

Sociobiology:

SEX AND HUMAN NATURE

When sociobiology, the new study of the biological elements in social behavior, touches on *human* behavior, it causes a stir. Yet the “nature versus nurture” controversy goes back to Charles Darwin’s *On the Origin of the Species* (1859) and his theory of natural selection. The man who wrote *Sociobiology: The New Synthesis* in 1975 is Harvard entomologist Edward O. Wilson. To his surprise, he became the target of academic critics, notably Marxists who argued that sociobiology, in effect, preached “genetic determinism” and thus reinforced sexism, racism, and the status quo. In this speculative essay, drawn from his follow-up book, *On Human Nature*, Wilson tackles one issue among many: How can modern society bypass deep-rooted sexual inclinations to eliminate inequalities, and what are the costs?

by Edward O. Wilson

Sex, of course, permeates every aspect of our existence. Its complexity and ambiguity are due to the fact that sex is *not* designed primarily for reproduction.

Evolution has devised much more efficient ways for creatures to multiply than the complicated procedures of mating and fertilization. Bacteria simply divide in two (in many species, every 20 minutes). Fungi shed immense numbers of spores. Hydras bud offspring directly from their trunks. Thus, if multiplication were the only purpose of reproductive behavior, our mammalian ancestors could have evolved without sex. Every human being might be asexual and sprout new offspring from the surface cells of a neutered womb.

Nor is the primary function of sex the giving and receiving

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of pleasure. The vast majority of animal species perform the act mechanically and with minimal foreplay. Pairs of bacteria and protozoans form sexual unions without the benefit of a nervous system, while corals, clams, and many other invertebrate animals simply shed their sex cells into the surrounding water.

Pleasure is at best a means for inducing creatures with versatile nervous systems to make the heavy investment of time and energy required for courtship, sexual intercourse, and parenting.

There are good reasons for reproduction to be *nonsexual*: It can be made private, direct, safe. Sex itself is a risky activity. The reproductive organs of human beings are anatomically complex in ways that make them subject to lethal malfunctions, such as ectopic pregnancy and venereal disease. One sex chromosome too few or too many, or a subtle shift in the hormone balance of a developing fetus, creates abnormalities in physiology and behavior.

Why, then, has sex evolved?

The principal answer is that sex creates *diversity*. And diversity is the way a parent hedges bets against an unpredictably changing environment.

A Matter of Survival

When two individuals mate they combine their sex cells, each of which contains either a dominant (*A*) or a recessive (*a*) gene for each possible genetic characteristic (e.g., brown or blue eyes). Since each adult contributes sex cells bearing either *A* or *a*, three kinds of offspring are possible: *AA*, *Aa*, and *aa*. Suppose the environment changes—due to a hard winter, a flood, or the invasion of a dangerous predator—so that *aa* individuals are favored to survive. In the next generation, the sexually reproducing population will consist predominantly of *aa* organisms until conditions change to favor, perhaps, *AA* or *Aa* individuals. Through such diversity, the species thus can adapt and survive.

Not surprisingly then, a two-sex system prevails through most of the living world.

The anatomical difference between the female egg and the male sperm is often extreme. In particular, the human egg is 85,000 times larger than the human sperm. The most important immediate result is that the female places a greater investment in each of her sex cells. A woman can produce only about 400 eggs in her lifetime. Of these, a maximum of about 20 can be converted into healthy infants. The costs of bringing an infant to term and caring for it afterward are relatively enormous.

In contrast, a man releases 100 million sperm with each ejaculation. Once he has achieved fertilization his purely physical commitment has ended. His genes will benefit equally with those of the female, but his investment will be far less than hers unless she can induce him to contribute to the care of the offspring. If a man were given total freedom to act, he could theoretically inseminate thousands of women in his lifetime.

The resulting conflict of interest between the sexes is a property of not only human beings but also the majority of animal species.

It pays males to be aggressive, hasty, fickle, and indiscriminating. In theory, it is more profitable for females to be coy, to hold back until they can identify males with the best genes. In species that rear young, it is also important for the females to select males who are more likely to stay with them after insemination.

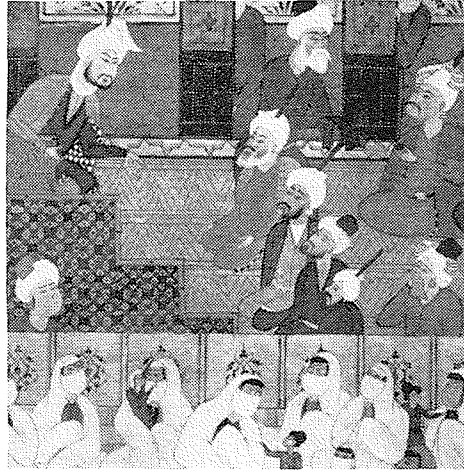
Human beings obey this biological principle faithfully. It is true that the thousands of existing societies are enormously variable in the details of their sexual mores and the division of labor between the sexes. This variation is based on culture. Societies mold their customs to the requirements of the environment and in so doing duplicate in totality a large fraction of the arrangements encountered throughout the remainder of the animal kingdom: from strict monogamy to extreme differences between men and woman in behavior and dress.

Nevertheless, this flexibility is not endless, and beneath it all lie general features that conform closely to the expectations drawn from evolutionary theory.

We are, first of all, moderately polygynous, with males initiating most of the changes in sexual partnership. About three-fourths of all human societies permit the taking of multiple wives, and most of them encourage the practice by law and custom. In contrast, marriage to multiple husbands is sanctioned in less than 1 percent of societies. Monogamous societies are monogamous but usually only in a legal sense, with concubinage and other extramarital stratagems being permitted to allow *de facto* polygyny.

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16th-century Persian men listen to a visiting monk while women and children wait in a separate room.



From the Madjälis al-'ushshäk, MS. Ouseley Add 24 f. 55v. Bodleian Library, Oxford.

Anatomy bears the imprint of the sexual division of labor. Men are on the average 20 to 30 percent heavier than women. Pound for pound, they are stronger and quicker in most categories of sport. The proportion of their limbs, their skeletal torsion, and the density of their muscles are particularly suited for running and throwing—the archaic specialties of the ancestral hunter-gatherer males.

The world track records reflect the physical disparity. Male champions are always between 5 and 20 percent faster than women champions. Even in the marathon, where size and brute strength count least, the difference in 1974 was 13 percent. Women marathoners have comparable endurance, but men are faster—their champions run 27 five-minute miles one after another.

The gap cannot be attributed to a lack of incentive and training. The great women runners of East Germany and the Soviet Union are the products of nationwide recruitment and scientifically planned training programs. Yet their champions, who consistently set Olympic and world records, could not place in an average men's regional track meet.

It is of equal importance that women match or surpass men in a few other sports. These are among the ones furthest removed from the primitive techniques of hunting and aggression: long-distance swimming, the more acrobatic events of gymnastics, precision (but not distance) archery, and small-bore rifle shooting. As sports and sport-like activities evolve into more sophisticated channels dependent on skill and agility, the over-

REORIENTING SOCIAL THEORY

Sociobiology cannot create a wholly new science of man in one stroke, but it can and will reorient social theory in many ways, eventually bringing the social sciences—anthropology, psychology, sociology—into closer alignment with biology. Some realignment has already occurred, as sociobiologists have tested new theories of sexuality, altruism, aggression, and religion.

In any new field of knowledge, elementary principles must be established before the complexities can be fully understood. Unique qualities of human behavior certainly exist, but they cannot be fully understood until they have been perceived as having ultimately biological origins.

For many persons, the most troubling feature of human sociobiology is its notion that human behavior is in some way controlled by genes. They fear that human beings might come to be seen as automatons lacking free will. But that is not what "genetic constraint" really means: Each group of genes affecting a given trait establishes a range of possible traits, the expression of which depends on an organism's interaction with its environment.

The idea, popular to the point of dogma among social scientists, that the desires and propensities of human nature are *determined* by culture cannot be sustained. Desires and propensities can be *influenced* by culture, sometimes strongly and sometimes weakly, but the overall possibilities for behavior, and the resulting pattern of human social organization, are limited by our genetic endowment.

all achievements of men and women can be expected to converge more closely.

The average temperamental differences between the human sexes are also consistent with the generalities of mammalian biology. Women as a group are less assertive and physically aggressive. The magnitude of the distinction depends on the culture, ranging from a tenuous, merely statistical difference in egalitarian settings to the virtual enslavement of women in some extreme polygynous societies. Still, women differ *consistently* in this qualitative manner regardless of the degree.

The physical and temperamental differences between men and women have been amplified by culture into universal male dominance. History records not a single society in which women have controlled the political and economic lives of men. Even when queens and empresses ruled, their intermediaries remained primarily male.* In about 75 percent of societies studied

*When Margaret Thatcher became Britain's Prime Minister last spring, she appointed no women to her Cabinet.

Our deepest feelings—the source of our ethical code—are innate creations whose ultimate function is genetic survival. They may appear (or even be) sublime, but they are based ultimately on physical laws, not some mysterious, supernatural set of instructions. We are on our own, the product of a very special genetic and cultural history.

A dilemma grows out of the realization that in making ethical judgments we must choose among our innate feelings on the basis of those very same innate feelings. People repeatedly face essentially unresolvable moral problems, such as whether to protect national territory by going to war or to surrender it and save lives. Such choices have to be made on the basis of purely internal, conflicting guides.

A more awesome dilemma arises from the new realization that we will eventually be able to alter human nature, including the innate ethical guides, by reprogramming the brain and thereby eliminating ambiguity and conflict. But the form that a new human nature might take, and the decision to make a change, can only be based on those same ethical guides waiting to be transformed by “genetic engineering.”

Perhaps fortunately, we have more immediate and demanding problems facing us today. The choices concerning genetic engineering must be left to future generations, who will, I hope, accumulate the wisdom and judgment needed to solve the dilemma in a way that provides *Homo sapiens* with a long, happy tenure on earth.

—E.O.W.

by anthropologists, the bride is expected to move from the location of her own family to that of her husband, while only 10 percent require the reverse exchange. Men have traditionally assumed the positions of chieftains, shamans, judges, and warriors; their modern technocratic counterparts rule the industrial states and head the corporations and churches.

These differences are a simple matter of record—but what is their significance for the future? How easily can they be altered?

The evidence for a genetic difference in behavior is varied and substantial. In general, girls are predisposed to be more intimately sociable and less physically venturesome. From the time of birth, for example, they smile more than boys. This trait may be especially revealing; the infant smile, of all human behaviors, is most fully innate in that its form and function are virtually invariant. Several independent studies have shown that newborn females respond more frequently than males with eyes-closed, reflexive smiling. The habit is soon replaced by deliberate, communicative smiling that persists into the second

year of life. Frequent smiling then becomes one of the more persistent of female traits and endures through adolescence and maturity. By the age of six months, girls also pay closer attention to sights and sounds used in communication than they do to nonsocial stimuli. Boys of the same age make no such distinction. One-year-old girls react with greater fright and inhibition to clay faces, and they are more reluctant to leave their mothers' sides in novel situations. Older girls remain more affiliative and less physically venturesome than boys of the same age.

In her study of the !Kung San,* University of New Mexico anthropologist Patricia Draper found no difference in the way young boys and girls are reared. All are supervised closely but unobtrusively and are seldom given any work. Yet boys wander out of view and earshot more frequently than girls, and older boys appear to be slightly more prone to join the men hunters than are girls to join the women gatherers. From these subtle differences, the characteristic strong sexual division of labor in !Kung encampments emerges by small steps.

At Birth, the Twig Is Bent

In Western cultures, boys are also more venturesome than girls and more physically aggressive on the average. Stanford psychologists Eleanor Maccoby and Carol Jacklin concluded that this male trait is deeply rooted and could have a genetic origin. From the earliest moments of social play, at age 2 to 2½ years, boys are more aggressive in both words and actions. They have a larger number of hostile fantasies and engage more often in mock fighting, overt threats, and physical attacks, which are directed at other boys during efforts to acquire dominance status.†

The skeptic favoring a totally environmental explanation might still argue that the early divergence in role playing has no biological component, it is merely a response to biased training practices during very early childhood. If it occurs, the training would have to be subtle, at least partly unconscious in application, and practiced by parents around the world.

*The !Kung San (the exclamation point here indicates a clicking "Q" sound) are a Bushman tribe of the Kalahari desert in Botswana. The average male height is five feet, two inches; the average for women is five feet. Draper's research on the !Kung is published with studies by other anthropologists in Richard B. Lee and Irven DeVore, editors, *Kalahari Hunter-Gatherers: Studies of the !Kung San and Their Neighbors*, Cambridge, Mass.: Harvard University Press, 1976.

†Eleanor E. Maccoby and Carol N. Jacklin, *The Psychology of Sex Differences*, Stanford, Calif.: Stanford University Press, 1974.

*Chinese "footbinding"
helped enforce female chastity
by making it difficult for
a woman to stray very far.*



From Chinese Footbinding: The History of a Curious Erotic Custom by Howard S. Levy. © 1966 by the author.

So at birth the twig is already bent a little bit. What are we to make of that? It suggests that the universal existence of sexual division of labor is not entirely an accident of cultural evolution. But it also supports the conventional view that the enormous variation from country to country *is* due to cultural evolution. Demonstrating a slight biological component delineates the options that future societies may consciously select.

Here a major dilemma presents itself. In full recognition of the struggle for women's rights that is now spreading throughout the world, each society must make one or the other of the three following choices:

Condition its members so as to exaggerate sexual differences in behavior. This already is the pattern in almost all cultures, and it was deliberately chosen by the Ayatollah Khomeini and his followers in Iran following the overthrow of the Shah. It results more often than not in domination of women by men and exclusion of women from many professions and activities. But this need not be the case. In theory, a carefully designed society with strong sexual divisions could be richer in spirit, more diversified, and even more productive than a unisex society. Such a society might safeguard human rights even while channeling men and women into different occupations. Still, some

THE KIBBUTZ EXPERIMENT

Can equal opportunity for women create sexual equality? In On Human Nature, Edward O. Wilson discusses the push for egalitarianism in Israel's famed kibbutzim, or communal villages:

From the time of the greatest upsurge of the *kibbutz* movement in the 1940s and '50s, its leaders promoted a policy of complete sexual equality, of encouraging women to enter roles previously reserved for men.

In the early years, it almost worked.

The first generation of women were ideologically committed, and they shifted in large numbers to politics, management, and labor. But they and their daughters have regressed somewhat toward traditional roles. The daughters have gone further than the mothers. They now demand and receive a longer period of time each day with their children, time significantly entitled "the hour of love." Some of the most gifted have resisted recruitment into the higher levels of commercial and political leadership, so that female representation in these roles is far below that enjoyed by the same generation of men.

It has been argued that this reversion merely represents the influence of the strong patriarchal tradition that persists in the remainder of Israeli society, even though the role division is now greater inside the kibbutzim than outside. The Israeli experience shows how difficult it is to predict the consequences and assess the meaning of changes in behavior based on either heredity or ideology.

amount of social injustice would be inevitable, and it could easily expand to disastrous proportions.

Train its members so as to eliminate all sexual differences in behavior. By the use of quotas and sex-biased education it should be possible to create a society in which men and women *as groups* share equally in all professions, cultural activities, and even, to take the absurd extreme, athletic competition. Although the early predispositions that characterize sex would have to be blunted, the biological differences are not so large as to make the undertaking impossible. Such control would offer the great advantage of eliminating even the hint of prejudice based on sex. It could result in a much more harmonious and productive society. Yet the amount of regulation required would certainly place some personal freedoms in jeopardy, and at least a few individuals would not be allowed to reach their full potential.

Provide equal opportunities and access but take no further action. To make no choice at all is of course the third choice open to all cultures. Laissez-faire might, on first thought, seem to be

the course most congenial to personal liberty and development, but this is not necessarily true. Even with identical education for men and women and equal access to all professions, men are likely to maintain disproportionate representation in political life, business, and science. Many would fail to participate fully in the formative aspects of child rearing. The result might be legitimately viewed as restrictive on the complete emotional development of individuals.

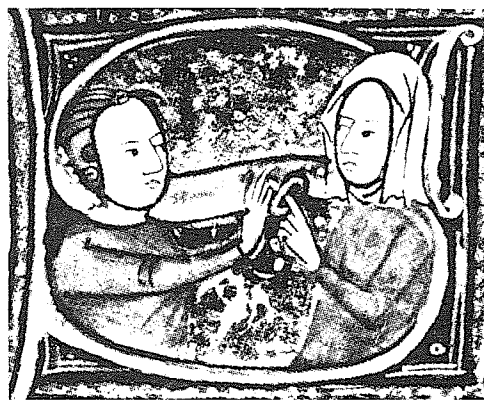
Costs and Benefits

From this troubling ambiguity concerning sex roles, one firm conclusion can be drawn: The evidences of biological constraint alone cannot prescribe an ideal course of action. However, they can help us to define the options and to assess the price of each. The price is to be measured in the added energy required for education and reinforcement and in the attrition of individual freedom and potential. And let us face the real issue squarely: Since every option has a cost, and concrete ethical principles will rarely find universal acceptance, the choice cannot be made easily.

Can we learn anything from our ancestors?

Neither sociological theory nor archeological evidence from 2 million years ago can satisfactorily explain sex roles in early human societies. Instead, we must rely on data from the living hunter-gatherer societies, which in their economies and population structure are closest to the ancestral human beings. Here the evidence is suggestive but not decisive.

Christian families in the Middle Ages were based upon monogamous marriage. "The family," according to Wilson, "remains one of the universals of human social organization."



Used by permission of the British Library.

IS SOCIOBIOLOGY SEXIST?

Some academic critics on the Left have charged sociobiologists with attempting to explain or even justify social inequalities. In Science for the People (May-June 1977), sociologist Barbara Chasin equates sociobiology with sexism:

From our earliest days, so the story goes, man was the active, aggressive, subsistence-providing person, while the little woman cleaned the cave, cooked the mastodon, and reared the kiddies. A charming picture but, in all probability, completely false. [The sociobiologists] create a never-never land, which they then "explain" with allegedly hard-headed science. . . .

There are societies where neither sex is aggressive. Preliminary reports on the Tasaday of the Philippines have noted the gentleness of males and females and their lack of anything resembling fighting. There is no war, no word even for war. Such leadership as there is has at times been exercised by a woman. In pygmy society too it is hard to find examples of males being more aggressive than females. . . . The cross-cultural evidence on sex roles is crucial and largely ignored or misrepresented in the works of the sociobiologists.

There are societies, and one can argue that these were the typical human groupings for millenia, where there is little division of labor. But even where some division exists, it is far different from that portrayed by Wilson. Men and women may engage in different tasks, but women are not confined to puttering around the campfire all day doing domestic chores. . . .

While claiming to be scientific, then, Wilson, like the other biological determinists, makes no attempt to deal with material that does not support his theories. This is not science; it is propaganda. . . . Biological determinists such as Wilson have not consciously decided to protect American capitalism from the threat of women's liberation, but their ideas are used by the people who control the media, the publishing industry, and the scientific and social scientific establishments. . . .

The faults in society, the injustices, the inequalities do not lie in genes; they are rooted in social institutions and class structure.

From "Sociobiology: A Sexist Synthesis" by Barbara Chasin, vol. 9, no. 3, May 1977. © 1977 by Science for the People.

In virtually all of the more than 100 such societies that have been studied around the world, men are responsible for most or all of the hunting and women for most or all of the gathering. Men form organized, mobile groups that range far from the campsites in search of larger game. Women participate in the capture of smaller animals, and they collect most of the vegetable food. Although men bring home the highest grade of protein, women generally provide most of the calories. They are also frequently but not invariably responsible for the fabrication of

clothing and the building of shelters.

Human beings, as typical large primates, breed slowly. It is to the advantage of each woman of the hunter-gatherer band to secure the allegiance of a man who will contribute meat and hides while sharing the labor of child-rearing. It is to the reciprocal advantage of each man to obtain exclusive sexual rights to women and to monopolize their economic productivity.

If the evidence from hunter-gatherer life has been correctly interpreted, the exchange has resulted in near universality of the pair bond and the prevalence of extended families with men and their wives forming the nucleus. Sexual love and the emotional satisfaction of family life can be reasonably postulated to be based on enabling mechanisms in the physiology of the brain that have been programmed to some extent through the genetic hardening of this compromise.

Human beings are unique among the primates in the intensity and variety of their sexual activity. Among other higher mammals they are exceeded in sexual athleticism only by lions. The females of most primate species become sexually active, to the point of aggressiveness, only at the time of ovulation. But human females are extraordinary in lacking the estrus, or period of heat. Their ovulation is hidden, to such a degree that it is difficult to initiate pregnancies or to avoid them even when the time of insemination is carefully selected. Women remain sexually receptive, with little variation in the capacity to respond, throughout the menstrual cycle.



Anthro-Photo/Iven DeVore

Two !Kung San families leave camp for the day. The men hunt with the weapons they carry, and their wives gather fruits and vegetables.

WHY THE BROUHAHA?

Why has sociobiology caused an uproar? In a July 1979 Commentary article written shortly before his death last May, philosopher Charles Frankel considered that question:

Wilson's views are usually conventional ideas in biological wrappings. On the whole, despite the brouhaha he has caused, he leans to the view that social environment is the primary agent in shaping human behavior. What separates him from the critics with whom he shares that view is only the qualification that, while environment is responsible for most of our behavior, it is perhaps not responsible for all.

Why, then, the brouhaha? One reason, undoubtedly, is that his critics are rendered anxious even by this small qualification. They would rather not have it expressed. It is obvious to them, as it is obvious to anyone, that human beings have characteristics which no society has created and to which all societies must respond or face trouble. . . . But they would prefer that such truths be treated with silence. The open mention of them, like the mention of sex in polite Victorian circles, can only incite wicked thoughts. Wilson, in their eyes, has opened a dangerous door: Once opened, no one can know what new and more disturbing reservations may have to be entertained about the omnipotence of environmental influences.

From "Sociobiology and Its Critics." Reprinted by permission of Commentary magazine.

Why has women's sexual responsiveness become nearly continuous? The most plausible explanation is that the trait facilitates bonding. Unusually frequent sexual activity between males and females of primitive human clans served as the principal device for cementing the pair bond. It also reduced aggression among the males. In baboon troops and other nonhuman primate societies, male hostility is intensified when females come into heat. The erasure of estrus in early human beings reduced the potential for such competition and safeguarded the alliances of hunter males.

Human beings are connoisseurs of sexual pleasure. They indulge themselves by casual inspection of potential partners, by fantasy, poetry, and song, and in every delightful nuance of flirtation. This has little if anything to do with reproduction. It has everything to do with bonding.

The nonhuman species that have evolved long-term bonds are also, by and large, the ones that rely on elaborate courtship rituals. Love and sex do indeed go together.*

*In my view, the biological significance of sex has been misinterpreted by the theoreticians of Judaism and Christianity. To this day, the Roman Catholic Church asserts that the primary purpose of sexual behavior is reproduction.

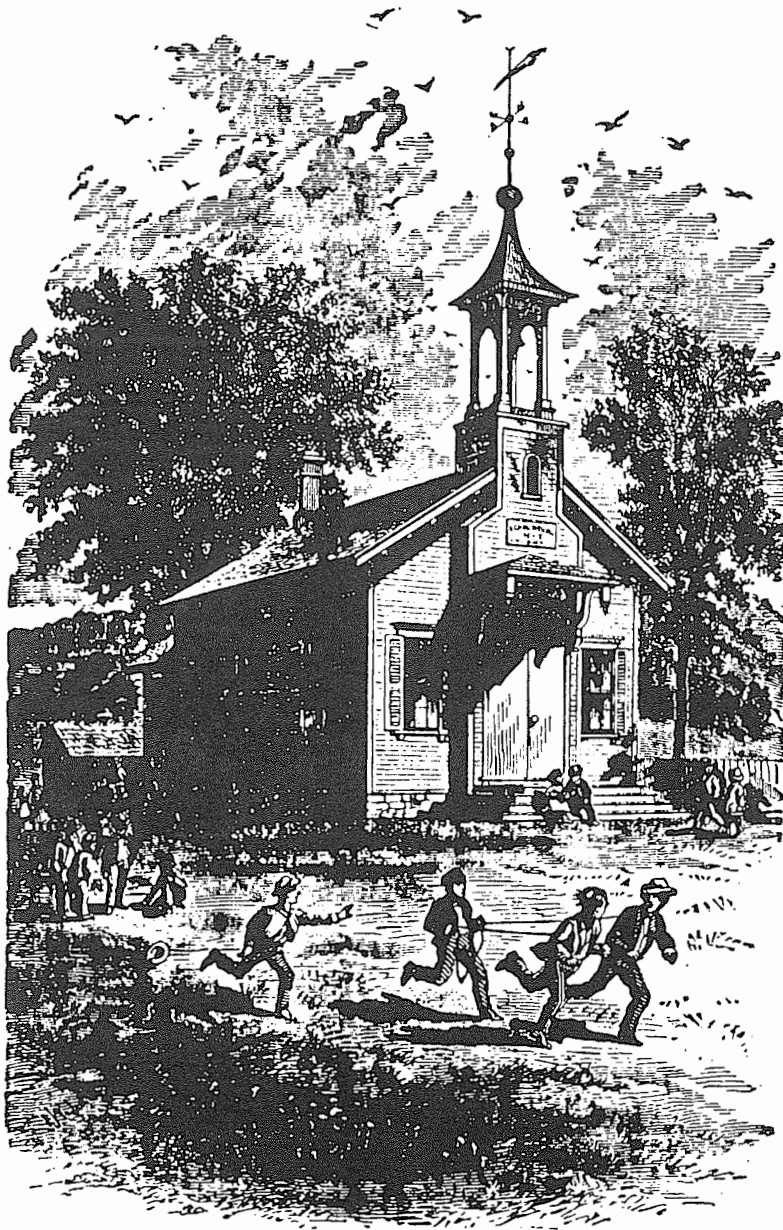
My central argument here has been that human sexuality can be much more precisely defined with the aid of the new advances in evolutionary theory. To omit this mode of reasoning is to leave us blind to an important part of our history, the ultimate meaning of our behavior, and the significance of the choices that lie before us.

Through the instruments of education and law, each society must make a series of choices concerning sexual discrimination, standards of sexual behavior, and reinforcement of the family. As government and technology become more complex and interdependent, the choices have to be correspondingly precise and sophisticated. One way or the other, intuitively or with the aid of science, evolutionary history will be entered in the calculations, because human nature is stubborn and cannot be forced without a cost.

There is a cost, which no one can yet measure, awaiting the society that moves either from juridical equality of opportunity between the sexes to a statistical equality of their performance in the professions or back toward deliberate sexual discrimination. Another unknown cost awaits the society that decides to reorganize itself into smoothly functioning nuclear families or to abolish families in favor of communal kibbutzim.

We now believe that cultures can be rationally designed. We can teach and reward and coerce. But in so doing we must also consider the price of each new culture, measured in the time and energy required for training and enforcement and in the less tangible currency of human happiness that must be spent to circumvent our innate predispositions.

EDITOR'S NOTE: *Interested readers may wish to consult two anthologies dealing with the sociobiology controversy: The Sociobiology Debate: Readings on Ethical and Scientific Issues, edited by Arthur L. Caplan (1978), and Sociobiology and Human Nature: An Interdisciplinary Critique and Defense, edited by Michael S. Gregory, Anita Silvers, and Diane Sutch (1978).*



From the American Journal of Education, LXVI (1876).

School house in Genesee Falls Township, New York, c. 1880. Local children now attend the modern, 1,700-pupil Letchworth Central School (kindergarten through 12th grade) in nearby Gainesville. A new addition, opened last month, includes a gym, stage, cafeteria, and "library/media" center. Letchworth's elementary school principal, Miss Edalyne Everett, attended the old one-room school, which was in use until 1946.