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The Magical Age of 10

Gilbert Herdt, Ph.D.,[1,3] **and Martha McClintock, Ph.D.**[2]

Developmental processes of "puberty" and their cultural contexts in understanding the emergence of sexual subjectivity, especially sexual attraction, prior to gonadarche are critically examined. In particular, we consider the hypothesis that "sexual attraction" follows the onset of adrenal puberty, termed adrenarche, precipitating the development of stable and memorable attraction toward others approximately by the age of 10. In a prior study, the authors suggested that adrenarche is a significant source of this developmental change in sexuality (McClintock, M., and Herdt, G., 1996). The inferential evidence from New Guinea is compared with recent studies from the United States, including clinical findings on "precocious puberty." We conclude with the question of whether the age of 10 is a human universal in the development of attraction and sexuality.

KEY WORDS: puberty; sexual attraction; adrenarche; gonadarche; culture.

INTRODUCTION

This paper critically examines developmental processes of "puberty" and their cultural contexts in understanding the emergence of sexual subjectivity, especially sexual attraction, prior to gonadarche. In particular, we consider the hypothesis that "sexual attraction" follows the onset of adrenal puberty, termed adrenarche, precipitating the development of attraction toward others approximately by the age of 10. Inferential evidence from New Guinea cultures is compared with recent studies from the United States to reconsider how societies deal with the expression of sexual development before the age of 10. Finally, we conclude by asking whether the age of 10 is a human universal in the development of attraction, in cross-cultural and historical perspective.

[1]Program in Human Sexuality Studies, San Francisco State University, San Francisco, California 94132.
[2]Committee on Human Development, University of Chicago, Chicago, Ilinois 60637.
[3]To whom correspondence should be addressed at Program in Human Sexuality Studies, San Francisco State University, 1600 Holloway Avenue, San Francisco, California 94132.

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A major stream of research now posits two sequential but distinct forms of "pubertal" processes: adrenal puberty and gonadal puberty. Adrenal puberty is the process that occurs in middle childhood, between 6 and 10 years of age. It is hypothesized to be a critical source of developmental subjectivity, including feelings of attraction and sexual awareness, becoming stable and memorable around the age of 10. By contrast, gonadal puberty begins later, normatively around the ages of 11 and 12 for girls and boys, respectively, and continues into the late teens. It is coincident with adolescent maturation and morphological developmental changes, which are commonly referred to as "secondary sex traits," as well as fertility. The evidence reviewed later, though anecdotal and incomplete, nevertheless suggests that the creation of sexual subjectivity begins well before the onset of adolescence. It is intrinsically driven by hormonal forces but, nevertheless, is informed by cultural meanings and social roles. Furthermore, it is sufficiently marked by the age of 10 or so that even in cultures where age variation in developmental transitions is common, a variety of cultures in ancient and modern times have sensed the age of 10 to be of critical importance in defining this age as the sexual juncture between "childhood" and "adulthood." Thus, the strong inference is that in society "sexual attraction" emerges as a significant developmental subjectivity during adrenarche, but before "gonadarche" and "adolescence."

Although a variety of researchers, since the time of Freud (1905), have suggested that "sexuality" emerges in childhood, the question whether this development is anchored in the unconscious, whether it involves subjectivities like those of the adult, as well as the intrinsic mechanisms of this developmental transformation, remains obscure (Bem, 2000; Green, 1987; Stoller, 1968). Moreover, many scholars working within this paradigm continue to ignore the evidence from recent biological developmental, historical, and cross-cultural studies. For example, a recent textbook, by Kimmel (2000, p. 37), a leading sociologist of gender, asserts:

> Sex differentiation faces its most critical events . . . [at] puberty, when the bodies of boys and girls are transformed by a flood of sex hormones that cause the development of facial hair for boys, and the development of all secondary sex characteristics.

Nonetheless, the literature on sexuality generally attests to a greater range and diversity of sexual development than textbooks and the popular culture allow, especially in cross-cultural child development and what we in the west refer to as "adolescence" (Elder, 1975; Herdt and Leavitt, 1998).

Recent developmental, neurological, linguistic, and hormonal studies generally suggest that in western countries, a critical developmental change occurs by the age of 8 or so, establishing the context for major cognitive and behavioral transformations in human development, including preparation for a more adult-like understanding of sexuality (Gelman *et al*., 1986; Money, 1997; Piaget, 1971). Likewise, instead of viewing late childhood as a time of "latency" in sexual development, as did Freud, we conceptualize middle childhood as a time in which general psychophysiological arousal, including erotic feelings and events

previously unknown or unrecognized, produces increasingly memorable and stable sexual attraction (see Friedman and Downey, 2000).[4]

The question of the chronological age of first sexual arousal and attraction have long intrigued researchers in sex and human development. In this century, Freud (1905), Ehrhardt and Meyer-Bahlburg (1981), Gagnon (1971), Kinsey and colleagues (1948, p. 299ff.), Maccoby (1979), Mead (1927), Money (1997), and Stoller (1968) are among the distinguished thinkers who have conceptualized the age and maturational conditions of the first experience of sexual attraction toward others. It has long been recognized that gonadal morphological changes in western populations vary widely and are distinct for males and females, and that chronological and maturational ages differ. It is also widely believed that historical change and modernization impact strongly upon maturation, as noted later. Today, in general, the mean age of onset of gonadal puberty is 11.5 years in boys, "but may begin as early as 9 years or as late as 15 years and still be considered within normal limits" (Money and Lewis 1990, p. 241). Likewise, the relationship between the achievement of gonadal puberty and sexual maturation is problematic, as Kinsey and colleagues (1948) noted long ago: first ejaculation in males, for example, is inadequate for understanding "sexual subjectivity." Adrenarche, we surmise—with its accompanying rise in sex steroids—has not even been considered as a factor in the development of sexuality, much less sexual subjectivity.

Certainly gender differences inflect the emergence of sexuality and sexual subjectivity, and male and female experiences must not be lumped together when it comes to the development of sexual attraction. As is well known, gender differences in a range of behavioral domains tend to increase during middle childhood (Moller *et al*., 1992); for example, Maccoby and Jacklin (1974) demonstrated the preference of nursery school children for their same-gendered peers. By the age of 4.5 years, children spent three times as much social time with the same gender; by the age of 6.5 years the increase is at the huge ratio of 11 to 1. When gender differences of this magnitude are enhanced or even exaggerated, and where gender segregation exists throughout life, such as among the Sambia of Papua New Guinea (Herdt, 1981), the combination of intrinsic and extrinsic (social) influences may especially affect the development of sexual subjectivity and the conscious formation of objects of attraction before adolescence.

A word about definitions and semantics. The notion of "attraction" is culturally and emotionally loaded and although very imprecise, nevertheless, the construct is well established in the literature (Gagnon, 1990; Herdt and Boxer, 1993; Laumann *et al*., 1994; Kinsey *et al*., 1948). By "sexual attraction" is meant the subjective state, within the adult person, of feelings of desire or fantasies about another person, known or imagined, that may or may not lead to sexual intimacy

[4]This article deals only with the normative developmental experience, which we are attempting to reconceptualize; we are aware of the importance of precocious and delayed puberty for the phenomena under review, but along with others, we chose to separate these from the discussion of normative sexual attraction development (see Money and Lewis, 1990, p. 245ff).

with another person. The definition marks the adult experience as mature and separates the subjective state from the actual sexual behavior that might result from it. This concept should not be confused with sexual orientation, which is a more global, and often assumed to be a core or "fixed" trait (Byne and Parsons, 1993; Gorman, 1994; Meyer-Bahlberg, 1997; Stoller and Herdt, 1985; Storms, 1981; Townsend and Wasserman, 1997).

Attraction indicates psychophysiological arousal, but this is not a necessary precursor of sexual arousal, at least in all cases. People may at times be aroused but deny their feelings or have their culture deny them; the relationships between experience and self-conscious recognition of sexual attraction are especially problematic in sex-negative or repressive societies.

It is important to mark the difference between childhood and adult subjectivities as well. For a child "attraction" is not the same as for an adult; a child's diffuse, more emergent properties of liking, friendship, and emotional closeness or intimacy have meanings different from those of an adult that is sexually aroused. Moreover, the content of such experiences obviously varies by culture, as does the ability of the person to express their feelings, particularly in public. Such differences are especially critical to keep in mind when sexuality is approved in childhood play and carried into the teen years, as Mead (1927, 1935, 1961) repeatedly suggested in her ethnographies. The childhood experience—and the subsequent adult retrospection of this—is also distinct and should not be confused (Plummer, 1995). Indeed, sexual attraction is manifest throughout middle childhood and is not yet linked with sexual desire or fantasy. It is around the age of 10 that it becomes a robust, memorable experience (McClintock and Herdt, 1996). Both subjectivities are nevertheless dependent upon cultural meanings in interpreting the preadolescent experiences as "sexual," a point long recognized in script theory (reviewed in Gagnon, 1990). In some societies, such meanings are restricted to reproductive genital sexuality, whereas in others, recreational and pleasurable sexuality are encouraged outside of and beyond marriage, such as among the Trobriand Islanders, the !Kung people of Southern Africa, and others (Herdt, 1997; Vance, 1991).

Adolescence, as a time of increasing demands upon the person's social and moral responsibility in many societies, often compresses sexual behavior, because parents, families, and communities may regulate intimacy and sexual relations, especially when relationships may lead to reproductive unions (Herdt and Leavitt, 1998). Coincidentally, of course, this change in moral attitudes occurs as the child's body changes morphologically into an adult's. Individuals may experience desire and attraction toward others without the cultural means either to recognize or to express their feelings in public. However, eventually, attraction typically becomes genitally arousing, and such arousal must be reconciled with customary arrangements for sexuality and marriage recognized in the local culture (Mead, 1961). Sexual maturity in many societies is, finally, dependent upon the achievement of gonadal puberty and menarche in males and females, respectively, though neither

of these achievements should be reduced to the presence or absence of orgasm or menstrual flow (see the discussion of preadolescent orgasm in Kinsey *et al*., 1948, pp. 175–180).[5]

ADRENAL PUBERTY AND ATTRACTION

The inference that sexual attraction—as denoted by intimate romantic and/or erotic attraction to another—becomes stable and memorable by the age of 10, was previously formulated by McClintock and Herdt (1996). In a study of self-identified gay and lesbian adolescents in Chicago, Herdt, and Boxer (1993) had observed that the mean age of first awareness of attraction was between 9.5 and 10 years for boys and girls, respectively. Subsequently, McClintock and Herdt reviewed the evidence to discover similar patterns in other studies. It was argued that American children typically become aware of a new way of sexual thinking about their bodies, body imagery, gender roles, and emotional and intimate relations with their playmates between the fourth and fifth grades (e.g., a normative chronological age range of 9–11, for most fourth and fifth graders). Studies on sex-typing in play relationships, and popularity among children, also support the importance of these sexual and gender changes around fourth grade (Moller *et al*., 1992).

The concept of "puberty" is still widely seen in the minds of many researchers and the public as "adolescence" or as the morphologic changes (incorrectly labeled "secondary" sex changes; see Money and Ehrhardt, 1972) of adolescence. In prior models of developmental sexual psychology, gonadarche was typically seen as a kind of internal force that changed attraction into sexual action, culminating in the developmental sequelae of adult sexuality, especially reproduction. As was previously argued (McClintock and Herdt, 1996), however, biopsychosocial "puberty" should be expanded to encompass two distinct, sequential processes of puberty, adrenal puberty followed by gonadal puberty, each of which is independent but temporally processed by different mechanisms of development (McClintock *et al*., 1998; and see Hopper, 1975; Korth-Schutz, 1989). Rather than viewing sexual attraction as following gonadarche, this model conceptualizes the subjectivity of attraction as a longer sequence of developments that "begins endocrinologically at age 6 on average" (McClintock *et al*., 1998, p. 1).

Traditionally, in the general population, the gonads were seen as the cause of gonadal puberty, anticipating reproduction, now around the age of 10.75 years, for females (McClintock *et al*., 1998, p. 1). Money and Lewis (1990, pp. 241, 242) find that for males, the visible evidence of gonadal puberty is in the enlargement of the testes, scrotum, and penis, with a mean age onset of these changes at 11.5 years. Ejaculation and nocturnal emissions of viable sperm complete the

[5] As Simon and Gagnon (1973, p. 34) once wisely stated: "An important source of guilt in children comes from the imputation to them by adults of sexual appetites or abilities that they may not have, but they learn, however imperfectly, to pretend they have."

process. However, these changes may begin as early as 9, and as late as 15, and still be considered within the normal range. The duration of the process is typically 2–4.5 years until completion, which culminates in attainment of adult height and pubic hair distribution. For females, the visible and invisible changes begin between the ages of 9 and 13, with growth accompanied by pubic hair and breast growth. The average age of the growth spurt is just after 12, with the average first ovulation and menstruation occurring between 13 and 13.5, with a range of 11.5–15.5 years. The female process may last only 1.5 years or as long as 6 years.

Between the ages of 5 and 15, the child's developing hormones change and influence both physical and psychological (interpersonal and intrapsychic) development. Both genders begin neonatal development with adult levels of testosterone and estrogen. However, the sex hormone levels begin to fall and remain low until the maturation of the adrenal glands, i.e., ages 6–8 (reviewed in McClintock and Herdt, 1996; McClintock *et al*., 1998). Increased adrenal activity and hormone production begins to increase exponentially until it reaches the low adult range around the age of 10, and then plateaus in both boys and girls. Androgens released during preadolescence continue to rise from adrenal gland secretion until ages 12 and 13, when the maturation of the gonads continue to augment androgen production.

Children between the ages of 6 and 8 begin to experience increasing adrenal function, in both males and females. The adrenal glands (specifically the adrenal cortex) secrete low levels of androgens (typically identified as male sex hormones), primarily of dehydroepiandrosterone (DHEA). The specific androgen released by the adrenal glands is in the same metabolic pathways as testosterone and estrogen. There is no sex difference in the rate or onset, though the conversion rate may vary between the genders, until the onset of gonadarche. The levels of these hormones begin to steadily climb upwards until adult levels of DHEA are reached by the age of 12 for girls and the age of 13 for boys, respectively. By the age of 10, they reach the low end of the adult range. Although these levels are low as compared to normal adult levels, they are many (10–20) times what typical young children exhibit. Moreover, although the hormone levels required for an organizational (long-term, permanent) effect are unknown, there are brain changes at this age, which are indicative of neural proliferation and sculpting; there is an overproduction of neurons followed by a selective loss, presumably of nonfunctional connections, which "sculpts" the neural networks of the cortex (Blumenthal *et al*., 1999). The levels experienced between ages 6 and 10 are within activational (short-term, temporary) range. Thus, it is highly probable that the levels of hormones secreted during these age ranges have a significant influence on preadolescent brains.

Something prior to puberty is transforming the child's body and psyche in the direction of sexual arousal. What might the precursor of this development be? Adrenarche is the best candidate for conceptualizing the development of attraction in this hypothetical model. In addition to the factors already outlined, four additional developmental influences stimulate the development of attraction. First,

the adrenals release hormones that have already been identified as being relevant in adults for sexual attraction. Second, there does not appear to be a significant age difference in adrenal pubertal development for a girl and a boy. Third, the same hormones continue to rise in concentration during gonadarche. If the gonads constitute the structure for biological "priming" in sexual attraction development, then it intuitively follows that the same hormones at earlier ages have a similar effect. Finally, DHEA is the primary sex hormone released by the adrenals. It is only two metabolic steps away from testosterone, but another three steps away from estradiol—the major adult sex hormones. These hormonal changes, it is postulated, stimulate awareness of the body and sensations when interacting with others, heightening perceptions of sexual and/or romantic attraction and their cues before gonadal puberty (McClintock and Herdt, 1996). Eventually these developmental subjectivities are strong enough to become memorable in the child's experience.

THE CASE OF NEW GUINEA

Anthropology has stressed social, rather than the biological elements of "puberty," since the time of the French scholar Van Gennep (1960), and it is commonly accepted today that "adolescence" is not a universal category. Moreover, for a variety of reasons, the social and biological dimensions were typically lumped together with a notion of gonadarche or "puberty at 13" (reviewed in Herdt and Leavitt, 1998), as one clearly sees in the early work of Mead (1927). Thus, distinctions between "adolescence," "puberty," and "sexuality" are controversial and require detailed study of the ethnographic data from a particular culture area to "make sense" of what is local and universal—or something in between.

The island of New Guinea is home to more than 700 cultures and within the Melanesian area, 2000 languages. The area has also been known, since the classical studies of Malinowski (1929) and Mead (1935), for the immense range of variation in sexual behavior found across the life course (Herdt, 1984). As Herdt has worked among the Sambia of New Guinea since 1974 and contextualized sexuality, we have chosen to highlight this culture area in comparing findings from the United States on the emergence of sexual attraction before gonadarche. We shall emphasize the precolonial situation of these societies prior to western contact and globalization.

What is remarkable about the anthropological record of this area is the attention to the age of 10 or so in many reports of ritual initiation for over more than half a century. These cultures in the precolonial period were characterized by unwritten languages, and the lack of attention to individual ages, typically used for recording birth and developmental events in the west. What stands out is the dramatic attention showered upon the tenth year, especially in male development, but also in female development. Ritual separation, especially from the natal households,

gender segregation, ordeals and taboos, as well as the introduction into sexual life, either homoerotic or heteroerotic, characterized the late childhood years. The folk psychology of these peoples strongly connected the need for ritual initiation with an inferred internal development in the attractions, desires, and motivations of the child, especially boys. The societal response seems widely to have involved the need for change in the person's social identity, living arrangements, and sexual regulation before gonadarche. When it is remembered that gonadarche was much later than in contemporary western cultures, the extreme attention to changing the child's psychosexual status by the age of 10 is even more impressive.

Contemporary study of these issues began in 1954, when the Australian anthropologist K. E. Read—then the leading authority on New Guinea—published the first ethnological survey of the New Guinea Highlands. Read had served in New Guinea during WW II and later returned to conduct the first long-term field study. He also initiated first contact with certain indigenous Highlands peoples, such as the Bena Bena, described as follows:

> Men and women did not sleep under the same roof. A man had a house for each of his wives, and he kept many of his personal possessions in them, but since constant association with women was thought to be weakening, he regularly slept in the club house with his male contemporaries and seniors and all boys over the age of about ten. (Read, 1954, p. 13)

Read claimed that this generalization applied to "all Highland groups."

Reports from other anthropologists since then have confirmed the insight of his original discovery. In these precolonial societies, the age of 10 seems to be a "baseline" for removal from the "childhood" category, followed by ritual advancement into a new social and sexual category. The following are but a few of the relevant cases known from the literature. The earliest report comes from British anthropologist Deacon, who described Malekula Island in the New Hebrides, specifically that boys are initiated at the age of 10 (Deacon, 1934, p. 41). American anthropologist Langness (1967, p. 164), writing on the same Bena Bena people observed by Read years earlier, independently confirmed that boys are taken to the men's house around the age of 10 or 12. Further afield, the Dutch anthropologist Van Baal (1966, p. 52, 1984, p. 133), who described the Marind-anim peoples occupying the entire Southwest coast of New Guinea, noted that boys stayed with their mothers until the age of 5 or 6, and then went to live nearer their fathers; however, they were formally admitted to the men's house when they had reached the approximate age of 10. Initiation was the introduction to sexual life, as the boys were inseminated by older males (Van Baal, 1984, p. 133). Again, among the Kaluli people in Northwest Papua New Guinea, the ethnographer states: "Homosexual intercourse for boys also took place in everyday life . . . whenever a boy reached the age of about ten or eleven" (Schieffelin, 1976, p. 152).

It is remarkable that in spite of the diverse nationalities, generations, and cultural theories of these different anthropologists, all of them have drawn attention to the age of 10. Whatever projection might be involved in "guessing" the age of

the child and his or her age-cohort, a good deal of objective understanding of the relevant age differences in these local communities was obviously available to these fieldworkers. In fact, our own work among the Sambia suggests that the age of 10 is probably a regional "critical period" for sexual development.

But what is so critical about the age of 10 in New Guinea? As recently suggested elsewhere for the Sambia people, the accumulating evidence on sexual development supports the hypothesis that at least for males,[6] adults recognized the age of 9 or 10 in the child as commencing the emergence of sexual attraction to others (Herdt, 2000). That is, parents and community leaders inferred—either directly from their own observations of children, or indirectly from retrospections of their own psychosexual development—that sexual attraction and desire were budding in late childhood. Following initiation, Sambia elders and fathers taught boys about the need to physically separate from their mothers in order to grow into strong warriors. This gender segregation was strongly sanctioned and prevented any possibility of sexual interaction between boys and girls. Concomitantly, older males introduced boys to ritual insemination, typically occurring between younger (ages 7–14) and older males (ages 15 and above) before marriage (Herdt, 1981), a pattern found in 10–20% of Melanesian societies (Herdt, 1984).

Homoerotic initiation rites of these kinds are common throughout the area (Herdt, 1984). However, boys and girls are elsewhere introduced to heterosexual relations by the age of 10 or so, suggesting that the process applies both to males and females, as well as to homoerotic and heteroerotic customs (Knauft, 1993). The reason for this intense focus on sexuality by the age of 10 may have had to do with how these cultures regarded sexual and gender development before gonadarche as a "social problem" that required the dramatic solution of *rites de passage.*

Sambia male initiation rites required treatment of the boy before the age of 10, otherwise it was thought that he would weaken and die. The Sambia believe that a boy must be initiated before he is "too old" or "too big" in order for the rite of passage to have its necessary and desired effect (Stoller and Herdt, 1982). By contrast, girls were not initiated until their betrothed husbands had attained the stage of being late adolescent warriors, which was about the age of 10–12 for girls. Further, female initiation waited upon menarche in girls, which was in the late teens throughout Highlands New Guinea. Initiation of the boy moved him away from women and mother directly and led into the men's house, where he was inseminated, paving the way for a 10–15-year period of being exclusively homoerotic/homosocial, during the preadolescent and adolescent development, until his late teens or early twenties, depending upon the exact age at which a particular boy would have married and fathered a child (Herdt, 1981, 1987). Sambia pinpoint this transition point at between the ages of 7 and 10 years, for an age-cohort of

[6]We would not want to claim that all traditional societies in Melanesia had initiation practices moving boys into the men's house by the age of 10, because examples to the contrary can certainly be found (Herdt, 1991).

boys from a group of villages, with individual boys' ages averaging approximately 8.5 years.

We do not know at what age adrenal puberty begins in these populations, but the onset of the independent process of gonadal puberty was slower than in contemporary western society. Child mortality was also high and in some areas created a definite challenge to the survival of the society (Herdt and Leavitt, 1998), resulting in prolonged breast-feeding of children, in some cases, upto the age of 4 or 5. Long-term field studies have attested to the resilience and robustness of surviving children in New Guinea, however, as well as to the seemingly slow rate of growth (Mead, 1956). We should note that the onset of gonadal puberty was very slow, perhaps slower than any comparable area of the world, in these precolonial societies of Papua New Guinea. These societies were protein deficient, parasitically challenged, and they lacked prenatal care or modern medicine in dealing with such diseases as yaws and malaria. Infant mortality was very high and reached more than 50% in some villages in some years (Herdt, 1987). Adrenal puberty may have been at the same or slightly older ages for Sambia children. Generally, gonadal puberty remained late in precolonial times and well into the 1970s, with boys achieving gonardarche between the ages of 13 and 14 years, and girls achieving menarche by the age of 18 among the Bundi people, and as late as 19.2 years among the Sambia and their neighbors (Malcolm, 1968; Worthman, 1999; see Danker-Hopfe, 1986, for European comparisons).

Because of warfare, an extreme imperative was placed on the need to achieve gonadarche and adult masculinity in boys. Sambia parents felt very strongly that the rituals would only have their desired effect before the age of 10. In their minds, proper sexual development and reproduction were placed at a risk without insemination by older warriors. However, in other cultures, heterosexual relations were viewed as logical outcome of parallel ritual processes (Knauft, 1993).

In sum, Sambia adults imagined that the boy's awareness of his body and sexuality took a pivotal turn in late childhood, well before gonardarche. Sambia initiation, commencing after the age of 7, directly followed or was concurrent with the onset of adrenarche, we would hypothesize, in males. Furthermore, although the culture did not recognize the boys as being physically mature, their folk psychology recognized the age of 10 as the "critical period" for sexual subjectivity. Given that the boys begin their sexual role as fellators on average by the age of 8.5 years, it is not surprising that by the age of 10 or so they would be regarded as having developed sexual interest. Moreover, by the age of 11–12, the period of the second-stage initiation that advances the boys to the next level of the male hierarchy, the boys have become aggressive fellators who actively pursue semen to masculinize their bodies (Herdt and Stoller, 1990, p. 103). The ethnographic evidence suggests that Sambia boys, by the age of 9–10, had begun to experience awareness of their attractions toward others, including, in some cases, sexual attraction toward other boys or girls (Herdt, 2000). The culture feared the expression

of these attractions, if left unchecked. By initiating boys by the age of 10, the men reduced the undesired effects of sexual attractions toward others, especially incest, premarital sex, moral and social challenges to male control, including the use of ritualized boy-inseminating to regulate male/male sexuality before marriage. Far from being rare or exotic, these cases in New Guinea may actually highlight a more general process in preliterate societies that has previously been ignored.

CONTEMPORARY STUDIES—UNITED STATES

Accumulating studies from the United States over the past decade suggest that the development of sexual attraction may commence in middle childhood and achieve individual subjective recognition sometime around the age of 10 (Herdt and Boxer, 1993; Pattatuci and Hamer, 1995; Hamer *et al*., 1993, as previously reported in McClintock and Herdt, 1996, Fig. 1). As these studies have shown, first same-sex attraction for males and females typically occurs at the mean age of 9.6 for boys (Herdt and Boxer, 1993), and between the ages of 10 and 10.5 for girls (Hamer *et al*., 1993; Pattutuci and Hamer, 1995). It is significant to note that within the range of these samples, males and females, heterosexuals and homosexuals, all experienced sexual attraction at or near the age of 10, with male sexual subjectivity a bit ahead of female sexual subjectivity.

In a prior study, it was speculated that adrenal puberty may be the source of this change in samples of American men and women (McClintock and Herdt, 1996). In two separate studies, conducted by different investigators from diverse academic fields in different parts of the country, the age of 10 was shown to be the developmental marker for first memorable attraction toward others, regardless of the gender of the object. Furthermore, these studies have a mean age of 37 years (Hamer *et al*., 1993) in one case, and a mean age of 17.9 years in the other (Herdt and Boxer, 1993). This difference—approximately one generation—is critical, for it suggests that first attraction is independent of social age or generational cohort differences. It also hints that cultural change (such as the mass media attention to intervening events of the AIDS epidemic) have not directly affected the age of onset of attraction in the youngest cohort. Furthermore, if the reports of first attraction were biased by retrospection to a significant degree, one would expect that the difference in social experience and the person's proximity to the developmental marker would have resulted in different reported outcomes. Since the reported age is the same for both generations, a deeper biopsychosocial structure of influence is hypothesized to be at work in both cohorts.

The study of Herdt and Boxer (1993) reported first attraction by an average age of 9.6 for boys and 10.1 for girls. Typically, the age of first homoerotic fantasy was 11.2 for males and 11.9 for females, with sexual conduct with the same gender delayed by 2 years for males, and about 4 years (to 15.2 years on average) for

females (Herdt and Boxer, 1993, chapter 5). It was not until completing the study that the investigators went to the larger research literature for comparison, and discovered that the same age had previously been reported by Saghir and Robins (1973, p. 232) from their study a generation before. They assert:

> The natural history for the development of homosexual responses, overt behavior and finally recognition of identification of other homosexuals with their groups could be illustrated by the following chronological account: "As early as the age of 10 I would feel attracted to my teachers and would want to be with them and do things for them. Shortly later, I started having crushes on my classmates. I would think about them and desire to be with them."

In a different study, focused on risk factors for suicide in gay and bisexual youth, Remafedi *et al.* (1991, Table 3) found that the mean age for first homosexual attraction in their sample of 137 males ranged from 9.27 to 10.66 years. The work of Savin-Williams (1998) shows a similar age of onset of sexual attraction in younger gays and lesbians (see also Savin-Williams and Diamond, 2000). An important early study by D'Augelli (1991, p. 141) of 77 college males also found an awareness of attraction toward other males on average by the age of 10.8 years. Given the difficulties of remembering and reporting common to survey studies, and given the strong cultural bias of the folk psychology to mark sexuality *after* gonadarche, it is remarkable that the age of attraction clusters around the age of 10 in all these studies.

What role does sexual orientation play in the emergence of attraction before gonadarche? Clearly, more research is needed to answer this question with authority; however, one should be cautious in concluding that the development of sexual attraction differs significantly by sexual orientation. First, the development of sexual attraction in heterosexuals and homosexuals, (defined by fantasy and desire and their vicissitudes) does not seem to be dependent upon the biological or social concomitants of gonadarche. Second, differences in sexual precocity for heterosexuals versus homosexuals do not seem to be significant predeterminants of adolescent sexual outcomes (Bailey and Zucker, 1995; Money and Lewis, 1990).[7] Indeed, a recent study has found the reverse: Bailey and Oberschneider (1997, pp. 438–439) in an intriguing retrospective survey of 136 professional dancers found that straight males experience their first heterosexual feelings at an average age of 8.9 years, whereas the gay males report their first attractions at the age of 10.4 years, a significant difference.

What role do gender differences play in the development of attraction? The slightly younger age for males compared to females may be influenced by the social and historical conditions of gender role performance, as in so many other areas of gender development. Summarizing the Kinsey data on male sexual development,

[7] Survey studies have found differences in adolescent attraction levels between homosexuals and heterosexuals. Remafedi *et al.* (1992, pp. 716–717) report that the average experience of first sexual attraction is at a younger age for heterosexuals than for homosexuals in a large Minnesota school survey. On average, the straights reported an average age of 15 for first heterosexual attractions, whereas for gays it was 15.6 years for their first homosexual attraction.

Gagnon (1971, p. 239) once noted: "For males early adolescence is commonly characterized by the onset of early sexual activity which is conducted in the context of secrecy experienced in tension with the public masculine striving associated with homosexuality. In contrast, among females overt sexual activity is infrequent; they, like males, live in a world dominated by their own gender, but it is a more public world designed to promote future heterosociality." Hence, about 20% of boys, but only 10% of girls in Kinsey's sample, had experienced orgasm to masturbation by the age of 12. A generation later, Baldwin and Baldwin (1997, p. 193) state, "Boys report noticing the pubertal changes in sexual excitability 2 or 3 years earlier (and much more often per week) than girls do, giving boys yet another several years head start over girls in learning about the physical pleasures of sex." In a study by Knoth *et al.* (1988, p. 79, and Table 1), "The modal age of first arousal for boys across all our samples was between 11 and 12. The modal age for the first arousal for girls was 2–3 years later than for boys." Perhaps even more important for the present discussion of adrenal puberty, Knoth *et al.* (1988, p. 79, and Table 1) found that 40% of males reported having their first sexual arousal by the age of 8, whereas the aggregate of 60% reported theirs by the age of 10.

Cultural change is occurring all the time, and we should be surprised if its effects were not felt in the area of the development of sexuality. However, a comparison of the Kinsey recall data with those of the recent National Health and Social Life Survey suggest only modest age cohort differences related to the emergence of sexual attraction in young people (Laumann *et al.*, 1994; Michaels, 1996). It is tempting to posit that whatever is changing in the context of desires and objects of attraction, the deep structure of the development of attraction as a subjective process is only crudely associated, if at all, with cultural change.

EARLY MATURATION AND SEXUAL ATTRACTION

It has long been theorized that the age of menarche varies with social and historical conditions, and indeed, that modernity has brought about increasingly earlier ages of maturation (Danker-Hopfe, 1986; Herdt and Leavitt, 1998; Khan *et al.*, 1996). Thus, as modernity advances, with increments in diet, health care, education, and maternal care, gonadal puberty has a tendency to emerge earlier in development. Although a variety of studies have focused on this point, a startling new clinical study indicates that precocious gonadal puberty is increasingly apparent in the United States and this observation bears upon the conceptualization of sexual attraction.

In a report based upon a study of 17,077 girls seen by a cross-section of 225 clinicians in the United States, Herman-Giddens and colleagues (1997) reported a substantially younger age of gonadal pubertal traits. At the age of 8, the clinicians found that 48.3% of African-American girls and 14.7% of white girls had begun pubertal development. Breast and pubic hair development in proportions increasing

toward adult norms were registered for these girls, with nearly 17% of the African-American revealing axillary hair. The authors note that "for each characteristic, African-American girls were more advanced than white girls at the same age" (Herman-Giddens *et al*., 1997, p. 507). By the age of 12, they report that 62% of the African-Americans and 35% of the white girls had begun menses. With respect to breast development—in terms of Tanner stages—the mean age of onset for breast development was 8.87 years for African-American girls and 9.96 years for white girls. These developmental characteristics are markedly younger than "suggested by standard pediatric textbooks" (Herman-Giddens *et al*., 1997, p. 509) on the subject. The authors conclude that "More appropriate standards for defining precocious and delayed puberty may need to be developed, taking into account racial differences" (Herman-Giddens *et al*., 1997, p. 511). The implications for the development of sexual attraction and sexual behavior before adolescence are obvious but bear scrutiny (McClintock *et al*., 1998).

The author's conclusion seems to be directly related to what typically would be called "gonadal puberty," though, in fact, the early ages observed by the clinicians fall between adrenal and gonadal puberty. The standard thinking in pediatric practice previously did not differentiate between these two processes, and the statement just made seems to conflate them. The question arises: If gonadarche is demonstrably related to social and historical changes in maturation, might some of these changes also result from adrenal puberty? At the present we must rely again upon inferences drawn from studies of the social conditions of responses to early sexual attraction and sexual behavior prior to the onset of adolescence.

Cultures may, as has long been known, either support or inhibit the expression of sexual expressions before adolescence (Ford and Beach, 1951; Herdt, 1997; Mead, 1961). Sexually approving cultures—those in which sexual play in childhood is tolerated or even encouraged, differ strikingly from sexually disapproving cultures—wherein family and community may frown upon or even punish sexual exploration or curiosity prior to the age at which the sexual culture thinks this is "natural and normal" (Carrier, 1980; Herdt, 1997). It might be predicted that early physical maturation, and/or sexual behavior, would be more readily approved in such "sex positive" cultures. In contemporary Norway, for example, Langfeldt (1981) describes sexual relations among normative 8–12-year-old males as a regular part of "boys' subcultures." He asserts that it is common for these male peer groups to sexually experiment in secret (Langfeldt, 1981, pp. 67–68). Langfeldt (1990) estimates that about 10% of all Norwegian children between the ages of 4 and 10 masturbate to orgasm. It is interesting to note that clinical reports reveal the age of 10 as typical for the beginning of sexual feelings. If early maturation and sexuality are positively regarded in Norway, we might then predict that the expression of early sexual attraction and the expression of sexual feelings will develop relatively unimpeded.

Conversely, Musaph (1990) has reviewed the statistical evidence for first intercourse in western countries and finds the average age onset to be in the teens. Both

parental control and religious affiliation strongly influenced the age of first sexual intercourse. It may be that sexual intercourse, especially in sexually disapproving cultures, may serve to inhibit knowledge of early sexual attraction. Ironically, however, the same conditions of sexual ignorance, when accompanied by a reign of silence or taboo on "sex talk" (Fine, 1988) in these sexual cultures, may allow for the emergence of pristine attractions and sexual fantasies, before adolescence. Diaz (1998, p. 108) has noted how Latino culture in the United States creates conditions of this kind in the early initiation of sexual intercourse and bisexual behavior among males.

To illustrate this effect, recall the earlier cited study of the development of same-sex feelings among gay and lesbian self-identified youth in Chicago (Herdt and Boxer, 1993). Many of the 202 youth (age range of 14–20) in the Chicago study said that in growing up they always felt "different," and their parents often described how their sons and daughters were perceived to be "different than the others." Their parents, in turn, described their gay or lesbian child's development as being more "creative," "academic," or "artistic" (for boys), or more "athletic," "introspective," or "competitive" (for girls), compared to the peers and sibs of these children; however, such stereotypes also reflect our society's attitudes about normative gender development in childhood (Herdt and Koff, 2000). There is no reason to believe that gonadal puberty arrived earlier than normal in this population. However, by the age of nine and half on the average, the Chicago boys and girls had experienced their first erotic attraction to the same-sex. In short, they were aware and in some cases excited or aroused by another person, typically a peer or friend, suggesting that these children had already recognized sexual attraction in themselves and were on the path to sexual maturity.

Thus, sexual subjectivity (probably including sexual orientation) had achieved an adult-like state well before gonadarche. Granted, this does not mean that the sexuality of these boys and girls was "complete" or finished, nor that subsequent psychosexual transformations would ensue. Instead, it seems plausible to infer that whatever form their sexual and social careers take, sexual attraction following adrenarche creates the conditions for sexual subjectivity and behavior in children well before the society expects this to happen. In this respect, the precolonial New Guinea societies may have anticipated outcomes ahead of those in contemporary American society.

CONCLUSION

This article has examined the hypothesis that sexual attraction emerges after the advent of adrenal puberty, typically precipitating the development of stable and memorable sexual attraction by the age of 10 across cultures. Two pubertal processes—adrenarche and later gonadarche—are suggested as doing the work of maturation, including the development of phenotypic gonadarche, with important

implications for the emergence of sexual awareness and behavior. This argument effectively expands the period of "puberty" to encompass a wider span of human development after the age of 6. It also suggests that the emergence of attraction, as found in the New Guinea cultures—both in homoerotic and heteroerotic forms, and in the contemporary United States among males and females in both homosexuals and heterosexuals—may constitute a good candidate for being a human universal of sexuality.

Middle childhood should no longer be viewed as a period of hormonal quiescence. Nor should we believe that for all children, there is an absence of sexual subjectivity before gonadarche. Rather, the accumulating evidence suggests that there is more sexual subjectivity occurring during childhood than previously believed, especially from the age of 6 onward, with the onset of adrenarche. The key in the United States is that between the fourth and fifth grades, the child's sexual attractions have already begun to stabilize or consolidate, becoming robust and memorable, suggesting the results of an earlier developmental process. The stability of the attraction is manifest by its memorability, accessible even in late adulthood. When thinking of how sexual risk-taking is regarded in development, and is sensitive to the context of relationships, it is critical to reconsider the early onset of sexual attraction before adolescence and its implications for social policy (Ehrhardt, 1996).

Although cross-cultural differences in the meanings of sexual arousal and attraction are impressive, the evidence for a deeper structure of adrenal hormonal development that influences the sequence and timing of sexual attraction before adolescence is profound. This is not to say that cultures may of course thwart the emergence of developmental subjectivities of sexual attraction in late childhood, through the use of beliefs, taboos, rituals, and social gender roles. Are the internal processes associated with adrenal puberty robust enough to overcome these social barriers in the development of individual development of the body and fantasy before gonadal puberty? We do not know the answer to this question; however, as Freud (1905) speculated long ago, cultures may exercise an enormous constraint upon the emergence of sexuality and hence, the subjective memory of, as well as the expression of, sexual aim and object attractions. When a culture completely denies or "forgets" the earlier experience of childhood upon adult development, we have what Benedict (1938) once referred to as "cultural discontinuity." It is tempting to argue that if attraction typically develops during adrenarche but is ignored or repressed by adults' retrospection about sexual development, particularly before it becomes stabilized around the age of 10, the contemporary United States may be a good example of a society in which discontinuity in sexuality is a common developmental experience, and may affect the memory of earliest sexual attraction (Herdt, 1990). Because male and female, as well as homosexual and heterosexual experiences of attraction were found before the age of 10, the internal representation of sexual attraction is robust and memorable enough to overcome these societal constraints (McClintock and Herdt, 1996).

We should not ignore the context of political power in the social regulation of childhood and adolescent sexuality. In precolonial New Guinea, it may well have been the case that adrenal puberty led to sexual attraction in ways that directly or indirectly challenged male power and gender hierarchy. Clearly, the implementation of strict avoidance taboos and gender segregation constitute powerful indicators of adult male authority and the attempt to control adolescent sexual attraction and behavior. The need for strict identification with the same-gender parent, and political solidarity in times of warfare, may have produced a general structural effort to exaggerate gender differences and assert sexual control. These points lead to a generalization about the New Guinea societies: When a society worries over the effects of early gender development, and the expression of sexual attraction before adulthood, its folk psychology and institutions will implement controls on the child's sexuality well before gonadarche. It is remarkable that our own postindustrial society continues to exert similar powerful controls over childhood sexuality in the face of enormous change and access to sexual knowledge and the media. Sexuality in the western liberal democracies, it would seem, is still a challenge to forces of social regulation and authority.

That western and nonwestern societies have focused upon the age of 10 as a memory marker for development is thus no coincidence, but neither should it be regarded as a great mystery. The age of 10 is not magical—only a convenience marker in the cultural reasoning of societies about powerful hormonal processes.

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REFERENCES

Bailey, J. M., and Oberschneider, M. (1997). Sexual orientation and professional dance. *Arch. Sex. Behav.* 26: 433–444.

Bailey, J. M., and Zucker, K. J. (1995). Childhood sex-typed behavior and sexual orientation: A conceptual analysis and quantitative review. *Dev. Psychal.* 31: 43–55.

Baldwin, J. D., and Baldwin, J. I. (1997). Gender differences in sexual interest. *Arch. Sex. Behav.* 26: 179–210.

Bell, A. P., Weinberg, M. S., and Hammersmith, S. (1981). *Sexual Preference*, Indiana University Press, Bloomington.

Bem, D. (1996). Exotic becomes erotic: A developmental theory of sexual orientation. *Psychol. Rev.* 103: 320–335.

Benedict, R. (1938). Continuities and discontinuities in cultural conditioning. *Psychiatry* 1: 161–167.

Blumenthal, J., Giedd, J. N., Jeffries, N. O., Castellanos, F. X., Liu, H., Tijdenbos, A., Paris, T., Evans, A. C., and Rapaport, J. L. (1999). Brain development during childhood and adolescence: A longitudinal MRI study. *Natl. Neurol.* 2(10): 861–863.

Byne, W., and Parsons, B. (1993). Human sexual orientation: The biological theories reappraised. *Arch. Gen. Psychiat.* 50: 228–239.

Carrier, J. (1980). Homosexuality in cross-cultural perspective. In Marmor, J. (Ed.), *Homosexual Behavior: A Modern Reappraisal*, Basic Books, New York, pp. 100–122.
Danker-Hopfe, H. (1986). Menarchal ages in Europe. *Yearbook Phys. Anthropol.* 29: 81–112.
Deacon, A. B. (1934). *Malekula: A Vanishing People in the New Hebrides*, George Routledge, London.
Diaz, R. M. (1998). *Latino Gay Men and HIV*, Routledge, New York.
D'Augelli, A. (1991). Gay men in college: Identity processes and adaptations. *J. Col. Stud. Dev.* 32: 140–146.
Ehrhardt, A. A. (1996). Our view of adolescent sexuality: Risk behavior without developmental context. *Am. J. Pub. Health* 86(11): 1523–1525.
Ehrhardt, A., and Meyer-Bahlburg, H. F. L. (1981). Effects of prenatal sex hormones on gender-related behavior. *Science* 211: 1312–1318.
Elder, G. (1975). *Adolescence in the Life Cycle: Psychological Change and Social Context*, Halsted Press, New York.
Fine, M. (1988). *The Missing Discourse of Desire*, Harvard Ed. Rev. Vol. 2, pp. 29–53.
Ford, C. S., and Beach, F. A. (1951). *Patterns of Sexual Behavior*, Harper and Brothers, New York.
Freud, S. (1905/1953). *Three Essays on the Theory of Sexuality. Standard Edition of the Complete Psychological Works of Sigmund Freud, Vol. 8*, Hogarth, London.
Gagnon, J. (1971). The creation of the sexual in adolescence. In Kagan, J., and Coles, R. (Eds.), *Twelve to Sixteen: Early Adolescence*, W. W. Norton, New York, pp. 231–257.
Gagnon, J. (1990). The explicit and implicit use of the scripting perspective in sex research. *Annu. Rev. Sex Res.* l: 1–44.
Gelman, S., Collman, P., and Maccoby, E. E. (1986). Inferring properties from categories versus inferring categories from properties: The case of gender. *Ch. Dev.* 57.
Gorman, M. R. (1994). Male homosexual desire: Neurological investigations and scientific bias. *Perspect. Biol. Med.* 38: 61–81.
Green, R. (1987). *The 'Sissy Boy Syndrome' and the Development of Homosexuality*, Yale University Press, New Haven.
Hamer, D. H., Hu, S., Magnuson, V. L., Hu, N., and Pattutucci, A. M. L. (1993). Linkage between and markers on the X chromosome and male sexual orientation. *Science* 261: 321–327.
Herdt, G. (1981). *Guardians of the Flutes*, McGraw-Hill, New York.
Herdt, G. (1984). Ritualized homosexual behavior in the male cults of Melanesia, 1862–1983: An introduction. In Herdt, G. (Ed.), *Ritualized Homosexuality in Melanesia*, University of California Press, Berkeley, pp. 1–81.
Herdt, G. (1987). *The Sambia: Ritual and Gender in New Guinea*, Holt, Rinehart, and Winston, New York.
Herdt, G. (1990). Developmental continuity as a dimension of sexual orientation across cultures. In McWhirter, D., Reinisch, J., and Sanders, S. (Eds.), *Homosexuality and Heterosexuality: The Kinsey Scale and Current Research*, Oxford University Press, New York, pp. 208–238.
Herdt, G. (1991). Representations of homosexuality in traditional societies: An essay on cultural ontology and historical comparison, Part I. *J. Hist. Sex.* 1: 481–504.
Herdt, G. (1997). *Same Sex, Different Cultures: Perspectives on Gay and Lesbian Lives*, Westview Press, New York.
Herdt, G. (1999). *Sambia Sexual Culture: Essays from the Field*, University of Chicago Press, Chicago.
Herdt, G. (2000). Why the Sambia initiate boys before age 10. In Bancroft, J. (Ed.), *Sexual Theory*, Indiana University Press, Bloomington.
Herdt, G., and Boxer, A. (1993). *Children of Horizons*, Beacon Press, Boston.
Herdt, G., and Koff, B. (2000). *Something to Tell You: The Road Families Travel When a Child is Gay*, Columbia University Press, New York.
Herdt, G., and Leavitt, S. C. (1998). *Adolescence in Pacific Island Societies*, University of Pittsburgh Press, Pittsburgh.
Herdt, G., and Stoller, R. J. (1990). *Intimate Communications: Erotics and the Study of Culture*, Columbia University Press, New York.
Herman-Giddens, M. E., Slora, E. J., Wasserman, R. C., Bourdony, C. J., Bhapkar, M. R., Koch, G. G., and Hasemeier, C. M. (1997). Secondary sexual characteristics and menses in young girls seen in office practice: A study from the pediatric research in office settings network. *Pediatrics* 99: 505–512.

Hopper, B. R., and Yen, S. S. (1975). Circulating concentrations of dehydroepiandrosterone and dehydroepiandrosterone sulphate during puberty. *J. Clin. Endocrinol. Met.* 40(3): 458–461.
Khan, A. D. (1996). Early childhood determinants of age at Menarche in rural Guatemala. *Am. J. Human. Biol.* 8: 717–723.
Kimmel, M. S. (2000). *The Gendered Society*, Oxford University Press, New York.
Kinsey, A. C., Pomeroy, W. B., and Martin, C. E. (1948). *Sexual Behavior in the Human Male*, W. Saunders, Philadelphia.
Knauft, B. (1993). *South Coast New Guinea Cultures*, Cambridge University Press, New York.
Knoth, R., Boyd, K., and Singer, B. (1988). Empirical tests of sexual selection theory: Predictions of sex difference in onset, intensity, and time course of sexual arousal. *J. Sex Res.* 24: 73–89.
Korth-Schutz, S. (1989). Precocious adrenarche. In F. M. G. (Ed.), *Pediatric Adolescent Endocrinology*, Karger, New York, pp. 226–235.
Langfeldt, T. (1981). Childhood masturbation: Individual and social organization. In Constantine, L. L., and Martinson, F. M. (Eds.), *Children and Sex*, Little, Brown and Co., Boston, pp. 63–74.
Langfeldt, T. (1990). Early childhood and juvenile sexuality, development and problems. *Handbook of Sexology, Vol. 7*, Elsevier Science, Amsterdam, pp. 179–200.
Langness, L. L. (1967). Sexual antagonism in the New Guinea Highlands: A Bena Bena example. *Oceania*, 37(3): 161–177.
Laumann, E. O., Gagnon, J. H., Michael, R. T., and Michaels, S. (1994). *The Social Organization of Sexuality: Sexual Practices in the United States*, University of Chicago Press, Chicago.
Malinowski, B. (1929). *The Sexual Life of Savages in North-Western Melanesia*, Harcourt, Brace and World, New York.
McClintock, M., and Herdt, G. (1996). Rethinking puberty: The development of sexual attraction. *Curr. Direc. Psychol. Sci.* 5: 178–183.
McClintock, M., Herdt, G., and Rosenfield, R. (1998). Preadolescent determinants of sexuality. *Pediat. Update* 19(9), 1–10.
Maccoby, E. E. (1988). Gender as a social category. *Dev. Psychol.* 24: 755–765.
Maccoby, E. E., and Jacklin, C. (1974). *The Psychology of Sex Differences*, Stanford University Press, Stanford.
Malcolm, L. A. (1968). Determination of the growth curve of the Kukukuku people of New Guinea from dental eruption in children and adult height. *Archaeol. Phys. Anthropol. Oceania* 4: 72–78.
Mead, M. (1927). *Coming of Age in Samoa*, Norton, New York.
Mead, M. (1935). *Sex and Temperament in Three Primitive Societies*, Dutton, New York.
Mead, M. (1956). *New Lives for Old. Cultural Transformation: Manus 1928–1953*, William Morrow, New York.
Mead, M. (1961). Cultural determinants of sexual behavior. In Young, W. C. (Ed.), *Sex and Internal Secretions*, Williams & Williams, Baltimore, MD, pp. 1433–1479.
Meyer-Bahlburg, H. (1984). Psychoendocrine research on sexual orientation. Current status and future options. *Prog. Brain Res.* 61: 375–398.
Meyer-Bahlburg, H. (1997). The role of prenatal estrogens in sexual orientation. In Ellis, L., and Ebertz, L. (Eds.), *Sexual Orientation: Toward Biological Understanding*, Ct. Praeger, Westport, pp. 41–51.
Michaels, S. (1996). The prevalence of homosexuality in the United States. In Cabaj, R. P., and Stein, T. S. (Eds.), *Textbook of Homosexuality and Mental Health*, pp. 43–65.
Moller, L. C., Hymel, S., and Rubin, K. H. (1992). Sex typing in play and popularity in middle childhood. *Sex Roles* 26: 331–353.
Money, J. (1987). Sin, sickness, or society? *Am. Psychol.* 42: 384–399.
Money, J. (1997). *Principles of Developmental Sexology*, Continuum, New York.
Money, J., and Ehrhardt, A. (1972). *Man and Woman, Boy and Girl*, Johns Hopkins University Press, Baltimore, MD.
Money, J., and Lewis, V. G. (1990). Puberty: Precocious, delayed and incongruous. In Perry, M. E. (Ed.), *Handbook of Sexology, 7: Childhood and Adolescence*, pp. 236–262.
Musaph, H. (1990). First sexual intercourse. In Perry, M. E. (Ed.), *Childhood and Adolescent Sexology*, Elsevier, Amsterdam, pp. 287–296.
Pattatuci, A., and Hamer, D. (1995). Developmental and familiarity of sexual orientation in females. *Behav. Genet.* 25: 407–420.

Piaget, J. (1971). *Structuralism* (Trans. C. Maschler), Harper Torchbooks, New York.
Plummer, K. (1995). *Telling Sexual Stories*, Routledge, New York.
Read, K. E. (1954). Cultures of the central highlands, New Guinea. *Southwestern J. Anthropol.* 10: 1–43.
Remafedi, G., Farrow, J. A., and Deisher, R. W. (1991). Risk factors for attempted suicide in gay and bisexual youth. *Pediatrics* 87: 869–875.
Remafedi, G., Resnick, M., Blum, R., and Harris, L. (1992). Demography of sexual orientation in adolescents. *Pediatrics* 89: 714–721.
Saghir, and Robins. (1973). *Male and Female Homosexuality*, William's and Wilkins, Baltimore.
Schieffelin, E. L. (1976). *The Sorrow of the Lonely and the Burning of the Dancers*, St. Martin's, New York.
Simon, W., and Gagnon, J. H. (1973). Psychosexual development. In Gagnon, J. H., and Simon, W. (Eds.), *The Sexual Scene*, Transaction Books, New Brunswick, NJ, pp. 29–47.
Stoller, R. J. (1968). *Sex and Gender*, Science House, New York.
Stoller, R. J., and Herdt, G. (1982). The development of masculinity: A cross-cultural contribution. *J. Am. Psychoanal. Assoc.* 30: 29–59.
Stoller, R. J., and Herdt, G. (1985). Theories of origins of male homosexuality: A cross-cultural look. *Arch. Gen. Psychiat.* 42: 399–404.
Storms, M. (1981). A theory of erotic orientation development. *Psychol. Rev.* 88: 340–353.
Tanner, J. M. (1973). Trend toward earlier menarche in London, Oslo, Copenhagen, The Netherlands and Hungary. *Nature* 243: 95–96.
Townsend, J. M., and Wasserman, T. (1997). The perception of sexual attractiveness: Sex differences in variability. *Arch. Sex. Behav.* 26.
Van Baal, J. (1966). *Dema*, Martinus Nijhoff, The Hague.
Van Baal, J. (1984). The dialectics of sex in Marind-anim Culture. In Herdt, G. (Ed.), *Ritualized Homosexuality in Melanesia*, University of California Press, Berkeley, pp. 128–166.
Van Gennep, A. (1960). *The Rites of Passage*, In Vizedom, M. K., and Caffee, G. L. (Eds.), University of Chicago Press, Chicago.
Vance, C. S. (1991). Anthropology rediscovers sexuality: A theoretical comment. *Soc. Sci. Med.* 33: 875–884.
Worthman, C. (1999). Faster, farther, and higher: Biology and the discourses on human sexuality. In Suggs, D. N., and Miracle, A. (Eds.), *Culture, Biology and Sexuality*, University of Georgia Press, Athens, GA, pp. 64–75.