JOHN MONEY

GAY, STRAIGHT, AND IN-BETWEEN

The Sexology of Erotic Orientation

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For Libby Hopkins and all other members of my extended family together with all other morally sane people everywhere who bestow equality on others regardless of whether they are heterosexual, homosexual, or bisexual.

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Contents

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Introduction

In New Zealand's forestry business, exotic evergreen species from the Northern Hemisphere mature more rapidly than in their colder, native habitat, and are ready for harvesting in thirty to thirty-five years. One of these exotic forests is the image that I see in my mind's eye when I view the manuscript of this book. It is a down-under image, for I left New Zealand in 1947 at the age of twenty-six, and in 1950, while a doctoral student at Harvard, began planting the seedlings of intersex research that are now harvested in this book, over thirty years later. It has been evident to me for some time that this particular harvest time was due, since an unending succession of people, especially those from the print and electronic media, request an account by telephone, or on camera, of the significance of my sexological and psychohormonal research publications for today's understanding of homosexuality. "Is it nature or nurture? Biological or psychological?" These are the commonest questions. Their response has required a semester's course condensed into an hour!

The impetus to write a complete account of the significance of my clinical sexological research for the theory of homosexuality—and, therefore, of bisexuality and heterosexuality as well—instead of continually repeating an hour's course, was launched by the American Psychological Association (APA), when it notified me that, at its ninety-third Annual Meeting in Los Angeles, I would receive its 1985 Distinguished Scientific Award for the Applications of Psychology. Then, on August 25th, 1986, at the ninety-fourth Annual Meeting in Washington, D.C., I would deliver the award-winner's address. The title of my address, I decided, would be "Sin, Sickness, or Status? Homosexual Gender Identity and Psychoneuroendocrinology." I would summarize the significance for homosexual theory of my long-term, outcome studies of selected endocrine syndromes, many of them of prenatal onset. It immediately became obvious that I would, in the fifty minutes allocated, be able to deliver only a very abridged version of what I would write for publication in the *American Psychologist* (Money, 1987c). Even so, the written version would itself be heavily condensed; and it would also omit syndromes that, although relevant, are primarily cytogenetic rather than hormonogenic in prenatal origin. These considerations notwithstanding, the

written version would have its own coherency and unity. Since I had an overabundance of other commitments, it might well have to stand alone, and on its own merits. However, fate would decide otherwise.

In the spring of 1986 I was delivered an edict: the space allocated to the Psychohormonal Research Unit in the building that houses the Department of Psychiatry and Behavioral Sciences would be reallocated. The new space would be away from the hospital campus in a commercial building. No further explanation would be given. There would be no appeal. The distance of the new location from the hospital would, I knew, prevent continued synchronization of patients' psychohormonal schedules with their other inpatient and outpatient schedules. I envisioned myself in a position reminiscent of that of my illustrious forebear at Johns Hopkins, John B. Watson, the founder of the school of behaviorism in psychology. In 1920, for reasons not fully disclosed at the time, he too had been evicted not only from his space, but also from his job (Magoun, 1981; Pauly, 1979). My reaction was to write this book.

In May 1986, I had been the discussant for the opening session of The Second Kinsey Symposium, "Homosexuality/Heterosexuality: The Kinsey Scale and Current Research" (McWhirter, Sanders, and Reinisch, 1988). I discussed the need for a criterion of what is male and what is female, so as to put some constraints on the chaos of undisciplined cultural relativity, while at the same time respecting cultural diversity and accommodating also the incongruities of hermaphroditism. Even in cases of infertility, I said, the basic criterion of the male/female distinction, acceptable in all branches of biology, is the male/female difference in procreation. In the overall context of homosexuality, this criterion is not as straightforward as it seems. It was not acceptable to some of the scholars in humanities and social science present at the symposium. Their discontent, and their lack of an alternative, warned me that I should, perhaps, deal in more detail with the criteria of male and female, homosexual and heterosexual, in what I was preparing for the APA. Such discursiveness would, however, lead me far from my original intention of writing a paper into writing this book.

In the early stage of planning, I considered the possibility of having a book in three parts. Part One would be a narrative survey. Part Two would be an anthology of those of my own clinical research publications surveyed in Part One. Part Three would be a portfolio of matched pairs of psychohormonal biographies in which each member of the pair was diagnostically concordant for intersexual prenatal history, and discordant for postnatal history as male or female by rearing; or concordant for rearing but discordant for prenatal diagnostic history. For reasons of time, space, and cost, Parts Two and Three were put on hold, and Part One was expanded to become the present book.

If there were a single term with which to denote the sexology of homosexuality, heterosexuality, and bisexuality, that would be the term for the title of this book, for the understanding and explanation of any one of the three applies to the other two as well. Homosexology fails to qualify as

signifying the sexology of mankind, for according to its other etymology it signifies also the sexology of same-sexed partners, that is of homosexuals. The term sexology itself also fails to qualify, as its meaning is already established as encompassing more than the science of sexual orientation as homo-, hetero-, or bisexual.

One way around this terminological impasse would be to have a word like fuckology, used in everyday, vernacular English to signify the science of what it is that people actually do under the cover of polite expressions like making love or having sex. To love does not mean to fuck, and to sex is not even a verb, except when it means to determine the sex of, for instance, newly hatched chicks. The polite synonyms for fuck as a noun are coitus, copulation, and sexual intercourse, but no one who speaks English as a native language would invite a partner of either sex to coit, to copulate, or to intercourse. Nor would the two say they had a good coition, copulation, or intercourse.

Dictionaries are of no help in providing a polite synonym for the term that still exists in disgrace, debased and dishonored. A dictionary search a few years ago yielded two quasi-archaic words that survive in bawdy verse (Money, 1982). Quim, of Welsh origin, signifies what a woman does to a man when she takes charge of his quim stick, or quim wedge. Swive, of Anglo-Saxon origin, signifies what a man does to a woman. But there is no corresponding word of non-Latin origin for what two people do together, mutually, either heterosexually or homosexually, other than fuck—except, perhaps, that by de-Anglicizing the spelling and the pronunciation, they phuck (pronounced fook). The derivation of this neologism is from the Greek verb, *phuteuein,* to sow or plant in the ground; hence, to beget, and thus to impregnate. The aorist passive of this verb is *ephuchthen,* the gerund *phuktos,* and the gerundive *phukteos.* For this etymological Greek connection, I am indebted to James C. G. Conniff (personal communication, based on the 8th edition, p. 1702, of Liddell and Scott's *Greek Dictionary,* American Book Co., New York, 1897). He recalled that Sophocles used the term in Antigone with its meaning of impregnate, as had Aeschylus before him. He quoted from Shakespeare's *Julius Caesar:* "He ploughed her, and she cropped"; and from Aldous Huxley's *Devils of Loudun* (p.186), Sister Claire, one of the nuns accused of devil possession, went into a hysterical seizure and cried out repeatedly, "*Venez donc, foutez-moi,*" which in French signifies the same lewd abandon as does "Come on, fuck me," in English. The modern spelling of *foutez* is *foutrez,* the infinitive of the verb being *foutrer,* from which is derived the noun, *le foutre,* a contemporary vulgarism for the ejaculate. These French words are derived through the Greek from the Latin, *futuere,* to have connection with a female. Lewis and Short, in their *Latin Dictionary* Oxford, 1879), say that usage of the word is rare; and an undated edition of last century's *Ainsworth's Dictionary* abridged for use in American schools gives no definition and specifies only that the word is obscene.

There is a corresponding implication of obscenity or, at least, of vulgarity

in the modern Italian equivalent of the Latin *futuere*, namely *fottere*, which is used with the same significance as the English, *to fuck*. The polite Italian synonym for *fottere* is *figere*, which corresponds to the French *ficher*. Both mean to drive or thrust into. Both are soundalikes of the German, *fichen*, the term that is applied to the copulation of pigs and dogs and that is not acceptable in polite company. The English pronunciation of the German *fichen* would be ficken—and, indeed, in the working-class slang of Devon in the southwest of England, *ficky-ficky* is the term used instead of *fuck* as the noun for sexual intercourse.

In Greek, the first-person singular of the verb meaning to sow, plant, or beget is *phitio*. Thus it is likely that ficky-ficky and fuck have a shared ancestry either in Greek, or in an antecedent Indo-European linguistic stock shared by Greek, Latin, and the Teutonic languages.

Eric Partridge, in his *Origins: A Short Etymological Dictionary of Modern English* (London, Routledge and Kegan Paul, 1958), attributes the first printed appearance of the word *fuck* to Dunbar in 1503: "By his feiris he wald have fukkit" (Poem 75, line 13). Lyndsay is quoted (*Satyre* No. 1363, 1535) thus: "Bishops . . . may fuck their fill and be vnmaryit (unmarried)." John Wilmot, Earl of Rochester, in 1680 wrote:

"Much wine had passed with grave discourse
Of he who fucks who, and who does worse"

(*Poems on Several Occasions*. Poem No. 14, line 1). In the *Origins*, Partridge entered the forbidden term as f..k, and said that f..k and c..t were the two words that, throughout the English-speaking world, never appeared, fully spelled, in print.

Etymology was not productive as a way to find a title for this book. I abandoned a one-word title: *Homosexology*, or *Homosexuology*. I used a working title: *Gay and Lesbian Sexology*, and abandoned it at the behest of one of the three referees of the manuscript. In this anonymous referee's opinion, this title was too restrictive for a book that applies as much to heterosexuality as homosexuality. I gave thought to a title that would very literally mirror the book conceptually: *Genes, Genitals, Hormones, and Gender*—and then settled temporarily on the title: *Genes to Gender: The Sexology of Being Homosexual, Bisexual and Heterosexual*, so that the book would be included in all the computer-indexing services where it legitimately belongs. There were too many sexes in that title. Hence the final revision to *Gay, Straight, and In-Between: The Sexology of Erotic Orientation*.

The title announces that this book is addressed to those who would like to know the present state of knowledge regarding what determines that some children grow up to become homosexual, whereas others become bisexual or heterosexual. Each reader will find a story of his/her own sexological development and, at the same time, recognize that the book is designed to explain homosexuality to homosexuals themselves, as well as to other people, and likewise for heterosexuality and bisexuality.

People become homosexual, bisexual, or heterosexual because of what happens to them partly in their prenatal history, and partly in their postna-

tal history. Scientific investigation of prenatal causes is done predominantly in experiments on animals that yield valuable ideas that may or may not apply to human beings. It is ethically forbidden to experiment on human beings. Therefore, one must rely on nature's own experiments, which are the various conditions of birth defect of the sex organs. That is why most of Chapter 1, "Prenatal Hormones and Brain Dimorphism," consists of a comprehensive survey of what has been learned from long-term, follow-up studies of people born with defective sex organs. With the support of Lawson Wilkins, the world's first pediatric endocrinologist, these long-term studies began in 1951 and have continued until the present day in my Psychohormonal Research Unit of the Pediatric Endocrine Clinic at the Johns Hopkins Hospital and University. The findings of these studies have never before been brought together for comparison with one another and with the work of others, so that their full significance can be systematically recognized and evaluated.

Chapter 2, "Gender Coding," bridges the gap between prenatal history and postnatal history, and spells out the principles of identification and complementation by which masculine and feminine become differentiated in the childhood years. Chapter 2 prepares the way for the gender discrepancies of Chapter 3, "Gender Crosscoding," in which masculinizing and feminizing develop at cross-purposes with the sex of the external genitalia. Biological determinants are not set off against social and psychological determinants because at critical developmental periods all prior determinants are recognized as being able to influence those that follow, and their influence becomes biologically incorporated into the organism, especially into the brain. The important consideration is not biology versus nonbiology, but whether a particular outcome of development becomes fixed and immutable, or loose and easily changed. The different crosscoded phenomena or syndromes in Chapter 3 include, among others, transexualism, transvestism, homosexuality, and bisexuality, each differing from the others on the criteria of duration and extent or degree of crosscoding. Chapter 3 concludes with a review of today's knowledge of the relationship between hormones and homosexuality in adulthood.

Chapter 4, "Lovemaps and Paraphilia," introduces and explains the new concept of *lovemaps*, which may be healthy or pathological in their development. Whereas a homosexual lovemap is not pathological, per se, it also is not exempt from possible pathology any more than is a bisexual or heterosexual lovemap. Developmentally, lovemaps of all three types are able to incorporate a paraphilia. Paraphilias are legally defined as perversions and, on the street, as kinky or bizarre sex. The relationship of paraphilia to homosexuality has been neglected in gay politics and scholarship in general. In this book, paraphilia is examined in relationship to the cleavage between love and lust, to opponent-process theory, to addiction to various sexual stimuli, to pornography, and to prevention and treatment. There is a list of the forty-odd known paraphilias, each of which is defined in the glossary.

This is a book that should appeal to anyone, animal sexologists included, who is interested in the whys and wherefores of human sexuality in general, as well as to students and scholars of human homosexuality in particular. It is meant for physicians, psychologists, and other health care practitioners; for professionals in sex therapy and counseling; for sex educators and social workers; and for legislators, lawyers, police, and others in the judicial system who specialize in sex. It is written so as to be intelligible to not only the professional, but also the layperson. Unfamiliar and technical terms are defined in the glossary, so that the book will be understandable not only to professionals, but also to readers of literary and news magazines with a widespread national circulation, and to readers of periodicals with a specialty circulation, like the *New York Native, Christopher Street,* or *The Advocate,* and various regional and foreign publications for the gay community.

CHAPTER

ONE

Prenatal Hormones and Brain Dimorphism

1 HISTORICAL AND CULTURAL RELATIVITY

The phenomenon that is today named homosexuality did not have that name until is was coined by K.M. Benkert, writing under the pseudonym of Kertbeny, in 1869 (Bullough, 1976). Although he applied the term homosexuality to both males and females, he defined it on the criterion of erectile failure:

> In addition to the normal sexual urge in men and women, Nature in her sovereign mood has endowed at birth certain male and female individuals with the homosexual urge, thus placing them in a sexual bondage which renders them physically and psychically incapable—even with the best intention—of normal erection. This urge creates in advance a direct horror of the opposite sex, and the victim of this passion finds it impossible to suppress the feeling which individuals of his own sex exercise upon him.

Instead of the criterion of genital sexuality, as in homo*sexual*, Benkert could have used the criterion of falling in love, as in homo*philic*, or the criterion of being attracted to those of the same sex, as in homo*genic*. Both terms were proposed by others, but homosexual won the day, probably because it was taken up in the early years of the twentieth century by Havelock Ellis and Magnus Hirschfeld (Ellis, 1942; Hirschfeld, 1948). Neither of these two writers recognized that the ethnocentricity of Benkert's

definition of homosexuality as a sickness, though freeing it from being a sin or a crime, confines it too narrowly to pathological deviancy. It leaves no place for homosexuality as a status that is culturally ordained to be normal and healthy, as it is in societies that, since time immemorial, have institutionalized bisexuality. In bisexuality, homosexuality and heterosexuality may coexist concurrently, or they may be sequential, with a homosexual phase of development antecedent to heterosexuality and marriage. Concurrent bisexuality was exemplified in classical Athenian culture (Bullough, 1976). Sequential bisexuality is exemplified in various tribal Melanesian and related cultures.

There is a vast area of the world, stretching from the northwestern tip of Sumatra through Papua New Guinea to the outlying islands of Melanesia in the Pacific, in which the social institutionalization of homosexuality is shared by various ethnic and tribal people (Money and Ehrhardt, 1972b; Herdt, 1984). More precisely, it is sequential bisexuality that is institutionalized in these societies. Their cultural tradition dictates that males between the ages of nine and nineteen reside no longer with their families but in the single longhouse in the village center where males congregate. Until the age of nineteen, the prescribed age of marriage, they all participate in homosexual activities. After marriage homosexual activity either ceases or is sporadic.

The Sambia people (Herdt, 1981) of the eastern highlands of New Guinea are among those who traditional folk wisdom provided a rationale for the policy of prepubertal homosexuality. According to this wisdom, a prepubertal boy must leave the society of his mother and sisters and enter the secret society of men, in order to achieve the fierce manhood of a headhunter. Whereas in infancy he must have been fed woman's milk in order to grow, in the secret society of men he must be fed men's milk, that is, the semen of mature youths and unmarried men, in order to become pubertal and grow mature himself. It is the duty of the young bachelors to feed him their semen. They are obliged to practice institutionalized pedophilia. For them to give their semen to another who could already ejaculate his own is forbidden, for it robs a prepubertal boy of the substance he requires to become an adult. When a bachelor reaches the marrying age, his family negotiates the procurement of a wife and arranges the marriage. He then embarks on the heterosexual phase of his career. He could not, however, have become a complete man on the basis of heterosexual experience alone. Full manhood necessitates a prior phase of exclusively homosexual experience. Thus, homosexuality is universalized and is a defining characteristic of head-hunting, macho manhood.

In Sambia culture, omission of, rather than participation in the homosexual developmental phase would be classified as sporadic in occurrence, if it occurred at all, and would stigmatize a man as deviant. In our own culture, by contrast, it is homosexual participation that is classified as sporadic, and stigmatized as a deviancy in need of explanation. For us, heterosexuality, like health, is taken as a verity that needs no explanation, other than being attributed to the immutability of the natural order of things. Since hetero-

sexuality needs no explanation, then in bisexuality the homosexual component alone needs explanation. Consequently, there has been no satisfactory place for bisexuality in theoretical sexology. The universalization of sequential bisexuality, as in the Sambia tradition, is unexplainable in homosexual theory that is based exclusively on the concept of homosexuality as sporadic in occurrence and pathologically deviant (Stoller and Herdt, 1985).

Institutionalized homosexuality, in serial sequence with institutionalized heterosexuality and marriage, as among the Sambia and other tribal peoples, must be taken into account in any theory that proposes to explain homosexuality. The theory will be deficient unless it takes heterosexuality into account also. Culturally institutionalized bisexuality signifies either that bisexuality is a universal potential to which any member of the human species could be acculturated; or that bisexuality is a unique potential of those cultures whose members have become selectively inbred for it. There are no data that give conclusive and absolute support to either alternative. However, genetically pure inbred strains are an ideal of animal husbandry, not of human social and sexual interaction. Therefore, it is likely that acculturation to bisexuality is less a concomitant of inbreeding than it is of the bisexual plasticity of all members of the human species. It is possible that bisexual plasticity may vary over the life span. Later in life it may give way to exclusive monosexuality—or it may not.

2 PREFERENCES VERSUS STATUS OR ORIENTATION

A heterosexual man or woman does not become heterosexual by preference. There is no option, no plan. Becoming heterosexual is something that happens—an example of the way things are, like being tall or short, left-handed or right-handed, color-blind or color-seeing. Being homosexual is no more a preference than being heterosexual. No one, boy or girl, man or woman, prefers to be homosexual instead of heterosexual. Likewise, no one prefers to be bisexual instead of monosexual. One either is or is not bisexual, homosexual, or heterosexual.

Sexual preference is a moral and political term. Conceptually it implies voluntary choice, that is, that one chooses, or prefers, to be homosexual instead of heterosexual or bisexual, and vice versa. Politically, sexual preference is a dangerous term, for it implies that if homosexuals choose their preference, then they can be legally forced, under threat of punishment, to choose to be heterosexual.

The concept of voluntary choice is as much in error here as in its application to handedness, or to native language. You do not choose your native language as a preference, even though you are born without it. You assimilate it into a brain prenatally made ready to receive a native language from those who constitute your primate troop and who speak it to you and listen to you when you speak it. Once assimilated through the ears into the brain, a native language becomes securely locked in—as securely as if it had been phylogenetically preordained to be locked in prenatally by a process of

genetic determinism, or by the determinism of fetal hormonal or other brain chemistries. So also with sexual status or orientation, which—whatever its genesis—also may become assimilated and locked into the brain as monosexually homosexual or heterosexual or as bisexually a mixture of both.

A sexual status (or orientation) is not the same as a sexual act. It is possible to participate in homosexual acts, and even to be cajoled or coerced into participation, without becoming predestined to have a permanently homosexual status—and vice versa for heterosexuality. The Skyscraper Test exemplifies the difference between sexual act and sexual status. One of the versions of this test applies to a tourist with a homosexual status who is atop the Empire State Building or another high building and is pushed to the edge of the parapet by a gun-toting, crazed sex terrorist with a heterosexual status. Suppose the homosexual is a man and the terrorist a woman who demands that he perform oral sex with her or go over the edge. To save his life, he might do it. If so, he would have performed a heterosexual act, but he would not have changed to have a heterosexual status. The same would apply, vice versa, if the tourist were a straight man and the terrorist a gay man, and so on.

This Skyscraper Test, by dramatizing the difference between act and status, points to the criterion of falling in love as the definitive criterion of homosexual, heterosexual, and bisexual status. A person with a homosexual status is one who has the potential to fall in love only with someone who has the same body sex—the same genital and body morphology—as the self. For a heterosexual, the morphology must be that of a person of the other sex. For the bisexual it may be either.

It is not necessary for the body sex of the partner to be in agreement with the chromosomal sex, the gonadal sex (testicles or ovaries), or the sex of the internal reproductive anatomy. For example, a male-to-female, sex-reassigned transexual with the body morphology transformed to be female in appearance is responded to as a woman—and vice versa in female-to-male transexualism.

Discordance between the body morphology and other variables of sex occurs also in some cases of intersexuality (see Section 3, this chapter). For example, it is possible to be born with a penis and empty scrotum and to grow up with a fully virilized body and mentality, both discordant with the genetic sex (46,XX), the gonadal sex (two normal ovaries), and the internal sexual structures (uterus and oviducts) (Figures 1-1 and 1-2). Conversely, it is possible to be born with a female vulva and to grow up with a fully feminized body and mentality, both discordant with the genetic sex (46,XY), the gonadal sex (two testes), and the internal sexual structures (vestigiated feminine müllerian duct structures and differentiated masculine wolffian duct structures) (Figures 1-3 and 1-4). Clinical photographic examples of these syndromes, and many others, are reproduced in Money (1968b, 1974).

The aforesaid type of 46,XX intersexed man who falls in love with and has a sex life with a 46,XX normal woman is regarded by everyone as

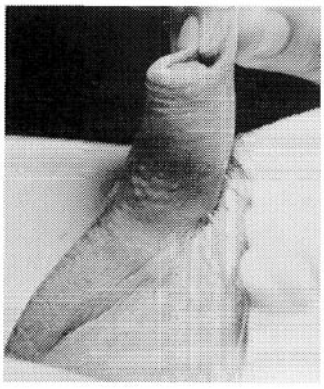

Figure 1-1. 46,XX Adrenogenital syndrome showing complete masculinization of the external genitalia; the scrotum is empty and the intraabdominal gonads are ovaries.

heterosexual, and so is his partner. The criterion of their heterosexuality is the sexual morphology of their bodies and the masculinity or femininity of their mentality and behavior, not the sex of their chromosomes, gonads, or internal organs. The same principle applies conversely in the case of the aforesaid type of feminized 46,XY intersexed woman whose sex life is with a normal 46,XY man.

3 EVOLUTIONARY BISEXUALITY

Any theory of the genesis of either exclusive homosexuality or exclusive heterosexuality must address primarily the genesis of bisexuality. Monosexuality, whether homosexual or heterosexual, is secondary and a derivative of the primary bisexual or ambisexual potential. Ambisexuality has its origins in evolutionary sexology and in the embryology of sexual differentiation.

Ambisexuality has many manifestations in evolutionary sexology. Oysters, garden worms, and snails, for example, are ambisexual. They are also classified as bisexual and as hermaphroditic. There are many species of fish capable of changing their sex from female to male, or male to female, in some species more than once (Chan, 1977). The change is so complete that the fish spends part of its life breeding as a male with testicles that make sperms, and part as a female with ovaries that make eggs—an exceptionally thorough degree of sequential bisexuality.

There is a species of whiptail lizard from the Southwest, *Cnemedophorus uniparens*, that offers a unique contribution to bisexual theory (Crews, 1982, 1987a,b). This species has neither males nor females and so is said to be monecious or one-sexed. It is also said to be parthenogenic, meaning that procreation does not require male sperms. Nonetheless, as judged by comparison with closely related two-sexed whiptail species, each individual

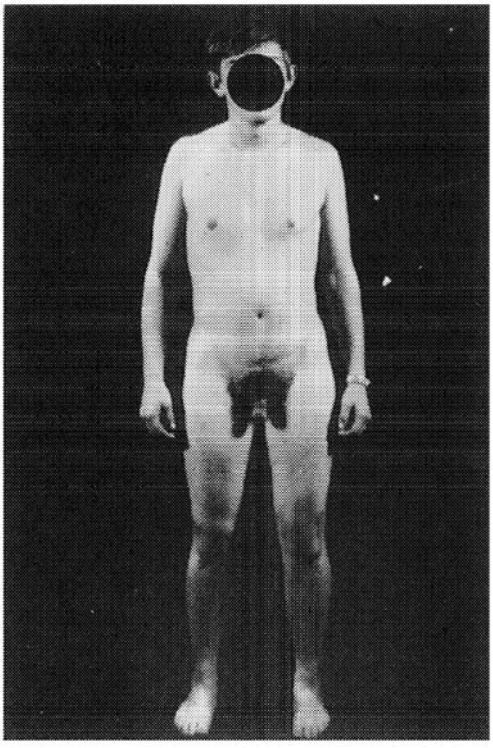

Figure 1-2. 46,XX Adrenogenital syndrome showing complete masculinization of the body at puberty, independently of treatment.

lizard is able at different times to behave as if a male, and as if a female in mating. The one in whom a clutch of eggs is ripening, ready to be laid in the sand for sun-hatching, is mounted by a mate whose ovaries are in a dormant, nonovulatory phase (Figure 1-5). This enactment is believed to affect the hormonal function of the pituitary of the ovulating lizard, and to facilitate reproduction. At a later date, their roles reverse.

In this parthenogenic reptilian species, the brain is bisexual or ambisexual, even though the pelvic reproductive anatomy is not. According to MacLean's evolutionary theory of the triune brain, the mammalian brain is made up of an evolutionarily ancient reptilian brain overlaid by a paleocortex, also known as the limbic system, which is shared by all mammals, and which in turn is overlaid by the neocortex, which is most highly evolved in the human species (MacLean, 1972) (Figure 1-6). Thus the behavioral bisexuality of parthenogenic whiptail lizards may provide a key to understanding the bisexual potential of mammalian species.

It has long been known that the mammalian embryo, in the early stages of its development, is sexually bipotential. The undifferentiated gonads differentiate into either testes or ovaries. Thereafter, the biblical principle that Eve sprang from Adam's rib makes a complete about-face in embryo-

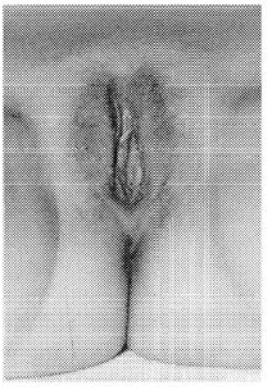

Figure 1-3. 46,XY Androgen-insensitivity syndrome, showing normal female external genitalia, postpubertally. Note the effect of androgen insensitivity in impairing growth of pubic hair.

logical science, for it is beyond all possible doubt that, in the development of the embryo, Eve takes precedence over Adam. Chromosomal sex notwithstanding, the new embryological principle is that, after the early bipotential phase, and after the differentiation of the unformed gonadal tissues into either testicles or ovaries, in the remainder of sexual differentiation, the principle of feminization takes priority over the principle of masculinization. Something must be added to induce masculinization. This is the principle of Eve first, then Adam! It is symbolized in Figure 1-7.

The something that must be added is hormonal—two different types of gonadal hormones, to be specific. In normal embryonic and fetal development, each is normally secreted by the male baby's own testicles. One of these two masculinizing hormones from the fetal testes is actually a defeminizing hormone, müllerian-inhibiting hormone (MIH). It appears early in prenatal development and has a brief life span. What it does is to atrophy the embryonic müllerian ducts and thus prevent them from growing into a uterus with its bilateral fallopian tubes or oviducts, along which eggs are transported from the ovary, in the female.

The other masculinizing hormone acts not by defeminizing, but by actively inducing the growth of masculine sexual organs—first the internal, and then the external sexual organs. It is testosterone, a steroidal sex hormone, or else one of its biochemical derivatives. Together with its derivatives, testosterone promotes the growth of the bilateral wolffian ducts into the male internal accessory sexual organs—the vas deferens, one on each side, to connect the testicle with the urethra, and the seminal vesicles and prostate gland which produce, at maturity, the seminal fluid in which sperms are transported through the penis. The development of the penis itself, and its foreskin and scrotum, is dependent on testosterone.

Differentiation of the internal genitalia is ambitypic. That is to say, at the outset, a set of both the male and female precursors or anlagen is present,

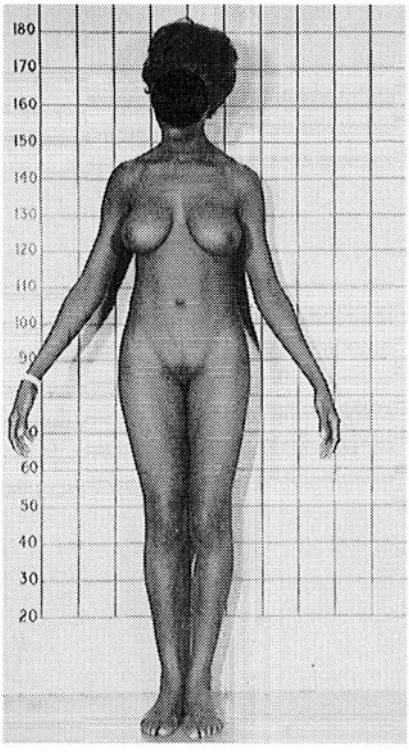

Figure 1-4. 46,XY Androgen-insensitivity syndrome, without treatment, showing spontaneous pubertal feminization.

regardless of whether the genetic sex of the embryo is male and chromosomally 46,XY, or female and 46,XX. Then one set of precursors atrophies and disappears, while the other set grows and develops (Figure 1-8). By contrast, differentiation of the external genitalia is unitypic. That is to say, there is a single set of precursors or anlagen that have two possible destinies, namely, to become either male or female (Figure 1-9). Thus, the clitoris and the penis have the same beginning—are homologues of one another. So also are the clitoral hood and the penile foreskin. The tissues that become the labia minora in the female wrap around the penis in the male and fuse along the midline of the underside to form the tubular urethra. The swellings that otherwise form the divided labia majora of the female fuse in the midline to form the scrotum of the male. Unitypic signifies that the external genitals must be either male or female. They may be incompletely differentiated and unfinished as either male or female, but they cannot be both male and female simultaneously. By contrast, ambitypic signifies that, though it is rare, it is actually possible to have a combination or partial combination of both male and female organs internally.

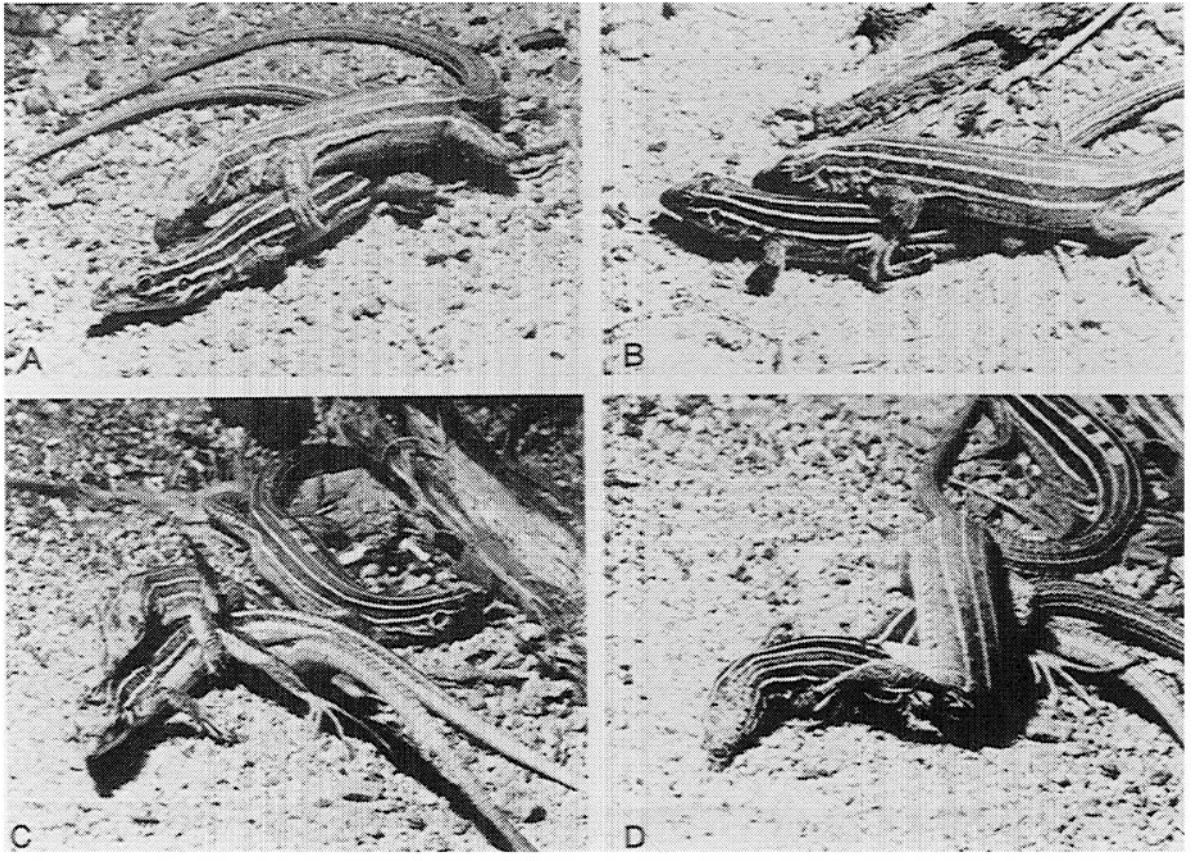

Figure 1-5. Monomorphic, parthenogenic whiptail lizards mating as if there were males and females in the species (courtesy of David Crews).

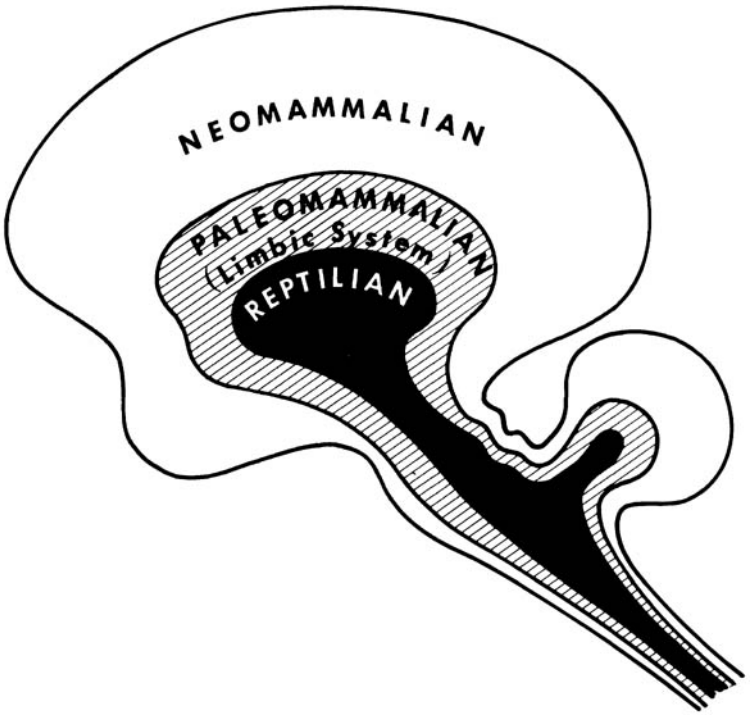

Figure 1-6. MacLean's diagrammatic representation of man's three brains. The innermost brain is shared with lower vertebrates, including reptiles. The paleocortex or limbic system is shared with other mammals. The neocortex, the outermost brain, is poorly developed in lower mammals, and most highly developed in humans (courtesy of Paul McLean).

The modern embryological principle already referred to as the principle of Eve first, then Adam, applies not only to the hormonal control of the differentiation of the genital anatomy as dimorphic, that is as either male or female. So far as can be judged from animal research, the same principle applies also to the differentiation of dimorphism of the brain, or at least to the dimorphic differentiation of the sexual centers and pathways of the brain that have a part to play in the sexual and erotic functioning of the genital organs. According to present evidence, hormone-induced brain dimorphism takes place later than that of the genitalia, and, dependent on species, may extend into the first few days or weeks of postnatal life. The primary masculinizing hormone is testosterone, although it is not necessarily used in all parts of the brain as such. Within brain cells themselves, as within cells of the pelvic genitalia, it may be reduced by enzymatic action to dihydrotestosterone. Paradoxically, it may also exert its masculinizing action only if first aromatized by the body's own chemistries into estradiol, one of the sex steroids that received its name when it was considered to be exclusively an estrogenic, feminizing hormone. In both sexes, estradiol is

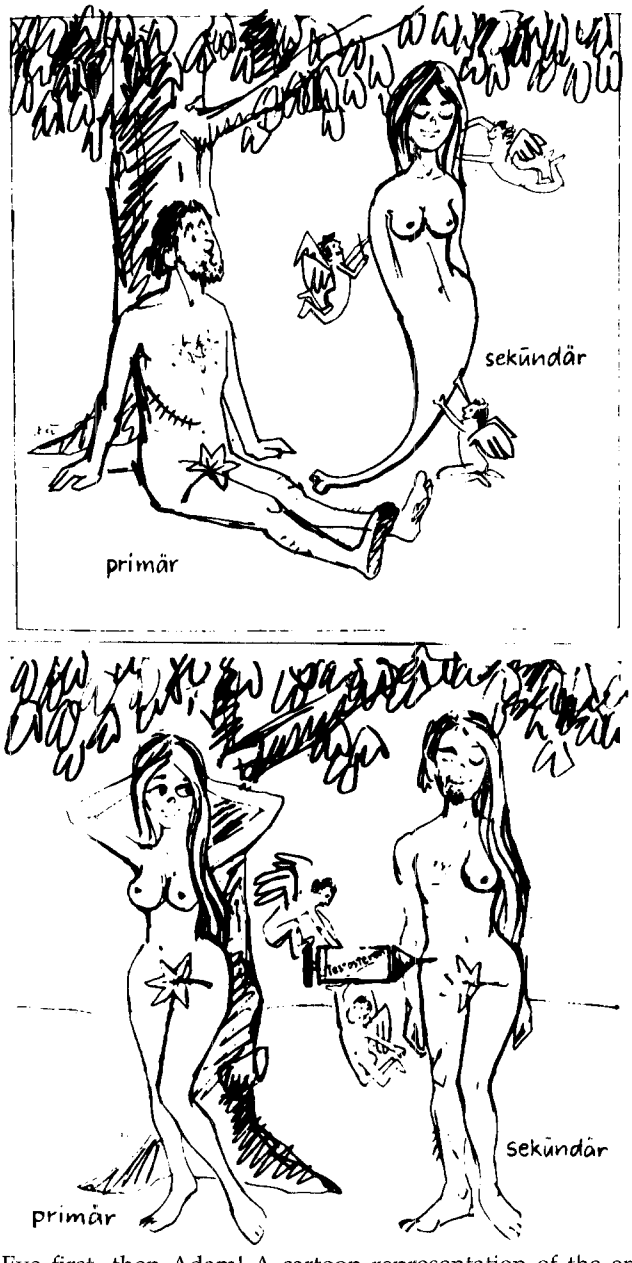

Figure 1-7. Eve first, then Adam! A cartoon representation of the embryological principle of sexual differentiation that reverses the biblical principle. Eve differentiates, unaided, whereas Adam is depicted as needing the help of the archangel who appears with an injection needle loaded with testosterone, the masculinizing hormone, shoots up Eve, and lo! Adam comes forth.