Book Reviews

Human Sexual Differentiation

Female of the Species. M. KAY MARTIN and BARBARA VOORHIES. Columbia University Press, New York, 1975. xiv, 432 pp. Cloth, $15; paper, $6.50.

Female of the Species is a general anthropological treatment of sexual differentiation. The authors approach the subject from the perspective of the species as a whole, attempting to provide an explanation both for the major cross-cultural similarities in sex role structuring and for the kinds of variation found among different human groups. Their thesis is that ecological factors are the major determinants of how sex roles are allocated and that women's contribution to the productive process is the key to their general status in society.

Martin and Voorhies are primarily concerned with the adaptive significance of sexual differentiation and view the behavior patterns of our own species within a wider biological framework. At the same time, their insistence on the cultural dimension of human adaptive strategies places them in opposition to recent ethological writings on sex roles. Unlike the ethological writers, Martin and Voorhies see little reason to explain behavioral differences between men and women in genetic terms. They maintain that evidence for the biological determination of sex-typed behavior patterns is convincing only in the case of aggressiveness and add that in man—and, for that matter, in other animals as well—the form in which such aggressiveness is expressed is considerably affected by learning. They also suggest that traits widely associated with one sex rather than the other can reasonably be accounted for by convergent socialization practices, citing the results of cross-cultural investigations of child-rearing. In Martin and Voorhies's opinion, notions about the innateness of male-female differences are best interpreted as ideologies. Whether they appear in the cosmologies of New Guinea tribes or in the pages of academic journals, they function primarily as mystifications that transform a particular social order into an immutable natural order.

The major theories of sex roles produced by our own scientific culture, which Martin and Voorhies review in chapters 5 and 6 of their book, reveal more about the society in which they were written than they do about the respective position of men and women throughout human history. The social evolutionists of the 19th century focused on the control of sexuality, particularly male sexuality, in describing the passage from one hypothetical stage of social life to another. Women were portrayed with characteristic ambivalence: on the one hand, a civilizing influence and, on the other, passive and irrational. The sexual division of labor tended to be represented in terms of men as the economic providers and women as child-rearers confined to the home, a situation that characterizes middle-class life in industrial societies more than it does known hunting and gathering or horticultural peoples.

The neoevolutionist theories of sexual differentiation that have appeared recently in the widely read work of such authors as Desmond Morris, Lionel Tiger, Robin Fox, and Robert Ardrey are, according to Martin and Voorhies, as strikingly ethnocentric as anything produced in the heyday of Victorianism—this despite the fact that these later authors have been able to draw upon a vast amount of ethnographic and primatological field research. The major difference is that the familiar stereotypes are now explicitly rooted by their proponents in human biology. The newer theories, moreover, are more exclusively male-oriented than their 19th-century counterparts. Ideas about the past existence of matriarchies have fallen by the wayside. Control over sexuality, once the achievement of gentle-minded ladies, is now something men are more liable to have accomplished themselves, since they presumably surpass women both in innate sociability and in the degree of higher cortical regulation of sexual activity. In pointing out that the Victorians attributed a more significant creative role to women in the process of cultural development, Martin and Voorhies do not argue for the greater validity of their theories. What they seem to be saying is that when science is science fiction it may be evaluated for its mythic properties.

One of the most interesting and timely contributions of *Female of the Species* is its discussion of primatological perspectives on the evolution of human sex roles. According to Martin and Voorhies, writers like Ardrey, Tiger, and Fox have failed to take proper account of the range of behavioral variation both within and between primate species and have instead concentrated on those species that confirm preconceived notions about early man. Martin and Voorhies's critique could be made more coherent and concise, but it is essentially sensible and runs as follows: Some anthropologists and ethologists have attempted to show that certain human sex role attributes are part of our phylogenetic inheritance. In doing so, they have drawn upon the results of primate studies in a highly selective and misleading manner. Those who have taken savanna-dwelling baboons as their prototype justify their choice by claiming that the ecological setting in which these animals live most closely approximates that of emerging hominid groups. The problem with this approach is that it fails to sort out ecological and genetic considerations. If what we are concerned with is common inheritance of genetically determined behavior patterns, it would seem most reasonable to turn to our closest primate relations, the great apes. These species, besides varying considerably among themselves, generally fail to present the elaborate patterns of male dominance in which recent evolutionists have interested themselves. If the argument for skipping over these species to phylogenetically more distant ones is made in ecological terms, then should we not be emphasizing bases for convergent adaptive strategies that lie elsewhere than in the "biogram" of the species in question? In the case of the baboons themselves, forest-dwelling groups differ from their savanna-dwelling cousins and approximate fellow inhabitants of forest environments—chimpanzees, for example—in many important aspects of social organization.

Unfortunately, Martin and Voorhies themselves show some similar confusion about the lessons to be drawn from comparative primatology. Like the colleagues they criticize, they have an ideological vested interest in certain primate behavior patterns. They are intrigued, and rightly so, by the matricentered family units, fluid social arrangements, and low level of aggressiveness found in various great ape populations. They are less than clear, however, on how these data relate to the ecological perspective that is central to their approach to sex roles.

Martin and Voorhies's own explanation of sex role patterning in human society is presented in the second half of *Female of the Species*. It is organized around a division of societies into the traditional categories of cultural evolutionism: hunting and gathering (or foraging), horticultural, agricultural, pastoral, and industrial. Each socioeconomic type is the subject of a separate chapter in which the authors provide

both a cross-cultural overview and a more detailed case study. This part of the book offers a useful introduction to the ethnology of sex roles. The authors do not, however, present convincing proof of their thesis that women's roles in economic production determine their general status in society. First of all, they fail to show how the general status of women can be discussed in cross-culturally meaningful terms. (It should be pointed out, in all fairness, that as yet no one else has done so either.) Second, their investigation of women's economic roles seems to be hampered rather than helped by their adherence to the familiar categories of American cultural evolutionism. Martin and Voorhies themselves point out significant variations in the sexual allocation of productive roles within such subsistence types as foraging, horticulture, and pastoralism. This is a welcome contribution, but it leads the reader to wonder why the authors did not go on to order their data in some other manner. A more systematic approach to the analysis of modes of production as social systems would seem to be required.

The category in Martin and Voorhies's typology that comes closest to revealing some overall pattern of male and female roles is agriculture, that is, cultivation involving such techniques as plowing, the use of draft animals, and irrigation. According to Martin and Voorhies, it is adaptive in such systems for men to take over the major share of heavy work that is carried out away from the home. They claim that, in agricultural societies, "women dropped out of the mainstream of production for the first time in the history of cultural evolution" (p. 290). This had certain consequences for women's status in general: "The exclusion of women from major economic-event systems outside the household signals their increasing isolation from central roles in other societal institutions as well" (p. 240).

The pattern of sexual division of labor in which men are the major economic providers and women's activities are largely confined to the domestic sphere has, in Martin and Voorhies's view, persisted into the industrial period as a sort of hangover from earlier agricultural systems. Interestingly enough, this analysis absolves Martin and Voorhies from having to account for sexual inequality in industrial societies in the same positive functional terms that they apply to all other societies. On the contrary, they claim that sexual inequality is dysfunctional within the industrial mode of organization, since it is wasteful of individual talents and aptitudes.

There are several problems with this line of reasoning. For one thing, it is not clear that agriculture suffices to account for a pattern of sexual differentiation in which women's activities revolve around a relatively narrow domestic sphere while men move in a wider social world, since such a pattern is found in nonagricultural (and nonindustrial) societies as well. For another, it is not so easy to dismiss the functions that sexual inequality has taken on in industrial societies; both of Martin and Voorhies's case studies—of the United States and the Soviet Union—provide ample evidence of this. It seems to me that Martin and Voorhies's argument is basically an ideological one, incorporating elements of laissez-faire (the inherent logic of industrial society is that each individual be free to develop his or her natural propensities and interests), utilitarianism (sexual inequality will disappear when people realize that it doesn't pay), liberalism (what is good for one currently disadvantaged segment of society is better for all), and positivism (answers to political problems will emerge from objective scientific research).

In making these criticisms, I do not wish to detract from the value of *Female of the Species* as a general introduction to the study of sex roles. It should be read by anyone interested in the subject. However, I feel it important to point out that an uncritical mingling of moral and scientific perspectives is limiting in both directions: just as there is no direct path from political commitment to scientific knowledge, so there is no direct path from scientific knowledge to a system of ethics.

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Approaches to Biological Information Processing

Physics and Mathematics of the Nervous System. Proceedings of a summer school, Trieste, Italy, Aug. 1973. M. CONRAD, W. GÜTTINGER, and M. DAL CIN, Eds. Springer-Verlag, New York, 1974. xiv, 584 pp., illus. Paper, $18.50. Lecture Notes in Mathematics, vol. 4.

Many experimental biologists dismiss with contempt the approach of even very able theoreticians to developmental or neurophysiological problems. The outsider need look no further than this volume to understand why. One or two papers apart, only the section on cellular and sensory biophysics demonstrates that recourse to mathematics is sometimes worth the effort, and it is no accident that this occurs in the most traditional part of the book. The remaining papers describe attempts to elucidate problems of biological information processing, but in one way or another they all make the same error of strategy—engaging in the search for a general theory before and actually instead of tackling any of the particular problems at hand. This has been a fruitful strategy in other branches of science, but there scientific intuition has been honed by decades or centuries of empirical study. With problems of biological information processing there has been almost no experience, and one's intuition is at best untrustworthy. It may even be that biological information processing admits of no general theories except ones so unspecific as to have only descriptive and not predictive powers.

There are a number of candidates for the general theory. I take the liberty of setting out the most common ones here, in the hope of preventing yet another generation of theoreticians from being seduced by them.

1) *Catastrophe theory.* The most forgivable candidate, since it is the only one that rests on a mathematical foundation of genuine power and beauty, is catastrophe theory as enunciated by René Thom. Güttinger's paper shows clearly the reasons why the advocates of catastrophe theory believe it is important for biology. The import of Thom's deep theorem is that when a dynamical system becomes unstable and undergoes a discontinuous change, that change ultimately can occur in one of only a very small number of ways (seven for conventional space-time). Hence if a functioning organism is regarded as a dynamical system, each sudden change can be classified as one of these canonical discontinuities, and the behavior of the system near the discontinuity can be captured geometrically. This approach has been applied (by E. C. Zeeman and others) to phenonema as diverse as the heartbeat, the conduction of the nervous impulse, the division of a cell, the breaking of a wave, and the switch from fight to flight. Its spectacular generality has led to claims that catastrophe theory will become the "applied mathematics" of development and of the nervous system, being comparable in importance to the differential calculus.

The objection is simply this: that these "catastrophic" events are distinctive and important only when they are uncommon, in systems that are predominantly continuous; and that is precisely not the nature of the central nervous system. At the level where one isolates an information-process-