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Is Homosexuality Familial? A Review, Some Data, and a Suggestion

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This report summarizes evidence that sexual orientation is familial. Family studies report that homosexual subjects have more homosexual siblings than do heterosexual subjects and more than would be expected given population frequencies. Twin studies find in general a higher concordance in sexual orientation among monozygotic than among dizygotic twins. Evidence for associated psychopathology in homosexual subjects or their relatives is inconclusive. Possible sources of bias in these reports are discussed and a suggestion is offered that family studies should be undertaken in which the sexual orientation of relatives would be directly ascertained by interview.

KEY WORDS: homosexuality; genetics; twin studies; psychopathology.

INTRODUCTION

The variables which shape human sexual preference toward a same-sex or an other-sex partner are not well understood. Many researchers believe that both biological and psychosocial factors may be relevant. There is considerable evidence, reviewed below, to suggest that homosexual (HS) and, by implication, heterosexual (HT) orientations are familial. If so, family studies of sexual orientation should help to identify the predisposing factors and to assess their relative importance.

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This paper reviews the literature pertaining to familial homosexuality. It includes family and twin studies as well as the few articles which examine associated mental disorders in the families of HS index subjects.

In the studies to be reviewed, it will be helpful to compare the percentage of homosexuality reported with the background population rate. Kinsey's (Kinsey *et al.,* 1948, 1953) figures for predominant HS behavior (Kinsey classes 4-6) for males of educational level 13+ are in the 6-8% range. However, Gebhard (1972) believes that this is too high and concludes that only 4% of white, college-educated males are predominantly HS. For women, the figure is 1-2%. The studies below refer to predominant homosexuality, and we suggest that population figures for comparison should be 4-5% for men and 2% for women.

Kinsey also showed that the accumulated incidence for men for any HS experience increases steadily from age 11 to 20, then more slowly, virtually leveling off by age 25 at about 33%. Thus, a man at age 25 may be considered to have completed the "age at risk." For women, accumulated incidence does not level off until age 40, at about 20%. The studies to be reviewed may underestimate HS incidence to the extent that they include younger individuals and do not employ an age correction formula.

FAMILY STUDIES

Sex researchers before 1940 frequently commented on many HS members within certain families. Hirschfeld, von Romer, Krafft-Ebing, Moll, and Ellis (cited by Ellis, 1922) were each impressed by this. von Romer, for example, found "inversion" in other family members in 35% of his HS cases, and Ellis reports a positive family history in 24 of 62 cases. Unfortunately, these reports do not state the number of relatives included, the certainty with which the ascertainment of sexual orientation was made, or the degree of relationship.

In 1941, Henry published extensive case material on 40 male and 40 female "sex variants." Family trees were drawn which in some cases included more than 100 individuals over four generations. Ascertainment of sexual orientation (and other factors) was made by a research worker interviewing the index subject with occasional supplement from other subjects, since the method of recruitment yielded some subjects who were acquainted.

Henry's data suffer from lack of a summary, as Zuger (1978) has pointed out. Therefore, we tabulated the siblings' sexual orientations using the family trees and accompanying text, and the results are displayed in Table I.

Table I. Summary of Sibling Sexual Orientation from Henry (1941)

Index subjects	Siblings[a]	Number homo- or bisexual	Percentage homo- or bisexual
37 males[b]	45 brothers	3	6.7
	48 sisters	3	6.2
40 females	40 brothers	6	15.0
	43 sisters	4	9.3
Total	85 brothers	9	10.6
	91 sisters	7	7.7

[a] Siblings who died before maturity and half-siblings were omitted.
[b] Three male index cases were omitted as they had little or no homosexual history and would now be considered transsexuals or heterosexual transvestites.

These data seem supportive of a familial factor since the overall percentages are higher than expectation and are even likely to be underestimates, as many of the siblings were very young or their situations were not well known to the index subject. However, a cautious interpretation is advisable since in some instances determination of sibling sexual orientation was quite certain, whereas in others it was no more than a guess. The degree of "bisexuality" introduces uncertainty as well.

Of additional interest in Henry's family trees is the information on parents, aunts, and uncles. Of 12 HS or bisexual aunts and uncles, 11 came from the maternal side ($p < 0.006$; two-tailed binomial probability). Two mothers and no fathers were reported as bisexual.

Whatever its shortcomings, Henry's book stands alone as an example of the family history method applied to a nonclinical sample of HS women and men.

Kenyon (1968) did a postal questionnaire study of HS and HT women as a part of which he inquired about familial sexual orientation.[2] First-degree relatives predominantly HS were identified by 18 of the lesbians and by only 1 HT control subject, a significant difference ($N = 123$ subjects in each group; $\chi^2 = 14.6$; df $= 1$; $p < 0.0002$).[3] Among lesbian subjects, the distribution was 7 mothers, 5 fathers, 2 sisters, and 7 brothers, or 21 relatives in all. One HT woman had a HS brother. Since the total number of siblings is not recorded, the percentage of HS siblings cannot be calculated.

Other HS relatives (aunts, uncles, cousins, and others of unspecified relationship) were reported by 18 HS but only 2 HT subjects ($\chi^2 = 12.2$;

[2] The calculations are based on data kindly supplied by Dr. Kenyon.
[3] All χ^2 statistics are calculated with Yates's correction.

df = 1; $p < 0.0005$). It would be interesting to know how many HS second-degree relatives were paternal and how many maternal.

Margolese and Janiger (1973) asked about homosexuality in the families of men recruited for an endocrine study. Of 24 HT men (Kinsey 0-2), 2 reported HS relatives. Of 28 HS men (Kinsey 4-6), 17 reported HS relatives, 5 reporting two relatives each. This is a significant difference ($\chi^2 = 13.1$; df = 1; $p < 0.0003$). There were two sets of monozygotic twins in this study, one pair concordant for homosexuality and one pair concordant for bisexuality.

Dank (1971) reported a family of 10 siblings (3 female, 7 male), of whom 6 were predominantly or completely HS. The other four had also had HS experiences but may have been too young to have a fully developed sexual preference (the youngest two siblings were aged only 10 and 9). Dank's principal informant was one of the siblings. Dank emphasized the importance of the children's relationship with their father, a hated, violent man, in the etiology of their sexual orientation.

Hoenig and Duggan (1974) gave an interesting but sketchy report of a family of 117 members, whose histories were supplied by a single informant. Of these, 14 (12%) had "sexual abnormalities" mostly transsexuality and transvestism. This is above expectation by comparison with the population frequency for homosexuality and especially striking since transsexuality and transvestism are even more rare. The authors speculate that these "abnormalities" may have been linked with epilepsy, which was also frequent in that family.

We interviewed 36 men in the course of other research and inquired about the sexual orientations of their relatives. The men were normal volunteer subjects aged 19 to 28, all Kinsey 5-6. Some siblings were too young for the subjects to estimate their sexual orientations, but even without age correction the results were striking. There was a total of 80 siblings. For the 35 sisters, one was HS, one bisexual—only slightly higher than expectation. Among the 45 brothers, 10 were HS and 2 were bisexual, substantially higher than the random expectation. Among fathers there were one definite and two possible bisexuals, and among the mothers two possible bisexuals. Even these figures may be underestimated; one subject who talked about the study with his family found to his surprise that his father was bisexual.

Comparing the index subjects who had a HS sibling with those who did not, it was our impression that the former had a more feminine demeanor, though they did not differ in amount or type of sexual activity or on any of the personality variables which we measured.

Taken together, these studies add up to a persuasive conclusion. Homosexual subjects report more HS siblings than HT subjects and more than would be expected given population frequencies.

TWIN STUDIES

Kallmann (1952) discovered 85 twin pairs, 40 monozygotic (MZ) and 45 dizygotic (DZ), from the records of various social agencies and contacts with the "clandestine homosexual world." The index twin was, in each case, HS with a Kinsey rating of 3-6. The orientation of the co-twin was ascertained, though Kallmann does not describe the details of either the recruitment or the ascertainment procedures.

In the MZ group, no co-twin had a Kinsey rating of less than 3 (three were unclassified); thus, there was 100% concordance for homosexuality, overall. Moreover, the degree of concordance across the Kinsey classes 3-6 is highly significant ($\chi^2 = 26$; df = 9; $p < 0.005$) and is further emphasized by Kallmann's remark that the twins had never engaged in mutual sexual relationships but, nevertheless, often independently developed remarkably similar activity preferences.

In the DZ group, the orientations of 26 co-twins were determined. Of these, 11 had some HS experience (Kinsey 1-6), 3 of whom (11.5%) were substantially HS,[4] and 15 were entirely HT. There were 19 co-twins who were unclassified—14 women, 5 dead or unavailable.

The MZ/DZ difference is generally regarded as evidence for the presence of a genetic factor which, in this study, would be substantial. Incidence in the DZ co-twins is supportive of a family factor, as it is higher than the general population both for any HS experience (Kinsey 1-6) and for predominant homosexuality (Kinsey 3-6). Age correction would make these figures even higher, since three of the co-twins were under 25 and had not passed the "age at risk." There is no evidence that the incidence of homosexuality in twins is higher than in singletons.

Heston and Shields (1968) found twin pairs in the Maudsley Twin Register. The probands were investigated by research workers. Of 5 MZ pairs, 2 were concordant and 2 discordant for homosexuality. The fifth co-twin was schizophrenic with delusions of sex change. Of 7 DZ pairs, only 1 was concordant for homosexuality. The authors also report a remarkable family of 14 siblings with 3 pairs of MZ twins. Two of the pairs were concordant for homosexuality and the third concordant for heterosexuality ($p \cong 0.002$, given population incidence figures).

There are also many reports of MZ twins discordant for sexual orientation. Rainer *et al.* (1960) reported two pairs and Mesnikoff *et al.* (1963) an additional two pairs. Parker (1964) and Green and Stoller

[4]There is a slight error in the Kallmann paper. The text in two places cites the 11.5% figure as applying to Kinsey classes 5-6, but calculations from Kallmann's Table II make clear that this percentage applies to classes 3-6. Accepting the table as more conservative, the conclusions are fundamentally the same.

(1971) each reported two pairs, and there are a number of single case reports (Klintworth, 1962; Davison *et al.*, 1971; Perkins, 1973; Friedman *et al.*, 1976; Zuger, 1976). Many of these were well-enough studied for the reviewer to conclude that monozygosity and discordance for sexual orientation were unquestionably established. Thus, concordance for sexual orientation in MZ twins is probably closer to 50%, though higher for MZ than for DZ twins.[5]

There is evidence that chorion type is a factor in the similarity of MZ twins. Monochorionic twins have more similar full-scale IQ than dichorionic twins. It would be useful for future twin studies to document placentation (Melnick *et al.*, 1978).

To summarize, there is substantial evidence from twin and family studies and from the pilot data we have gathered that male and probably female homosexuality is a disposition which runs in families. However, none of the studies cited in this review is a true family study, involving direct interview with family members. One would expect that studies such as these, which rely on reports by a proband, would generally underrepresent the incidence of a condition as compared with direct ascertainment by interview of each family member, but there may also be an asymmetrical source of bias. Homosexuals are certainly more attuned to this characteristic and more adept at recognizing it in others. It is plausible that HS siblings might more readily confide in one another than in a HT sibling. Thus, HT subjects may be underestimating the incidence of HS siblings compared with HS subjects. (This does not explain why HS index subjects should have more HS siblings than in the general population unless there is a bias in their selection or an overestimation in their report of HS siblings.)

We suggest that further family studies are needed to clarify this issue. Such studies should employ direct interviews of relatives wherever possible so that their sexual orientations may be correctly ascertained. If information from an index subject must be relied upon, the report should include some estimate of the adequacy of the information obtained, that is, does the index subject know of a relative's sexuality through direct conversation, conversation with others, observation, or an educated guess?

[5]An interesting and possibly relevant sidelight is provided by Taylor (1971), who reviewed a series of MZ twins *raised separately* and simply calculated their concordance for being married. The results indicated a rate of concordance significant at the 0.0001 level.

ASSOCIATED PSYCHOPATHOLOGY

Few well-controlled and thorough studies have been done linking psychopathology with homosexuality using the family history method. Holemon and Winokur (1965) compared 36 HS (24 affeminate, 12 not) with 25 HT men from a prison population. Only 2 HS siblings were found (by history), and both were related to the effeminate men. Maternal age and birth order were the same for all groups.

There are family studies of affective illness and personality disorder which include homosexuality as a variable. Guze *et al.* (1967) studied 223 male and female convicted criminals. They found only 1% homosexuality in this group, 2% in their male first-degree relatives, none in the female relatives. These figures seem too low, and there is no report of whether the HS relatives are related to the HS index subjects.

Cloninger and Guze (1970) reported on 66 female felons of whom 4 had "significant" and 5 had "casual" same-sex relationships. A number of their first-degree relatives were interviewed (Cloninger and Guze, 1973). There were 36 male relatives, of whom 4 (11%) were probably HS, and 70 female relatives, of whom 4 (6%) were judged to be lesbians. The authors concluded that the women felons had "more sociopathy, hysteria, alcoholism, drug dependence and homosexuality than would be expected in the general female population" and that, among first-degree relatives, there was also more sociopathy, alcoholism, hysteria, and drug dependence, but not more homosexuality. The authors did not say whether the HS relatives came from the same families as the index cases. However, Cloninger has kindly supplied the information that among the 4 HS male and 4 HS female relatives were 2 sisters and 2 brothers of the 9 index women judged to be either significantly or casually HS. In other words, HS women who comprise 14% of the index cases have 50% of the HS relatives.

Taylor and Abrams (1973) examined 50 male and female patients with mania and inquired about 258 first-degree relatives. There were 8 homosexuals (16%) in the patient group. The authors conclude that alcoholism, drug abuse, and homosexuality were considerably in excess of that in the general population in this manic patient sample. Only 5 HS relatives were found, 3 among the 144 relatives of early-onset probands and 2 among the 114 relatives of late-onset probands. Alcoholism, drug abuse, affective illness, and sociopathy were reported as excessive ($p < 0.005$) among relatives of the early-onset probands only. Again, we do not know whether the few HS relatives were related to the HS probands.

These are among the many studies which suggest that there is a family linkage for affective illness and sociopathies such as alcoholism,

drug use disorder, and antisocial personality. Homosexuality is reported to be more common in the probands; however, incidence figures from prison and hospital populations are difficult to evaluate. Prison data may reflect situational homosexuality and may depend on the administrative policies of the prison, the criteria for "homosexuality," the method of history taking, etc. Thus, Guze *et al.* (1967) identified only 1% of women prisoners as HS, but Climent *et al.* (1977) found that 27% of 95 women prisoners at Framingham Prison were HS by self-report.

Hospital data must be similarly evaluated. The association between homosexuality and a given diagnosis may be biased if HS individuals frequent or avoid certain hospitals. A useful comparison might be the percentage of HS patients in the whole clinic population. At present, it seems safe to conclude that there is no proven association between homosexuality and any mental disorder.

DISCUSSION

The family study method is widely used by epidemiologists to study patterns of illnesses. While we assume that a HS orientation is not necessarily an illness, we view it as a trait appropriate for application of the family study method. The implications of establishing the familiality of sexual orientation can be derived by analogy to family studies of mental disorder.

The general purpose of the family study method is to identify variables—both biological and environmental—associated with the trait of interest and to see whether they run in families. For example, Winokur and his colleagues (Winokur, 1978) have used this method to define syndromes of depressive disorder based on symptoms and associated characteristics which are familial. Applied to sexual orientation, the family study method could suggest typologies of sexual behavior using characteristics such as age of onset, presence of effeminacy, preferred sexual practice, etc., if particular clusters of these traits were found to "breed true." Mental disorders such as alcoholism and manic-depressive illness as well as musical and artistic abilities are sometimes alleged to be more prevalent in HS individuals and in their families. The family study method is a way to gather evidence for the linkage between sexual orientation and other traits of interest to the investigator.

To identify a typology or syndrome from family data does not demonstrate its etiology. Winokur interprets his data as indicating that genetic factors are important in the etiology of the various depressive syndromes, an interpretation which is supported independently by adoptive, twin, and gene linkage studies. Under certain circumstances, ex-

amination of pedigrees alone will support the hypothesis that a trait is genetically influenced, for example, if the trait is due to the operation of a single gene of large effect. Usually, however, this support must come from other types of investigation, and evidence from pedigrees can only suggest whether it is worthwhile to undertake more definitive adoptive or linkage studies.

That a genetic predisposition could even be considered as a causal variable in the HS orientation seems, at first, paradoxical because, as Moran (1972) points out, the HS trait should be negatively selected and should eventually disappear except for occasional mutations. However, Hutchinson (1959) reasoned that genes for homosexuality could persist if they conferred a special advantage for the heterozygote; that is, if HS individuals and their kin have in their genetic makeup alleles that, in the heterozygote state, confer a reproductive advantage sufficient to balance the disadvantage of the homozygous HS phenotype. This advantage could be some characteristic unrelated to sexuality, such as enhanced IQ or, as Hutchinson suggested, a "paraphilia" that might be expressed by the capacity to make closer bonds of comradeship, to establish dominance, and to secure mates.

Alternatively, homosexuality may be an example of an "altruistic" behavior, that is, behavior which decreases the fecundity of the individual but benefits kin. This possibility was suggested by the geneticist W. D. Hamilton and expanded by Wilson, Trivers, and their students (Wilson, 1975; Kirsh and Rodman, 1977). Weinrich (1976) suggests that homosexuals in preliterate societies may have formed a "sterile caste" that provided special benefits for the kin group. If the gene, rather than the individual, is the unit of selection, behavior that diminishes individual reproductive fitness but benefits kin may be favorably selected.[6]

Developmental, social, demographic, prenatal hormones, and other environmental factors may also, of course, contribute to the development of sexual orientation and may also be strongly familial. Several investigators have noted the frequency among HS men of a family configuration typified by a close-binding, seductive mother and a passive, aloof father, often with the implication that the family interaction is responsible for the sexual orientation (Bieber *et al.,* 1962; Bene, 1965; Evans, 1969; Saghir and Robins, 1973). A family study may focus the investigator's attention on salient variables in the environment, since families with several HS members will likely exhibit such factors more clearly than families with few or no

[6]The intensity of selection at the gene, individual, and group levels is a highly complex question (see Williams, 1966), but the possibility of selection for reproductively "altruistic" behaviors seems fairly well established.

HS members. Again, however, the identification of a causal or predisposing factor generally requires other research strategies.

The present social climate makes it more possible than in the past for an investigator to obtain information about sexual orientation. We suggest that family studies be planned to examine the issues raised above and hope that the dimension of sexual orientation will be more frequently included in research employing the family study method.

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REFERENCES

Bene, E. (1965). On the genesis of male homosexuality: An attempt at clarifying the role of the parents. *Brit. J. Psychiat.* 111: 803-813.

Bieber, I., *et al.* (1962). *Homosexuality: A Psychonalytic Study.* Basic Books, New York.

Climent, C. E., Ervin, F. R., Rollins, A., Plutchik, R., and Batinelli, C. J. (1977). Epidemiological studies of female prisoners. IV. Homosexual behavior. *J. Nerv. Ment. Dis.* 164: 25-29.

Cloninger, C. R., and Guze, S. B. (1970). Psychiatric illness and female criminality: The role of sociopathy and hysteria in the antisocial woman. *Amer. J. Psychiat.* 127: 303-311.

Cloninger, C. R., and Guze, S. B. (1973). Psychiatric illnesses in the families of female criminals: A study of 288 first-degree relatives. *Brit. J. Psychiat.* 122: 697-703.

Dank, B. M. (1971). Six homosexual siblings. *Arch. Sex. Behav.* 1: 193-204.

Davison, K., Brierley, H., and Smith, C. (1971). a male monozygotic twinship discordant for homosexuality. *Brit. J. Psychiat.* 118: 675-682.

Ellis, H. (1922). *Studies in the Psychology of Sex. II. Sexual Inversion.* F. A. Davis, Philadelphia.

Evans, R. B. (1969). Childhood parental relationships of homosexual men. *J. Consult. Clin. Psychol.* 33: 129-135.

Friedman, R. C., Wollesen, F., and Tendler, R. (1976). Psychological development and blood levels of sex steroids in male identical twins of divergent sexual orientation. *J. Nerv. Ment. Dis.* 163: 282-288.

Gebhard, P. (1972). Incidence of overt homosexuality in the U.S. and Western Europe. In National Institute of Mental Health—Task Force, *Homosexuality: Final Report and Background Paper,* DHEW Publications No. (HMS) 72-9116.

Green, R., and Stoller, R. J. (1971). Two monozygotic (identical) twin pairs discordant for gender identity. *Arch. Sex. Behav.* 1: 321-327.

Guze, S. B., Wolfgram, E. D., McKinney, J. K., and Cantwell, D. P. (1967). Psychiatric illness in the families of convicted criminals: A study of 519 first-degree relatives. *Dis. Nerv. Syst.* 28: 651-659.

Henry, G. W. (1941). *Sex Variants: A Study of Homosexual Patterns.* Paul B. Hoeber, New York.

Heston, L. L., and Shields, J. (1968). Homosexuality in twins. *Arch. Gen. Psychiat.* 18: 149-160.

Hoenig, J., and Duggan, E. (1974). Sexual and other abnormalities in the family of a transsexual. *Psychiat. Clin.* 7: 334-346.

Holemon, R. E., and Winokur, G. (1965). Effeminate homosexuality: A disease of childhood. *Amer. J. Orthopsychiat.* 35: 48-56.

Hutchinson, G. E. (1959). A speculative consideration of certain possible forms of sexual selection in man. *Amer. Naturalist* 93: 81-91.

Kallmann, F. J. (1952). Comparative twin study on the genetic aspects of male homosexuality. *J. Nerv. Ment. Dis.* 115: 283-298.

Kenyon, F. E. (1968). Studies in female homosexuality—IV & V. *Brit. J. Psychiat.* 114: 1337-1350.

Kinsey, A. C., Pomeroy, W. B., and Martin, C. E. (1948). *Sexual Behavior in the Human Male.* Saunders, Philadelphia.

Kinsey, A. C., Pomeroy, W. B., Martin, C. E., and Gebhard, P. (1953). *Sexual Behavior in the Human Female.* Saunders, Philadelphia.

Kirsh, J. A. W., and Rodman, J. E. (1977). The natural history of homosexuality. *Yale Scientific* (Winter): 7-13.

Klintworth, G. K. (1962). A pair of male monozygotic twins discordant for homosexuality. *J. Nerv. Ment. Dis.* 135: 113-125.

Margolese, M. S., and Janiger, O. (1973). Androsterone/etiocholanolone ratios in male homosexuals. *Brit. Med. J.* 3: 207-210.

Melnick, M., Myrianthopoulos, N. C., and Christian, J. C. (1978). The effects of chorion type on variation in I. Q. in the NCPP twin population. *Amer. J. Human Genet.* 30: 425-433.

Mesnikoff, A. M., Rainer, J. D., Kolb, L. C., and Carr, A. C. (1963). Intrafamilial determinants of divergent sexual behavior in twins. *Amer. J. Psychiat.* 119: 732-738.

Moran, P. A. (1972). Familial effects in schizophrenia and homosexuality. *Aust. N. Z. J. Psychiat.* 6: 116-119.

Parker, N. (1964). Homosexuality in twins: A report on three discordant pairs. *Brit. J. Psychiat.* 110: 489-495.

Perkins, M. W. (1973). Homosexuality in female monozygotic twins. *Behav. Genet.* 3: 387-388.

Rainer, J. D., Mesnikoff, A., Kolb, L. C., and Carr, A. (1960). Homosexuality and heterosexuality in identical twins. *Psychosom. Med.* 22: 251-259.

Saghir, M. T., and Robins, E. (1973). *Male and Female Homosexuality,* Williams & Wilkins, Baltimore.

Taylor, C. C. (1971). Marriages of twins to twins. *Acta Genet. Med. Gemmellol.* 20: 96-113.

Taylor, M., and Abrams, R. (1973). Manic states. A genetic study of early and late onset affective disorders. *Arch. Gen. Psychiat.* 28: 656-658.

Weinrich, J. D. (1976). Human reproductive strategy. I. Environmental predictability and reproductive strategy: Effects of social class and race. II. Homosexuality and nonreproduction: Some evolutionary models. Unpublished doctoral dissertation, Department of Biology, Harvard University.

Williams, G. C. (1966). *Adaptation and Natural Selection: A Critique of Some Current Evolutionary Thought.* Princeton University Press, Princeton, N.J.

Wilson, E. O. (1975). *Sociobiology: The New Synthesis.* Belknap Press, Cambridge.

Winokur, G. (1978). Mania and depression: Family studies and genetics in relation to treatment. In Lipton, M. A., DiMascio, A., and Killam, K. F. (eds.), *Psychopharmacology: A Generation of Progress,* Raven Press, New York.

Zuger, B. (1976). Monozygotic twins discordant for homosexuality: Report of a pair and significance of the phenomenon. *Compr. Psychiat.* 17: 661-669.

Zuger, B. (1978). A neglected source-book on homosexuality. *Brit. J. Psychiat.* 133: 87-88.