

AN ANALYSIS OF THE THEORETICAL ORIGINS AND PERSISTANCE OF  
ASEXUALITY IN HUMANS

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## Abstract

Asexuality is defined as a lack of sexual attraction to members of any sex or gender. This phenotype would be considered detrimental in the context of the fitness of the asexual individual, so the question on how this trait originated and continues to persist remains unanswered. Synthesizing studies on asexual humans, homosexual human genetics, evolutionary selection theories, and historical context, the issue of asexuality and the fitness of asexual individuals is considered from multiple points of view. While no clear conclusion is produced, the possibility of a combination of polygenic traits and cultural context not seen in most animal species is proposed as possibly asexuality's initial origin and persistence in human populations. Further research is needed in queer studies and behavioral evolution before a more definite conclusion can be reached.

## Introduction

While LGBTQ+ affairs have gained more and more attention in the public sphere in the last century (Morris, 2017), there have also been large spikes in the evolutionary biology community interested in how behaviors altering the general reproductive cycle could have come to be in human populations and persisted despite the seemingly detrimental effects to individual fitness. Most research devoted to this topic is focused on the homosexual phenotype. However, much less attention in general (and only declarations of interest in the evolutionary biology community) is given to the more extreme example of the asexual phenotype. The purpose of this paper is to shed light on the possible origins of asexuality in humans, how asexuality has persisted into the modern era, and methods required to obtain supportive information for future study. To this end, I will focus on connections to genetics of mental illness, genetics of homosexuality, and cultural influences on evolution.

## Demographics and Research in Asexuality Studies

Since first reported in 1948 (Kinsey, 1948), asexuality in humans has been overlooked until approximately 20 years ago. This leaves the field of asexuality research still in the stages of establishing a single definition given the subjectivity of self-identification, spectrum expressivity of asexuality, and low number and wide geographic distribution of asexual individuals (Brotto L. , 2016) (Prause & Graham, 2007) (Houdenove, 2013) (Bogaert A. , 2006). For the purposes of this paper, asexuality will be defined as low to no sexual attraction to other individuals regardless of sex/gender and *not* low to no desire to engage in sexual behavior/libido (Bogaert A. F., 2004). This distinction is based on the differences found in self-reporting as asexual and description of sexual behavior (Houdenove, 2013).

Currently, the prevalence of asexuality in the U.S. is found to be between 0.7% and 6.1% of males and 0.8% and 4.8% of females (Poston & Baumle, 2010), but these ranges are heavily influenced by unspecific survey questions and assumptions based on which survey answers would be answered by asexual individuals. This is supported by the 1.05% estimate found in a British sample, the same as those reporting as being attracted to people of the same sex at least in part (Bogaert A. F., 2004). Asexual

individuals tend to be adult, female, short in stature, religious (Bogaert A. F., *Asexuality: Prevalence and Associated Factors in a National Probability Sample*, 2004), and have traits linked to mental illness (Yule, 2013).

### Influences Based on Genetic Components of Mental Illness

Several papers have shown connections between the presence of the asexual phenotype and traits that are found in mental illness patients, specifically those with Asperger's syndrome or Schizoid personality disorder (Brotto L. A., 2010). While proposing the cause of asexuality being rooted in mental illness is disputatious for both the asexual community and those with mental illness (Lund, 2015) (Kim, 2011), traits that could link the two groups to genetic origins should not be ignored. Many mental illnesses, including Schizoid personality disorders and Autism spectrum disorders, have been linked to complex networks of genes with different alleles than those without mental disorders (Rucker, 2015) (Chakrabarti, et al., 2009). Because of the sheer number of genes in these networks, the presence of only some of the mental illness linked traits may not produce symptoms in people, allowing those traits to be passed down despite having negative effects when combined with other traits (Persico, 2013). Through recombination during reproduction, these traits can combine in an individual producing symptoms. It is possible then that a certain combination of the mental illness related genes may combine and produce an asexual phenotype in healthy individuals. In addition, genes for asexuality linked traits may be propagated through linked selection, where by mere proximity to a strong positively selected for trait genes that are considered negative are also selected for (Jospehs & Wright, 2016). A combination of hiding in complexity and being selected for by nearby gene could help a trait persist that would ideally not allow for propagation at all.

### HSDD, Hormonal, and Kindling Influences on Sexuality

Hypoactive Sexual Desire Disorder (HSDD) is a hormone related mental illness that is characterized by chronic lack of sexual interest to the point of personal distress or problems with relationships (American Psychiatric Association, 2013), also known as Female Sexual Interest/Arousal Disorder (FSAID) or Male Hypoactive Sexual Desire Disorder (MHSDD) when considering differences in biological sex (American Psychiatric Association, 2013). Given its symptoms, HSDD has been confused with asexuality and, before the distress clause was added to diagnostic definitions, misdiagnosed in asexual individuals. However, when considering the common trait of late onset menarche found in many asexual women (Bogaert A. F., *Asexuality: Prevalence and Associated Factors in a National Probability Sample*, 2004), there is the possibility of a hormonal component that can cause asexuality in humans. Many cell types have been shown to produce sex related hormones (Nelson & Bulun, 2001), therefore mutations in genes regulating hormone production resulting in altered hormone levels or altered cell reactions to hormones is a possible origin of asexuality and connection to HSDD.

Another possibility is to look at brain development in areas of recognizing and processing sexual stimuli, where women with HSDD had less grey matter than healthy individuals (Bloemers, 2013). In asexual individuals, a similar reduction may occur but

to a different enough degree to cause no distress at the lack of attraction. In these areas, the kindling effect may also play a part in development of asexuality on a physiological level.

The kindling hypothesis states that activation in certain areas makes consecutive activations easier to conduct, with the possibility of eventual desensitization to the stimuli (Kendler, Thornton, & Gardner, 2000). In the case of asexual humans, the brain centers related to processing and recognizing sexual stimuli may have been desensitized during development and childhood (Prause & Graham, 2007). This would leave those unable to experience attraction after the point of desensitization, while also allowing for a libido in adult years depending on which areas underwent kindling.

### Genetics of Homosexuality, Sexually Antagonistic Selection, Kin Selection, and Density Dependence

From an evolutionary point of view, homosexuality and asexuality would result in a similar outcome: no offspring and zero fitness. Heritable genetic influences on homosexuality have been found (Rice, 1999), therefore, similar mechanisms could be in play that result in asexuality. Most evolutionary theories that seek to explain the origin and persistence of homosexuality fall under three groups: presence of genes promoting gentler, more attractive behavior in heterosexual males but causing homosexuality when expressed in too high quantity, genes giving reproductive benefits when in females but resulting in homosexual males, or kin selection leading to homosexual gene promotion in family members of homosexual individuals.

Overdominance, or heterozygous advantage, occurs when individuals have higher fitness when carrying two alleles of the same gene when compared to individuals only carrying one type of allele for a gene. In the case of homosexuality, carrying only one "homosexual" allele could make heterosexual males more attractive to mates, but causes homosexuality in homozygotes for the homosexual allele (Gavrilets & Rice, 2006). This has yet to be supported by empirical evidence in homosexual populations (Santtila, et al., 2008) (Oxford, 2008), but the possibility of overdominance in asexual populations is worth investigating.

Sexually antagonistic selection, or selection on a trait that increases fitness when in one sex also decreases fitness when found in the opposite sex, has been investigated in homosexual populations. Model data compared to genome empirical data has shown that sexually antagonistic genes resulting in homosexuality in males could be passed down, but the exact mechanisms have yet to be agreed on. Inheritance seems to be based on sex chromosomes, with the possibility of incomplete penetrance allowing for heterosexual mating to induce recombination (Chaladze, 2016) (Sanders, Martin, & Beecham, 2015) (Ciani, Cermelli, & Zanzotto, 2008). Xq28, a gene found to contribute to testis development, has been speculated to be the gene in question (Sanders, Martin, & Beecham, 2015). While not pointing out any specific genes by name, other studies have found a higher incidence of heritable traits related to female fecundity in homosexual men (Langstrom, Rahman, Carlstrom, & Lichtenstein, 2010) (Rahman, et al., 2007). Asexuality may be acting in an opposite way, explaining the higher incidence of female asexual individuals.

Kin selection is another possibility, where members of a population help propagate their genes not through reproduction, but helping close family members reproduce/rear young. This has been theorized to influence hunting parties in hunter-gatherer communities (Morgan, 1979), formation of social constructs in Chinese culture (Sun, 2010), and has been used to describe altruistic behaviors in animals (Veelen, 2006) (Williams, 2005). In survey studies asking homosexual individuals about their levels of caring for their family members, researchers found no significant increase over heterosexual individuals (Bobrow & Bailey, 2001) (Rahman & Hull, 2005). However, because these studies were performed on modern populations, we can't rule out the possibility of kin selection being important for the propagation of homosexual traits in hunter-gatherer societies when it would have developed. A similar argument could be made for kin selected asexual traits despite the lack of modern research on the subject.

With shifts towards populations of people that would normally not reproduce sexually, the possibility of density dependence should be considered in areas with high population density like urban areas. Density-dependent selection is selection whose effects on a trait (speed and direction of change) depends on the density of the population. While evidence for density dependent selection has been modeled in human populations (Bauch, 2008) and theorized in hunter-gatherer populations (Walker & Hamilton, 2008), there has not been much research on density-dependent selection in humans. The current shift towards greater proportions of queer identities, including asexual individuals, might be related to density-dependent selection as the human population spikes.

Overall, there are possibilities for homosexual trait inheritance mechanisms to apply to asexual trait inheritance, but lack of conclusive research in both areas hindered the progress of finding answers.

### Pressures of Human Culture on Human Evolution

With the recent up-rise of language to describe orientations other than heterosexual, looking into the cultural context of asexual evolution can be difficult. This difficulty can be broken down into three groups: lack of widespread records of human attraction before the current rise in LGBTQ+ awareness, the current stigma against lifestyles that may not partake in sex (for pleasure or procreative purposes) and the stigma against LGBTQ+ people living according to their orientation. While the first hinders our study of past influences on asexuality, the second and third will continue to hinder our studies into the future.

Looking onto past cultural records for incidence of asexuality and the contexts in which they were brought about is difficult only because of the lack of resources describing people's day to day feelings. Therefore, patterns in general marriage expectations and speculation on famous people's sexuality must be used to help structure asexuality's past context. While there is some evidence that several historical figures like Isaac Newton and Emily Bronte were able to act in an asexual manner (Bogaert A. , Understanding Asexuality, 2012), marriage patterns of the general populous show quite the opposite. Up until the 17<sup>th</sup> century, most marriages were forged for economic ties and procreation, where not choosing to marry was rare. Real blurring of societal transitions that usually happened with marriage didn't significantly start

occurring until the 1970s (Coontz, 2004). This general tendency to survive in society rather than commit to sexual preferences may be the reason genes associated with asexuality have stayed in the human population. While in some areas asexual individuals could have resorted to religious celibacy (Wright, 2002), some would have reasons for not choosing so, primarily familial and economic pressures.

In the modern era other difficulties have arose: the continued pressure to procreate despite infertility or lack of desire, and the continued anti-queer movements. As infertility rates rise in the United States ( Reproductive Medicine Associates of New Jersey, 2016), the pressure to have children has been consistent with more and more focus on using fertility treatments in cases of infertility (Simonstein, 2006). Without the possibility to hide behind a façade of infertility, asexual individuals who do not want to reproduce will be subjected to social stigmas against childless adults (Peterson & Engwall, 2015) (Wong, 2014). In addition, as more and more attention is brought to LGBTQ+ communities, more stigmas that are associated with larger groups will be pressed upon the asexual community (Herek & McLemore, 2013). This is also separated from the biases that many social groups, including homosexual and bisexual communities, have against asexual people because of the lack of sexual attraction (MacInnis & Hudson, 2012). These modern combinations may continue to pressure otherwise non reproducing individuals to procreate to 'survive' the cultural environment.

## Discussion

Taking into consideration all the possibilities I have introduced to explain the evolution and persistence of asexuality in humans, it would be unwise to consider one source the sole reason for a trait that would not be passed down in a perfect scenario. However, an evolutionary explanation for the persistence of asexuality likely combines positively selected polygenic traits and heavy cultural influences on reproduction in humans. As queer sexual identities become more and more accepted in modern societies, the ability for individuals to act on their desires and be open to participate in research will continue to grow, helping the current complexity involved in this topic to be teased apart. In the asexual community specifically, progress can be taken by the research and medical communities to continue to distinguish between orientations and pathological conditions despite similarities in expression (Flore, 2013) (Gressgard, 2013).

To answer this question of the evolutionary origins of asexuality and other queer sexualities in general, the biological sciences community must first focus on answering how behaviors can be inherited without being taught and evolutionary aspects of mental development and diseases. When delving into questions about human evolution, we cannot separate biological developments from cultural context, calling for a greater communication between biological science and anthropological communities. Studies involving asexual individuals should continue to work towards a scientific definition of asexuality, referencing behavior, attraction, and self-identification methods while also trying to use genetic data to find similarities between asexual people and differences from other populations. This is where the difficulties studying an attraction based behavior reside.

Because asexuality is considered by the asexual community on a spectrum of different levels of sexual attraction (Bogaert A. F., 2012) (Bogaert A. F., 2016), it can be difficult to define what should be considered 'asexual' when collecting data. Researchers should be aware, along with the issues normally cited when using survey data, that some questions may be interpreted as referring to general attraction rather than sexual attraction specifically. In these cases, questions should be structured as specifically as possible to obtain useful results. This leads to the issue of ignorance of definitions, especially when distinguishing between different types of attraction (sexual, romantic, etc) (Chasin, 2011). Providing definitions could be helpful in these cases, but may also bias answers to fit definitions that are given rather than what is actually true. Overall, as more people become educated to the matters of queer identification, self-identification will become more and more reliable as a method of research. When taking genetic data, focusing on relating common markers within the asexual community should be prioritized before comparing those markers to other communities to establish an origin.

While research on biological influences of behavior may be difficult and slow in results, their value should not be undermined, especially to those within communities studied. In a world that continues to differentially treat minorities, scientific data may help bring to light that, despite our individual differences, humans are still united by many similarities.

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