

THE PINK SHEEP OF THE FAMILY

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this situation, scientists must resort to studying a phenomenon in another animal, then applying those conclusions to humans. Amazingly, even though humans don't appear to have much in common with laboratory animals such as rats and mice, evolution has retained many of the important anatomical features across species.

Roselli's group chose to use sheep because rams are a good "model system" for studying the biological basis of sexual preference. Up to 10 percent of rams show a strong preference for mating only with other rams. The mating behaviors of the population of sheep studied by Roselli's researchers—along with their collaborators at Oregon State University and the U.S. Sheep Experiment Station in Idaho—were already well characterized.

Roselli knew from previous work in other animals and humans that a part of the brain called the sexually dimorphic nucleus is implicated in mating behaviors. The SDN derives its name from the observation that it is larger in males than in females.

However, it was unclear whether the SDN was directly involved in sexual preference. In their study, Roselli and colleagues asked the question, "Does the size of the SDN correlate with sexual preference?"

They studied the brains of eight female-preferring rams, nine male-preferring rams and 10 ewes. Because the SDN of sheep brain had not been studied in detail before, Roselli's group first had to determine whether sheep even had an SDN.

Using a staining technique that allowed them to identify groups of neurons, they found the sheep analogue of the SDN and measured the size and average number of neurons for the SDNs of each group. They discovered that female-preferring rams had larger SDNs than both ewes and male-preferring rams. In fact, the size of the SDNs of ewes and male-preferring rams were quite similar.

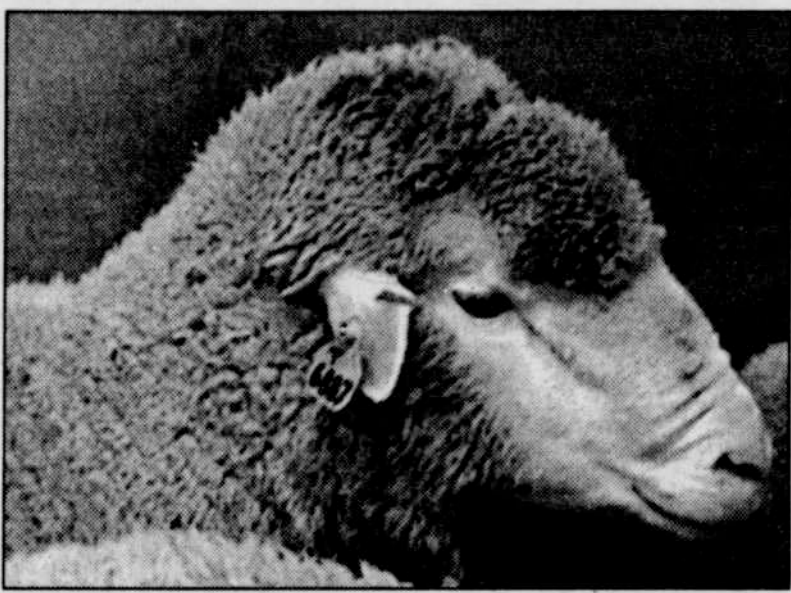
Why did the male-preferring rams have larger SDNs? Of the two possibilities—that these SDNs are composed of bigger brain cells, or simply more brain cells—the latter is true.

The female-preferring rams had more brain cells in their SDNs than either the ewes or the male-preferring rams. Again, the ewes and male-preferring rams were similar in their numbers of SDN brain cells.

Not only did female-preferring rams have larger SDNs that were composed of more brain cells, but their SDNs had more of the precursor for an enzyme called aromatase. This simply might be the result of having more neurons, or it might be a genetic difference between the groups.

This result is interesting because aromatase is involved in hormonal control of the development and maintenance of masculine characteristics. Sexual preference is not likely to be the result of differing hormone levels in the brain, though, as the two groups of rams had similar amounts of the male hormone testosterone.

Given the controversial nature of the issue of the biological basis of sexual preference, Roselli and colleagues are understandably cautious in drawing conclusions from their results. Their



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work has shown that the size of the SDN is correlated with sexual preference in male sheep, but there are still any number of possibilities as to what actually causes sexual preference.

Roselli stresses that his results are not necessarily true for humans. In the future, he has plans to test whether sexual preference is affected by exposure of the fetus to naturally occurring hormones during gestation.

"While we realize that sexuality is more complex in humans than reproductive behaviors in sheep," Roselli says, "this model will help illuminate the basic principles that apply to all mammals and may be helpful in understanding the biology of human behaviors as well."

"This model... may be helpful in understanding the biology of human behaviors as well"
—Charles Roselli

Roselli's work agrees in principle with a controversial human study published in 1992 by Simon LeVay and colleagues. Conducted using human cadavers as subjects, their research concluded that a region of the brain called the hypothalamus was smaller in women and gay men compared to that in heterosexual men.

A major criticism of the study, however, is that all the gay men died of AIDS, and there is no way of knowing whether the disease itself, or its treatment, changed their brains before they died. Although interesting and suggestive, LeVay's conclusion was weakened by this experimental hurdle.

The OHSU results are significant because they are the first to show a clear correlation between anatomy and sexual preference in an animal model. Hopefully this will spur new research on the biological basis of sexual preference.

It would be interesting, for example, if the study could have included female-preferring ewes. These aren't common among sheep, so to compare to the previous results, Roselli's group would have to find a new animal model. But it could further extend the hypothesis of SDN size correlated with sexual preference.

If these results can be extended to humans, for example, would one expect SDN size of lesbians to be larger than in heterosexual men? Would the SDNs of bisexual people be of intermediate size?

No studies to date have examined this. But it would be fascinating to know—regardless of one's beliefs, gender or gender of amorous interest—whether sexual preference is determined in much the same way for everyone. □

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