

# Male rhesus macaques often have sex with each other, a trait they have inherited in part from their parents

July 15 2023, by Jackson Clive, Ewan Flintham and Vincent Savolainen

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Homosexual behavior is not limited to humans. Biologists have reported homosexual behavior in many species of wild animal, ranging from [bats](#)

and [birds](#) to [dolphins](#) and [primates](#).

When animals engage in homosexual behavior, one might assume that they invest less time and energy on reproduction. This suggests that there may be strong reproductive costs associated with such behavior, such as having fewer offspring. So it raises the question of how homosexual behavior manages to evolve and continue to exist within a population.

The underlying presumption is that there is not only a cost associated with engaging in homosexual activity, but also that variation in such behavior is passed down from one generation to the next. Called heritability, this is essential for any evolution by [natural selection](#) to occur.

We set out to investigate these issues by studying 236 male [rhesus macaques](#) living freely in a colony of 1,700 monkeys on the tropical island of Cayo Santiago, Puerto Rico. We observed these monkeys for three years and [found that](#) male same-sex sexual behavior (SSB) was widespread. In fact, 72% of the males we observed mounted other males, while only 46% mounted females.

Critically, male SSB is not unique to this population of macaques. We saw similar behavior in wild rhesus macaque populations in northern Thailand. And there have been [previous reports](#) of SSB in this species from India, too.

## **From one generation to the next**

We also had access to pedigree records that traced the parentage of each macaque back to 1956. This allowed us to explore the effect of relatedness (heritability) on their behavior, taking into account other factors that could influence the results, such as age and social group structure.

We found that the heritability of male SSB was 6.4%, meaning genetics do account for a small proportion of SSB—the rest is environmental.

We calculated "evolvability" to be 14.9%, giving the potential rate at which the trait can evolve per generation through natural selection. Evolvability is thought to be a more reliable indicator than heritability of the degree to which genetics can respond to evolutionary pressure, and provides us with further evidence that SSB can evolve through selection.

Our estimates align with what we would expect for a behavioral trait that is probably influenced by multiple [genetic factors](#) and [environmental effects](#). They are also consistent with heritability values reported in studies of other social behavior in primate species, including [social grooming in baboons](#) and [social proximity in capuchins](#).

We also found a genetic correlation between the number of times a male was observed mounting another male and the number of times he was mounted by other males. This suggests that different forms of SSB in these monkeys share a common genetic basis.

## **What underpins this behavior?**

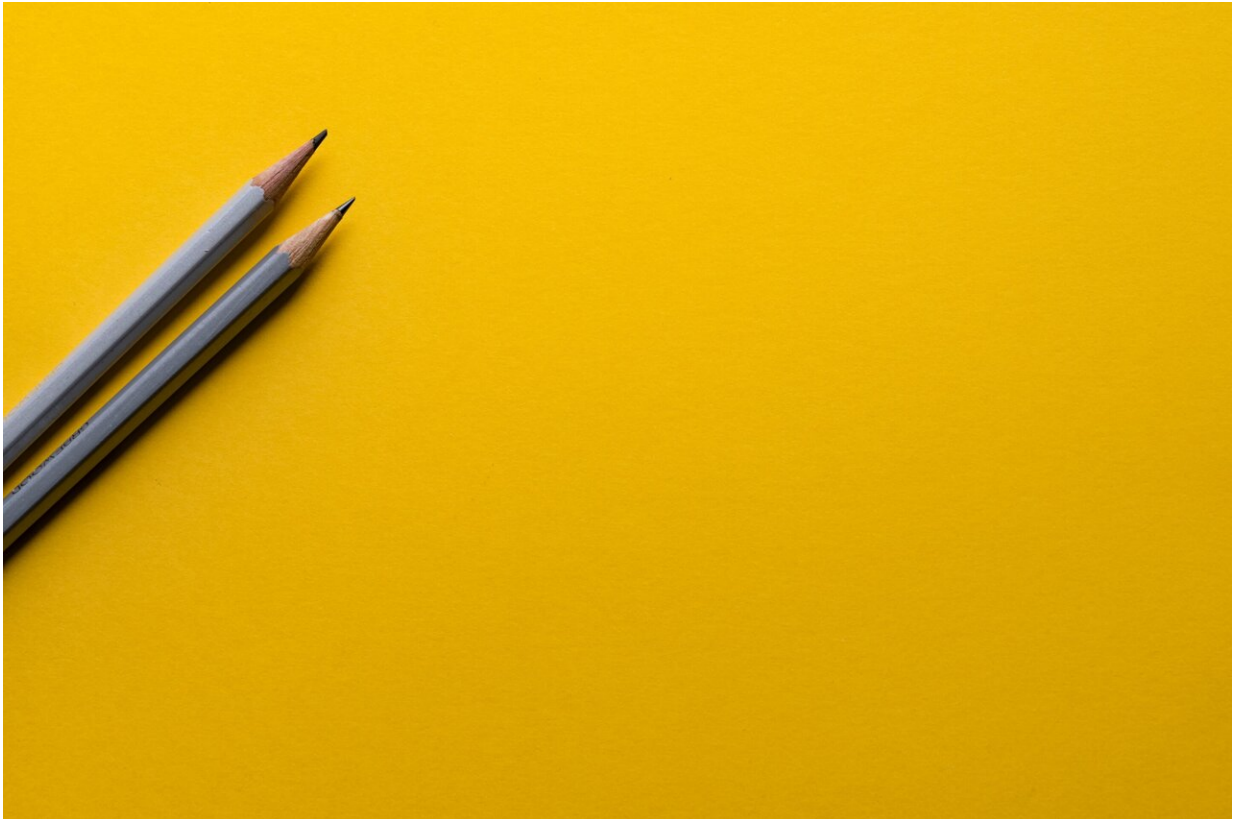
[Previous studies](#) on the heritability of SSB have primarily focused on humans. However, these studies often rely on self-reported data, which can introduce complications. The cultural stigma surrounding homosexuality, for instance, could lead to the underreporting of homosexual activity.

Heritability of SSB has also been found in some invertebrate species, including [seed beetles](#) and [fruit flies](#). However, the pathways through which SSB develops in these species are thought to be different from those observed in social vertebrates like primates. For example, factors such as [imperfect sex recognition](#) are believed to influence the

development of SSB in invertebrates.

Demonstrating that SSB is heritable and its potential for evolutionary response to natural selection is an important first step towards understanding the factors that influence variation in this behavior.

Many evolutionary theories for SSB in animals exist. But they all depend on the behavior showing a degree of heritability.



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One theory suggests that in some species, animals may engage in SSB

because it serves a [beneficial social function](#). For example, it may strengthen the bonds between males, ultimately benefiting them during competition for mates and food.

In support of this theory, our research found that male [rhesus macaques](#) involved in SSB partnerships were more likely to support each other in conflicts with other individuals. This effect could be a way in which SSB benefits a macaque and its chances of producing offspring, thereby allowing the behavior and the genes associated with it to persist within a population.

## Learning from primates

So what can we learn from these findings about SSB across primate species, including humans?

A [previous study](#) examining SSB [heritability](#) in humans found significant reproductive costs associated with this behavior. In contrast, we found no such costs in macaques.

This suggests that the costs associated with human SSB might arise from specific social factors unique to humans. However, more research is needed to explore this idea further.

Today, some people still believe that SSB is rare or the product of extreme and unusual environmental conditions, and selectively look to examples in nature to validate their view. Our results may help to challenge these beliefs and combat prejudice against homosexuality and bisexuality. However, society's moral obligation to strive for more inclusivity and acceptance of different sexual orientations ultimately does not rely on observations from the natural world.

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