

# Homosexuality and Heterosexuality in Identical Twins

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THE VALUE of the twin study method has been demonstrated as a means of approaching the study of genetic determinants of the mental disorders. Kallmann's<sup>1</sup> studies, which disclosed the concordant occurrence of the schizophrenic reaction in a large series of one-egg twins as contrasted to the low concordance in two-egg twins and siblings, are a model example of this type of investigation.

Such studies have concerned themselves largely with the concordance of similar types of personality organization. In its large context the following presentation represents the initial step in a series of studies directed to examining those factors responsible for the divergent development of behavioral traits in identical twins. It utilizes a variation of the co-twin control method which consists in observing selected pairs of one-egg twins whose physiological reactions and psychological adaptations may be compared under different life conditions. The present design is arranged to examine identical twin pairs with divergent development using current physical and biological (biochemical and tissue exami-

nations), and psychological and historical (psychoanalytical) techniques and family studies for their possible correlations with dissimilarities in a given behavioral trait. Through comparing the developmental process within the twin pair and between other identical twin pairs presenting similar differences in behavior it is believed that some weighting may be given to the significance of various continuing and incidental postnatal experiences (transactions) that appear related to the occurrence of particular traits. Thus the design of the study offers the opportunity of examining the significance of life experiences with more certainty, as the genetic factor is held constant in the identical twin pair. Also it follows from the design of this clinical study that the significance of particular life experiences may be determined, and perhaps be given a quantitative weighting as well, by studying their occurrence in identical twins with concordance for the trait. Furthermore, this design allows a new means for verifying or modifying the hypotheses of other retrospective examinations of the developmental process.

While the potential value of such an approach is evident, its complexity must not be overlooked. It may be assumed generally that the genic pattern of identical twins is likewise identical. However, the pathway from this postulated molecular structure to

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the manifestation in later life of a behavioral trait is a tortuous one. Modern genetic theories do not preclude changes in gene action due to minor shifts in the balance of forces in the total chromosomal or nuclear structure, which thereafter perpetuate themselves via divergent biochemical pathways, while interactional patterns during embryonic life leading to gross phenotypic differences can only broadly be subsumed under the heading of "expressivity." Intensive study of dissimilar pairs is bound to throw light on important developmental phenomena.

### Etiology of Homosexuality

Theories of the etiology of homosexuality range from those that consider the homosexual as a genetic intersex with female chromosome structure to those that consider him as a product of social or interfamilial pressure. The former theories, akin to Goldschmidt's biological findings in lower organisms,<sup>2</sup> were based on the supposed preponderance of males among the siblings of homosexuals<sup>3</sup> and either infertility or the production of only females in their offspring. These findings were supposed to follow from the possession of two X chromosomes in the genetic structure of the individual, and are now subject to more definitive study since the development of facile methods of determining chromosomal sex.<sup>4</sup> Although there is evidence that as many as one male in 400 has two X chromosomes,<sup>5</sup> a number of studies thus far have failed to demonstrate this female sex chromatin pattern in male homosexuals.<sup>6,7</sup> This is not surprising, since various forms of hermaphroditism or eunuchoidism have never been shown to be connected with homosexual wishes or behavior.<sup>8,9</sup>

Twin and family studies of homosexuality have suggested that genetic mechanisms of some kind may play a part in the process of psychosexual maturation leading to overt homosexual behavior. The largest series of twins was reported by Kallmann, who compared 40 monozygotic and 45

dizygotic male twin pairs.<sup>10</sup> Although procedural difficulties prevented extension of this study, the homosexuality rate among dizygotic co-twins of homosexual index cases did not appear to differ significantly from that among brothers. In either category, about 60 per cent revealed no evidence of overt adult homosexual experience, a figure similar to Kinsey's rate for the whole male population. In the monozygotic pairs, on the other hand, all were fully concordant as to the regular and overt practice of homosexuality, although no mutuality was ever reported. In his original study, Kallmann viewed homosexual behavior in the adult male as an "alternative minus variant" in the integrative process of psychosexual maturation rather than as a simple and codifiable entity. Postulating that the attainment of a maturational balance may be disarranged at different developmental stages and by a variety of disturbing mechanisms, he stated:

... the general conclusion that habitual predominance of a homosexual behaviour pattern results from disturbing experiences only in a limited number of persons, by no means minimizes the psychodynamic significance of these constellational factors in potentially vulnerable individuals.

In *Three Essays on the Theory of Sexuality*, Freud<sup>11</sup> expressed a similar opinion:

The nature of inversion is explained neither by the hypothesis that it is innate nor by the alternative hypothesis that it is acquired. In the former case we must ask in what respect it is innate, unless we are to accept the crude explanation that everyone is born with his sexual instinct attached to a particular sexual object. In the latter case it may be questioned whether the various accidental influences would be sufficient to explain the acquisition of inversion without the cooperation of something in the subject himself. The existence of this last factor is not to be denied.

According to psychoanalytic theories, heterosexual object choice in the male homosexual is excluded by fear of the female due to early castration anxiety or disappointment concerning the mother. The

individual thus identifies with the frightening or frustrating mother and loves other men as he wished to be loved himself. Further, he may in his identification seek to be loved as she is by the father. Thus simultaneously he accomplishes a passive submission to the fearful male as a way of checking competitive hatred in the rivalry situation. Such rivalry may also occur between brothers.

These conceptual schemes provide various means to understand the motivational context in which the homosexual conflict appears. However, as Freud suggested, they do not explain why this conflict develops only in certain persons, and why only in certain persons is it overtly manifested. It is actually to this age-old problem of symptom choice, if you will, that a combined genetic and developmental study may be directed.

#### Differences in Twin Personality Development

Before turning to the plan of twin investigation and to the case material, it is important to bear in mind that psychoanalytic observation of twins in the past has found that certain phases of personality development differ from those found among children brought up in ordinary sibship families or as only children.<sup>12</sup> These phases lead to exaggerated conflicts and tendencies toward specific adaptations. They are briefly summarized as follows:

The maternal attitude toward twins is often one of rejection and shame, followed later by preoccupation with an exploration of the similarities and differences in the twins. Twins that cannot be easily distinguished frequently induce maternal anxiety in her need to determine which child is to obtain from her an appropriate show of emotion. Since some mothers consciously indicate their inability to love until a difference is found, the search for distinguishing marks is of significance. Insistence on similarity, on the other hand, may represent an exhibitionistic and narcissistic pleasure on the part of the mother.

The paternal attitude toward twins may be either rejection of the twins as burdensome, or pride in them as evidence of the father's sexual capacities.

The twin pair may have difficulty in establishing strong self-images if they identify with each other. The constant emotional and psychological closeness may interfere with the independent development of learned functions. Also, twins usually have an intense rivalry problem to which they may adapt by attaching themselves to one or the other parent or by always adopting the same desires and sacrificing individual drives. Intense jealousy thus generates exaggerated hostile death wishes toward each other that in turn demand compensatory efforts at repression, again bringing the twins together. These problems, of course, are not inevitable, but they represent extreme forms of intrafamily adaptive mechanisms which must be understood and taken into consideration in the clinical investigation or management of families with twins. They may exist in all twins, identical or not, although they may be presumed to play a stronger and more persistent role, the more similar the twins happen to be.

#### Observations

In planning the study of divergent sexual behavioral patterns as they exist in identical twins, a search was made for appropriate twin pairs. A survey of a considerable number of one-egg pairs over the past 4 years yielded only two pairs with overt differentiation in behavior.\* The first was a female pair diagnosed as schizophrenic with differences in their sexual roles, as yet unexpressed by actual sexual contact. The second was a male pair, psychoneurotic, with one exclusively and consistently overtly homosexual in his behavior, the other similarly heterosexual.

The plan was to investigate the twins, preferably by the free-association method and by family and social studies, looking

\*Since this paper was presented, two additional twin pairs have been found with divergent sexual development.

for the patterns of interpersonal interaction which influenced their psychosexual development, and to study their similarities and differences through physical, biological (biochemical and tissue studies), and psychological examinations.

#### Twin Pair 1

The first pair of identical twins presented divergent development in their sexual role pattern not accompanied in the "homosexual" twin by intimate genital contact with a member of the same sex. Their study was important as a means of exploring the methods of later examinations. Rosalind and Roberta, as we may call them, were born unwanted; the mother, desiring more time to care for her firstborn, a son, attempted unsuccessfully to abort when she found she was pregnant again. The first born, Rosalind, has the heterosexual orientation. The second born, Roberta, was given a derivative of a boy's name intentionally by the parents. The mother was able to distinguish them immediately, as Rosalind had a small birthmark on the forearm and upper lip. These marks were frequently sought for by the mother, maternal grandmother, and maternal aunt who examined and constantly touched them. Since the focus of interest rested in pointing out and touching Rosalind's distinguishing physical feature, Roberta received much less physical handling and caressing than her twin sister.

The favored child developed a heterosexual orientation and was the less disturbed in her psychosis, and the child with the homosexual role was the one rejected by both parents. Before the age of five she was severely mistreated by the father, who beat her and chained her in the basement. She was unfortunate in having no person outside the family with whom to identify, and seems to have established a hostile identification with the male parent, whom she saw as dominant and threatening. Since both parents were felt to prefer boys, this identification apparently meant greater acceptance and represented a reaction forma-

tion against the feminine role of her sister. It is interesting to note that in later life her delusional system was fixed upon the need to develop a venous marking on the forearm, which would at once give her a distinguishing mark like her sister and establish her as a boy and man.

Although neither member of this pair was amenable to free-association investigation, study of the pair helped in the formulation of the factors to be considered in later work. Thus it was decided to direct particular attention to the examination of the prenatal attitudes of each parent to the birth, their fantasies in regard to the desired sex of the child, their attitude at birth (pleased, anxious, expectant), and the family significance of the names chosen. Further important parental attitudes were those relating to bodily differences in the twins as a means of distinguishing them and their later relationship to each twin. This material was sought through interviews with both parents.

From the twins, data were elicited comparing their psychopathology, as well as their attitudes to their bodies and body parts, their self-concept as the result of the family interactional pattern from which these attitudes derived, their attitudes to being a twin and to separation from the twin, and their fantasy and dream life, important experiences, and significant relations with others.

#### Twin Pair 2

Soon after the first pair of twins was seen, a 29-year-old male clerical employe, who may be called Tom, presented himself for treatment with the complaints of disliking his job and having difficulty in relating to people, especially women. He was taken into psychoanalytic therapy. His twin, Dick, discovered to be living an active homosexual life, was asked to come in for studies, including 25 hours of free-association interview, for which he was compensated. He has maintained his disinterest in therapy and in changing his sexual orientation.

These twins were born to parents who already had a daughter. The parents desired sons. The twins could be distinguished at birth, since Dick, the later homosexual twin, had a more pronounced split in his lower lip due to a defective closure in the median labial fissure. This fact was revealed only through interviews with the parents and a search of old pictures. Dick was further singled out by the cold and inhibited mother because he was supposed to be weaker, although it is possible she had an earlier preference for Tom. At any rate, Tom was associated in the mind of the mother with a difficult and severe labor to which she referred many physical disabilities and for which she often blamed him in later life. Named for his father, and rejected by his mother, he found his warmth and support in his paternal grandmother and a young nursemaid. As he repressed his jealous rage toward his brother and his fear and hatred of his parents, he became withdrawn, felt alienated, was doubtful of himself, and suffered periodic depression.

Both twins were seduced homosexually in their early adolescence, the homosexual at age 11, the heterosexual at age 13. Later they were both caught at school in some homosexual play with other boys. Only the heterosexual twin, Tom, recalls a warning and reprimand by his father for such activities. Dick's first attempts at sexual play with a girl were reported by her to her parents, an experience which was frightening to him. While the boys' parents discouraged both of them in their contact with girls, Tom had his first heterosexual experience in his late teens, while his brother Dick began a long series of homosexual attachments. The parents became aware of the latter activity when he was expelled from college. The mother has maintained a permissive and denying attitude in regard to his homosexuality, visiting him and his male paramour in their apartment. The other twin, Tom, after a series of affairs with older women, married during the course of his psychoanalysis.

The marriage has been satisfactory over a period of a few years, although no child as yet has been conceived.

### Physiological Data

In these twins, zygoty was determined by the similarity method as outlined by Smith and Penrose;<sup>13</sup> based on the seven blood groups for which the twins are identical, as well as on fingerprint analysis,<sup>14</sup> the probability of their being monozygotic is 0.9954.

Steroid analysis was carried out on 24-hour urine specimens collected on both twins under identical controlled conditions in the hospital (by Dr. Perry B. Hudson). The identity of the steroid substances was established by detailed chromatographic and spectrophotometric procedures, including infrared analysis.

Eleven steroid substances were detected in the specimens of both twins. The most abundant steroid found in both in approximately equal quantities was  $11\beta$ - $17\alpha$ - $20\beta$  21-tetrahydroxy- $\Delta_4$  pregnene-3. This is a normal urinary metabolite of cortisol, the major steroid known to be secreted by the human adrenal. Four 17-ketosteroids, androsterone being the most obvious, were detected in both specimens. Thus, urinary steroid patterns of these twins were qualitatively and quantitatively similar.

Chromosomal sex determinations using specimens of buccal mucosa were obtained (by Dr. Melvin Grumbach). These revealed a male chromatin pattern in both.

### Psychological Test Findings

The psychological test findings\* on Tom and Dick taken at the beginning of Tom's treatment presented interesting similarities and dissimilarities. In general, intellectual functions were similar, with each twin at the bright normal level of intelligence. (Tom's I.Q., 117; Dick's I.Q., 113). While hewing to a much more conventional ap-

\*The following tests were administered: Wechsler Adult Intelligence Scale, Rorschach, Sentence Completion, Second Body Cathexis Scale, Draw-a-Person, and Bender Gestalt tests.

proach to life's problems than Dick, Tom appeared relatively less able to operate productively and creatively. In spite of the dissimilarity of their overt expression in the sexual area, underlying conflicts and unconscious motivations were strikingly similar. Marked sexual confusion was apparent in each record and would not have distinguished one twin from the other. Tom (heterosexual) demonstrated a greater need to present a heterosexual façade and gave Rorschach responses including a vagina, penis, and anus. Dick's (homosexual) record included only anal-sexual responses. The distortion in body image appeared greater in Tom; his figure drawings showed greater confusion and his expressed dissatisfaction with his own body was more marked. Anxiety and feelings of depression were also greater in Tom's protocol. In terms of the over-all evaluation of the data, Dick showed evidence of less anxiety, with ego defenses more effective than those of Tom in spite of the less conventional sexual adaptation of the former.

### Discussion

In its design, this study differs from previous efforts to examine the human developmental process. The genetic factor may be assumed as constant through selection of identical twin pairs with divergent psychosexual roles as subjects. It must be emphasized again that the finding of suitable subjects for such studies is most difficult. Not only are such twin pairs rare but also the design is impaired in this instance through inability to have one of the male twins motivated for psychoanalysis and to find both of the female pair able to communicate to the point of providing free-association material. Nevertheless, in the male pair, the homosexual twin did provide free-association material pertinent to elucidating his developmental experiences over a 25-hour period when offered his expenses for the time given. Material gained through free association over brief periods and under similar circumstances has been used by others in the past to construct a

definition of personality development, and such information has been found similar to that obtained under the usual circumstances of psychoanalytic practice where the patient is required to pay a fee. From the standpoint of the writers a greater defect exists in the fact that the homosexual twin was studied by the free-association method over a period of approximately one-tenth the time that the heterosexual was studied. In the case of the heterosexual twin, highly significant data, particularly in relation to experiences with important extrafamilial female figures, were obtained only after hours of free association. Nevertheless, it is believed that this pilot study has disclosed a series of parental attitudes and transactions with each twin that led to the resulting overtly variant sexual behaviors.

Psychosexual confusion coupled with body image distortion were found in both twins in psychological testing but were greater in degree in the heterosexual twin. There existed in each of these brothers an increased body preoccupation. More intense in the heterosexual twin, it showed itself in extreme self-devaluation, sexual confusion, and poor self-identity. The homosexual brother also showed some self-derogation when interviewed, but there had been less parental devaluation and a better sense of identity existed from early years. Aided by these factors, but more fearfully involved with his mother, he had been able to transfer his concern from his own body to another person of the same sex and achieve some kind of love relationship in a homosexual attachment.

The mother blamed the last-born heterosexual twin for her difficult labor and subsequent invalidism, and by distinguishing the two through slight physical differences, admittedly bestowed preferential physical contact on the other. Considering his brother to be his mother's favorite, the heterosexual twin was estranged from his mother. It became clear in his analysis that his estrangement was basically self-imposed and determined by guilt relating to his repressed rage toward his mother and broth-

er. With this separation from the mother he obtained his satisfactions from a kind and accepting grandmother, a warm and feminine nursemaid, and some degree of guidance from an otherwise passive father. From them he turned in early adulthood to a series of immature and compulsive heterosexual attachments, with concomitant submergence of his aggressivity, which have been interpreted as a reaction formation against his own homosexual fears.

The homosexual twin, on the other hand, was held closely to the mother who preferred him, overprotected him as being physically less able than his brother, derogated his father to him, frustrated his attempts to contact girls, and acted permissively toward his homosexual life—a family pattern which one of us has defined earlier as leading to overt homosexual activity.<sup>15</sup> His homosexual pattern also represents a submissive adaptation to an originally aggressive brother.

The paternal relationship was significant in establishing a heterosexual role for the maternally rejected twin by providing him a focus for masculine identification and also through establishing a masculine ideal through nonpermissiveness regarding homosexual behavior.

It may be noted that biologically the socially appropriate sexual behavior in these twins appears unrelated to the quantity or degree of the psychopathology. Moreover, homosexual seduction in itself did not determine overt homosexual behavior in adulthood, since both twins were seduced between the ages of 11 and 13.

Thus, this study sought for differences in the developmental processes of these one-egg twins which might help to explain the alternate modes of preferred sexual gratification eventually evolved. The parents of these twins had wanted a boy and upon their birth sought for distinguishing body features. The mother created an especially close bond between herself and the first born twin who had the distinguishing facial feature, was supposed to be weaker, and had not injured her during pregnancy.

Body ego development, poor for both, was less pathological for this twin. Nevertheless, fearful and frustrated in his close maternal relationship, he apparently formed a hostile identification with her which contributed to his homosexual pattern. The less-favored twin, his greater strength only a source of guilt to him, withdrew from the mother and did form an identification with the father. Because of the father's own weakness, this identification did not provide a significant ideal image, yet revealed itself in analysis to have been a potential source of ego strength. Most significant for his future object relationships were female figures other than his parents—namely his grandmother and nursemaid. As he grew, he developed reaction formations against both aggressivity and the homosexual adaptation which his brother assumed. Homosexual dreams in this twin occurred only once during his analysis, and then as a reaction to a currently disturbing conception of heterosexuality as murderous aggression toward the woman. As can be seen, the factors which operated in the differentiation of sexual roles in the female twins were similar to those reported in this male pair, except that in the instance of the homosexual girl twin there was an absence of significant interpersonal relations outside the family.

### Summary

Two sets of identical twins, one male and the other female, have been studied in whom the development of the overt psychosexual role was divergent in the sense that one of each pair was heterosexual while the other was homosexual. In the male pair the roles were overtly determined to the extent of genital satisfaction; in the adolescent female pair the roles were determined but without as yet overt sexual intimacies.

The determining life experiences for the differentiation of the sexual role were found in the prenatal fantasies of the parents of one pair for a child different in sex from that of the twins at birth; and a slight

but definite anatomical differentiation in the twins which determined for the mother a special attachment for one or the other child. There resulted early differentiation of the body ego for each of the individuals and later in life enhancement of the sexual role through the existence or deprivation of significant extrafamilial relations. Of significance also was the parental attitude toward the role of the individual child disclosed through the naming of the child.

Biologically appropriate sexual behavior was unrelated to the type or degree of psychopathology.

Homosexual seduction in itself was not found to determine homosexual behavior nor deter heterosexual behavior.

Neurological and various biochemical examinations failed to reveal differences between these identical twin pairs divergent for homosexuality and heterosexuality.

### References

1. RAINER, J. D., and KALLMANN, F. J. The role of genetics in psychiatry. *J. Nerv. & Ment. Dis.* 126:403, 1958.
2. GOLDSCHMIDT, R. *Physiological Genetics*. New York, McGraw-Hill, 1938.
3. LANG, T. Studies on the genetic determination of homosexuality. *J. Nerv. & Ment. Dis.* 92:55, 1940.

4. MOORE, K. L., and BARR, M. L. Smears from the oral mucosa in the detection of chromosomal sex. *Lancet* 2:57, 1955.
5. MOORE, K. L. Sex reversal in newborn babies. *Lancet* 1:217, 1959.
6. PARE, C. M. B. Homosexuality and chromosomal sex. *J. Psychosom. Research* 1:247, 1956.
7. RABOCH, J., and NEDOMA, K. Sex chromatin and sexual behavior. *Psychosom. Med.* 20:55, 1958.
8. MONEY, J., HAMPSON, J. G., and HAMPSON, J. L. Hermaphroditism: Recommendations concerning assignment of sex, change of sex, and psychologic management. *Bull. Johns Hopkins Hosp.* 97:284, 1955.
9. MONEY, J., HAMPSON, J. G., and HAMPSON, J. L. An examination of some basic sexual concepts: The evidence of human hermaphroditism. *Bull. Johns Hopkins Hosp.* 97:301, 1955.
10. KALLMANN, F. J. Comparative twin study on the genetic aspects of male homosexuality. *J. Nerv. & Ment. Dis.* 115:283, 1952.
11. FREUD, S. *Three Essays on the Theory of Sexuality*. London, Imago Publishing Co., Ltd., 1949.
12. BURLINGHAM, D. *Twins: A Study of Three Pairs of Identical Twins*. New York, Internat. Univ. Press, 1952.
13. SMITH, S. M., and PENROSE, L. S. Monozygotic and dizygotic twin diagnosis. *Ann. Human Genetics* 19:273, 1954-55.
14. NIXON, W. L. B. "On the diagnosis of twin-pair ovularity and the use of dermatoglyphic data." In *Novant' Anni delle Leggi Mendeliane* by Prof. Luigi Gedda. Istituto Gregorio Mendel, Rome, 1956, pp. 235-245.
15. KOLB, L. C., and JOHNSON, A. M. Etiology and therapy of overt homosexuality. *Psychoanalyt. Quart.* 24:506, 1955.

### Discussion

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CONTRARY to what my reputation may lead one to expect, my real goal is to help in promoting pluridimensional concepts of etiology which would fully reconcile current psychodynamic and psychogenetic theories of disordered behavior, in sex maturation patterns as well as in other areas of personality integration. I am delighted, therefore, to have been

invited to discuss this interesting report by my colleagues at the New York State Psychiatric Institute. Having had no hand in this well-presented study, I am free to underscore its good timing and unquestionable significance.

It is gratifying, although by no means unexpected, that the search for a one-egg pair of nonschizophrenic males, found at age 30 to



be dissimilar as to overt homosexuality, has at long last been successful. Even if this were not a single pair, it would be immaterial whether such twins were classified as partly concordant for homosexual behavior or as largely discordant. Certainly, the twin who is now heterosexual falls below Group 3 on Kinsey's rating scale, which was used in our earlier study of twin index sibships.<sup>4</sup>

Methodologically, it is more important to emphasize that, in a series of one-egg twins, a 100 per cent concordance rate is regarded as a statistical artifact even in a highly specific sequence of faulty biosynthetic steps triggered by a major mutant gene. Indeed, the assumption of such a fixed relationship between primary gene effect and its behavioral endpoint would put us back in that unhappy stage when a genetic hypothesis was a wastebasket abstraction about which one knew little and could do even less.<sup>5</sup> Fortunately, recent advances in psychogenetic techniques have been so remarkable that numerous subbasement structures of genically disarranged behavior patterns no longer deserve the label *terra incognita*.<sup>2</sup>

As to the genetic aspects of male homosexuality, no biologist would assume that "the tendency to substitute reproductively nonsignificant sexual goals for a mate of the opposite sex"<sup>3</sup> is reducible to a homogeneous maturational deficiency state produced by a single genetic factor. Obviously, the potentials for a mature form of sexual behavior depend on the balanced effect of many genes, and the concept of a coadapted polygenic system implies that different genetic mechanisms may produce correlated responses. Known to have pleiotropic effects, polygenes can act both as modifiers of other genes and as determinants of traits for which no major gene differences are demonstrable.<sup>6</sup>

To do justice to both psychoanalytic and genetic data on homosexuality, it has been suggested that the most probable mode of operation of its gene-specific components with a pleiotropic effect may be "on the rates of development of neuropsychological mechanisms involved in identification processes and other aspects of object relationship in infancy."<sup>3</sup> At the present stage of information it is quite possible that this somewhat generalized hypothesis is the simplest explanation of the observations made in twin studies.

Even if this hypothesis should ultimately have to be modified as additional facts are provided by new research methods, I am confident that the histories of the twins studied so painstakingly by Dr. Rainer and his co-workers will prove of lasting value. We know that many important discoveries have come from investigations undertaken to explore some hypothesis that later called for refinement.<sup>1</sup>

### References for Discussion

1. FEIBLEMAN, J. K. The role of hypotheses in the scientific method. *Perspectives Med. & Biol.* 2:335, 1959.
2. GRUMBACH, M. M., and BARR, M. L. "Cytologic Tests of Chromosomal Sex in Relation to Sexual Anomalies in Man." In *Recent Progress in Hormone Research*. New York, Acad. Press, 1958, vol. 14.
3. HUTCHINSON, G. E. A speculative consideration of certain possible forms of sexual selection in man. *Amer. Nat.* 93:81, 1959.
4. KALLMANN, F. J. Comparative twin study on the genetic aspects of male homosexuality. *J. Nerv. & Ment. Dis.* 115:283, 1952.
5. KALLMANN, F. J. The use of genetics in psychiatry. *J. Ment. Sc.* 104:542, 1958.
6. LERNER, I. M. *The Genetic Basis of Selection*. New York, Wiley, 1958.