

The Gay Animal Kingdom

The effeminate sheep & other problems with Darwinian sexual selection.

by Jonah Lehrer, June 07, 2006

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Joan Roughgarden thinks Charles Darwin made a terrible mistake. Not about natural selection - she's no bible-toting creationist - but about his other great theory of evolution: sexual selection. According to Roughgarden, sexual selection can't explain the homosexuality that's been documented in over 450 different vertebrate species. This means that same-sex sexuality—long disparaged as a quirk of human culture—is a normal, and probably necessary, fact of life. By neglecting all those gay animals, she says, Darwin misunderstood the basic nature of heterosexuality.

Male big horn sheep live in what are often called "homosexual societies." They bond through genital licking and anal intercourse, which often ends in ejaculation. If a male sheep chooses to not have gay sex, it becomes a social outcast. Ironically, scientists call such straight-laced males "effeminate."

Giraffes have all-male orgies. So do bottlenose dolphins, killer whales, gray whales, and West Indian manatees. Japanese macaques, on the other hand, are ardent lesbians; the females enthusiastically mount each other. Bonobos, one of our closest primate relatives, are similar, except that their lesbian sexual encounters occur every two hours. Male bonobos engage in "penis fencing," which leads, surprisingly enough, to ejaculation. They also give each other genital massages.

As this list of activities suggests, having homosexual sex is the biological equivalent of apple pie: Everybody likes it. At last count, over 450 different vertebrate species could be beheaded in Saudi Arabia. You name it, there's a vertebrate out there that does it. Nevertheless, most biologists continue to regard homosexuality as a sexual outlier. According to evolutionary theory, being gay is little more than a maladaptive behavior.

Joan Roughgarden, a professor of biology at Stanford University, wants to change that perception. After cataloging the wealth of homosexual behavior in the animal kingdom two years ago in her controversial book *Evolution's Rainbow*—and weathering critiques that, she says, stemmed largely from her being transgendered—Roughgarden has set about replacing Darwinian sexual selection with a new explanation of sex. For too long, she says, biology has neglected evidence that mating isn't only about multiplying. Sometimes, as in the case of all those gay sheep, dolphins and primates, animals have sex just for fun or to cement their social bonds. Homosexuality, Roughgarden says, is an essential part of biology, and can no longer be dismissed. By using the queer to untangle the straight, Roughgarden's theories have the potential to usher in a scientific sexual revolution.

Darwin's theory of sex began with an observation about peacocks. For a man who liked to see the world in terms of functional adaptations, the tails of male peacocks seemed like a useless absurdity. Why would nature invest in such a baroque display of feathers? Did male peacocks want to be eaten by predators?

Darwin's hypothesis was typically brilliant: The peacocks did it for the sake of reproduction. The male's fancy tail entranced the staid peahen. Darwin used this idea to explain the biological quirks that natural selection couldn't explain. If a trait wasn't in the service of survival, then it was probably in the service of seduction. Furthermore, the mechanics of sex helped explain why

the genders were so different. Because eggs are expensive and sperm are cheap, "Males of almost all animals have stronger passions than females," Darwin wrote. "The female...with the rarest of exceptions is less eager than the male...she is coy." Darwin is telling the familiar Mars and Venus story: Men want sex while women want to cuddle. Females, by choosing who to bed, impose sexual selection onto the species.

Darwin's theory of sex has been biological dogma ever since he postulated why peacocks flirt. His gendered view of life has become a centerpiece of evolution, one of his great scientific legacies. The culture wars over evolution and common descent notwithstanding, Darwin's theory of sexual selection has been thoroughly assimilated into mass culture. From sitcoms to beer ads, our coital "instincts" are constantly reaffirmed. Females are wary, and males are horny. Sex is this simple. Or is it?

Indeed, biology now knows better. Nobody is hornier than a female macaque or bonobo (which mount the males because the males are too exhausted to continue the fornication). Peacocks are actually the exception, not the rule.

Roughgarden first began thinking Darwin may have been in error after she attended the 1997 gay pride parade in San Francisco, where she had gone to walk alongside a float in support of transgendered people. Although she had lived her first 52 years as a man, Roughgarden was about to become a woman. The decision hadn't been easy. For one thing, she was worried about losing her job as a tenured professor of biology at Stanford. (The fear turned out to be unfounded.)

After living for a year in Santa Barbara while undergoing the "physical aspects of the transition," Roughgarden returned to Stanford in the spring of 1999 and decided to write a book about the biology of sexual diversity. In particular, she wanted to answer the question that had first surfaced in her mind back in 1997. "When I was at that gay pride parade," Roughgarden remembers, "I was just stunned by the sheer magnitude of the LGBT [Lesbian, Gay, Bisexual, Transgender] population. Because I'm a biologist, I started asking myself some difficult questions. My discipline teaches that homosexuality is some sort of anomaly. But if the purpose of sexual contact is just reproduction, as Darwin believed, then why do all these gay people exist? A lot of biologists assume that they are somehow defective, that some developmental error or environmental influence has misdirected their sexual orientation. If so, gay and lesbian people are a mistake that should have been corrected a long time ago. But this hasn't happened. That's when I had my epiphany. When scientific theory says something's wrong with so many people, perhaps the theory is wrong, not the people."

The resulting book, *Evolution's Rainbow*, was an audacious attack on Darwin's theory of sexual selection. To make her case, Roughgarden filled the text with a staggering collection of animal perversities, from the penises of female spotted hyenas to the *ménage à trois* tactics of bluegill sunfish. As Roughgarden put it, "What's coming out [in the past 10-15 years] is to the rest of the species what the Kinsey Report was to humans."

According to Roughgarden, classic sexual selection can't account for these strange carnal habits. After all, Darwin imagined sex as a relatively straightforward transaction. Males compete for females. Evolutionary success is defined by the quantity of offspring. Thus, any distractions from the business of making babies—distractions like homosexuality, masturbation, etc.—are precious wastes of fluids. You'd think by now, several hundred million years after sex began, nature would have done away with such inefficiencies, and males and females would only act to maximize rates of sexual reproduction.

But the opposite has happened. Instead of copulation becoming more functional and straightforward, it has only gotten weirder as species have evolved—more sodomy and other

frivolous pleasures that are useless for propagating the species. The more socially complex the animal, the more sexual "deviance" it exhibits. Look at primates: Compared to our closest relatives, contemporary, Westernized *Homo sapiens* are the staid ones.

Despite this new evidence, sexual selection theory is still stuck in the 19th century. The Victorian peacock remains the standard bearer. But as far as Roughgarden is concerned, that's bad science: "The time has come to declare that sexual theory is indeed false and to stop shoe-horning one exception after another into a sexual selection framework...To do otherwise suggests that sexual selection theory is unfalsifiable, not subject to refutation."

Roughgarden is an ambitious scientist. She believes it is impossible to comprehend the diversity of sexuality without disowning Darwin. Although she isn't the first biologist to condemn sexual selection—Darwin's theory has never been very popular with feminists—she is unusually vocal about cataloguing his empirical errors. "When I began, I didn't set out to criticize Darwin," she says. "But I quickly realized that most scientists are pretty dismissive about same-sex sexuality in vertebrates. They think these animals are just having fun or practicing. As long as scientists clung to this old dogma, homosexuality would always be this funny anomaly you didn't have to account for."

Roughgarden's first order of business was proving that homosexuality isn't a maladaptive trait. At first glance, this seems like a futile endeavor. Being gay clearly makes individuals less likely to pass on their genes, a major biological faux pas. From the perspective of evolution, homosexual behavior has always been a genetic dead end, something that has to be explained away.

But Roughgarden believes that biologists have it backwards. Given the pervasive presence of homosexuality throughout the animal kingdom, same-sex partnering must be an adaptive trait that's been carefully preserved by natural selection. As Roughgarden points out, "a 'common genetic disease' is a contradiction in terms, and homosexuality is three to four orders of magnitude more common than true genetic diseases such as Huntington's disease."

So how might homosexuality be good for us? Any concept of sexual selection that emphasizes the selfish propagation of genes and sperm won't be able to account for the abundance of non-heterosexual sex. All those gay penguins and persons will remain inexplicable. However, if one looks at homosexuality from the perspective of a community, one can begin to see why nature might foster a variety of sexual interactions.

According to Roughgarden, gayness is a necessary side effect of getting along. Homosexuality evolved in tandem with vertebrate societies, in which a motley group of individuals has to either live together or die alone. In fact, Roughgarden even argues that homosexuality is a defining feature of advanced animal communities, which require communal bonds in order to function. "The more complex and sophisticated a social system is," she writes, "the more likely it is to have homosexuality intermixed with heterosexuality."

Japanese macaques, an old world primate, illustrate this principle perfectly. Macaque society revolves around females, who form intricate dominance hierarchies within a given group. Males are transient. To help maintain the necessary social networks, female macaques engage in rampant lesbianism. These friendly copulations, which can last up to four days, form the bedrock of macaque society, preventing unnecessary violence and aggression. Females that sleep together will even defend each other from the unwanted advances of male macaques. In fact, behavioral scientist Paul Vasey has found that females will choose to mate with another female, as opposed to a horny male, 92.5% of the time. While this lesbianism probably decreases reproductive success for macaques in the short term, in the long run it is clearly beneficial for the species, since it fosters social stability. "Same-sex sexuality is just another way

of maintaining physical intimacy," Roughgarden says. "It's like grooming, except we have lots of pleasure neurons in our genitals. When animals exhibit homosexual behavior, they are just using their genitals for a socially significant purpose."

Roughgarden is now using this model of homosexuality to reimagine heterosexuality. Her conclusions, published last February in *Science*, are predictably controversial. While Darwin saw males and females as locked in conflict, acting out the ancient battle of their gametes, Roughgarden describes sexual partners as a model of solidarity. "This whole view of the sexes as being at war is just so flawed from the start. First of all, there are all these empirical exceptions, like homosexuality. And then there's the logical inconsistency of it all. Why would a male ever jettison control of his evolutionary destiny? Why would he entrust females to serendipitously raise their shared young? The fact is, males and females are committed to cooperate."

Consider the Eurasian oystercatcher, a shore bird that enjoys feasting on shellfish. A consistent minority of oystercatcher families are polygynous, in which a lucky male mates with two different females simultaneously. These threesomes come in two different flavors: aggressive and cooperative. In an aggressive threesome, the females are at war; they attack each other frequently, and try to disrupt the egg-laying process of their fellow spouse. So far, so Darwinian: Life is nasty, brutish and short. However, the cooperative threesome is everything Darwin didn't expect. These females share a nest, mate with each other several times a day, and preen their feathers together. It's domestic bliss.

In Roughgarden's *Science* paper, she uses "cooperative game theory" to elucidate the diverse mating habits of the oystercatcher. Whereas Darwin held that conflict was the natural state of life (we are all Hobbesian bullies at heart), Roughgarden sees cooperation as our default position. This makes mathematical sense: The family that sleeps together has more offspring. Why, then, do oystercatcher females occasionally engage in all out war? According to Roughgarden, violence occurs when "social negotiations" break down. Although the birds really want to get along (who doesn't like being preened?), something goes awry. The end result is risky violence, in which one female or both will end the breeding season without an egg.

The advantage of Roughgarden's new theory is that it can explain a wider spectrum of sexual behaviors than Darwinian sexual selection. Lesbian oystercatchers and gay mountain sheep? Their homosexuality is just a prelude to social cooperation, a pleasurable way of avoiding wanton conflict. But what about the peacock and all those other examples of sexual dimorphism? According to Roughgarden, "expensive, functionally useless badges like the peacock's tail...are admission tickets": they just get you in the door. If you don't have a ticket, you are ruthlessly denied breeding rights, like an uncool kid at the prom.

Of course, most humans don't see sex as a way of maintaining the social contract. Our lust doesn't seem logical, especially when that logic involves the abstruse calculations of game theory. Furthermore, it's strange for most people to think of themselves as naturally bisexual. Being gay or straight seems to be an intrinsic and implacable part of our identity. Roughgarden disagrees. "In our culture, we assume that there is a straight-gay binary, and that you are either one or the other. But if you look at vertebrates, that just isn't the case. You will almost never find animals or primates that are exclusively gay. Other human cultures show the same thing." Since Roughgarden believes that the hetero/homo distinction is a purely cultural creation, and not a fact of biology, she thinks it is only a matter of time before we return to the standard primate model. "I'm convinced that in 50 years, the gay-straight dichotomy will dissolve. I think it just takes too much social energy to preserve. All this campy, flamboyant behavior: It's just such hard work."

Despite Roughgarden's long list of peer-reviewed articles in prestigious journals, most evolutionary biologists remain skeptical of her conclusions. For one thing, it's tough to measure the benefits of diversity—or lesbian pair bonding. It's even harder to imagine how traits that are good for the group get passed on by individuals. (As a result, group selection has largely been replaced by kin selection.) In the absence of anything conclusive, most scientists stick with Darwin and Dawkins.

Other biologists think Roughgarden is exaggerating the importance of homosexuality. Invertebrate zoologist Stephen Shuster told *Nature* that Roughgarden "throws out a very healthy baby with some slightly soiled bathwater." And biologist Alison Jolly, in an otherwise positive review of *Evolution's Rainbow for Science*, conceded that Roughgarden ultimately fails in her ambition to "revolutionize current biological theories of sexual selection." As far as these mainstream biologists are concerned, Roughgarden's gay primates and transgendered fish are simply interesting sexual deviants, statistical outliers in a world that contains plenty of peacocks. As Paul Z. Myers, a biologist at the University of Minnesota, put it, "I think much of what Roughgarden says is very interesting. But I think she discounts many of the modifications that have been made to sexual selection since Darwin originally proposed it. So in that sense, her Darwin is a straw man. You don't have to dismiss the modern version of sexual selection in order to explain social bonding or homosexuality."

Roughgarden remains defiant. "I think many scientists discount me because of who I am. They assume that I can't be objective, that I've got some bias or hidden LGBT agenda. But I'm just trying to understand the data. At this point, we have thousands of species that deviate from the standard account of Darwinian sexual selection. So we get all these special case exemptions, and we end up downplaying whatever facts don't fit. The theory is becoming Ptolemaic. It clearly has the trajectory of a hypothesis in trouble."

Roughgarden's cataloging of sexual diversity has challenged a fundamental biological theory. If Darwinian sexual selection— whatever its current variant—is to survive, it must adapt to this new data and come up with convincing explanations for why a host of animals just aren't like peacocks.

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