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Human Sexuality and Evolutionary Models²

Until recently the most widely accepted model of evolution hinged on the concept of group selection. According to this view, behavior of individuals evolved to preserve and perpetuate the genotype of the reproducing population.

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2. Comments by R. D. Alexander.

interpretation, which is that individuals behave in ways most likely to ensure the perpetuation of their own individual genotypes. In historical perspective what this model says is the following: We and our contemporaries tend to exhibit behavioral and nonbehavioral characteristics that in past generations contributed to preservation of the genes we have inherited from our ancestors. Various lines of research can be explored to test the validity of this new model as it applies to different aspects of human sexuality.

Evolution has commonly been viewed as the discipline that traces long-term changes through fossil remains and comparisons of related living forms. The more such studies focus on truly long-term changes, the less likely they are to unravel the causes of change because the environments of antiquity are inevitably so poorly known.

Another aspect of evolution, less well understood outside biology, is the use of what is known about the actual process of change, studied in living forms, to predict states of phenotypic attributes or combinations of attributes. A particularly well-studied example, relevant to this volume, is the ratio of males to females in a population.

There are similarities in sex ratios, not just across the animal kingdom, but across both the animal and plant kingdoms. Usually, they are about 1:1 in early adulthood. Even tiny shifts in sex ratio can affect sociality and sexuality. For example, one may contemplate the idea that whatever causes lie behind sex ratios might have produced one male for every ten females or vice versa. Under such conditions our sociality could scarcely have its current structure. But the sex ratio among humans also is generally about 1:1 in early adulthood. Only one explanation has been devised, and it works: An individual can maximize its reproduction in a sexual species, in which the two halves of genetic materials come from parents of the two different sexes, only by investing in the two sexes so as to produce a local sex ratio that will not cause any of its offspring to be devalued reproductively solely because of their sex (Fisher, 1958). This is what organisms appear to do, and it leads to strange predictions such as: If twice as much parental effort is required to rear a male as to rear a female then one expects a sex ratio at the end of parental care of 1:2 rather than 1:1; and things like this do happen. The major exceptions to a 1:1 investment are species in which all the females are inseminated by their brothers. Parents in those cases would be expected to

invest only enough in males to assure insemination of all of their daughters. In such species the resulting sex ratio may be 1:20 or 1:45—even though the males in some cases are tiny, crippled, blind, short-lived things that do nothing but inseminate the female and then die (Hamilton, 1966).

Philosophically, the significant idea is that individuals evolve to maximize their reproduction. This seems counter-intuitive to human views of our own motivations. We all believe that humans do countless things besides reproduce. Part of this belief is derived from our ability to define *reproduction* as we see fit. Nevertheless, human sex ratios suggest that we too have evolved to maximize reproduction as individuals.

In almost all groups of the world's species, including all mammals, females invest more than males in rearing their offspring. Males work harder in competition for matings. Consequently, some males in all these species reproduce more than any female. Biologists refer to such species as polygynous, whether or not the males have harems. In polygynous species, *because sex-ratio selection produces about a 1:1 sex ratio in early adulthood*, the male's lifetime is a high-stakes, high-risk game compared with the female's (Williams, 1957; Hamilton, 1966; Alexander et al., 1978). In other words, because some males inseminate many females, other males do not reproduce at all.

Humans are polygynous in the sense that I have described and share many common characteristics with other polygynous species: In these species in which the sex ratios are about 1:1, males take longer to mature and senesce more rapidly; mortality is higher in males at essentially every age. In species that compete sexually on the ground, rather than in water or in the air, males are always bigger than females. Promising juvenile males get more help from their parents than do any females, while not-so-promising males are abandoned or killed either as fetuses or later; that is also true in humans to some extent. More males are conceived, but more die while still under parental care, even though males get more parental care than females. In mammals, males are carried longer during gestation and are larger at birth. Healthy and high-ranking parents produce male-biased broods, while low-ranking and less healthy parents do not, or in some cases produce female-biased broods. There is good evidence that in stratified human societies the same effect is brought about by sex-preferential infanticide (Dickeman, 1978).

Quotes from other papers in this volume show the connections between topics like sex-ratio selection and the goals of this conference. Luria, for example, indicates that in early or middle childhood the rigidity of sex-typing falls most heavily on the shoulders of boys. She points out that parents appear to be more worried about a boy's masculinity than about a girl's femininity; that boys are more likely to be ostracized as sissies than girls are as tomboys; that girls fight less than boys; and that "higher education and middle-class status are associated with more relaxed gender roles." All of these findings are consistent with what I have said about sex-ratio selection. In other words, *the basic aspects of sex and gender roles derive from the effects of sex-ratio selection upon our species*. Surely it is no triviality to realize this.

The consensus of authors in this volume seems to be that the reasons we are what we are and do what we do—like it or not—are mostly social. There are, of course, genetic differences between males and females, which lead to differences of appearance; but these appearances only initiate the social phenomena that cause the development, exaggeration, and diversification of gender-role differences. It seems that, historically, social contingencies have represented the most appropriate kinds of causes for achieving desired ends. How to succeed socially is the most difficult of all questions about how to succeed, because everybody else is also trying to succeed socially, and our individual goals necessarily conflict.

The sources of the effective social contingencies for the development of sex and gender roles also seem apparent in this volume. They are parents, peers, and ourselves. These are the sources of the social stimuli that put us in particular roles. An evolutionary biologist would suppose that these social influences work because parents want their offspring to succeed. But what constitutes "success" or "desired ends"? It is worth contemplating that, in terms of history, success may be defined in terms of the general theoretical approach that has developed in biology in the last ten years—namely, that attributes of organisms exist because they help those individual organisms maximize their reproduction.

This approach is a brand-new philosophy in biology. Previously we assumed that the attributes of organisms exist because they are good for perpetuating the species; but that explanation does not work. Sex ratios cannot be explained that way. Nor can senescence patterns, mating systems, sex differ-

ences and similarities, or sociality. We have thought that it is all a matter of personal satisfaction or pleasure or the acquisition of power or of influence; but those ideas will not work alone either. Beginning with things like sex ratios and considering others like patterns of senescence, social behavior, nepotism, and sexual competition, the hypothesis that individuals evolve to maximize their own reproduction, and not that of the species, *does* work (Alexander, 1977).

This discovery does not mean that we are bound to our history. We are the organisms who sit and contemplate these things. Then the contemplation itself becomes part of the environment, which means that in the end we can do almost anything we like. Perhaps this possibility is open to us only if we bring the significance of our evolutionary past into our consciousness through analysis of, and reflection on, the kinds of considerations raised here.

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*Herant A. Katchadourian,
editor*

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