Feather Fascination!

with local Birdwatcher, Jim Butler

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BIRD SEX CHROMOSOMES

Aristotle (350BC) knew a lot about birds! In particular, he knew they have a remarkable facility to change sex. For many centuries this strange happening was a momentous portent and in 1474 a rooster that laid eggs was burnt at the stake in Basel; but to Aristotle it was a complex biological problem. It is a fact that when a female bird's ovaries are removed she grows male plumage; but when a male's testes are removed he does not grow female plumage.

This problem was only fully understood around 1940 when scientists found that birds, like us, carry a pair of sex chromosomes. In humans, there are two different sex chromosomes, X and Y, and each person's cells hold two sex chromosomes: women (XX) carry two X's, and men (XY) carry an X and a Y. Therefore, it is the man that determines the sex of the children. In birds the two sex chromosomes are Z and W but the female/male identity is the opposite: the female bird is (ZW) and the male is (ZZ); and it is the female bird that determines the sex of her offspring. In both humans and birds this arrangement ensures that the random act of fertilisation gives rise to equal numbers of males and females.

In female birds the W chromosome contains a gene that produces oestrogen that allows the embryo to develop as a female. The male embryo which has only Z chromosomes does not produce oestrogen and develops as a male. In birds, oestrogen determines femaleness; the absence of oestrogen dictates maleness. In birds the male is considered the default sex.

So returning to Aristotle's problem: when a female bird's ovaries are removed or damaged and oestrogen production ceases, she reverts to the default sex which is male and she grows male plumage but may still produce eggs!

~ Jim

Image: The male Superb Fairy-wren by Mike Ford ©