Genesis of Sexual Orientation: From Plato to Dorner

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Full Text: Headnote ABSTRACT: This article examines the genesis of sexual preference. Since human beings as a species are unique in that they have a sexual orientation toward their own gender (homosexuality) as well as the opposite sex (heterosexuality), how or where this preference begins is of interest. This paper examines the research and focuses on how and why some fetuses lack male hormones at the end of pregnancy, which along with stress responses may trigger a high level of activity in the mother's adrenal glands impacting the developing child's later sexual orientation. Options for future research are also discussed. KEY WORDS: Sexual orientation, heterosexuality, homosexuality, bisexuality. INTRODUCTION Why do most human beings have a consistent preference for sexual relations with the opposite sex? Why do others have a consistent preference for sexual relations with their own sex? Why do others express some ambivalence about their partner's sex? Any study of heterosexuality, homosexuality and bisexuality must start with questions about the genesis of sexual orientation. We are the only species where a substantial proportion of individuals is exclusively and consistently oriented towards their own sex. History Until recently all theories of sexual orientation defied scientific verification. In ancient Greece, Plato had expressed the dominance theory in his Symposium. He explained how humanity was originally divided into three sexes rather than two: its members were joined in pairs of either two men, or two women, or a man and a woman. Zeus cut each pair apart to diminish their power and to teach them to fear the gods. This explains why humans spend their time on the earth searching for their other half, with whom they can merge in love. Those whose sex had once been mixed were obsessed by coupling, whereas people sprung from single-sex pairs were more suited for everyday business of the world, particularly for government and leadership. During the twentieth century many theories focused on explanations based on social (particularly family) and environmental causes. Freud, without dismissing hereditary factors, argued that male homosexuality reflected a premature fixation of one's psychosexual development: it was typically due to the presence of a domineering mother or the absence of a dominant father (Freud, 1905). Homosexuality has also been attributed to seduction in early childhood by an older same-sex sibling or playmate that arrested psychosexual development (Cameron, 1963). Others have attributed male homosexuality to excessive societal demands on boys to be 'masculine' (i.e., boys who feel inadequate in complying with those demands tend to seek refuge in females roles) (Kardiner, 1963). In the 1950s, imprinting theories based on ethological learning principles were developed. It was argued that, after the first year or two of life characterized by sexual neutrality, one's sexual orientation will be formed by the second or third year of life. Subtle, often accidental social encounters during this critical period cause sexual orientation to develop gradually, but irreversibly (Smitt, 1991). These twentieth century theories are not supported by homosexual men who feel their sexual orientation to be innate, deeply embedded in their personality, and not determined by external factors. It is significant that most homosexual men neither seek nor desire therapeutic reorientation. Twenty-First Century In the age of Primal Health Research, we are learning that most personality traits and states of health are to a great extent determined during fetal life. It is time to cease contrasting genetic and environmental factors. We now understand that the expression of our genes is influenced by early - particularly prenatal and perinatal - environmental factors. Our study of the genesis of sexual orientation provides an exemplary opportunity to realize that we are entering a new phase in our understanding of human development. On one hand, the role of genetic factors in sexual orientation is well researched. On the other hand there is accumulating of data confirming that the sexualisation of the brain is to a great extent determined during fetal

life. Today, by combining anatomical data, the genetic perspective, the results of animal experiments and the results of physiological and epidemiological studies, we can draw valuable conclusions. Anatomical Data. There are many reasons to wonder if the anatomical structure of the hypothalamus is the same among heterosexual and homosexual men. The hypothalamus is an archaic brain structure that develops early in life and is involved in the regulation of the typically male sexual behaviour. Simon LeVay, a neuroscientist at the Salk Institute in San Diego, set out to answer this intriguing question by examining the hypothalamus of 41 subjects - 19 homosexual men who had died of complications of AIDS, 16 heterosexual men, and six heterosexual women. A characteristic feature of the brains of gay men is the small size of one hypothalamic nucleus, INAH 3, which LeVay found to be the same size as in women and only half the size found in heterosexual men (LeVay, 1991). INAH 3, he concludes, is dismorphic not with gender, but with sexual orientation. It is noticeable that six of the heterosexual men had died of AIDS but nevertheless had a large INAH 3. Statistical analysis indicated that the probability of the result's being attributed to chance was about one in 1000. The brains of lesbians might yield interesting results but are seldom available for research, since this group is at low risk of AIDS. Let us recall that, as early as the 1960s, Gunter Dorner, from East Berlin, had already conducted animal experiments in order to demonstrate the importance of the hypothalamus in sexual behaviour (Dorner &Staudt, 1968; Dorner &Staudt, 1969a, 1969b). Dorner's conclusions were reinforced by Gorski and colleagues who found that, in rats, the size of the 'sexually dismorphic nucleus' of the hypothalamus is established very early in life and influences later sexual behaviour (Gorski, Goprdon, Shryne, &Santham, 1978). Subsequently, the same team of researchers showed that two nuclei of the hypothalamus, INAH 2 and 3 were twice as large in men as in women (Allen, Hines, Shryne &Gorski, 1989). Gorski and colleagues have reported another feature in brains that is related to sexual orientation. The anterior commissure, a bundle of fibers running across the midline of the brain, is larger in women and gay men than in heterosexual men. The Genetic Component. Now we understand that the expression of our genes is influenced by early environmental factors; we can therefore accept that even a genetic factor that reduces reproductive success can transmit itself in a population. The two main research tools to evaluate the genetic component are twin and family studies and DNA linkage analysis (LeVay &Hamer, 1994). Twin and family tree studies are based on the principle that genetically-influenced traits run in families. The first modern study of patterns of homosexuality within families was published in 1985 by Richard Pillard and James Weinrich of Boston University. Since then, many other systematic studies of twins and siblings of gay men and lesbians have confirmed the initial results. The first pooled data for men showed that about 57% of identical twins, 24 % of fraternal twins and 13% of brothers of gay men are also gay. For women, approximately 50% of identical twins, 16% of fraternal twins and 13% of sisters of lesbians are also lesbian. Michael Bailey of Northwestern University estimates that the overall heritability of sexual orientation is about 53% for men and 52% for women. One of the latest evaluations, based on the sexual orientation in a U.S. national sample of twin and non-twin sibling pairs, confirmed that resemblance for sexual orientation was greater in the identical twins than in the fraternal twins and that sexual orientation is substantially influenced by genetic factors (Kendler, Thorton, oilman, &Kessler, 2000). Family trees of male sexual orientation show that the rates of homosexuality in maternally-related males are far above the incidence of 2% in the average population, while the rates in paternal relatives are close to those of the average population. This finding raised the possibility of X chromosome involvement. Males have two sex chromosomes - Y inherited from the father and an X from the mother. Thus, a trait inherited through the mother's side logically might be influenced by a gene on one of her X chromosomes. This hypothesis is the basis of the X chromosome DNA analyses by Hamer and his colleagues. It appeared that one small area at the tip of the X chromosome - Xq28 - was shared by a large percentage of gay brothers (Hamer, Hu, Magnuson, et al. (1993). The results of such DNA analyses focusing on the X chromosome can help interpret a study among an Italian population, in which the mothers of gay men produced an average of 2.7 babies, compared to 2.3 for the other mothers (Corna, Camperio-Ciani, &Capiluppi, 2004). It seems that maternally-inherited factors favoring male homosexuality also promote female fecundity. This might

explain why a genetic factor that reduces reproductive success remains in the population. Pre- and Perinatal Environment. The turning point in our understanding of the effect of environmental factors in sexual orientation was generated by the work of Gunter Dorner. Probably because Dorner was based in East Berlin his pioneering research in the 1970s was not widely noticed (Dorner, 1972; Dorner, 1976; Dorner, 1977). Before Dorner there had been unsuccessful attempts to compare the hormonal profiles of adults expressing different sexual orientations. Dorner's studies revealed the importance of the critical period when the sexual differentiation of the brain happens. While this critical period may vary slightly from one species to another, it is always around the time of birth. Dorner started with animal experiments. Male rats were castrated on the first day of life and were injected with male hormones when adults. These male rats expressed a complete inversion of sexual behaviour. In other words, being deprived of testosterone during the critical fetal period of sexual determination produced homosexual behaviour in their adult lives. What we know now about the hormonal profile of homosexuals fits perfectly with the hypothesis of a transitory lack of testosterone during the critical period. Homosexuals usually have the same level of total testosterone as heterosexuals, but their level of 'free testosterone' (testosterone that is not combined with other chemicals) is lower. The levels of pituitary hormones, which control testicular functions, are relatively high and so are the levels of oestrogene. It is important t`o realize is that if this hormonal profile were to be artificially reproduced in an adult, it would not give rise to homosexual behaviour. When a fetus is faced with a lack of testosterone at the end of pregnancy it compensates for this by increasing secretions of pituitary hormones. At the same time as the fetus tries to increase the level of male hormones by a feedback mechanism, it increases in parallel the level of oestrogens. In fact, oestrogens increase the binding capacity of sexual hormones with proteins and lower the level of free testosterone. This raises the question of how and why some fetuses lack male hormones at the end of pregnancy. The answer could be that certain stressful situations at this time might trigger a high level of activity in the mother's adrenal glands. The adrenal glands release male hormones the action of which is different from testosterone, but similar enough to compete with testosterone in the fetal brain to lower the amount of free testosterone. Furthermore, a complementary question is raised: Can prenatal stress play a causal role in human male homosexuality? The multidisciplinary approach of Dorner's team provides answers to this question. They found a significantly-increased proportion of homosexual males in the former East Germany among the population born between 1941 and 1947 (with a maximum relative frequency in 1944-1945) (Dorner, Geier, Ahrens, et al., 1980). In a further study by Dorner's team, one hundred bi- or homosexual men were asked about the occurrence of maternal stressful events during their prenatal life. A significantly-increased incidence of prenatal stressful situations was found in bisexual and, particularly, in homosexual men (Dorner, Schjenk, Schmiedel, &Ahrens, 1983). Since the 1980s, several experimental studies have supported the interpretations suggested by Dorner. They have confirmed in particular that female rats in stressful situations during pregnancy are more likely to have male offspring who exhibit in adulthood female receptivity postures (lordosis) in the presence of other males, than those that are not stressed. Some of these experimental studies suggested that alcohol consumption may also modulate the fetal testosterone surge (Ward, Ward, Affuso, et al., 2003). The effects of stressful situations, but not of alcohol consumption, were confirmed by another study involving 7500 human beings and their mothers. This study was the first to suggest that nicotine has masculinizing/defeminizing effects on the sexual orientation of female offspring (Ellis &Cole-Harding, 2001). At a time when our focus is on the critical period of sexualisation of the brain and when we understand how artificial is the separation of the different components of the 'Primal adaptive system' (nervous system, endocrine system and immune system); we can easily offer interpretations of relevant recently-published data. According to a Canadian study involving 302 homosexual men and an equal number of heterosexual men, the presence of older brothers was linked to an increased probability of homosexuality in the later-born males, while having older sisters neither enhance nor counteract this effect (Blanchard &Bogaert, 1996). The most plausible interpretation takes into account that male fetuses are more antigenic to the mother than female fetuses and

thus more likely to provoke maternal immune reactions. This reaction strengthens after each pregnancy with a male fetus. The connection between the mother's immune reaction and the child's future sexual orientation is perhaps some effect of the maternal antibodies on sexual differentiation of the brain. It is noteworthy that male-specific Y-linked H-Y antigen (Muller &Lattermann, 1988), which is considered the basis for the greater antigenicity of male fetuses (Komlos, Vardimon, Normann, et al., 1990), appears to be well-represented on the surfaces of brain cells (Koo, 1981). The Future The recent accumulation of data regarding the genesis of sexual orientation has opened several avenues for research. Sexual Orientation of Genetically Female Subjects. Compared with the sexual orientation of genetically male subjects, the sexual orientation of female subjects has not been widely studied, although Dorner had demonstrated that a complete inversion of sexual behaviour occurs in female rats following androgen excess during sexual differentiation of the brain (Dorner, 1977). Perkins looked at the morphology of lesbians (Perkins, 1981). He reported that lesbians had narrower hips and more muscular builds than non-lesbian women. Within lesbian relationships, those who played the more dominant role were taller (a statistically highly significant difference). The dominant women also had broader shoulders and narrower hips than did lesbians who played passive or intermediate roles, although only the shoulder measurements were statistically significant. These differences are consistent with one developmental process affecting masculinity in both build and personality. A powerful piece of evidence for lesbianism being related to prenatal masculinisation comes from a comparison of the auditory systems of heterosexuals and homosexuals: click-evoked otoacoustic emissions of lesbians resembled the male pattern rather than the female pattern (McFadden &Pasanen, 1998). The Way Babies are Born. The Primal Health Research Data Bank contains a certain number of studies accessed via the key-words 'sexual orientation' and 'homosexuality.' It is striking that none of these studies looked at possible perinatal factors. Since the sexualisation of the brain of mammals in general is influenced by pre- and perinatal factors, we might also wonder if the ratio of hetero- to homosexuals is related to the way babies are born. Is this ratio the same among those born by the vaginal route without any drug or intervention, compared with those born after labour induction, or after elective caesarean, or after a cesarean during labour, or by a premature birth followed by some weeks spent in an intensive care unit? Intrauterine Pollution. Since the late 1990s we could gather a sufficient amount of data to realize that a major threat to the health of the unborn generations is intrauterine pollution by fat-soluble manmade molecules. The extensive list of such pollutants includes PCBs, dioxins and Bisphenol-A that accumulate over the years in our adipose tissues. Many of these synthetic chemicals are considered hormonal disrupters. More precisely they mimic oestrogens. This is how we currently explain the increasing rates of disorders of the male genital tract (undescended testicles, hypospadias, testicular cancers, decrease in average sperm counts, etc). It is plausible that this modern form of pollution can also influence the sexualisation of the brain. Relevant results of preliminary animal experiments have already been published (Farabollini, Porrini, Delia Seta, Bianchi &Dessi-Fulgheri, 2002). Interestingly Dorner is already looking at milk pollution (a marker of intrauterine pollution) (Dorner &Plageman, 2002). If our centre were rich enough to bestow a 'Primal Health Research Award' I guess that Gunter Dorner would be the likely candidate. Sidebar Editors note: This essay is reprinted with the permission of Michel Odent, Director, Primal Health Research, published in North and South America by Birth Works, Inc., Medford, N.J. Free access to the Primal Health Research Data Bank is provided at: www.birthworks.org/primalhealth. Email address for Dr. Odent is: modent@aol.com. References REFERENCES Allen, L.S., Hines, M., Shryne, J.E., &Gorski, R.A. (1989). Two sexually dismorphic cell groups in the human brain. J Neuroscience, 9, 497-506. Blanchard, R., &Bogaert, A.F. (1996). Homosexuality in men and number of older brothers. Am. J. Psychiatry, 153, 27-31. Cameron, N. (1963). Development and psychopathology. Boston, MA: Houghton-Mifflin. Corna, F., Camperio-Ciani, A., &Capiluppi, C. (October 12, 2004). Evidence for maternally inherited factors favouring male homosexuality and promoting female fecundity. Proceedings of the Royal Society B: Biological Sciences. Dorner, G. (1972). Sexualhormonabhangige gehirndifferenzierung und sexualitat. New York: Springer-Verlag. Dorner, G. (1976). Hormones and brain

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