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Sexual Orientation

If outside behavior matches inside morphology, then gay and lesbian people may have unique bodies. If string players have special brain parts for left-handed fingering, and race jockeys special genes for a short physique, then perhaps people of same-sex sexuality have special brain parts and/or genes for sexuality too. The search for biological aspects of sexual orientation often confuses sexuality with transgender expression.

GAY BRAINS

Remember the three rice-grains of nerve cells in the preoptic/hypothalamus area at the base of the brain? These grains, called SDN-POA, BSTc, and VIP-SCN, are sexually dimorphic in humans. VIP-SCN size seems to align with sexual orientation in males. I bet you're guessing that gay males have a female-sized VIP-SCN. Nope. Gay males have an even bigger VIP-SCN than straight males, which is in turn bigger than the VIP-SCN of females. So much for the belief that gay men have female brains![1] Specifically, straight males have about 2,500 cells, and females about 1,000 cells in this approximately 0.25 cubic millimeter cluster.[2] Gay males have a volume of VIP-SCN 1.7

times as large, and with 2.1 times as many cells, as that of straight males.[3]

Another possible difference between gay and straight men comes from an unconfirmed study of a fourth and rarely mentioned rice-grain, the tiniest of all—a cluster of cells in the hypothalamus called INAH3. In heterosexual men, this grain averages 0.1 cubic millimeters; in heterosexual women, 0.05 cubic millimeters; and in gay men, also 0.05 cubic millimeters. This tiny feature in gay male brains has been singled out as matching that in women.[4] Thus gay males are closer to females in this rice-grain (INAH3), but farther from females in the other (VIP-SCN).

The brains of lesbian women appear to differ from those of straight women. Recall that men produce fewer clicking sounds in their internal ears than women do (see chapter 12). Lesbian and bisexual women produce fewer clicking sounds in their ears than straight women do, but more than men do.[5] Thus lesbian and bisexual women are intermediate between straight women and men in this regard. Indeed, ear clicking can change in an adult as a result of taking hormones. A transgendered woman who began taking estrogen prior to her sex reassignment surgery developed the ear clicking. So ear clicking does not necessarily say anything about how brain structure is organized.[6]

All in all, variation in the many rice-grains of nerve cells shows that brains vary with sex, gender identity, and sexual orientation. Further analysis of brain states may reveal as many differences among people's brains as among people's faces.

GAY FAMILIES

Did Dad go fishing? Do you go fishing? Did Mom bake cookies? Do you bake cookies? Lots of traits run in families, like hobbies and styles of food preparation. Like hair color and eye color. Hobbies and cooking styles reflect shared environment; hair and eye color, shared genes. Being gay and lesbian runs in families too. Does shared sexual orientation in families reflect shared environment or shared genes, or both? The answer isn't clear. Here are some clues.

If a man is straight, there is a 4 percent his brother will be gay, the same percentage as in the general population. If a man is gay, the likelihood increases fivefold, to 22 percent. Whether a man is straight or gay has no statistical effect on whether his sister will be straight or lesbian.[7] These figures show that gay men cluster in families but do not say whether this stems from shared genes or a shared environment. Similarly, if a woman is lesbian, her sister is about twice as likely to be lesbian, but whether a woman is lesbian has a very small or undetectable statistical effect on whether her brother is gay or straight.[8] Gay men and lesbian women cluster independently.

Comparing identical and fraternal twins suggests some genetic component. In a 1991 study, 52 percent of identical male twins were both gay, while only 22 percent of fraternal twins were both gay.[9] In a 1993 study, 65 percent of identical male twins were both gay, and 29 percent of the fraternal twins were both gay.[10] Similarly, a 1993 study reported that 48 percent of identical female twins were both lesbian, and only 6 percent of fraternal twins were both lesbian.[11]

The studies just cited come from the United States. A 1992 British study, which looked at males and females together, found that 25 percent of identical twins were both homosexual, but only 2.5 percent of fraternal twins were homosexual.[12] A 1995 Australian study used a different method.[13] Instead of inviting twins to participate by placing advertisements in magazines and other sources likely to be seen by gay readers, the study used a preexisting list of twins. Based on a strict definition of whether twins could be scored as both being gay, the investigators reported that 20 percent of the identical male twins were both gay, 0 percent of the fraternal male twins were both gay, 24 percent of the identical female twins were both lesbian, and 11 percent of the fraternal female twins were both lesbian.

The studies repeatedly show that identical twins are at least twice as likely both to be homosexual as fraternal twins. The chance that identical twins will both be gay ranges from about 25 percent to 50 percent, depending on the study, and is decidedly less than 100 percent. Thus, even though a genetic component may be present, other, presumably environmental factors account for 50 to 75 percent of the story.

Although comparisons between identical and fraternal twins suggest a genetic component in homosexuality, the possibility remains that identical twins are raised more similarly to one another than fraternal twins are, and that identical twins associate more closely and encounter more

similar experiences while they are growing up than fraternal twins do. Further investigation of a genetic component should look at data from identical twins raised apart, because these data will show the effects of shared genes in the absence of a common environment.

A 1986 study located six pairs of identical twins who were raised apart and had at least one member who was gay or lesbian. In all four female instances, one member was lesbian and the other straight. In one of the male instances, both members were gay—in fact, they didn't know of each other's existence until they happened to meet in a gay bar where people had been mistaking them for each other. In the other instance of identical male twins raised apart, one member was bisexual until age nineteen and then became exclusively gay, whereas the other was homosexual between ages fifteen and eighteen, then later married and regarded himself as straight. In this instance, both members exhibited at least partial same-sex sexual orientation.[14] Thus the data on sexual orientation in twins reared apart are perhaps suggestive of a possible genetic component for gay male sexuality, but much less so for lesbian sexuality.

Nonetheless, an important contrary fact remains. The 1991 study mentioned above also showed that an adopted brother of a gay man is twice as likely to be gay (11 percent) as an adopted brother of a straight man (5 percent). So unless the adoptive parents are somehow selecting babies likely to become gay, something about the environment into which the adopted child is placed is contributing to sexual orientation as much as any genes are.[15]

Substantial evidence points to both genetic and environmental components in the development of same-sex sexuality. No one who pushes one factor to the exclusion of the other can be correct.

THE HAMER-PATTATUCCI STUDY AND THE QUESTION OF A GAY GENE

A milestone in the genetic analysis of gayness in males came in 1993 with the publication of a paper in the respected magazine *Science* by a team including a senior out gay scientist, Dean Hamer, and a young out lesbian scientist, Angela Pattatucci.[16] This work (hereafter referred to as HP) has since become quite controversial and must be considered carefully.

The paper confirmed yet again the tendency for gay men to cluster in families. The brother of a gay man had a 13.5 percent of being gay, whereas the brother of a straight man had only the baseline chance of being gay, which in this study was estimated at about 2 percent.

The researchers' distribution of men into the categories of straight and gay was claimed to be nearly absolute—bisexuals were almost completely absent. HP concluded that "it was appropriate to treat sexual orientation as a dimorphic rather than as a continuously variable trait." Although some other studies also report such a bimodal distribution (e.g., the 1986 and 1991 studies mentioned above), this claim has been seriously disputed.[17] In most cultures, same-sex sexuality is intermixed with between-sex sexuality. One anthropological study tabulates same-sex sexual practices from twenty-one cultures, and in fifteen of these homosexual practice was concurrent with heterosexual practice.[18]

The sorting into distinct categories is partly an artifact of present-day social pressures within the gay and straight communities. HP's subjects were self-acknowledged homosexual men recruited through outpatient HIV clinics in the Washington, D.C., area, and through local homophile organizations. The participants were 92 percent white non-Hispanic, 4 percent African American, and 1 percent Asian, with an average educational level of 3.5 years beyond high school and an average age of thirty-nine years. Among the gays, 90 percent said they were nearly exclusively homosexual, and 90 percent of the straight men said they were nearly exclusively straight, giving the impression of a clear-cut bimodality. On reflection, though, bimodality emerges in such a sample as a result of social pressure and isn't necessarily representative of the human population. A contemporary gay man can't admit to being sexually interested in a woman any more than a present-day straight man can admit to being sexually interested in a man. The organizations and magazines that offer safe space for those who insist on a bisexual identity were not solicited.

The response of the investigators to this criticism has been evasive. Hamer states, "I didn't tell these men to answer 0 or 6 [on a scale between heterosexual to homosexual], it's just that almost all of them did. Am I supposed to pretend the trait is continuous?" He continues, "Well, how many truly bisexual men have you ever met? I have no theoretic argument with bisexuality. It's just that before I started doing research, I'd

never met any. Of the men we've interviewed, most identify themselves as either gay or straight. A handful identified themselves as bisexual, and we did not include them . . . for simplicity. But of the few who said—even insisted—they were bisexual and made their case with the fact that they were also sleeping with women, it would become clear with most of them after just a couple of casual questions that they were really only attracted to men but were in the process of coming out. . . . Besides, as a geneticist, to be blunt about it, I don't really give a damn what label anyone uses, or even what they do, or with whom. I care about what they feel inside."[19]

Pattatucci too is skeptical that bisexuals exist: "The most illuminating experience for me has been discovering that the way we ask the questions reveals what sexual orientation truly is. . . . I would often preface the central question by saying 'I want to know what's in your interior. . . do you feel that who you are now, your homosexual orientation, has always been part of you, part of who you are . . . even though your sexual behavior might have been with members of the opposite sex?'. . . It actually is fairly rare, even when I talk to people who identify as bisexuals, that they say their interior, true sexual orientations have changed. Their behavior may have changed, but their homosexual core has always been there. That's the important thing. The behavior is irrelevant compared to the core."[20]

These quotes show that homosexuality was defined in the study as a form of self-identity, irrespective of sexual practice. One wonders, though, whether any hypothetical gene for homosexuality would pertain more to perceived identity than to practice. Homosexual practice has existed throughout the evolutionary history of our species, whereas the assertion of homosexuality as an identity is located in our particular culture. Mischaracterizing the phenotype can render subsequent genetic analysis meaningless.

Pattatucci is selective about who counts as lesbian: "A relatively small number of women will say in the interview, 'I'm not a lesbian, I just fell in love with this one woman' and it's apparent that their feelings are . . . basically heterosexual. They perceive themselves as having had a serendipitous experience. They fell in love and committed to this particular woman, and sex became part of the relationship." Pattatucci excludes these women from the study because "you'd better narrow your field as much as you can. The best place to look is at people who show the greatest amount of expression." Another group Pattatucci excludes are "women who identify themselves as lesbian for political and ideological reasons with little or no evidence of a romantic or sexual attraction to women. . . . Am I sympathetic to those goals on a purely political level? I absolutely am. I'm a woman, and I'm a lesbian. But . . . I'm researching a scientific question, not a political one."[21]

This selection of subjects forces a bimodality between lesbian and straight by throwing away the data for people who would score in between. Scientifically, picking and choosing data in this way is a red flag. Politically, this winnowing of the social category of lesbianism in search of the truest lesbians of them all leads down a slippery slope, culminating in an biologically based hierarchy.[22] For these reasons, the assertion of HP that gays and straights sort cleanly into a dichotomy is dubious.

HP provides valuable demographic data on the life history of gay men, showing the ages when they first experienced same-sex sexual attraction, when they self-acknowledged their sexual orientation, and when they publicly acknowledged their orientation (came out). The average age of first same-sex attraction was ten years, two years before their average age of puberty at twelve. The average age of self-acknowledgment was fifteen years, and the average age of coming out was twenty-one years.[23]

HP claims that gayness in males is maternally inherited and linked to the X chromosome. The paper reports that maternal uncles and sons of maternal aunts (first cousins) of a gay man had a 7.5 percent chance of being gay, higher than the baseline chance of 2 percent. That is, out of one hundred maternal uncles and cousins of maternal aunts, only about seven are likely to be gay. Although seven is higher than the two who are likely to be gay on the paternal side, the number is still quite small. The strongest scenario from proponents of a genetic basis to homosexuality shows only a rather mild effect.

Building on the premise that a genetic component of gayness is maternally inherited, HP looked for spots on the X chromosome that might be statistically correlated with gayness. Such a spot could be called a "gay gene." HP reported that a section on the X chromosome at the tip of its long arm, a section called Xq28, was statistically related to gayness. This finding attracted enormous attention.

HP located forty families in which two brothers were gay, the father was straight, and not more than one of the sisters was lesbian. By looking at families in which the homosexuality was expressed mostly in males, they felt they had achieved a sample "enriched" for a hypothetical gene for gayness that was maternally inherited. Again, the sample had been picked and chosen.

HP devised a genetic test to detect a gay gene on the X chromosome. The question is: do gay brothers share the same X chromosome 100 percent of the time, or do gay brothers share X chromosomes at random (50 percent of the time)? A finding of 100 percent would mean the X chromosome was needed for brothers to be gay—it contains a gay gene—whereas 50 percent would mean the X chromosome was irrelevant to whether brothers were gay and there is no gay gene on the X chromosome.

Well, out of 40 pairs of brothers, 33 shared the Xq28 section of chromosome X, and 7 did not. This result is intermediate. If something in Xq28 were absolutely needed to be gay, then all 40 brothers would share this chunk of DNA, whereas if only 20 brothers shared Xq28, then it would be irrelevant to gayness. The figure of 33 out of 40 is statistically significant, and it was therefore concluded that some gene in Xq28 tends to produce gayness in males. Notice how modest this claim actually is. A gene in the Xq28 region of the X chromosome is neither necessary nor sufficient for gayness in males. Because identical twins aren't always both gay, genes alone don't guarantee gayness. Conversely, a male can be gay without the gene, because 7 of the 40 pairs were gay but didn't have this gene. Nonetheless, this gene would be part of some biochemical pathway occasionally involved with the development of gayness in males.

HP then followed up their own study and claimed to confirm their earlier work. In this case, 22 out of 32 pairs of gay males shared the Xq28 section of the X chromosome. Again, the result is intermediate. If Xq28 were irrelevant to gayness, then 16 of the gay-brother pairs would share this section of X, and if Xq28 were necessary for gayness, then all 32 pairs would share the section. The figure of 22 is not too far from 16, overall a weaker result than the original study.[24] Is even this limited claim for a genetic basis to gayness in males correct?

The Hamer-Pattatucci study has not received any further confirmation, and it has even been directly refuted by subsequent work from other investigators. One follow-up study did not detect any evidence of maternal inheritance for gayness, stating that "none of the samples showed a significantly greater proportion of maternal than paternal homosexual uncles or homosexual male maternal first cousins."[25] This follow-up study did confirm (yet again) that homosexuality runs in families: a brother of a gay man has about a 10 percent chance of also being gay, about two to three times the baseline chance of being gay in that study. A sister of a gay man has a 4 percent chance of being lesbian, also about two to three times the baseline chance of being lesbian in that study. Thus, the family clustering was confirmed, but the claim of maternal inheritance was not. A Canadian team repeated the attempt to detect a gay gene on the X chromosome, using the same overall design as HP.[26] Advertisements were placed in the Canadian gay news magazines *Xtra* and *Fugue* for families in which there were at least two gay brothers. Forty-six families with two gay brothers and two families with three gay brothers were studied. The sexual orientation was confirmed for each subject by direct questions from a "gay interviewer"; each subject read gay magazines and volunteered that he was gay; and his self-report was corroborated by interviewing the gay brother.

Of the 46 brother-pairs, 23 would be expected to share Xq28 if this section was irrelevant to gayness, whereas all 46 would share Xq28 if it was necessary. In fact, only 20 of the pairs shared Xq28, suggesting that Xq28 is irrelevant to whether a male becomes gay. The results demonstrate that there is no gay gene in Xq28. The Canadian investigators conclude, "It is unclear why our results are so discrepant from Hamer's original study. . . . Nonetheless, our data do not support the presence of a gene of large effect influencing sexual orientation at position Xq28 . . . [although] these results do not preclude the possibility of detectable gene effects elsewhere in the genome."

The failure of the Hamer-Pattatucci study demands a postmortem. What went wrong? Why was a widely publicized and believed report from a credible laboratory at the National Institutes of Health directly contradicted by later research? The most striking difference between these studies is the way in which people were identified as gay. The Canadian team apparently did not demand that a gay person affirm sexual orientation as their personal identity to the extent that the HP study did;

sexual practice may have been sufficient to qualify the person as gay. This sensitivity to how homosexuality is defined was anticipated by Pattatucci: "People hear you say 'How the question is asked will determine the answer' and they think this means they can discount the result. What it really means is that one needs to ask the right questions." When you do "and the data starts coming back, you're thrilled because you realize you've tapped the vein, you're on the right track . . . and you're simply thrilled."[27]

So who asked the wrong question? Was it HP, with their demand that people define their homosexuality as a core identity before being counted as gay? Did HP manufacture a trait that doesn't exist biologically, and select subjects in such a way as to fabricate the appearance of a result? Or did the Canadian team, with their apparently looser interview criteria for homosexuality, lump different types of homosexuality into one, obscuring a true underlying pattern? Did the Canadian team overlook a genuine finding by not being rigorous enough in their selection of subjects? The jury's still out.

I support the conventional wisdom, which is suspicious of any result highly dependent on how a question is posed. In my experience, a strong and robust result is not extremely sensitive to methodological details—different people, both friends and foes, get more or less the same answer, whether they like it or not, even with somewhat different approaches. I believe that if a gay gene were a major phenomenon, its detection wouldn't be so tricky.

WHY BOTHER WITH A GAY GENE?

One might wonder why so much effort has been invested in the scientific chase for a gay gene. Who cares whether a gay gene exists? Scientists and the general public have a big disconnect here, trapping gay scientists in the middle. From a scientific perspective, sexual orientation is a fundamental feature of mating behavior, and a task of basic research is to understand how this trait forms, what the relative contributions of direct gene products are, and how early hormonal and childhood experiences enter the picture. From a policy perspective, the issue is different: it is focused on whether gayness is a matter of choice, whether gayness is learned and can thus be unlearned.

Media interviews with Hamer illustrated this disconnect. On July 16, 1993, Hamer was interviewed by all the major television networks. The *Today* show announced, "There is new evidence that homosexuality may be inherited in some cases and not a matter of choice." Tom Brokaw opened with, "There's new medical evidence that homosexuality is genetic, not acquired behavior." On *Nightline,* Ted Koppel announced, "Tonight: the genetic link to male homosexuality. More authoritatively than ever before, a scientific study is suggesting that a man's homosexual tendencies may not be a matter of choice. . . . Think about the legal implication . . . it is not constitutional to make status such as race illegal. If the findings of this study are confirmed, it will not quite raise homosexuality to the same legal level as race, but it moves it a lot closer."[28]

Koppel asked Hamer directly, "If the findings of the study, Dr. Hamer, are confirmed, will it then be accurate to say that homosexuality is not optional behavior?" Hamer repeatedly answered a different question, that his work points to a gene in a particular region of the X chromosome, but stressed that other genes are involved too. After consultation during a commercial break, Hamer finally stated, "I think all scientists that have studied sexual orientation already agree that there's very little element of choice in being gay or homosexual. The question is whether there's a defined genetic component to homosexuality." For Hamer, the question is technical. According to alternative hypotheses, sexual orientation could become fixed for life because of hormones or other environmental factors impacting how brain circuitry develops, without necessarily being genetic. Hamer is taking the absence of choice in sexual orientation as a given and asking specifically how genes might be involved.

Agreement that choice is absent from sexual orientation is not as widespread as Hamer indicates. Many lesbian histories show transitions back and forth between straight and gay lives, whereas other lesbians stay in one sexual space for their entire life.[29] Gay male histories, which Hamer seems primarily to be discussing, are less fluid, at least in today's culture. Transgender narratives also show variability in sexual orienta-

tion. A recent study reports that about 30 percent of transgendered women changed their sexual orientation after they transitioned.[30]

The enthusiastic reception of early evidence for a gay gene has spawned an industry of genetic crystal-ball gazing by both scientists and science reporters. One geneticist states, "I expect sexual orientation will come down to just one or two genes. Sexual orientation is a simple trait. Everyone says it's complex, but it's not complex at all."[31] Another scientist speculates about the number of genes determining sexual orientation: "I imagine it will come down closer to one. I'd speculate that sexual orientation is linked to a very early event in embryogenesis and thus possibly could involve just a few fundamentally important genes that start the process unfolding. I would really be surprised, for example, if we were to learn that the gene turned on late in fetal development."[32] Still another scientist, "one of Hamer's colleagues, who would not allow himself to be identified, [is] much more frank. 'Look, you'll never get me to say it publicly, but I think it's clear that this is really a pretty simple trait . . . if you look at where the data are going, there's not much question.' "[33]

Alas, this molecular bravado must face up to contrary data. Science reporters seem especially taken in. A reporter compares the inheritance of gayness in males to the inheritance of short height in pygmies, a trait brought about by a single major gene for the growth-hormone receptor: "If a Pygmy has a child with an African of average height, all the children are either of average height or of Pygmy height. The trait is one or the other, clear cut, and the reason is that the trait is controlled by one gene."[34] This pattern is precisely *not* how sexual orientation is inherited, as the many studies of gayness in families have shown; gayness is clearly not inherited as a single major gene.

Similarly, a reporter compares gayness with two very rare genetic diseases, ocular albinism and menkes disease, which occur on the X chromosome near Xq28. These diseases are decidedly *not* comparable to sexual orientation. Gay sexual orientation is far more common than a genetic disease, and it is not associated with any physical disability (see p. 284).

I believe sexual orientation develops analogously to an accent in speech, which also develops early in childhood. Some people don't deviate even slightly from the accent they learned as a child, although a thick Russian accent isn't genetic. Other people easily acquire a new accent—I can change mine in hours. Some people's sexual orientation is immutable, whereas other people's shifts. Not only is sexual orientation part of one's temperament, but so is the degree of flexibility, just like an ability to alter one's accent.

WHEN DOES SEXUAL ORIENTATION DEVELOP?

As we did for the timing of gender identity, let's look for an early limit and a late limit for the development of sexual orientation, and work in from there. An early limit would seem to be a year or so after birth, for two reasons. First, sexual orientation would seem to require the mental lenses that distinguish gender and thus would develop only after gender identity develops. Because gender identity seems set by about the first year after birth, sexual orientation could begin to form then. Second, adopted boys with a gay brother are more likely to be gay than adopted boys with a straight brother. This line of thought also suggests an early limit near a year or so after birth, when adoptions typically take place.

A late limit is indicated by the average age of first awareness of same-sex sexual arousal, which is about ten years of age, two years before puberty. So the window for developing one's sexual orientation would appear to be from infancy to very early childhood, say a nine-year window from one to ten years of age, as a first guess. The window is probably much narrower, and further study of when gayness develops in adopted children might be very revealing.

GAYNESS AND EVOLUTIONARY THEORY

If there is some genetic component to homosexuality, we may wonder how homosexuality fits into ideas about human evolution. Until recently, scientists have taken for granted that homosexuality is a deleterious trait within the framework of Darwinian fitness and have looked for theories, often far-fetched, to explain how a "bad gene" could somehow become common. But who says homosexuality is deleterious?

For lesbian women, a 1988 U.S. survey reported that the mean number of children born to women with homosexual experience was 1.2

compared to a mean of 2.2 for women without homosexual experience.[35] A 1994 survey reported that 67 percent of lesbian women were mothers, compared with 72 percent of straight women,[36] and a 1995 study of contemporary British women showed that bisexual women have a higher fecundity to age twenty-five and no significant difference in lifetime fecundity compared to heterosexual women.[37] From these studies, lesbian and bisexual woman apparently have somewhere between the same and one-half the reproduction rate of straight women.

For gay men, the 1994 study showed that 27 percent were fathers, compared with 60 percent for straight men.[38] On the other hand, of 655 homosexual and bisexual men in contemporary Japan, 83 percent had offspring.[39] Thus, gay and bisexual men also apparently have somewhere between the same and one-half the reproduction of straight men.

These references scrape the bottom of the barrel. One would have thought that if homosexuality was deleterious, the evidence would be plentiful and easy to find. Furthermore, fertility is only one component of Darwinian fitness, and fertility must be multiplied by the probability of living long enough to reproduce when computing the overall fitness relevant to natural selection. A disadvantage in fertility could be offset by a higher survival rate. No data are available on a trade-off between survival and reproduction for homosexuality in humans. Today's society is certainly not amenable to the survival and health of gay and lesbian people, but the matter may have been entirely different at other points in human evolutionary history.[40] All in all, the data do not support uncritical acceptance of homosexuality as deleterious.

One early theory postulated that gays and lesbians were like avian helpers at the nest, people who remain with their nuclear family to help raise brothers, sisters, and cousins, who would then go on to do the reproducing. This theory, which positively values the contributions to family and society that gay and lesbian people can make, was a step forward in depathologizing same-sex sexuality.[41] As one gay scientist notes, though, "Homosexuality is not simply the abandonment of sex in favor of altruistic behavior toward one's relatives; rather it involves the adoption of a different sexuality, one that can be quite costly in terms of time and resources."[42] Nor does helping at the nest account for why such helpers would specifically be gay or lesbian. Important though this suggestion has been, helping at the nest doesn't appear to hold the answer to why homosexuality has evolved in humans.[43]

A more devious theory making the rounds is based on the premise that a gay gene on the X chromosome, say in Xq28, causes homosexuality in males and not in females. If the gay gene escapes X inactivation (see p. 209), then females express two copies of the gene and males only one. If females benefit from this gene in some presently unknown way, then men might carry the gay gene as a side effect of the gene's double-dose benefit for women.[44] This idea, called sex-antagonistic pleiotropic homosexuality, is theoretically far-fetched, has no supporting evidence, and relies on the false assumption that a gay gene lies within Xq28. One science reporter even found a molecular biologist who speculated, "Homosexuality may be a type of bacterial infection . . . we may eventually be able to eradicate with an antibiotic."[45]

The various theories advanced, some of them absurd, all suffer from an uncritical acceptance of homosexuality as deleterious and therefore must conjure up evolutionary pathways whereby a deleterious gene can become as common as homosexuality is. Instead, if homosexuality is an adaptation, then the commonness of homosexuality is no problem. Indeed, the question becomes why everyone isn't homosexual, as in bonobos. Overall, an evolutionary theory of human homosexuality needs to explain the polymorphism in sexual orientation among humans. Why are, say, 90 percent of men straight and 10 percent gay, and why are 95 percent of women straight and 5 percent lesbian? And today at least, why are lesbian women more likely to be bisexual than gay men? Finally, why does homophobia exist? No evolutionary theory has been proposed for humans that addresses this complete suite of issues, although I believe some promising first steps have recently been made.

One study offers a long-overdue extension of evolutionary psychology to include homosexuality in humans.[46] This investigation contends that the "long history of institutionalized homosexuality between higher status and lower status males," usually of different ages by five years or more, produces "relationships [that] tend to socialize the youths into the adult male role, nurture and protect the youths and provide the basis for life-long friendships, social alliances and social status. . . . Social status, a reflection of political strength and alliances, appears to have played a

large role in the evolutionary history of human male reproductive success." The study goes on to suggest that homosexuality for women provides bonds of friendship that lead to mutual assistance in raising children, assuming paternal assistance is absent in primitive societies. Here too homosexuality is hypothesized to provide higher reproductive success. These conjectures about how homosexuality evolved logically feed back to determining the type of environment in which homosexuality develops during infancy: "Homoerotic behavior may be evoked as a normal response to placement in an environment which closely resembles the environment in which it evolved and was adaptive in the evolutionary past." In particular, homoerotic behavior in single-sex groups would reflect not an absence of partners, but the adaptive development of same-sex bonds and alliances in the conditions when they would be most useful, which may resemble the social structure of early hominids.

Another study presents an anthropological perspective focusing on how homosexuality leads to various types of alliances among males.[47] As already noted, heterosexual and homosexual practice occurred together in fifteen out of twenty-one cultures. Homosexual behavior has also occurred more often in agricultural than in hunter-gatherer societies, and more often in larger social groups.[48] Homosexual behavior may be more frequent when it empowers political networks rather than independent individuals, and it may be expressed more in industrial nations after their demographic transition from high reproduction to high survival.[49] A difficulty faced by a theory of homosexuality as a form of alliance-building, however, is that male-male alliances can be built without using sexuality. Data are needed that alliances bonded through homosexual behavior are in some sense stronger, better, or longer-lasting than bonds lacking this ingredient.

These new theories for the evolution of human homosexuality seem to be on the right track, but they may be too specific. Homoerotic attraction can have multiple functions, depending on context. Homosexuality need not be dyadic—such as an alliance between two people. Instead, I suspect homosexuality may also be a social-inclusionary trait, a ticket for admission to a collective.

What explains the polymorphism in sexual orientation—the *ratio* of gays to straights? I conjecture that a polymorphism in sexual orientation may indicate alternative strategies of same-sex relationships that are

equally effective in achieving access to net reproductive opportunity. These alternative same-sex relational strategies are the counterpart of alternative between-sex mating strategies, such as the controller and cooperator morphs. Abstractly, members of the straight morph may bond through the exchange of power, whereas members of the gay morph may build alliances through the exchange of pleasure. Conflict is likely to occur between alternative same-sex relational morphs because they are playing by different rules. Homophobia may emerge from this conflict. Transactions based on the exchange of pleasure may be seen as subverting the power hierarchy, and be crushed by those in control. A balance may then result. At one extreme, if everyone is in continual conflict, a cooperator can benefit by avoiding the hazards of conflict. In this view, homosexuality emerges as a complex social adaptation, a product of positive evolution.