From heteronormative to homonormative: A new perspective on the evolution of sexual behavior

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March 23, 2023

Abstract

This scientific paper discusses the origins and evolution of same-sex behavior (SSB) in non-human animals. The article offers an alternative perspective to Darwin's theory of evolution and explains that SSB is a 'Darwinian paradox' since it does not lead to reproduction. The paper argues that SSB and different-sex behavior (DSB) evolved together and that heteronormativity, the understanding that male-female relationships are the norm, harms research on these animals and queer individuals. The paper discusses the various definitions of SSB and its relationship to biological sex and sexual behavior. It offers examples of animals that differ from the perceived norm of two distinct sexes. The article emphasizes the need to shift our perspective to view same-sex behavior as normal to prevent bias in future research.

Introduction

Darwin's theory of evolution explains that natural selection favors organisms with a high probability of survival and the ability to pass genes down to their offspring through reproduction (Darwin, 1998). This theory is widely accepted and has become a core part of any course about evolution. (Darwin, 1859) theory of evolution suggests that individuals of high 'fitness' will pass their genetics to offspring by mating with individuals with gametes compatible for fertilization (e.g., egg and sperm). Same-sex behavior (SSB) often does not lead to reproduction, yet it has been documented in over 1500 species of animals (Monk et al., 2019).

Scientists have long searched for a genetic explanation for same-sex behavior in humans, aiming to find a gene or genetic trait that can be inherited and passed down to offspring. Most of these studies have come up short, with little to no evidence of a "gay gene" (Harris, 2019). This further confuses scientists that seek to understand how same-sex behavior evolved without any apparent "benefits." We must also consider that different-sex behavior (DSB) is not always initiated for reproduction purposes. However, this costly sexual activity is prevalent among most organisms. Why do we differentiate between same-sex and different-sex behavior if neither leads to reproduction?

(Monk et al., 2019) offer an alternative perspective of the origins of same-sex behavior from being a 'Darwinian paradox.' Under Darwin's theory, the biological costs of same-sex behavior would have eradicated it over time because of a lack of reproductive benefits. (Monk et al., 2019) explain how same-sex behavior and different-sex behavior evolved together instead of SSB evolving from DSB. When male-female, monogamous relationships are used as the baseline for animal mating behavior, same-sex behaviors are seen as abnormal or unusual. The understanding that male-female relationships are the norm and default is known as heteronormativity. This can harm the research of these animals and any queer person that adopts this mentality. If

we shift our perspective to view same-sex behaviors as normal, we can reconceptualize biological sex and sexual activity in animals and prevent bias in research.

Discussion

Defining Same-Sex behavior in non-human animals

Same-sex behavior has been observed and documented in various taxa like mammals, birds, reptiles, fishes, insects, and more (Bailey & Zuk, 2009). (Bailey & Zuk, 2009) categorized these behaviors to differentiate between sexual orientation, sexual preference, and same-sex behavior. Same-sex behavior is an individual engaging in sexual activity with the same sex without a clear preference or choice. Sexual orientation, a term often used for humans, indicates a defined and repetitive preference for one sex or multiple sexes. This term is difficult to apply to non-human animals, as it is difficult to determine if an animal shows a dedicated preference for one sex or another. Often the term 'sexual preference' is used to describe animals that choose a specific sex when given the opportunity to engage in behaviors with individuals of multiple sexes. It is important to make these distinctions when discussing same-sex behavior, as animals participating in SSB still reproduce with individuals of a different sex (Roughgarden, 2004). Therefore, if some hereditary component is associated with SSB, it would still be passed down to offspring.

Biological Sex and Sexual Behavior

We cannot discuss sexual behavior in animals without acknowledging that biological sex and sexual behavior are interconnected. Many species have more than two sexes, can change sex, reproduce asexually, are hermaphroditic, or develop secondary sex characteristics that are not the expected phenotype of their "biological sex."

For example, many fish species are sequential hermaphrodites and change from male-to-female, female-to-male, or alternate between male and female (Gemmell et al., 2019). There are many advantages to this lifestyle. (Cormier, 2017) writes that larger females are more fertile than smaller females, so the largest male will change to a female. This happens in clownfish and is also known as protandry. Larger males can also be more dominant, which is advantageous to fish that change from female to male. This is called protogyny, a strategy several parrotfish species use (Cormier, 2017). Fish that can change between male and female have the most advantage, as they just have to find a mate and can change to the sex needed for reproduction.

There are also numerous examples of species with more than one type of male and female. The bluegill sunfish displays three types of males and one type of female. (Gross, 1991) describes that each male sex has a distinct size, coloration, and behavior. One of these male sexes is seen as the "feminine male" as it schools with other females and displays courtship behaviors with the other types of males (Gross, 1991). (Roughgarden, 2004) theorizes that the "feminine male" appears less threatening than the larger males and can protect other males trying to mate. Therefore, the female often chooses this type of male to mate with.

Another interesting example of a species with multiple types of males and females is the White-throated sparrow. (Kaufman, 2017) describes the more aggressive and territorial males and females as having a white stripe on their heads, while the less aggressive males and females have a tan stripe. These four phenotypes even have distinct genetic differences - meaning this species has four different sexes.

These are just a few examples of animals that differ from our perceived norm of two distinct sexes - male and female. In reality, animals with two distinct sexes that form monogamous male-female relationships are the minority. Only 3-9% of mammals have been observed as socially monogamous species, meaning they find life-long partners and typically raise offspring together (Lambert et al., 2018). Social monogamy differs from genetic monogamy. Researchers have observed species once considered socially monogamous to rear offspring with different genetics than the original pair. In other words, a male and female bonded together

will still reproduce with other males and females outside their pair. Currently, no documentation or evidence suggests that any species is genetically monogamous (Ophir et al., 2008).

This information is an important find as the heteronormative society we live in today expects one male and one female to pair and mate for life. Any sexual activity outside this pair is considered infidelity, yet it is common amongst socially monogamous species. Based on this information, heteronormative monogamous relationships should not be the baseline for discussing sex and gender, as most animal relationships observed do not fit the criteria for a heterosexual monogamous pair.

Evolutionary Explanations for SSB

Previously, researchers have studied same-sex behavior under the pretense of Darwin's sexual selection theory. However, the problem with this assumption and bias is that it leads scientists to believe that same-sex behavior only exists for the reproductive benefits of different-sex behavior. In other words, the purpose of same-sex behavior is to facilitate different-sex reproduction. Studying and observing organisms under this mindset will ultimately lead to bias in interpreting results. There are a few examples in which same-sex behavior has been analyzed this way, but one can see that other explanations exist by taking a closer look.

(Bailey & Zuk, 2009) analyzed past research on the explanations of same-sex behavior and categorized them into 'adaptive explanations' and 'non-adaptive explanations.' Typical explanations of SSB argue that these behaviors are often displays of dominance (particularly in male-male interactions). The theory is that individuals display sexual behaviors to establish a hierarchy within the group. (Darwin, 1859) theory of sexual selection explained that males would compete for a female by showing aggressive behaviors and fighting. Researchers have explained male-male mounting in American Bison as a form of dominance, but male-male mounting occurs just as frequently as male-female mounting (*Homosexual behaviour in animals: An evolutionary perspective.*, 2006). It would be naive to think that this form of SSB solely exists as a mechanism for males to reproduce with females. An alternative explanation could be that SSB determines the herd's social structure, which benefits the species as a whole.

Another explanation scientists have given for SSB is that males may engage in SSB to transfer their sperm indirectly to a female. In flour beetles, males were found to have engaged in SSB right before mating with females. After genetic analysis, researchers discovered that offspring carried genetics from the male that directly mated and the male that engaged in SSB with another male (LEVAN et al., 2009). This provides an evolutionary explanation for why same-sex sexual activity may benefit a particular species, but it is uncommon.

Some animals may exhibit sexual fluidity by changing their preference for a specific sex based on the situation. For example, if individuals of one sex are entirely removed from an environment, members of the same sex might start to display SSB. In (Field & Waite, 2004) experiment, males kept in all-male groups for a set time engaged more frequently in SSB than did the males kept in male-female groups even after both sets of males were introduced to a male-female group. Afterward, these two groups switched - males from the all-male group were given a mixed group, and males from the mixed group were given an all-male group. The study found that after the switch, both groups of males were engaging in SSB. This example is one of many controlled experiments that sought to observe same-sex behavior in animals. However, it brings up the question - why engage in sexual activity if there are no females to reproduce with? One argument could be that these males are driven by hormones and still have the biological urge to reproduce. This would be a costly investment with no apparent benefits. Perhaps these animals are not engaging in SSB to facilitate mating with another sex but instead use it as a way to bond with other individuals and facilitate intraspecies cooperation.

These examples demonstrate that same-sex behaviors are often analyzed through the lens of Darwin's sexual selection theory. However, this ultimately biases the interpretation of results. It is important to critically examine all viewpoints of how these behaviors may have evolved, as there may be alternative explanations.

Social Selection Theory

Same-sex behavior and multiple-sex phenotypes do not fit perfectly into Darwin's theory of sexual selection. A more widely accepted theory for how these evolved is the "Social-selection theory" (Roughgarden, 2012). Instead of individuals seeking out mates that will provide the most "fit" offspring, individuals of multiple sexes work with each other to provide resources that benefit the species as a whole. Mates often seek out others with high parental investment, even if it means mating with an individual considered weak (Roughgarden, 2004).

Same-sex behavior can also facilitate bonding between individuals, as seen with many marine mammals. Dolphins, sea lions, whales, and other marine mammals have been well documented engaging in same-sex behavior. These behaviors facilitate life-long bonds between members of the same sex, which benefits the species' survival (Orbach et al., 2017).

Fish display a wide variety of same-sex courtship that increases the reproductive success of individuals involved. (Roughgarden, 2004) gives several examples of different fish species forming male partnerships to court females, build nests, and protect their eggs. Fish that participate in same-sex behavior as a form of species cooperation are selected to reproduce due to their social traits.

One particularly interesting example of a species displaying same-sex behavior as a social inclusionary trait is the all-female species of whiptail lizards that reside in Hawaii and parts of the southwestern United States. This species reproduces through parthenogenesis, a form of asexual reproduction that allows a female to produce a genetic clone without genetic material from a male (Crews & Fitzgerald, 1980). Because sexual activity is so costly and unnecessary for this species to reproduce, it would be expected for individuals to refrain from any sexual behaviors. However, researchers (Crews et al., 1986) have observed the same form of male-female courtship that other species of whiptail lizards display between the females of this species. The all-female lizards may demonstrate same-sex behavior to bond and develop intraspecies cooperative relationships.

Many species of birds display same-sex courtship and pairings that can lead to the "adoption" of orphaned individuals. One of the more famous examples of this is penguins at zoos and aquariums that form same-sex relationships and adopt abandoned eggs ("Same-sex penguin couples keep adopting eggs, and the Berlin Zoo is celebrating", 2019). While the public viewed this as a shock and abnormal for a while, it is actually quite common among many bird species (MacFarlane et al., 2010). In this example, same-sex behavior can be viewed as a social selection trait, as it benefits the survival and evolution of the species as a whole.

The prevalence of same-sex behavior in penguins at zoos and aquariums has opened up space for a new dialogue on same-sex behavior in animals. When these behaviors were first observed, visitors and guests may have seen it as abnormal or perhaps even a sideshow. But for the LGBTQIA+ community, this was the first representation of same-sex behavior that became popular in the media.

Conclusion

It is important to recognize that same-sex behavior in animals is normal, common, and beneficial for the species' survival. It is also important to acknowledge that using male-female, monogamous relationships as the baseline for studying sexual behaviors biases our results and observations. There are many explanations for why same-sex behavior has evolved in various species. It should no longer be viewed as a puzzling exception to Darwin's theory of sexual selection.

In addition, zoos and aquariums should work to create regular conversations about same-sex behavior that is displayed by almost all the animals that live at zoos and aquariums. Educators should interpret these behaviors and share them with the public just as they would talk about male-female bonding and parental care. Lastly, it is critical to understand which species form male-female, monogamous relationships and

which species do not. By removing this assumption, zoos and aquariums can create a more inclusive and equitable space for guests, visitors, and employees.

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