Fertility and Reproduction's Niche: Human Sexual Diversity

Samuel w. Austin

University of Montana, Missoula

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FERTILITY AND REPRODUCTION’S NICHE: HUMAN SEXUAL DIVERSITY

By

SAMUEL WILLIAM AUSTIN

Previous Degree: Political Science B.A., University of Montana, Missoula MT, 2004

Thesis presented in partial fulfillment of the requirements for the degree of

Master of Arts

in Anthropology

The University of Montana
Missoula MT

Official Graduation Date: May 2017

Approved by:

Scott Whittenburg, Dean of The Graduate School
Graduate School

Meradeth Snow Ph.D., Chair
Anthropology

G.G. Weix Ph.D.
Anthropology

Associate Dean Charles Janson Ph.D,
Biological Sciences

Paul Vasey Ph.D, External Advisor
Psychology: University of Lethbridge, Alberta, Canada
Fertility and Reproduction’s Niche: Human Sexual Diversity

Chair: Meradeth Snow Ph.D.

Abstract: Biologically exploring the origins and forms of human sexuality is of paramount importance. Scientific research has indicated that homosexuality was linked to reproduction, fertility, and adaptive child caring strategies, traits that seem to display cross-cultural similarities. This suggests that sexual diversity may be one of human’s earliest adaptations. While most of the previous research has been on individuals of European descent, little research on Native American populations has been completed to test whether these patterns continue in their population.

The research presented here tests the Sexually Antagonistic Hypothesis for Male Homosexuality, Fraternal Birth Order Effect, and childhood atypical gender behaviors among Native American Males. A questionnaire was administered to 45 Androphilic Native American Males and 40 Gynephilic Native American Males (control sample). Androphilic Native Males maintain greater numbers of kin, siblings, and greater means of offspring among relatives than gynephilic Native Males; yet these groups only maintained statistically significantly larger numbers of offspring for paternal and maternal grandmothers.

In support of the Fraternal Birth Order Effect, Androphilic Native Males had greater means for older brothers and older sisters, despite 23 out of 45 (51%) total androphilic males had reported to be the first males born among their siblings. However, the two groups failed to maintain statistically significance, which is potentially due to a sampling error as a large number of androphilic respondents reported to be first born.

The recalled childhood behaviors statistically demonstrate that Androphilic Native Males exhibited greater female roles and behaviors, and less male roles and behaviors than Gynephilic Native Males. Native American males maintain patterns that are consistent to support the presence of mechanisms for Sexual Antagonism and Fraternal Birth Order Effect. Future research seeks to elucidate these findings for clarity and expand on the sample size.
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CHAPTER 1: INTRODUCTION AND OVERVIEW

Fertility and Reproduction’s Niche: Human Sexual Diversity

Throughout the span of human evolutionary history, humans have demonstrated a mosaic of variability and adaptability to each groups’ unique environments. Despite each groups’ unique adaptations, all humans are on average 99.5% genetically similar, and it is only that less than 1% of genetic variability that is attributable to our differences (Crawford 2007; Mielke et al. 2011). Separate human groups have developed specific adaptations that are linked to the environments in which they and their ancestors lived. The vast majority of modern human adaptations have occurred in a very recent timeframe from an evolutionary standpoint, with many having occurred within the past 100,000 years (Molnar 2002; Mielke et al. 2011). Whether it be high altitude adaptation, skin color, or disease resistance, these all diversified as human groups migrated to various regions throughout the world. The resulting human variation in populations occurred very recently in human history due to distinct selective forces based on population’s unique environmental and cultural forces.

Human sexuality has been subject to its own selective forces throughout time. Biologically exploring the origins and forms of human sexuality is of paramount importance within a world populace of diverse sexual orientations and cultural backlash toward those deemed to differ from the heterosexual
'norm.' Scientific explanations can aid in explaining and redefining social, political, and cultural landscapes where an individual’s sexual orientation would be viewed as biological signature that occurs within the spectrum of human sexual variation. There is an interplay of biological origins and cultural forms in human sexuality, enriched understanding of these processes can mitigate ideological backlash that can be in denial of such diversity. Explanations that account for evolutionary forces on an individual’s sexual orientation can validate the spectrum of human sexual variation.

In the field of modern human variation we often look at the differences within human groups; surprisingly, 85% of human variation is contained within human groups not between them (Crawford 2007). Researching human sexuality and gender diversity, it is apparent that the gradations in human sexuality are prevalent in all human groups. Variability in human sexuality and gender is recorded in the earliest of human cultures (Roscoe 1998; Roughgarden 2013). There is a good indication and evidence to substantiate that the diversity in human sexuality began very early in the *Homo* lineage. Sexuality, fertility, and reproduction are believed to be one of humans’ primary evolved mechanisms. Non-human primates also exhibit same-sex sexuality that are incorporated in a adaptive fitness structures correlated with reproduction and fertility (De Waal 1995; Parish 1996; Roughgarden 2013). Diversity in human sexuality has patterns have been observed in traditional and indigenous groups, demonstrating that non-reproducing and reduced-reproducing individuals often have supporting
roles within their communities that are linked to reproductive fitness of others, individual and group success, fertility, and aid in child rearing strategies (Roscoe 1998; Vasey and VanderLaan 2010).

Evolutionarily and biologically, fertility is one of the primary essences for specie’s survival. Fertility and reproduction are believed to be hard wired into some of our earliest DNA properties; thus, human sexual diversity may have had similar origins. If human sexual diversity arose by chance, in that sexuality is the result of a complex set of genes, then it has maintained this diversity through selection and other evolutionary forces throughout human history. Human sexual diversity has been maintained in populations throughout human history due to a mosaic of complex selective forces, such that no human group is devoid of this sexual diversity in their past or present.

Genetic research over the past 20 years has been piecing together some of the mechanisms by which sexual diversity can be understood biologically. Research in the field has been able to determine a number of X linked and autosomal markers that have been identified to pattern male homosexuality along with several phenotypic traits (Camperio-Ciani et al. 2004; Mustanski et al. 2005; Rahman et al. 2008). The Sexually Antagonist Gene Hypothesis for male homosexuality postulates that female kin of androphilic males produce more offspring than gynephilic male’s female kin. Additionally, however not necessarily related to the SAGH is the pattern of androphilic males having substantially greater numbers of older brothers than gynephilic males. The cause
for this Fraternal Birth Order Effect is potentially maternal immunity (Maternal Immune Hypothesis), where certain mothers develop a progressive immunization to the male hormone with succeeding male pregnancies. They hypothesized that late birth order and sibling sex ratio reflected progressive immunization of some mothers’ H-Y antigen present in the male fetus. An increased number of pregnancies with male fetuses resulted in stimulating the maternal immunity reaction and reducing the sexual differentiation of the brain and result in males who exhibit homosexual tendencies in life (Blanchard and Klassen 1997; Camperio-Ciani et al. 2004; Ciani et al. 2008; Vasey and VanderLaan 2010). Male hormones in utero reduce the size of the hypothalamus in the brain. The reduction of the hypothalamus is one of the reliable patterns for male homosexuality (LeVay 1991). Additional studies have identified that reduced male hormones in utero also lead to an reduction in limb bone length and the alter the ratio of 2D: 4D finger lengths in homosexual men (Manning et al. 1998; Manning et al. 2003; Martin and Nguyen 2004).

Recent research using genome wide data for 908 homosexual males found a linkage for male sexual orientation on X-chromosome locus Xq28 linked with the pericentromeric chromosome 8 (Sanders et al. 2015). The Xq28 linkage is relevant to the X-linked sexually antagonistic hypothesis in that women with genetic variants have a reproductive advantage compared with other women, but may also predispose homosexuality in men. The testing of Xq28 and the
pericentrometric 8 has been identified in five single nucleotide polymorphisms for future testing and analysis (Sanders et al. 2015).

Understanding the patterns of universality regarding homosexuality substantiates the need to research this from a biological and genetic vantage point. Previous genetic research on male homosexuality and studies testing the Sexually Antagonistic Gene Hypothesis have relied predominately on individuals of European ancestry. If all human groups are genetically similar, and if human sexual diversity evolved early in human history, it should be possible to identify the similar biological and genetic patterns regarding sexuality in all human groups. Located in Western Montana, Native Americans provided a good subject group with a representation of traditional and contemporary Two Spirit roles.

Based on these findings the research proposed here will investigate the following hypothesis:

Hypothesis: Native American males will maintain the patterns found among other worldwide populations in support of the Sexuality Antagonistic Hypothesis for Male Homosexuality.

The question that has eluded scientific understanding is how has homosexuality evolved and how has it been maintained throughout human evolutionary history? If survivability is linked to reproduction why do we have archaic and historic examples of homosexuality? If individuals of homosexual sexuality are a non-reproducing or lower-reproducing group, why has
homosexuality not been selected out of the genome? This has been described as
the Darwinian Paradox of homosexuality in humans (Camperio-Ciani, et al. 2004;
Iemmola and Ciani 2009). Despite this paradox, homosexual males do reproduce
and have done so historically. This has been documented in the Samoan Fa a
afafine men who are transgendered effeminate gay men; yet reproduce at one
fifth the rate of heterosexual Samoan men (Vasey and VanderLaan 2010). The
questions regarding the evolution of human homosexuality may very well be
related to the evolution of human development as a whole. The economic cost
and long-term investment of child rearing has relied upon the aid of group
members historically and presently (Small 1998; Small 2011). Increased
survivorship in early human groups was linked to parental aid of others for child
rearing duties. The others were often elders, siblings, aunts or uncles, and
oftentimes this was comprised of non-reproducing individuals. Altruistic acts
have further confounded previous scientific inquiries, as these have been
deemed contrary to the principal of Darwinian fitness and selection. In
researching human sexuality it is imperative to study how early humans groups
perceived sexuality, fertility, reproduction and birth, and how human cultures
evolved bodies of knowledge and structures regarding these biological
principles.
CHAPTER 2: Human Evolution and Biology

Distinct human evolutionary adaptations, such as brain growth and bipedalism, are linked to unique human patterns of gradual maturation periods that are allocated by extended childcare and rearing of the young (Small 1998; Small 2011). This extended care for the young may have lead to adaptive strategies in early human groups that outsourced the care of the young by collective group members. A great deal of scientific research indicates that homosexuality was linked to reproduction, fertility, and adaptive child caring strategies (Camperio-Ciani, Corna, and Capiluppi 2004; Rahman et al. 2008; Vasey and VanderLaan 2010). Human sexual diversity may have found a niche that aided in group efficiency and survivability.

Of paramount importance is the background in how brain evolution and bipedalism altered the way humans are born and develop. When the ancestors of modern humans began walking upright and engaging in bipedal locomotion some five million years ago, this gave the hominid line distinct adaptive advantages. Bipedalism increases the range of vision with elevated height extension. Bipedalism also functions for more efficient movement in fight or flee situations and in hunting strategies, compared to the knuckle-walking locomotion of other large apes. Most importantly the mechanics of bipedalism free the hands for use as opposed to knuckle walking primates. The freeing of the hands allowed early humans to develop more complex tool strategies and
technologies. Occurring between early and middle Homo we see the beginnings of exponential brain growth, occurring concomitantly with development of more complex tool usage. This exponential growth would continue onward throughout human evolution. Advancing tool technologies aided in hunting strategies and increased dietary transitions.

Evolutionary brain growth is often linked to diet transitions such as higher protein diets acquired in meat eating (Holloway and Post 1982). Human brains didn’t just become bigger in overall size, rather several areas of the brain grew exponentially in comparison to others. The parietal lobes expanded and are linked to cognition and reason. The lunate sulcus moved to a posterior position where the centers of sight, hearing, and speech were integrated. In apes the lunate sulcus is in an anterior position and forms a boundary for primary visual striate cortex (Holloway and Post 1982).

Numerous advantages were selected for in larger brains that produced increased cognition combined with integrated centers of sight, hearing, and speech perception. While bipedalism may have been the forerunner that allowed hominid adaptations that led to increased brain growth, functionally bipedalism would work against large brain growth. Bipedalism requires that human skeletal geometry maintain a narrow pelvis, while large brained babies would require larger, wider pelvises (Small 1998; Small 2011). An evolutionary compromise had to be made, and the solution was that human babies are born neurologically unfinished. This is why humans have a stage of growth called childhood not
found among other mammals (Small 1998; Small 2011). Not all babies are the same. Human babies cannot sit up because the nervous system and the brain are unfinished, while other animal babies are able to stand or cling to their mothers, thus requiring relatively less immediate care from their mothers.

Scientists have identified these two types of babies as altricial and precocial. Altricial babies are born helpless, usually after a short gestation and their brains are not quite finished. Precocial babies usually spend more time in the womb and are more alert at birth, their central nervous system is more advanced and exhibits greater control over their body and limbs (Small 1998). Precocial infants tend to be large bodied, large brained, and slow breeding, such as gorillas. Altricial infants tend to be small bodied, small brained, and fast breeding, such as mice. While humans are not as altricial as other mammals, such as mice, but when compared to apes, humans are very altricial. So why is it that large brained and large bodied humans have developed a more altricial pattern? The answer is in our evolutionary compromise of large brains vs. bipedalism. Altricial brain size grows 7.5 times its size from birth compared to precocial brains growing only 2.5 times. Human infant brain growth is faster than any other mammal and this rate continues for the first twelve months of life, afterwards we transition to a more normal pattern of mammalian brain growth (Small 1998). This explains the soft regions of the infant cranial area that allow this rapid growth and expansion. The soft regions of the human crania also allow the human infant to accommodate and manipulate through a narrow birth canal.
Human infants must contort their body by turning and twisting, bending their head to the chin, and enter the world face down (Small 1998). Birth in humans is a traumatic event for both mothers and infants. Comparably speaking, researchers observed a Barbary Macaque giving birth: the process consisted of the macaque squatting and letting out a few moans, and within minutes she reached behind and scooped up the baby coming out and shortly moved on with newborn clinging to her (Small 1998). Undoubtedly, there are radically divergent birth processes for humans and other mammals. The distinctly human birth processes and extended care of the young is part of our biological model for reproductive success. So how did early human cultures adapt strategies that enhanced this biological template for survivorship?
CHAPTER 3: Early Human Cultures

The continuum of human sexual diversity are believed to be an interplay of selective forces both biologically and culturally (Rahman 2005; Mustanski et al. 2005; Rahman et al. 2008). Every human culture contains individuals of diverse sexual orientations; yet how each culture interprets fertility, birth, and sexuality varies. Religion appears to be a catalyst within culture that can function to embrace or condemn sexual diversity. Despite this, human sexual diversity remains present throughout time and exists in all human groups. The primary mechanisms for human sexual diversity appear to be in rooted in our biology and DNA.

One of culture’s earliest and primary roles was the identification of the world that surrounds us and the sharing of knowledge. This shared knowledge and identification is codified in the structures of human language. The benefits of culture would be a shared pool of resources in group protection, hunting, skills, and most importantly knowledge that would enhance survivability. This sharing of knowledge functioned fairly well early on. However, without advancements yet to come in science and technology, early cultures functioned poorly in developing adequate understanding of forces of nature, such as the sun, moon, stars, and life giving birth. Culture is a byproduct of nature by humankind forming kinships and alliances. Religion is a product of culture. Religion’s function in culture is to explain what we don’t understand in nature and the
universe around us. Religion also functions to explain the inequities and injustices found in nature (Leach 1966). Religion often fails to understand the biological principles and concepts of nature.

One of the main biological concepts that early humans couldn’t quite comprehend was life giving birth. Fertility is regarded as the number one essence of survivability. Fertility’s Dividend provides that reproduction and fertility strengthen populations and nations; it’s the determinate factor to surviving wars, diseases, and catastrophes. The integral power and strength of fertility on human survivability, combined with early human’s lack of understanding of biological principles, created the mysticism of life giving birth (Leach 1966). This is especially true with monotheistic religions where procreation is seen as a divine representation of creation. Additionally, monogenetic theory of procreation is directly linked to the theological doctrine of monotheism (Delaney 1991). There is a universality among human cultures for origin myths in that they ask questions such as “Who are we?” and “Where do we come from?”; although, not all origin myths are the same and not all contain stories of creation (Delaney 1991). Various early human cultures were fascinated in the process of life giving birth. Birth and fertility became coveted, adorned and worshiped so demonstrated by the Venus Figurines (Nelson 1990).

Human cultures still worship fertility and birth. This is illustrated by the classical story of a god that is born from a human mother and reborn. Before Jesus, there was Dionysus who was conceived by the god Zeus with a human
mother; additionally, Dionysus had a death and rebirth along with various other historical god figures having birth mothers and rebirths (Leach 1966). E. R. Leach adds:

“On the one hand since virgin birth is plainly a non-rational concept, the stories could not have been invented by a sensible civilized people-they were survivals from an earlier primitive stage of society” (1966).

By the words “sensible civilized” Leach is pointing out that mysticism of the virgin birth would not likely be the byproduct of scientifically knowledgeable human groups (1966). Studying early human mysticism, Edwin Hartland assembled a broad collection of mythological tales from all over the world which relate to magical conception of ancestral heroes and hero deities (Hartland 1894; Hartland 1909-10). Western scholars for years were reluctant to recognize that there was a cultural universality in versions of the myth of the Virgin Birth (Leach 1966). There are three historical types of Supernatural Births: (1) Virgin Births yield normal children from normal mothers. (2) Magical pregnancies, such as on old woman long past the age of child bearing is finally granted a child, as in the biblical stories of the birth of Isaac, Samuel, and John the Baptist. In this instance the child is predestined to be a hero while the mother is a normal human being. (3) Virgin mothers who immaculately conceive deities and they themselves are regarded as supernatural (Leach 1966). Leach indicates that this can be interpreted as class status and power as gods are perfect and powerful while men are imperfect and impotent. The dogmas of the virgin birth and the irrelevance of human male sexuality appear as the by-products of this
theology (1966). The inability to understand random occurrence of infertility, combined with the importance placed upon reproduction would have contributed to the mysticism regarding birth and fertility.

Among other things, religion has evolved to sanction fertility and reproduction. Many religions suppress non-reproducing entities, especially Western ideologies (Roscoe 1998; Goodfellow 2015). Western cultures have subjugated classes of homosexual peoples who live in shame, fear, denial, and disillusionment to their very existence (Roscoe 1998; Goodfellow 2015). Various religions stand in opposition to contraceptives, abortion, euthanasia, and homosexuality. Western cultures and religions have transcribed the ideology that reproducing individuals were embracing life; conversely, non-reproducing individuals were not embracing life. This can be contrasted with Native American Two Spirits who are the embodiment of both genders and as well as sexuality. Traditionally they were viewed having an elevated spirituality, roles with their respective tribes were often shamans and spiritual leaders (Roscoe 1998).

Religion is the catalyst that has the ability to transcend or condemn representations of human sexual diversity (Roscoe 1998; Roughgarden 2013). These respective religions shape and mold the very logic, ideology, and intellectual reasoning for their respective cultures. Western societies have repressed human sexual diversity not only in their own milieu but also on a global scale through conquering people and subverting their cultures. Despite all
of this, homosexuality is reoccurring throughout time; furthermore, the cross-cultural universality of homosexuality often displays altruistic behaviors through individuals being mentors, spiritual leaders, and counselors. This should prompt one to consider that something is at work here that goes beyond the control of human cultures and can be better explained in our biological and evolutionary histories. Human cultures demonstrate the ability to repress or support the expression of human sexual diversity but apparently lack the power to create or eliminate it.

Historically, homosexuality was viewed from psychological modes of thought that relied on explanations due to childhood trauma and sexual experiences. When viewing others who may be different, it needs to be viewed from the perspective that all humans are essentially genetically similar and each one of us share some of the genes that make others unique. Homosexual and multiple gendered individuals do express some cross-cultural similarities, which suggests that understanding lies beyond culture and environment. Some of my initial studies in sexuality began with an ethnology on gay fathers by Aaron Goodfellow, *Gay Fathers, Their Children and the Making of Kinship* (2015). Present overwhelmingly in these gay fathers was a strong inherent drive for altruistic behaviors. Not only did they exhibit strong characteristics for parental drives and capacities as givers, but this signature encompassed their whole life, as majority of these men had careers as mentors, counselors, educators and therapists. I was further astonished when attending Gay Men’s Spirituality
meetings that all of the men had similar backgrounds in these same fields. The pattern was uncanny. This pattern also contains a historic multi-cultural representation. Native American Two Spirits were individuals who took on the roles and gender duties of the opposite sex. Oftentimes these roles took on the dress of the opposite sex and it was very common for Two Spirits to have homosexual relationships (Roscoe 1998). Native American Two-Spirits had varying roles base upon the individual and their respective tribes, yet there were some very common roles. Many Two Spirits held positions within their tribes as spiritual leaders, shamans, counselors, mediators, artisans, teachers, and were a unifying force between the sexual divisions with their tribes (Roscoe 1998). This multi-cultural pattern for homosexual expression suggests that it is not developed under the shaping of independent cultures but a common biological template that expresses this signature.
CHAPTER 4: Altruism

Altruism from non-reproducing individuals may have been one of the essential modalities of human groups’ structures. Reproducing group members raising families may have relied upon the help of altruistic agents. If non-reproducing individuals exhibit an overall advantageous benefit to their prospective groups through altruistic behaviors, how do they pass on their genes to future generations or how is it that altruism will survive into future generations?

W.D. Hamilton studied kinship selection, inclusive fitness and established this mathematical formula. Hamilton’s Rule is $rB > C$:

$r = \text{the genetic relatedness of the recipient to the actor, often defined as the probability that a gene picked randomly from each at the same locus is identical by descent.}$

$B = \text{the additional reproductive benefit gained by the recipient of the altruistic act,}$

$C = \text{the reproductive cost to the individual performing the act (Hamilton 1963; Hamilton 1964).}$

Hamilton established that an altruist will pass on their genes only if the recipient is a relative of the altruist; therefore, having an increased chance of carrying genes similar to their own and passing on the altruistic gene. A gene causing altruistic behavior towards brothers and sisters will be selected for only if the behavior and circumstances are that the gain is more than twice the loss. A half
brother it must be more than four times the loss and so on (Hamilton 1963; Hamilton 1964). Altruism undoubtedly may be an integral component to human survival. Families oftentimes need help with extended childcare and rearing of the young, and therefore human group success may have relied heavily on altruistic agents.

* Helpers in the nest* biologically indentifies juveniles and mature adults for any species or gender that remain in association with their parents and help them raise subsequent offspring. A great modern day of example of human helpers in the nest would be the Samoan *Fa’afafine* men (Vasey and VanderLaan 2010). The *Fa’afafine* are androphilic males who exhibited greater avuncular tendencies compared to heterosexual men. Most of the *Fa’afafine* are effeminate but they range from extremely effeminate to unremarkably masculine (Vasey and VanderLaan 2010). The *Fa’afafine* demonstrated function in their culture is “helpers in the nest” in caring for nieces and nephews and thus increasing their indirect fitness. The system that supports the *Fa’afafine* works under several cultural factors. The geographic small size of Samoa keeps kin geographically closer. Samoan families are usually quite large and often live together or in close dwellings. *Fa’afafine* are also more socially connected to their kin. The *Fa’afafine* have a high level of acceptance within their society and Samoan society in general. Samoan regard themselves as lucky to have a Fa’ afafine son because they help out numerous ways with the family (Vasey and VanderLaan 2010).
The Fa’afafine are predominately transgendered effeminate biologically male men who engage in same sex homosexual relationships; however, the Fa'afafine do not date other Fa’afafine, they date straight men or men that are defined as straight in their culture. The Fa’afafine insist that, “they do not have sex with gay men, they have sex with straight men” (Bartlett and Vasey 2006, p.660). These definitions can be hard to conceptualize under Western ideologies. To Western logic, two men engaging in same-sex relationship defines them as both being homosexual. The Samoan society tolerates straight men that often have wives and children, who engage in relationships with Fa’afafine men (Vasey and VanderLaan 2010). The Samoans, like many Native American cultures, claim that there is no such thing as gay or homosexual. The Fa’afafine are defined as a third gender, similar to how Native American Two Spirits have multiple genders (Roscoe 1998; Vasey and VanderLaan 2010). Many indigenous cultures express this more variable sense of sexuality, which is more akin to what we find in other species.

Sexuality in non-human species appears to function within group structure, survivability, and fitness (Roughgarden 2013). Sexual copulations occur among same sex and opposite sex partners, which can be related to kinship structures, alliances, and individual and group fitness. Sexual copulations among animals occur separately and in function from periods of reproductive matings (Roughgarden 2013).
CHAPTER 5: Sexuality Among Animals

Traditionally, the scientific and biological understanding of sex was for reproductive purposes; moreover, this is the primary biological function of the reproductive organs. Western ideologies have been influenced by religious concepts, which in turn has shaped scientific thought. Scientific reasoning therefore presupposed the natural order of things. Western reasoning demonstrated that there was a great chain of being in a hierarchal fashion. This great chain of being would range from god to angels to mankind then to the animal kingdom. Homosexuality was culturally and religiously interpreted as a deviation occurring in humans from god’s natural design. God was believed to have created a flawless nature. Fitting in with the chain of being, the animal kingdom was interpreted to demonstrate a pure template for god’s standard for sexuality and reproduction. Early western scientists interpreted the animal kingdom as representing only a binary system of sexuality in males and females where it was believed that sex only occurred for reproductive purposes. If homosexuality could not be explained scientifically or found in nature then it was a deviation of mankind and social culture. Regarding homosexuality as an oddity relegated it to be historically looked at through socio-cultural, sociological, and psychological lenses of reasoning that resulted in hundreds of years of misinterpretation, misunderstanding, and prejudice.
Despite Charles Darwin’s immense contributions to science and evolution with the understandings of natural selection, he still misinterpreted sexuality and contributed to the gross errors in Western logic. Darwin had a theological background and training because he was educated to become an Anglican Parson. This undoubtedly influenced Darwin’s sexual selection theory. According to Darwin, homosexuality was impossible because the purpose of mating is to transfer sperm with the intention of producing offspring and a homosexual mating can’t produce offspring (Roughgarden 2013). Historically if homosexuality was observed then it was believed that some error had occurred or that something in nature was out of place. This often attempted to be explained as too low or high of hormonal balances found in animals or not enough mates of the opposite sex (Roughgarden 2013). This logic also promoted ideas of homosexuality as contrary to evolution. Homosexuality was viewed as a problem and equated with non-breeding. Joan Roughgarden elaborates, that “non-breeding is an evolutionary problem, same-sex sexuality is not….. Mating is not the same as breeding” (2013, p.156).

There are countless examples of same-sex relationships within the animal kingdom. A recent survey for same-sex matings found 94 descriptions in bird species and over a hundred mammalian species that participated in same-sex behaviors and relationships (Roughgarden 2013). Geese (Anser anser) have been a well-known example of life-long pair bonding couples. Geese may live up to twenty years with pair bondings lasting over a decade. About 15% of these pair
bondings are male to male with bonds reported to have lasted over fifteen years (Huber and Martys 1993). Males have been reported to show grief after his partner dies, becoming despondent and defenseless just as between sex partners do when one dies. The male pairs sometimes join a female and the trio raises a family together (Huber and Martys 1993).

Swans (Cygnus atratas) also form stable male-male pairs that last for many years (Braithwaite 1981). Gay swans often raise offspring together, which is accomplished by a temporary female associate with the male pair, who mates with them and leaves her eggs with them (Braithwaite 1981). The male-male pair parents the eggs and are reportedly more successful than male-female parents. This has been suggested to be because male-male parents access better nesting sites and can defend territories better; additionally, the work load was distributed more equally than opposite sex parents. Gay male swans demonstrated a 80% success rate at fully fledging their young as opposed to 30% found in opposite sex parents (Braithwaite 1981). The pattern for same sex relationships in animals has lead to adaptive rearing strategies of the young, and inclusive fitness can also play a significant role.

Hamilton’s rules on kin selection and inclusive fitness were applied to asocial red squirrels (Tamiasciurus Hudsonicus). These red squirrels adopted kin, while orphans without nearby kin were never adopted (Gorrell et al. 2010). Such altruistic behavior could be favored if it was directed toward kin. Testing for Hamilton’s rule: (b) the benefits of the adopted juvenile, (r) the degree of
relatedness between the surrogate and the orphan and (c) the extended fitness cost of adding an extended juvenile to the litter. The results show a clear example of Hamilton’s Rules for kin selection that explains the persistence of altruism in a natural mammal population (Gorrell et al. 2010). Red Squirrels also demonstrate varying degrees of homosexual behavior and parenting strategies. Female Red Squirrels usually form a bond, with sexual and affectionate behaviors leading to joint parenting (Roughgarden 2013). The pair bonded females take turns mounting each other and they raise a litter together. Only one female is generally the biological mother of the liter, while both mothers take turns nursing the young. Only females form these pair bonds, male and female Red Squirrels don’t form pair bonds (Roughgarden 2013). Among male Red Squirrels approximately 18% of the mounts are homosexual (Roughgarden 2013).

Same-sex encounters have been observed in numerous primates and one of the best-documented same-sex relationships in the mammalian world comes from human beings’ closest relatives, the Bonobo Chimpanzee or Pygmy Chimpanzee (*Pan paniscus*). Bonobos have some distinct differences from the common chimpanzee (*Pan troglodytes*): Bonobos maintain a more vegetarian diet that the common chimp, and bonobos exhibit elevated sexuality. Bonobos demonstrate how a species can adapt sexuality and same-sex mating alliances to function within advantageous group fitness structures that promote efficient reproduction and survivability. In female bonobos a pink swelling around the genitals signals a readiness to mate. Female bonobos are receptive nearly
continuously, where female chimpanzees are receptive for only a few days in their cycle (De Waal 1995; Parish 1996). In bonobo male-female matings, one third take place face to face and the remaining two-thirds are front to back. In common Chimpanzees they are all front to back with the male mounting.

In female bonobo same sex encounters the paired females face each other. One female clings to the other with her arms and legs, who is then lifted off of the ground. The females rub their genital swelling from side to side (G. G. Rubbing), and have been observed grinning and squealing during orgasms (De Waal 1995; Parish 1996). Male bonobos have same sex encounters as well, where they position themselves rear to rear rubbing genitals against each other’s buttocks. Males also engage in another position referred to as penis fencing where two male hang face to face from a branch rubbing their erect penises (De Waal 1995; Parish 1996). Bonobos do not engage in anal intercourse but do have French kissing, oral sex, and engage in hand messages toward the genitals. Bonobos have developed a set of hand signals that tell each other what sexual activity that they are interested in. These signals are used in both same-sex and opposite-sex encounters (De Waal 1995; Parish 1996).

In bonobos, sexual encounters last about ten to fifteen minutes. Six commonly observed situations lead to sexual activities: (1) Sex facilitates sharing. When food is introduced in captivity or found in the wild, before eating bonobos invite each other to have sex. Females invite males, females invite females, and males invite females. After sex the meal commences. (2) Sex is used as
reconciliation over a dispute, such as claim to something or a right of away. (3)

Sex helps integrate new arrivals into a group. When females migrate to a new
group they establish relationships with the matriarchs through grooming and
frequent GG rubbing. (4) Sex forms coalitions: females form bond through GG
rubbing and use coalitions against dominant males. In common chimpanzees,
males eat until full, then females are allowed a turn. In bonobos females eat
carefree and work together to chase off harassing males. (5) Sex can be used for
trade. In return for sex a female may take a bundle of branches, leaves, or
sugarcane from a male. (6) Lastly, sex is used for reproduction (De Waal 1995;
Parish 1996; Roughgarden 2013).

Female bonobos have formed a social system of relationships that allows
them to choose when to mate with a male for reproductive purposes and one
that makes them more reproductively successful. Females bond with unrelated
females controlling access to food. Females share food among themselves more
often than with males and form alliances where they attack and even injure
males. The females’ control over food lessens the threat of males and allows
females to reproduce at an earlier age compared to common chimpanzees. An
earlier age of first reproduction turns into a lifetime of higher reproductive
success (De Waal 1995; Parish 1996; Roughgarden 2013). For female bonobos it is
essential to participate in this social system of coalitions, alliances, and same-sex
relationships to survive and successfully reproduce. This affects individual and
overall group success as well as fitness.
Human beings exhibit a diverse and complex system of sexuality both genetically and culturally. This diverse system of sexuality may have functioned and been an integral part of early human groups’ fitness and adaptive structures. Joan Roughgarden who researched sexual diversity in numerous animal species concluded “…the more complex and sophisticated a social system is, the more likely it is to have homosexuality intermixed with heterosexuality” (2013, p.155). In the primate world a great deal of same-sex courtship and mounting occurs. Prosimians have what only appears to be incidental same-sex mounting with no evidence for a major social role for same-sex courtship. New World primates show some homosexual behavior. In Old World primates, which include apes, homosexual courtships and relationships become the most pronounced (Roughgarden 2013). The Old World primates also demonstrate the most complex and developed social structure of all of the primates (Roughgarden 2013). As noted before, the number one essence of survivability for any species is fertility. Fertility and hormones cannot take a break from periods when reproduction is optimal. Fertility and hormonal desires must be strong and continually prevalent; this is the only way in which they can function. Humans have slow to mature babies demonstrated by a longer periods of growth and development. These long periods of growth and development impact the efficiency and economics for child rearing (Small 1998; Small 2011). For individual humans and human groups it is not cost effective or sustainable to abundantly reproduce offspring at every opportunity. This resonates with
worldwide issues of over-population that stem from capitalistic structures, and western ideologies of abundantly reproducing.

In most species it has been noted that males tend to mate more abundantly while females are more selective in mating due to the economic costs of child rearing; however, humans have a developed social structure that oftentimes also implements the help from males in child rearing. All species have the need to act upon hormonal desires. This suggest that non-reproductive sex may have functioned in place of the advent of contraceptives (Roughgarden 2013). This sets up the cost of rearing young versus the benefits of homosexuality. Homosexuality combined with the aid in rearing the young, prevents the costs of over-breeding and satisfies sexual stimuli. Regarding Social Selection, Roughgarden explains,

“…animal species with distinct males and females interact socially to acquire opportunities for reproduction — that is through trade or other exchanges, they obtain access to resources that enable the production and survival of the young….Each animal has a time budget to allocate among between-sex and same-sex relationships. Together, these relationships further the expected number of offspring successfully placed in the next generation” (2013, p.175).

If early human groups established these same structures in between-sex and same-sex relationship that aided in group fitness, then there’s a good indication that origins of human sexual diversity would be formed early in human evolution and share a genetic background in all modern descendant populations.
CHAPTER 6: Multiple Genders

The subject of Multiple Genders is one of the most difficult concepts for individuals to grasp. This is due to a history of Western thought and education that hard-wires one’s understanding of a binary system of the sexes. Considering some species are completely hermaphroditic, most vertebrate species fall under a binary system of two sexes represented in males and females. Then how is it that species that have two sexes can have multiple genders? The confusion in the English language where the terms sex and gender are used synonymously. The term gender is more representative one’s role or status as opposed to their anatomical birth sex. Will Roscoe adds,

“Derived from the Latin Genus (kind, sort, class) gender is widely used today to distinguish socially constructed roles and cultural representations from biological sex. This particular use of gender, however, is fairly recent …This can be accomplished by recognizing sex as a category of bodies, and gender as a category of persons” (1998, p.123).

In animal species, multiple genders can refer not only to social roles but also sexual roles and reproductive roles. For humans, males or females who do not occupy traditional roles and status of their gender are said to occupy third and fourth genders. For example, one can be born male and develop interest in non-traditional societal roles assigned to their sex; this can be an interest in the roles of the opposite sex and often accompanied with an attraction to same-same relationships, or bi-sexuality (Roscoe 1998). This has been described as a third gender in both Native Americans and Samoans (Roscoe 1998; Vasey and
VanderLaan 2010). When we observe multiple genders within the animal species we see that they all function within a niche that creates balanced in-group enhanced reproductive success through access to resources, foraging. This stands to reason why indigenous cultures identified and supported multiple genders. A crow tribal leader stated, “We don’t waste people the way white society does. Every person has their gift” (Roscoe 1998, p.4).

One great example of multiple genders in an animal species is in the Side Blotched Lizard (*Uta stansburiana*) of the American Southwest. The population turns over annually and has a high mortality rate. The Blotched Lizards have 5 genders, three male and two female (Sinervo et al. 1996; Roughgarden 2013): (1) Orange-throated males are controllers. They are ultra dominant and aggressive and have high testosterone. Orange-throated males defend areas large enough to overlap the home ranges of several females. (2) Blue-throated males are less aggressive and have less testosterone. Their territories usually are large enough to defend only one female. (3) Yellow-throated males don’t defend territories, they infiltrate the orange-throated males territories masquerading as females by mimicking female behavior. Yellow males then engage in sneak copulations within the Orange male’s territory. (4) Orange-throated females are very aggressive like the orange males and must distance themselves from one another. Their maximum density is 1.54 square meters per female. (5) Yellow-throated females are more tolerant of each other and can maintain a maximum density of one female per 0.8 meters (Sinervo et al. 1996; Roughgarden 2013).
Yellow-throated males imitate a female rejection display, which consists of a series of rapid head vibrations referred to as buzzing. Yellow-males will extend their throat, raise an arched back and nip at the tail of a dominant Orange-throated male. This behavior mimics the exact post-receptive behavior performed by females and passes detection. The three male genders exist in a delicate balance of phenotypes described as a *Rock-Paper-Scissors* of genders (Sinervo et. al 1996; Roughgarden 2013). Orange-throated males defend and defeat Blue-throated males, yet they are deceived by Yellow-throated males. Blue-throated males on the other hand are not deceived by Yellow-throated males and can easily defeat them (Sinervo et. al 1996; Roughgarden 2013). The exact dynamics and fitness of all of the color morphs has not been entirely figured out. One theory suggests that the Orange-throated females who are more fertile are favorable in times when crowding is low and growth is at a premium. Yellow-throated females on the other hand work for group success when crowding is high and the lizard population can occupy region more densely (MacArthur 1962; Roughgarden 1971; Roughgarden 2013).

In fish species it is common to have multiple genders, especially in males. These genders tend to be associated with reproductive strategies. Some fish species even change their sex throughout their lifetime. The Bluegill Sunfish (*Leponis macrochirus*), and the European Wrasse (*Symphodus ocellatus*), both have three male genders and one female. The males in these species come in three male gender sizes: small, medium, and large (Gross 1982; Alonzo et al. 2000;
Roughgarden 2013). All males fertilize eggs produced by females. The smaller gender males are more abundant and less dominant. The larger ones are dominant and spend a great deal of time chasing off small males trying to fertilize eggs left by a courted female. The larger males in both species have developed an adaptive strategy whereby they form a courtship with a medium sized male. The medium sized male helps defend the breeding territory and is allowed to fertilize eggs with the courted female (Gross 1982; Alonzo et al. 2000; Roughgarden 2013). In the Bluegill Sunfish, the small and medium males are of the same phenotype and the smaller ones will mature into a medium gender if they live long enough. During courtship, the medium male who is smaller than the female is sandwiched between the large male and female where a stylized turning and rotating takes place among the three fish. During this turning the female releases eggs and both of the males fertilize them (Gross 1982; Roughgarden 2013).

A species of Cichlid (*Oreochromis mossambicus*) also has three male genders and one female. The dark colored dominant male forms a pit in the sand and mud to attract a female companion for courtship. To attract courtship the male engages in tilting, circling, signaling the nest, and quivering. The female will lay her eggs then inhales a mixture of eggs and spawn and the actual fertilization take place in her mouth. The female will then brood the eggs in her mouth over a period of three weeks, until the young have hatched and swim away (Stiassny 2001; Roughgarden 2013). The less dominant male gender is always trying to
sneak in to fertilize eggs. The dominant males use the same pit in the mud to attract a light colored third gender male, using the same courting rituals as with female. In over six hundred courtships observed, two hundred were male-to-male while the remaining four hundred were male-to-female. During the male-to-male courtship the light colored males place their mouth on the genital papillae of the dark males, spawn is released and light colored males moves his mouth in the same manner as the female does in courtship with the egg/spawn mix. During this male-to-male courtship other males do not intrude in with an attempt to fertilize as they do in male-to-female courtships (Stiassny 2001; Roughgarden 2013). Numerous species exhibit diverse sexuality and diverse gendered roles linked to adaptive structures for survivability and diverse human sexuality may have developed in a similar niche that couples sex roles and methods to increase reproductive success.
CHAPTER 7: Native American Two-Spirits

Many indigenous cultures do not have a construct for the terms of “gay” or “homosexual.” These terms are western constructs similar to the race concept, where artificial divisions have been created in human diversity. Like the ideology of race, these western terminologies toward sexuality have created labeling, stigmatization, and bigotry; Western cultures have a long history of suppressing and subverting sexual diversity on a global scale. The fact that many indigenous cultures lack terms for “gay” or “homosexual” is more reflexive of randomly occurring human sexual variation (Roscoe 1998; Roughgarden 2013).

In Western ideology, which establishes a binary system of female and male constructs, the idea of multiple genders is a complete anathema.

Sexuality is not as polarizing as terms like “gay” or “straight,” many human beings demonstrate a sexual orientation that is varying degrees of bisexuality. For many humans their sexuality is fluid, adaptable, and evolving; thus, the rigid confines of the terminology of “gay” or “straight” only strictly defines what a person may or may not be. Human sexuality occurs in many incremental gradations from the very heterosexual to very homosexual. Moreover, sexuality is varying, adaptable, malleable, and for many can change over the span of a lifetime. This is concurrent with Kinsey Scale findings that most human beings do not identify as being very straight or very gay, but most exist in gradations of bisexuality (Kinsey et al. 1948). Many indigenous cultures have the definitions of multiple genders within their respective cultures, which
ultimately is in-tune with the true nature of human sexuality by allowing for expression of the gradations of how human sexuality presents itself.

An estimated four hundred or more North American Tribes existed at the time of European contact. The diverse tribes were representative of their environmental adaptations, subsistence strategies, social and family structures, and religions (Roscoe 1998). Historical male Two-Spirits, or Berdaches, have been documented in over 155 tribes and about one third of these groups had formal status for females Two-Spirits roles (Roscoe 1998). The term berdache has a negative connotation and has been deemed politically incorrect; however Will Roscoe claims that is has been an accepted anthropological term regarding traditional gender roles despite its etymology (1998). Roscoe uses Berdache to refer to traditional and historic Native Americans while Two-Spirits refers to a modern Native American movement for gender diversity and homosexuality (1998). Etymologically, Berdache had an Indo-European root wela meaning to “strike or wound”, from which an old Iranian varta “seized prisoner” is derived. In Persia it referred to as a young captive slave. The word entered western European languages through contact with Muslims during the Crusades, and by the Renaissance period berdache variants in Italian, Spanish, and English had the meaning of a catamite, which is a younger boy kept for older partner in a homosexual relationship (Roscoe 1998).

The enormous clash of cultures that transpired upon European contact is apparent on all levels of reasoning from religious to ideological to social.
Epistemologically, Europeans believed that all humans followed a universal template of a binary system of the sexes and gender roles. Europeans viewing a Native male in female dress performing female roles and duties had no way to conceive or conceptualize the dynamics of Two-Spirit’s roles, therefore they could only rationalize them as berdache akin to a catamite or male prostitute (Roscoe 1998).

The Europeans’ reactions to Native American Two-Spirits was one of bewilderment, misunderstanding, scorn, ridicule, and often violence. This misunderstanding and mode of reasoning is exemplified in Edwin Denig’s account of Native genders. Denig was a fur trader who came up the Missouri River in 1833 to trade with Crow Natives in Montana over a period of thirty years. Denig wrote:

“Most civilized communities recognize but two genders, the masculine and feminine. But strange to say, these people have a neuter. Strange country this, where males assume the dress and perform the duties of female, while women turn men and mate with their own sex” (Roscoe 1998, p.3).

Unfortunately, not all reactions were one’s of bewilderment such as Denig’s. In the 1500s, Vasco Nunez Balboa encountered forty pathicos foemineo amictu (male homosexuals dressed as women) in Panama and he had them put to the dogs (Roscoe 1998). For many Two-Sprits it was in the natural inclination of their spirituality, psychology, and cultural background to be curious, outgoing, ambassadors, and mediators; unfortunately, it was not uncommon for Two-Spirits to make first contact with Europeans (Roscoe 1998). The historic record
shows that Two-Spirits were beaten, tortured, and often killed. During the periods of colonization and resettlement Natives were forced to adopt western ways and culture. This resulted in a loss of culture in histories, language, traditions, and dress. Two-Spirits were especially not allowed to continue on in the dress of the opposite sex, traditional or Western, nor could they pursue the traditional practices of Native Two-Spirits (Roscoe 1998).

Native American societies emphasized a knowledge and familiarity with the environment. They had intuitive forms of knowledge with ideals of balance, harmony and integration between humans and nature (Roscoe 1998). Two-Spirits were thought of having the embodiment of both sexes. Native Two-Spirit males were referred to as the third gender, while Native Two-Spirit females were referred to as the fourth gender. Natives believe that the combination of man and a woman is a symbol of unity. Two-Spirits were used as a unifying force that functioned as mediators between the sexes. Native Americans hold a confluence of beliefs where non-procreative sexuality and fertility, creativity and inspiration, and warfare and death are linked; whereby, these links are represented by third and fourth gendered persons (Roscoe 1998).

For most tribes Two-Spirits initially developed an interest in the roles and behaviors of the opposite sex usually in early childhood. Secondly, many tribes had a vision-complex where dreams were linked to spirituality that defined Two-Spirits. While the complexity and the nature of the dreams varied between tribes and even individuals, the vision complex was a transcendental experience
where a person would have contact with the spirit world. These dreams and mediums with the spiritual world would define their origin and roles as a multiple gendered persons. Third, a reported transformation or expression of a Two-Spirit took place during or right after puberty (Roscoe 1998).

Spirituality allowed the expression of Two-Spirits to function at a high social level. Many Two-Spirits held positions as spiritual leaders, shamans, medicine persons, teachers, counselors, mediators, and even chiefs. Two-Spirits had contact with the spiritual world and functioned as spiritual mediators, such that certain Native rituals, chants, and spiritual ceremonies could only be performed by Two-Spirits (Roscoe 1998). They were also highly skilled artisans and cooks who practiced bead working, sewing, and weaving. Gary Witherspoon describes the weaving practice as “creative synthesis,… bringing together elements of diverse characteristics into a single, balanced, and harmonious whole” (as cited in Roscoe 1998, p.64). This is not only a spiritual practice for many Two-Spirits but a contains a self-identifying metaphor; free from child rearing, they were full-time craft specialists. However, Two-Spirits did adopt children from time to time, and rarer still, some even parented them in hetero-relations (Roscoe 1998). Two-Spirits were also noted as having close relations with their families and avuncular traits. While it was common for many Two-Spirits to achieve economic success, they had an innate altruistic capacity and were noted as “do gooders” often giving back to many members of their community (Roscoe 1998).
Male Two-Spirits identify how they functioned within a niche in their respective groups economically and spiritually. Female Two-Spirits may have had their expression linked to group fitness as well. Female Two-Spirits formed relationships with non-Two-Spirit women. Every documented case of female Two-Spirit roles also had male Two-Spirit roles. Documented female Two-Spirits are concentrated among groups west of the Rockies (Roscoe 1998). These groups were hunter-gather and equalitarian, were the women found more autonomy. No known full-time horticultural tribes had female Two-Spirits (Roscoe 1998). This could suggest that roles of female Two-Spirits had greater group fitness in hunter-gather societies and that their roles are associated with group economy and subsistence patterns. When prehistoric Yumans began to adopt agriculture they developed a more sedentary lifestyle and marriage practices (Roscoe 1998). Hunting and gathering was a supplement to their diet but no longer primary. The socio-economic patterns had changed and during this time of transition multiple genders flourished (Roscoe 1998). This occurred during a period of gendered divisions of labor where gendered roles served as templates for the creation of new adaptive roles for Two-Spirited peoples (Roscoe 1998).

One of the best documented and famous Two-Spirits was Osh-Tisch, (Finds them, Kills them). Osh-Tisch was a Crow male born around 1854 and he was well documented and interviewed in the early part of the 20th century. He preferred feminine dress, manners, work, and customs. Osh-Tisch was known as an artist, medicine person, and warrior. Retired General Hugh Scott, who served
as a member of the Board of Indian Commissioners had a chance to interview

Osh-Tisch in 1919 (Roscoe 1998).

Scott asked Osh-Tisch a series of questions:

Scott asked Osh-Tisch why she wore women’s clothes
“Our road” she replied
How long had she acted as a woman?
Since birth, she “inclined to be a woman, never a man”
Had anyone, a medicine person, perhaps, told her to become a berdache?
“No”
Did you ever dream about it?
“No”
Did any spirit ever tell you to do it?
“No! Didn’t I tell you that it’s my road? I have done it since I could remember because I wanted to……”
Again Scott asked if a spirit or vision directed individual to become berdache?
“No, it was just natural, they were born that way” (Roscoe 1998, p.27-28)

There are some very interesting revelations from Osh-Tisch responses. Roscoe points out that Osh-Tisch was carefully evading questions in the areas of sexuality and religion, because Crow life had been subject to ongoing interference from representatives from the U.S. government since the 1880s (1998). Osh-Tisch represents a bi-cultural explanation on his account while avoiding the subject of sexuality or religion. For Native Americans their spirituality and origins are harmonious with nature. For Osh-Tisch to explain that Berdaches’ proclivity was “born with” and “just natural” is a way of explaining something to western inquiries and rendering it natural-normal. This could be the early formation of a genetic based argument that could be cross-culturally explained.
The Native American history has been classified into four phases: symbiosis, conflict, the reservation period, and reemergence and revitalization (Roscoe 1998). Through the revitalization and modern movement we see that countless Natives are coming out to express their sexual diversity. This has not been destroyed by hundreds of years of western cultural subversion and indoctrination. Roscoe states that “specific historical developments create opportunities for individuals to construct and practice such roles and identities” (1998). In researching worldwide historical gender diversity, Roscoe determined three areas of similarity: (1) Economic specialization: In North America in hunter-gatherer and horticultural societies this took the form of craft specialization, especially for male Two-Spirits. (2) Non-production: In the realm of services such as healing, religious performances, and shamanism. (3) Gender difference and homosexuality (1998). These world-wide patterns for gender diversity elucidate notions that homosexuality may have similar biological and genetic origins for human groups.

Native American Two-Spirits offer a great example how human groups used diverse human sexuality within group fitness structures. The roles held by Two-Spirits contain a cross-cultural worldwide pattern for male homosexuality, historically and presently. Each human culture would interpret and represent gender diversity by their own expressions; this universal patterning suggests that origins of human sexual diversity took place prior to separate cultural differentiation. The answers to human sexual diversity and homosexuality may
have to come from biology and our DNA, which would demonstrate that sexual diversity was among some of early humans’ essential and primary adaptations.
CHAPTER 8: Sexual Theory

Queer theory formulated its ideas from a post-structuralist theory and deconstruction. Queer theory essentially challenged the straight-normative ideology. Deconstruction identifies how binaries (males and females) form hierarchies, which develop unstable relationships and imbalances (Jagose 1996). Within this dichotomy there must exist a mediator between the two in order to bridge the gap between the sexes (Jagose 1996; Roscoe 1998). This explains the roles and existence of homosexuality or multiple genders (Roscoe 1998). The theoretical principals in Queer Theory support the underlying ideas regarding the function of homosexuality in human evolution. Historically and presently, this has been demonstrated in how multiple gendered individuals ubiquitously hold roles of mediators and counselors. Homosexuality’s niche may have been filling a void by providing roles not found in the dichotomy of typical binary structures of male and female. What is needed is scientific data and research to substantiate the theory. Human sexuality is located through a vast array of alleles networking at several different loci. There is no specific gay gene or straight gene that encompasses all of one’s sexual traits. However, genetics can identify markers that predominately predispose toward the homosexual end of the spectrum.
CHAPTER 9: Homosexuality in Biology

Genetic advances within the last 15 years are piecing together the mechanisms and inheritance for male homosexuality. Much of this inheritance relates to patterning *in utero* upon the fetus along with an array of autosomal and sex linked genetic markers, which have been correlated with neurological and physical traits (Mustanski et al. 2005; Rahman 2005; Rahman et al. 2008). Family and twin studies have provided significant evidence to support a genetic component to male sexual orientation. They have been able to document the elevation in the rate of homosexuality among relatives of homosexual probands (Bailey and Pillard 1995). Several studies also demonstrate maternal transmission of male homosexuality (Hamer et al. 1993; Camperio-Ciani et al. 2004; Rahman et al. 2008).

The Sexually Antagonist Hypothesis for Male Homosexuality has demonstrated that the females in families with homosexual members also have increased rates of fecundity (Blanchard and Klassen 1997; Camperio-Ciani, Corna, and Capiluppi 2004; Rahman et al. 2008). Potentially playing a role in the Sexually Antagonist Hypothesis is the Fertile Female Hypothesis, where feminizing alleles increase reproductive rates in females who posses them by having increased sexual contacts and increased feminine physical attributes/attractiveness (Hamer and Copeland 1994). These feminizing alleles are also believed to produce sexual attraction towards males; however, if
inherited by males they are predisposed toward homosexuality (Hamer and Copeland 1994).

The effect of homosexual males having older brothers is also referred to as the Fraternal Birth Order effect (FBO). Research has estimated the odds of a male being homosexual increase by 33% with each older brother, while their statistical models approximated that 1 in 7 homosexual male’s sexual orientation is correlated with the FBO effect (Cantor et al. 2002). The FBO effect is potentially explained by the progressive immunization that some mothers develop to male-linked antigens. The maternal immune system identifies non-self male hormones and produces antibodies to the male antigens. These maternal antibodies will increase with each succeeding male pregnancy. The antigens involved are believed to be the Y-linked minor histocompatibility antigens H-Y. Accumulating maternal H-Y antibodies are believed to alter the typical male differentiation of fetus’ brain and ultimately leading to male homosexuality (Blanchard and Klassen 1997; Camperio-Ciani et al. 2004; Rahman 2005; Rahman et al. 2008). To support this a research group immunized female mice with H-Y antibodies. The male mice born to these immunized mothers demonstrated reduced consummatory behaviors toward receptive females (Singh and Verma 1987).

Neurological differences between heterosexual men’s brains and homosexual men’s brain were documented in the early 1990s. The third interstitial nuclei of the human hypothalamus (INAH3), which is significantly smaller in females, is also reported to be smaller in homosexual males (LeVay
INAH3 was reported to occupy a smaller volume in homosexual men than in heterosexual men, with no significant difference in the number of neurons within the nucleus (Byne et al. 2001; Mustanski et al. 2005). The hypothalamus has several functions, including hormone release and olfactory stimuli including pheromones.

A genome wide scan using 456 individuals was able to map several genetic markers related to male homosexuality and identify what these specific markers regulate (Mustanski et al. 2005). Male sexual orientation yielded three peaks with mlod score greater than 1.8 which were located on chromosomes 7, 8 and 10 (Mustanski et al. 2005). LOD stands for logarithm of the odds and a LOD score is a statistical estimate of whether two loci are likely to lie near each other on a chromosome and are therefore likely to be inherited together as a package. MLOD is a program to calculate the LOD score maximized over the five-dimensional parameter space (four genetic model parameters and a recombination fraction parameter) for the data of nuclear families.

The strongest finding was on 7q36 with a combined mlod score of 3.45 with equal contribution from paternal and maternal transmission (Mustanski et al. 2005). This region of chromosome 7 maps to Vasoactive intestinal peptide (VIP) receptor type 2 (VIPR2), which is a G-protein- coupled receptor that activates an adenylyl cyclase in response to VIP and functions as a neurotransmitter and neuroendocrine hormone (Mustanski et al. 2005). VIPR2 has been demonstrated to be essential to the development of the hypothalamus.
nucleus in mice (Mustanski et al. 2005). The region identified on chromosome 8 maps to the 8p12 region, and this region has been believed to be part of the relationship between prenatal hormones and sexual orientation (Mustanski et al. 2005). One hormone is the Steroidogenic acute regulatory protein (STAR) and is involved in hypothalamic-pituitary regulation of adrenal steroid production, this has an essential role in sexual development. Another hormone is Gonadotropin releasing hormone 1 (GNRH1). GNRH1 is regulating hormone for steroidogenesis in the gonads. GNRH1 is synthesized in the arcuate nucleus and other nuclei of the hypothalamus (Mustanski et al. 2005).

Neuropsychological studies demonstrate the differences among the sexes in performance related tasks. Additionally, early childhood gender related traits appear to be correlated with adult sexual orientation (Bailey et al. 1993; Bailey and Pillard 1995; Rahman and Wilson 2003; Mustanski et al. 2005). A great deal of research indicates that these gender behaviors and sexual orientation occur prenatally through exposure to hormones in utero (Camperio-Ciani et al. 2004; Mustanski et al. 2005; Rahman et al. 2008). Sexual dimorphism between the males and females is primarily due to hormones associated with the sexes (i.e. estrogen and testosterone). Growth hormones contribute to size and morphology throughout childhood and adolescence and these hormone levels in utero can alter the typical course associated with the sexes in morphology and sexual orientation (Rahman 2005; Rahman et al. 2008). Sexual orientation in males tends to be more of a dichotomous trait showing less individuals in realms of
bisexuality (Rahman 2005). This dichotomy is thought to be due to the maternal hormone levels in utero, which produce differentiations in sexual orientation.

The ratio of the second and fourth finger lengths (2D:4D ratio) is one of the best examples of prenatal hormone exposure (Manning et al. 1998; Manning et al. 2003). The Hox gene family regulates limb and genital development. Studies have identified that hormones including testosterone and androgen play a role in limb length development (Manning et al. 1998; Manning et al. 2003). Men predominately express low ratios between the 2D:4D finger lengths, while women on the other hand express higher ratios in the 2D:4D lengths. This 2D:4D ratio is believed to be established before two years of age; furthermore, prenatal concentrations of testosterone are believed to modify the development rate (Manning et al. 1998; Manning et al. 2003). The negative correlation between testosterone concentrations in men and their low 2D:4D ratio suggest that Hox genes control the development of the digits and the testes. High concentrations of fetal testosterone lead to low 2D:4D ratios and this relationship is particularly strong in the right hand (Manning et al. 1998; Manning et al. 2003). The response to prenatal testosterone is dependant upon the amount produced and the fetal sensitivity to testosterone. Variation in a X linked androgen receptor gene (AR) determines the sensitivity to testosterone (Manning et al. 2003). Studies have shown that homosexual men exhibit a more feminine like 2D:4D ratios (McFadden and Shubel 2002; Lippa 2003). Additional studies identified homosexual women have significantly lower masculine like 2D:4D ratios, while
these appear to be hand specific (Rahman and Wilson 2003). Science has yet to observe a consistent pattern in all research, and some have even demonstrated a hyper-masculinized hand in 2D:4D ratios among homosexual men (Rahman and Wilson 2003). These varying results could be due to the amount of testosterone present in utero and the presence of the androgen receptor gene. The varying levels of testosterone in utero and presence or non-presence of the X-linked AR gene could explain the variation in homosexual men in having more feminized 2D:4D ratios versus a more masculine ratio. These results are also consistent with the understanding the human sexual orientation is multi-allelic and may function in addition to maternal hormones in utero; moreover, each individual homosexual male will their own specific inheritance of genetic markers and varying levels of maternal hormones in utero.

The level of maternal hormones in utero is a readily identifiable pattern that can be correlated with sexual orientation, leading to a significant number of studies to better understand it. For example, study demonstrated that in a large community sample that homosexual men had less long bone growth in the arms, legs and hands compared to heterosexual men (Martin and Nguyen 2004). Interestingly, a reverse pattern was found in homosexual women who had longer limb bone growth in the arms, legs and hand as opposed to heterosexual women (Martin and Nguyen 2004). These bones are sexually dimorphic in childhood and not after puberty. This research indicates that homosexual men are partially feminized while homosexual women are partially masculinized.
before the pubertal increase in sex steroid levels (Martin and Nguyen 2004). This lends increased support that these hormonal levels are compromised in utero that can contribute to homosexual orientation.

Oto-Acoustic Emissions OAEs are tiny sounds emitted by the cochlea that can be evoked by clicking sounds or can occur spontaneously. OAEs are more numerous in females than in males. Research observed that OAEs are influenced by prenatal androgen. Female twins having a male co-twin have masculinized OAE patterns (McFadden 1993). Additional studies have identified weaker OAEs and less frequent OAEs in homosexual and bisexual women compared to heterosexual women. On the other hand, homosexual men and heterosexual men have no observable significant variation (McFadden and Pasanen 1998; McFadden and Pasanen 1999).

In 1993, Dean Hammer and Angela Pattatucci published a paper that demonstrated that gayness in males is maternally inherited and linked on the X chromosome (Hamer et al. 1993). The allele Xq28, located on the tip of the long arm of the X chromosome would eventually become referred to as the HP gene. Their research also indentified that gay men generally cluster in families such that a brother of a gay man had about a 13.5% chance of being gay, compared to a brother of a straight man with a 2% chance of being gay. Also maternal uncles and sons of maternal aunts of a gay man had a 7.5% chance of being gay as opposed to the probability of a straight male having a gay aunt or uncle remaining at 2% (Hamer et al. 1993). Thirty three pairs of gay brothers out of
forty were reported to share the Xq28 allele (Hamer et al. 1993). This landmark article came under some scrutiny and criticism due to sensationalism labeled their findings as “discovering the gay gene.” The findings of their research never attempted to promote the idea that had found an all-inclusive gene patternning for male homosexuality. The seven paired gay brothers out of the forty did not have the Xq28 allele, demonstrate that it is not all inclusive and that there is potentially a suite of alleles that code for homosexuality. The maternally inherited Xq28 allele may be one of the stronger mechanism in which homosexuality functions and is inherited. The Sexually Antagonistic Hypothesis for male homosexuality that increases maternal fecundity at the compromise of an antigen to the male hormone, may function in tandem with the inheritance of the Xq28 allele. Camperio-Cani et al. suggested that polygenic X-linked alleles were beneficial to female fecundity while compromising male fecundity (2004). More recently Sanders et al. detected a genome wide linkage to percentromeric chromosome 8 with multipoint support and replicated linkage to the Xq28 locus (2015).

To date the majority of the research testing for the SNPs on Xq28 and chromosome 8 have used populations with European ancestry, including Sanders et al. (2015) with 97.9% European ancestry among participants. The Xq28 linkage is relevant the sexually antagonistic hypothesis, and how Xq28 may be working tandem with chromosome 8 to sexually differentiate individuals towards homosexuality (Sanders et al. 2015). We proposes to test for the SNP
genetic markers found in Xq28 and the linked pericentromeric chromosome 8 among Native American male homosexual populations. These will be compared with those results found in Sanders et al (2015) as a control group.

The monumental significance in testing other populations for the genetic markers Xq28 and linked pericentromeric chromosome 8 is to enhance the understanding of modality and mechanisms homosexuality permeated through the human genome. If Native American populations carry these SNPs it can be inferred that the mechanisms for homosexuality may operate on a broad base across potentially all human populations; furthermore, the source of homosexuality could have deep ancestral origins in human evolution. If Native American populations do not carry the same SNPs, equal significance can be assumed. Under this outcome we would ultimately understand that mechanisms for homosexuality among populations are guided under their own unique and separate evolutionary histories. This would demonstrate that homosexuality would overall have a selectively advantageous proclivity manifesting in independent environments and populations.

Science is at pivotal moment in history where genetics is allowing us to understand the nature and role of human sexuality. This has monumental implications for biology, and for social, cultural, and political realms of human existence. Hetro-normative pressures have worked to suppress perceived non-reproducing entities. Demonstrating that homosexuality has a biological determination for development that is linked to fertility and survivability will
essentially turn the tables on human culture’s historical interpretations of homosexuality.
CHAPTER 10: Methods

Ethics Statement

This research was approved by the University of Montana Institutional Review Board Committee, IRB Protocol number 45-16. Informed written consent was obtained from all participants.

Participants

Data was collected from June 2016 through May 2017. Participants were of self-identified Native American ancestry who were born male and 18 years of age and older. Participants were from regions all over the United States, Canada, and one from Mexico. Individuals were recruited through networking with Native American groups and Native American Two Spirit groups. A networking sampling procedure was used where initial participants gave referrals to prospective interested parties. Participants were also recruited through social media and the Internet to take part in the questionnaire via an online IRB approved questionnaire format. Online recruitment was conducted through Facebook social media site networking with friends of established contacts and through several Native American Two Spirit pages/sites via Facebook. Additional contacts and networking was conducted through standard University of Montana student e-mail system. All participants were interviewed in English and or took the standard questionnaire in English.
Procedures and Measures

The questionnaire was developed through the advice and correspondence with Paul Vasey and was modeled after similar studies with the Samoan Faafafine (Bartlett and Vasey 2006; Vasey and VanderLaan 2010; VanderLaan and Vasey 2011; VanderLaan et al. 2012; VanderLaan et al. 2013). The questionnaire included questions concerning numbers of children produced by categories of kin (i.e. paternal and maternal grandmothers, uncles and aunts) and the number of each participant’s siblings that included their birth order. Additionally, participants were asked their sexual orientation using the Kinsey Scale and additional questions regarding childhood typical versus atypical behaviors for male and female roles (Kinsey et al. 1948). The individual questions are outlined below and the questionnaire is included in Appendix A.

Participants included 40 straight males (gynephilic) and 45 homosexual (androphilic) males. In order to assess their sexual orientation, the Kinsey Scale was employed as a measure of sexual attraction toward members of the same or opposite sex (Kinsey et al. 1948). Participants were asked the following question: “Which of the following best describes your sexual feelings during the last year?” Participants then selected from one of the following seven responses:

• “sexual feelings only toward females” (Kinsey rating = 0)
• “most sexual feelings toward females but occasional fantasy about males” (Kinsey rating = 1)
• “most sexual feelings toward females but some definite fantasy about males (Kinsey rating = 2)
• “sexual feelings equally divided between males and females with no strong preference for one or the other” (Kinsey rating = 3)
• “most sexual feelings toward males, but some definite fantasy about females” (Kinsey rating = 4)
• “most sexual feelings toward males, but occasional fantasy about females” (Kinsey rating = 5)
• “sexual feelings only toward males” (Kinsey rating = 6) (Kinsey et al. 1948; VanderLaan et al. 2012).

Kinsey ratings obtained from 40 gynephilic Native Males regarding their sexual feelings over the previous year. 23 (58%) participants described their sexual feelings only toward females (Kinsey rating = 0). 12 (30%) participants reported most sexual feelings toward females but occasional fantasy about males (Kinsey rating = 1). 5 participants (12%) reported most sexual feelings toward females but some definite fantasy about males (Kinsey rating = 2).

Kinsey rating obtained from 45 androphilic Native Males regarding their sexual feelings over the previous year. 32 (71%) participants reported sexual feelings only toward males (Kinsey rating = 6). 11 (24%) participants reported most sexual feelings toward males, but occasional fantasy about females (Kinsey rating 5). 1 (.02%) participant reported most sexual feelings toward males, but some definite fantasy about females (Kinsey rating = 4). 1 (.02%) participant
reported sexual feelings equally divided between males and female with no strong preference for one or the other (Kinsey rating = 3).

In order to access fertility among relatives of gynephilic males and androphilic males, participants were asked to report the number of children born to their grandmothers and each of their aunts and uncles for the maternal and paternal side of their families (adopted or step family were not to be included). From this data, for each participant I calculated the mean number of children produced by their paternal grandmothers, paternal uncles, paternal aunts, maternal grandmothers, maternal uncles and maternal aunts (VanderLaan et al. 2012).

Participants were asked a question regarding their birth order, to determine if male androphilia is correlated with later birth order and older male siblings. Specifically, participants were asked to list all of the children their mothers gave birth to from first to last-born. Participants were asked to indicate whether each sibling was male or female as well as indicate their own birth order (VanderLaan and Vasey 2011). Participant’s birth order was quantified using Slater’s Index (number of older siblings/total number of siblings), this metric expresses birth order as a value between 0 (first born) and 1 (last born), and controls for family size (Slater 1958). Additionally, I used the Fraternal Index (number of older brothers/total number of brothers) and the Sororal Index (number of older sister/total number of sisters) to determine the ratio of older siblings for each individual (Jones and Blanchard 1998).
Participants were asked questions regarding their recalled female-typical and male-typical childhood behaviors. The Female-Typical Behavior and Male Typical Behavior Subscales of the Childhood Gender Identity Scale (CGIS) were used to determine the extent participants recalled engaging in female and male typical behaviors in childhood (Bartlett and Vasey 2006). The wording for the term “behaviors” was substituted in the questionnaire for the term “roles.” This was upon the advice of Native American Two Spirits who described that culturally they regard these “behaviors” as taking on the “roles” of the opposite gender. This change was made prior administrating the questionnaires.

Participants were asked how often they engaged in the following five male-typical roles in childhood: (1) playing with males; (2) playing with male toys and games; (3) taking the male role in pretend play such as when playing house or when imitating male characters; (4) playing rough games and sports and (5) doing male roles. Participants were asked how often they engaged in the following six female typical roles in childhood: (1) playing with females; (2) playing with female toys and female games; (3) taking the female role in pretend play such as when playing house or when imitating female characters; (4) putting on make-up, female accessories or female clothes; (5) Talking and acting like a female and (6) doing female roles. Responses were based on a 5-point Likert-type scale (1 = never, 2 = less than have of the time, 3 = half of the time, 4 = more than half of the time and 5 = always/every time) (Likert 1932).
CHAPTER 11: Results and Discussion

The majority of androphilic Native American respondents preferred the term “Two Spirit”; however, some Native American respondents preferred the usage of the term “gay” and did not identify with the Two Spirit identity. For the purposes of differentiating the two groups in the data analysis they will be referred to as “androphilic Native Males” and “gynephilic Native Males.”

The offspring production of maternal and paternal line grandmothers, uncles, and aunts in androphilic Native American Males versus gynephilic Native American Males probands were compared using independent t-tests. The birth order among biological siblings and birth sex was recorded for all probands and their siblings. Birth order, Slater’s Indices, Fraternal Indices, and Sororal Indices in androphilic Native American Males versus gynephilic Native American Males were compared using independent t-tests. Recalled childhood male behaviors and recalled female childhood behaviors in androphilic Native American Males versus gynephilic Native American Males were compared using independent t-test. Statistical analyses were made using SPSS version 23. SPSS analyzed all comparisons in order to determine statistical significance with a type I error rate of 0.05.

The Native American Males who participated in this study represent Kinsey Scale responses that represent 95% of androphilic males with a Kinsey Scale of 5 or 6 and 88% of gynephilic males with a Kinsey Scale score of 1 or 2.
Only 2% of the sample respondents demonstrated a more bi-sexual Kinsey Score of 3 or 4. The respondents Kinsey Scores are represented in Figure 1.

**Figure 1: Percentages of Kinsey Scale Responses**

<table>
<thead>
<tr>
<th>Kinsey Scale</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>58%</td>
</tr>
<tr>
<td>1</td>
<td>30%</td>
</tr>
<tr>
<td>2</td>
<td>12%</td>
</tr>
<tr>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td>5</td>
<td>24%</td>
</tr>
<tr>
<td>6</td>
<td>71%</td>
</tr>
</tbody>
</table>

**Gynephilic Native Males**  **Androphilic Native Males**

**Description:** This illustrates the percentages of gynephilic Native males with Kinsey responses were Kinsey Scale 0-2 and the percentages of androphilic males with Kinsey responses that were Kinsey Scale 3-6.

The fertility and offspring production for androphilic Native Males relatives demonstrated they have greater numbers of kin than gynephilic Native Males. Relatives of androphilic Native Males represented greater offspring means in maternal and paternal grandmothers, maternal uncles and aunts, paternal uncles and paternal aunts. Androphilic Native Males also had
significantly larger numbers of aunts and uncles on both the maternal and paternal sides compared to gynephilic Native Males. Comparing both groups’ means for maternal and paternal grandmothers’ offspring calculated statistical $p$ values $< 0.05$. A $p$ value less than 0.05 indicates that these two groups are statistically divergent and the null hypothesis of equality can be rejected (See Figure 2 and Table 1).

Comparing both group’s means for maternal uncles and maternal aunts, paternal uncles and paternal aunts calculated a $p$ value of $> 0.05$, indicating that there was no significant statistical variance in the means between both groups.
Figure 2: Number of Offspring of Grandmothers. Mean number of children born to Paternal and Maternal Grandmothers for both androphilic Native Males and gynephilic Native Males.
Table 1: Fertility Among Relatives

**Description:** Independent sample *t*-test results for fertility among relatives for androphilic Native Males and gynephilic Native Males.

**Legend:** *n* = sample sizes, *M* = means, *SD* = standard deviations, *t* = *t*-values, *df* = degrees of freedom and *p* = p-values.

Note: *n* for Maternal and paternal aunts and uncles was calculated by taking each proband’s total number of cousins divided by the total number of aunts or uncles on the maternal or paternal side.

<table>
<thead>
<tr>
<th></th>
<th><em>n</em></th>
<th><em>M</em></th>
<th><em>SD</em></th>
<th><em>n</em></th>
<th><em>M</em></th>
<th><em>SD</em></th>
<th><em>t</em></th>
<th><em>df</em></th>
<th><em>p</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal Grandmothers</td>
<td>45</td>
<td>5.53</td>
<td>2.625</td>
<td>40</td>
<td>4.48</td>
<td>2.088</td>
<td>2.067</td>
<td>82.03</td>
<td>.042</td>
</tr>
<tr>
<td>Paternal Grandmothers</td>
<td>45</td>
<td>5.62</td>
<td>3.228</td>
<td>40</td>
<td>4.38</td>
<td>1.835</td>
<td>2.153</td>
<td>83</td>
<td>.034</td>
</tr>
<tr>
<td>Maternal Aunts</td>
<td>43</td>
<td>3.83</td>
<td>1.884</td>
<td>38</td>
<td>2.97</td>
<td>1.529</td>
<td>1.049</td>
<td>79</td>
<td>.297</td>
</tr>
<tr>
<td>Maternal Uncles</td>
<td>39</td>
<td>2.98</td>
<td>1.94</td>
<td>31</td>
<td>1.45</td>
<td>1.45</td>
<td>1.479</td>
<td>67.7</td>
<td>.144</td>
</tr>
<tr>
<td>Paternal Aunts</td>
<td>43</td>
<td>2.78</td>
<td>1.47</td>
<td>35</td>
<td>2.29</td>
<td>1.28</td>
<td>1.546</td>
<td>75.6</td>
<td>.126</td>
</tr>
<tr>
<td>Paternal Uncles</td>
<td>39</td>
<td>2.43</td>
<td>1.925</td>
<td>35</td>
<td>2.33</td>
<td>1.81</td>
<td>.243</td>
<td>71.7</td>
<td>.809</td>
</tr>
</tbody>
</table>

Birth order among androphilic males relative to their biological siblings is one of the primary methods to test for the Fraternal Birth Order Effect. Predicted patterns should follow that androphilic males have significant number of older siblings and less younger siblings compared to gynephilic males. The analyzed data shows that androphilic Native Males follow this pattern (See Figure 3). Androphilic Native Males exhibited greater means in older brothers and older sisters compared to gynephilic Native Males. Androphilic Native Males also exhibited fewer young brothers than gynephilic Native Males but not younger
sisters. Androphilic Native Males also had significantly greater numbers of total siblings compared to gynephilic Native Males, indicated with a $p$-value $< 0.05$. This is also supports the Sexually Antagonistic Hypothesis where androphilic males maternal relatives demonstrated greater rates of fecundity (Camperio-Ciani et al. 2004; Iemmola and Ciani 2009; Rahman et al. 2008).

**Figure 3: Birth Order Means**

*Description: Compared means for total siblings, older brothers and sisters, and younger brothers and sisters for androphilic Native males and gynephilic native males*
To further test the birth order effect, three indices are used: Slater’s Index, Fraternal Index, and Sororal Index. Slater’s Index takes the total number of older siblings/the total number of siblings. This ratio can only be expressed from zero to one. For example if the proband is a first born offspring, their calculated Slater’s Index would be equal to 0; however, if the proband is a last born offspring, their calculated Slater’s Index would equal to 1 (Slater 1958). The Fraternal Index (total number of older brother/total number of brothers), and Sororal Index (total number of older sisters/total number of sisters), are analyzed the same as Slater’s Index in calculating a ratio from zero to one. The analyzed data shows that androphilic Native Males have higher calculated means in both Slater’s Indices and in Fraternal Indices compared to gynephilic Native Males. These results indicate that on average androphilic Native Males have greater numbers of older siblings and older brothers compared to gynephilic Native Males. Androphilic Native Males had more younger sisters compared to gynephilic Native Males thus the Sororal Indices means were higher for gynephilic Native Males.

For the areas analyzed: Older Brothers, Older Sisters, Younger Brothers, Younger Sister, Slater’s Index, Fraternal Index, and Sororal Index all had calculated compared means with p-values > 0.05, indicating that the two groups analyzed are not statistically different for any categories noted above (See Table 2). This indicates the two groups of androphilic Native Males and gynephilic Native Males are not very dissimilar in these areas, thus the null hypothesis of
equality cannot be rejected. This is most likely due to a high number of androphilic Native Male probands reported to be first-born. Of the 45 total androphilic Native Male probands 18 reported to be first-born with an additional 5 more were first-born males with older sister(s). This totals to 23 androphilic probands who were first-born males, which is 51% of the androphilic respondents. This is in contrast to other studies where androphilic males were significantly latter born and considerably less were first-born (VanderLaan and Vasey 2011; Camperio-Ciani, Corna, and Capiluppi 2004; Rahman et al. 2008; Iemmola and Ciani 2009). This could be explained as a sampling error in the relatively small sample size of 45 androphilic respondents, substantiating the need for more research to elucidate these findings. Additionally, these findings could indicate that androphilia for Native Americans is controlled by other autosomal loci not associated the Fraternal Birth Order Effect.

Native Americans often have large families. Unfortunately, this created a limitation to my research in that the larger a respondent family was, the less chance they had in recalling their numbers of kin and counting cousins. There were 25 respondents who attempted to complete the questionnaire and had to back out, the majority of them began reporting significantly large numbers of kin. Ultimately, the lack of large family data may have skewed the potential results of analysis especially when concerning the Slater’s, Fraternal, and Sororal Indices.
### Table 2: Birth Order

**Description:** Independent sample *t*-test results for birth order and total siblings for androphilic Native Males and gynephilic Native Males.

**Legend:** *n* = sample sizes, *M* = means, *SD* = standard deviations, *t* = *t*-values, *df* = degrees of freedom and *p* = *p*-values.

Lowered or compromised male hormones *in utero* can lead to reduction of the hypothalamus in the brain as well as a reduction of limb bone length in the arms, hands, and legs (LeVay 1991; Manning et al. 2003; Manning et al. 1998; Martin and Nguyen 2004; Mustanski et al. 2005). This reduction of male hormones *in utero* is also strongly correlated with male androphilia in adulthood (Camperio-Ciani, Corna, and Capiluppi 2004; Mustanski et al. 2005; Rahman et al. 2008). Early childhood gender related traits appear to be correlated with adult
sexual orientation (Bailey et al. 1993; Bailey and Pillard 1995; Rahman and Wilson 2003; Mustanski et al. 2005). Compromised male hormones \textit{in utero} not only are believed to be strongly associated with the occurrence and development of male androphilia but also are correlated with the development of childhood gender a-typical related behaviors (Bailey et al. 1993; Bailey and Pillard 1995; Rahman and Wilson 2003; Mustanski et al. 2005). One method to determine the potentiality of compromised male hormones \textit{in utero} is to determine whether androphilic males had a-typical male behaviors in childhood demonstrated in female behaviors.

The androphilic Native Males had much higher mean scores in Recalled Childhood Female Behaviors compared to gynephilic Native Males. The inverse was also true where androphilic Native Males had much lower mean scores in Recalled Childhood Male Behaviors compared to gynephilic Native Males. Both Recalled Childhood Male and Female Behaviors had \( p \)-values of <0.00 in all categories, indicating the two groups are very divergent (See Figure 4, Figure 5, Table 3, and Table 4).
Figure 4: Female Behaviors

**Description:** Recalled female behaviors means for each female behavior represented in androphilic Native Male’s responses versus gynephilic Native Male’s responses.
Description: Recalled male behaviors means for each male behavior represented in androphilic Native Male’s responses versus gynephilic Native Male’s responses.
### Table 3: Recalled Childhood Female Behaviors

**Description:** Independent Samples $t$-test for compared means for Recalled Female Behaviors in androphilic Native Males compared to gynephilic Native Males.

**Legend:** $n$ = sample sizes, $M$ = means, $SD$ = standard deviations, $t$ = $t$-values, $df$ = degrees of freedom and $p$ = $p$-values.

<table>
<thead>
<tr>
<th></th>
<th>Androphilic Native Males</th>
<th></th>
<th>Gynephilic Native Males</th>
<th></th>
<th>$t$</th>
<th>df</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Playing with Females</td>
<td>45</td>
<td>3.67</td>
<td>.929</td>
<td>40</td>
<td>2.13</td>
<td>.791</td>
<td>8.184</td>
</tr>
<tr>
<td>Female Toys and Games</td>
<td>45</td>
<td>2.87</td>
<td>1.236</td>
<td>40</td>
<td>1.73</td>
<td>.679</td>
<td>5.186</td>
</tr>
<tr>
<td>Female Pretend Play</td>
<td>45</td>
<td>2.87</td>
<td>1.440</td>
<td>40</td>
<td>1.28</td>
<td>.554</td>
<td>6.569</td>
</tr>
<tr>
<td>Clothes and Make-up</td>
<td>45</td>
<td>2.04</td>
<td>1.043</td>
<td>40</td>
<td>1.20</td>
<td>.516</td>
<td>4.636</td>
</tr>
<tr>
<td>Talking and Acting Like a Girl</td>
<td>45</td>
<td>2.28</td>
<td>1.160</td>
<td>40</td>
<td>1.225</td>
<td>.5305</td>
<td>5.323</td>
</tr>
<tr>
<td>Female Roles</td>
<td>45</td>
<td>2.73</td>
<td>1.421</td>
<td>40</td>
<td>1.75</td>
<td>.670</td>
<td>3.99</td>
</tr>
</tbody>
</table>
Table 4: Recalled Childhood Male Behaviors

Description: Independent Samples t-test for compared means for Recalled Male Behaviors in androphilic Native Males compared to gynephilic Native Males.

Legend: n = sample sizes, M = means, SD = standard deviations, t = t-values, df = degrees of freedom and p = p-values.

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Androphilic Native Males</th>
<th>Gyneophilic Native Males</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
</tr>
<tr>
<td>Playing with Males</td>
<td>45</td>
<td>2.98</td>
</tr>
<tr>
<td>Male Toys and Games</td>
<td>45</td>
<td>3.31</td>
</tr>
<tr>
<td>Male Pretend Play</td>
<td>45</td>
<td>3.11</td>
</tr>
<tr>
<td>Playing Rough Games</td>
<td>45</td>
<td>2.29</td>
</tr>
<tr>
<td>Doing Male Roles</td>
<td>45</td>
<td>3.13</td>
</tr>
</tbody>
</table>
CHAPTER 12: Conclusion

Overall the data upholds patterns that support the hypothesis that Native Americans maintain patterns found among other worldwide populations that supports the Sexually Antagonistic Hypothesis for Male Homosexuality. Androphilic Native Males maintain families with greater numbers of kin and offspring of relatives compared to gynephilic Native Male’s families. However, this was only demonstrated as statistically divergent between the two groups in the offspring of Paternal and Maternal Grandmothers. Androphilic male’s grandparents demonstrate significantly greater numbers of offspring than gynephilic males. The afore mentioned difficulty of probands’ abilities to recall large family data by might have created a limitation in separating the two groups in regards to the offspring of maternal and paternal uncles and aunts.

One limitation in the research was that ages of the probands were not recorded. Hypothetically, if androphilic male probands were of an older age group than gynephilic male probands they would have more numbers of kin due to relatives having more time to reproduce. This was an oversight I had not predicted otherwise age would have been polled. Approximately two-thirds of the probands were interviewed in person while the remaining third was required online to take part in the on-line questionnaire. The majority of probands that I can attest to did not have an age dichotomy between the two groups. Both androphilic and gynephilic Native Males had respondents of mixed ages.
In support of the Fraternal Birth Order Effect, Androphilic Native Males had greater means for older brothers and older sisters, despite 23 out of 45 (51%) total androphilic males had reported to be the first males born among their siblings. Androphilic Native Males also had significantly greater means for total siblings (4.52) compared to gynephilic Native Males (3.58) \( p - \) value 0.011. This data correlates with expectations in the Sexual Antagonistic Hypothesis that purports increased levels of fecundity among kin of androphilic males. The Maternal Immune Hypothesis maintains that certain mothers will undergo a progressive immunization toward the male hormone that results in significantly lowered male hormones \textit{in utero}. Compromised male hormones \textit{in utero} contribute to neurological, physical, and behavioral differences correlated with adult androphilia (Bailey et al. 1993; Bailey and Pillard 1995; Manning et al. 1998; Manning et al. 2003; Martin and Nguyen 2004; Rahman 2005; Mustanski et al. 2005). The Recalled Childhood Behaviors demonstrated that androphilic Native Males had significantly greater means in all female behaviors compared to gynephilic Native Males. Androphilic Native Males also maintained significantly less means for male behaviors compared to gynephilic Native Males. Both Recalled Childhood Male and Female Behaviors had \( p \)-values of <0.00 in all categories. The recalled childhood behaviors create a dichotomy between the androphilic and gynephilic Native Males that supports the Sexually Antagonistic Hypothesis; notwithstanding, that certain cultural and psychological process contribute to these behaviors as well.
Future research that would compare Native regional and tribal differences would be optimal; however, one of the current challenges is getting enough volunteers from each specific locale. The future research will need to increase sample sizes to help clarify the findings regarding the Fraternal Birth Order Effect, which may be skewed here due to a sampling error. This finding also helps elucidate that there is a mosaic of genetic markers that contribute to one’s sexuality. Some of these autosomal and sex linked markers may work in tandem with Sexual Antagonism while others may function through separate processes that contribute to male androphilia. Identified genetic markers leading to neurological and physical changes in males from compromised male hormones in utero should be sampled in tandem and correlated with the questionnaire on Sexual Antagonism in future research. A small portion of the androphilic males who participated in the questionnaire have volunteered to be part of the genetic study to test for SNPs identified with male homosexuality as demonstrated in Sanders et al. (2015). This genetic analysis will be run in the upcoming month and added to these findings.
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VanderLaan, Doug P, and Paul L Vasey

Vasey, Paul L, and Doug P VanderLaan
Appendix A: Questionnaire

Questionnaire for Analyzing Fertility and Sexuality Among Native American Males

Number of Relatives:

• How many children did your maternal grandmother (mother’s mother) have? _____

• How many children did your paternal grandmother (father’s mother) have? _____

• How many children did your maternal aunts (mother’s sisters) have? (Don’t include adopted or step-siblings)
  o Aunt #1: _____
  o Aunt #2: _____
  o Aunt #3: _____
  (If more, please add more lines)

• How many children did your paternal aunts (father’s sisters) have? (Don’t include adopted or step-siblings)
  o Aunt #1: _____
  o Aunt #2: _____
  o Aunt #3: _____
(If more, please add more lines)

• How many children did your maternal uncles (mother’s brothers) have?
  o Uncle #1:_____  
  o Uncle #2:_____  
  o Uncle #3:_____  
(If more, please add more lines)

• How many children did your paternal uncles (father’s brothers) have?
  o Uncle #1:_____  
  o Uncle #2:_____  
  o Uncle #3:_____  
(If more, please add more lines)
Birth Order:

List all of the children, oldest to youngest, your mother gave birth to. Include their birth sex. Which one are you? (Please don’t use real names, use “son” or “daughter”.)

{Example: 1\textsuperscript{st} male, 2\textsuperscript{nd} Female, Third male-Self and fourth female}
**Childhood Behavior:**

Please put a check in the box corresponding to the frequency that you remember for each of the following activities when you were a child:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Never</th>
<th>Less than half the time</th>
<th>Half of the time</th>
<th>More than half the time</th>
<th>Always/every time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Playing with females</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Playing with female toys and female games</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taking the female role in pretend play such as when playing house or when imitating female characters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Putting on make-up, female accessories or female clothes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talking and acting like a female</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doing female roles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Please put a check in the box corresponding to the frequency that you remember for each of the following activities when you were a child:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Never</th>
<th>Less than half of the time</th>
<th>Half of the time</th>
<th>More than half of the time</th>
<th>Always/Every Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Playing with males</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Playing with males toys and males games</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taking the male role in pretend play such as when playing house or when imitating male characters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Playing rough games and sports</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doing male roles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sexual Orientation Kinsey Scale:

Circle which of the following best describes your sexual feelings during the last year:

0. Sexual feelings only toward females.

1. Most sexual feelings toward females, but occasional fantasy about males.

2. Most sexual feelings toward females but some definite fantasy about males.

3. Sexual feelings equally divided between males and female with no strong preference for one or the other.

4. Most sexual feelings toward males, but some definite fantasy about females.

5. Most sexual feelings toward males, but occasional fantasy about females.

6. Sexual feeling only toward males.