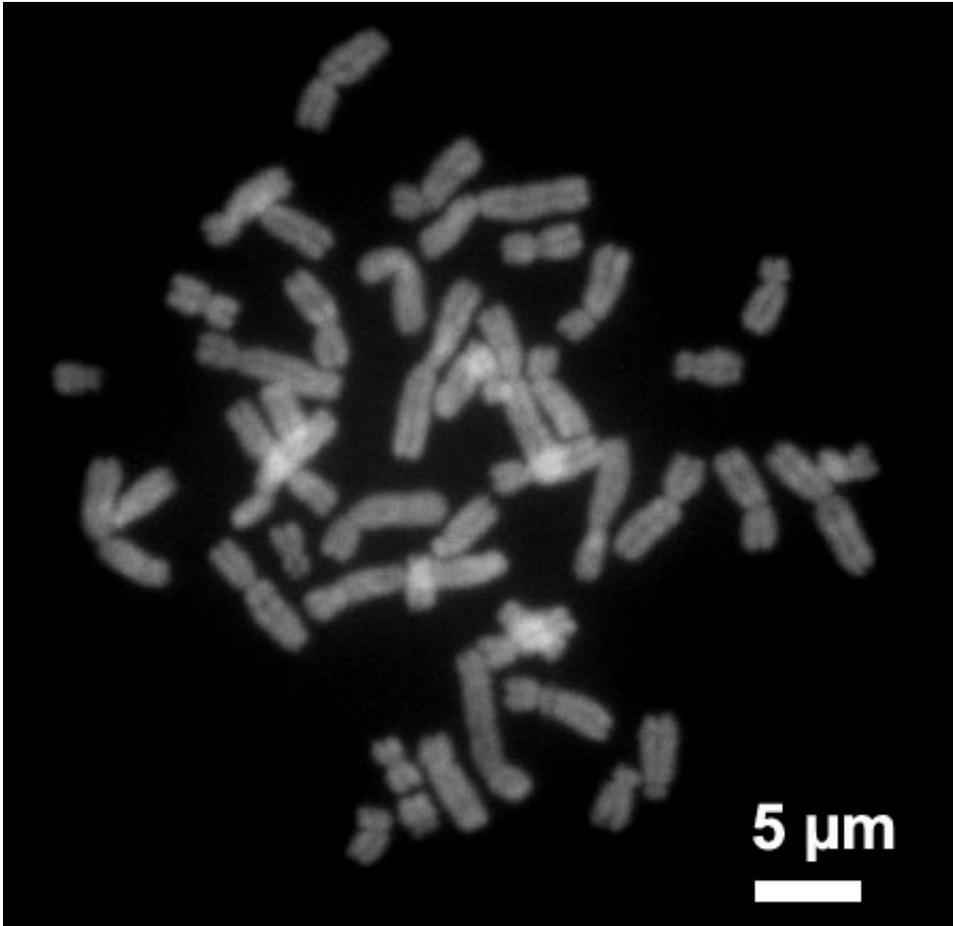


DNA which only females have

June 4 2015



Human chromosomes during metaphase. Credit: Steffen Dietzel/Wikipedia

In many animal species, the chromosomes differ between the sexes. The male has a Y chromosome. In some animals, however, for example birds, it is the other way round. In birds, the females have their own sex chromosome, the W chromosome. For the first, researchers in Uppsala

have mapped the genetic structure and evolution of the W chromosome.

Every individual of a species has the same sorts of [chromosomes](#), with one exception. In many species, the way the sexes differ is that males have their own sex chromosome, the Y chromosome. This contains genes which result in the development of male characters and [reproductive organs](#). If there is no Y chromosome, the organism will be a female.

In birds, however, the situation is different. It is the females which have a unique [sex chromosome](#) - the W chromosome.

In a study published today in *Nature Communications*, Linnea Smeds, Hans Ellegren and their colleagues show that, surprisingly enough, a bird's W chromosome does not contain genes that lead to the development of a female.

"Sex determination in birds and other animals with a W chromosome seems instead to depend upon the number of their equivalent to the X chromosome. Two copies of it produces a male, one copy (plus a W chromosome) produces a female," says Hans Ellegren.

The W chromosome seems instead to function as some kind of buffer for females since it contains genes similar to those in the X chromosome. In order for certain genes to work, it is critical that an individual has two copies of that gene. In this way, the W chromosome can serve as a complement for females who only have one copy of the X chromosome.

Researchers have discovered that the W chromosome changes at a slower rate than any other part of the genetic material.

"This is because it is only inherited on the maternal side and fewer

mutations arise in females than in males," says Hans Ellegren.

Most mutations occur during the formation of germ cells. Males produce a vastly greater number of [germ cells](#) than [females](#) and so the probability that a sperm contains a new mutation is much greater than for an egg cell.

The W chromosome is the only chromosome from the cell nucleus which is inherited on the maternal side. It shares this property with the small amount of DNA found in cell mitochondria.

Provided by Uppsala University

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