ARTICLES

SOCIOBIOLOGY: THE EVOLUTION THEORY'S ANSWER TO ALTRUISTIC BEHAVIOR

Leonard R. Brand
Professor of Biology and Paleontology
and
Ronald L. Carter
Professor of Biology
Loma Linda University
Loma Linda, California

WHAT THIS ARTICLE IS ABOUT

Sociobiology is a hotly debated theory which proposes to explain the evolution of behavior. The debate, especially as it deals with the application of sociobiology theory to humans, has been the cause of much misunderstanding between scientists with different views on the subject. Sociobiology has important implications for the nature of man, and consequently it is important for a Christian who is searching for a strong foundation for moral values to understand those implications of sociobiology before deciding what to do with the theory. A theory is not necessarily all correct or all wrong, but must be analyzed with care. Could it be that sociobiology theory correctly describes some of the changes that have occurred, even in man, in a post-creation world in which mutations are affecting behavior as well as morphology, but not necessarily implying that major groups of animals have evolved from common ancestors?

What is morality? Does it have a biological basis? Currently much debate in society centers around the development of morality. Deciding what is right and wrong in the technologically complex world of today is sometimes difficult, even for those who accept biblical guidelines for behavior. Many individuals look to nature and science to find principles of ethical and moral behavior. The theory of sociobiology was developed in the search for a more adequate evolutionary explanation for all forms of social behavior — among animals, as well as humans. Sociobiological theories have been developed which supposedly provide an evolutionary

explanation for the roots of moral behavior and the development of altruistic-like behavior in both animals and humans.

Charles Darwin's theory of evolution was highly successful in winning support, because it offered a logical explanation for diversity within groups of organisms, and described the process of natural selection which in nature would favor individuals who were most fitted for survival. That mechanism as understood today can be summarized as mutation, recombination, excess reproduction, and natural selection.

Mutations, or alteration of genes, along with genetic recombination, increase the genetic variation in a population of animals. Many more individuals of each species are born or hatched than the environment can support, and since the individuals in the species are not all alike, some process must determine which ones will survive and reproduce. If a mutation changes the color of an animal so that it matches its background environment more closely, it will have a better chance of escaping detection by predators, and will be more likely to survive longer than its relatives who do not blend as well into their background. This process of natural selection was a key element of Darwin's theory.

Will that new color variant become common and eventually dominate the species, at least in its local environment? In order for that to occur, it is not enough for the individuals with the new color variation to live longer. Their impact on the next generation is determined entirely by how many offspring are produced that have the new color gene. The ability of organisms to reproduce successfully is described by the term "fitness." The individuals that produce the largest number of surviving and reproductively successful offspring are said to have the highest evolutionary fitness. Natural selection favors traits that increase the reproductive rate of an animal; or, in more technical terms, increase its fitness. It is not too difficult to see how this can work in selecting such morphological traits as selection among individuals with 1) color variations (improving camouflage); 2) variations in size or strength (ability to secure food and defend against enemies), or in speed (ability to escape). Could the same process be involved in explaining evolutionary changes in behavior?

In the 1950s and 60s the field of ethology — the study of the natural behavior of animals — was developing out of the pioneering work of three ethologists — Konrad Lorenz, Niko Tinbergen, and Karl von Frisch — who later shared the Nobel Prize in medicine. The work of ethologists brought to light the numerous and fascinating species-specific behaviors in animals that apparently are under genetic control. The fields of etholo-

gy and population biology began to be integrated and applied to the task of explaining the evolutionary principles controlling the complexities of animal social behavior (Fisher 1991).

Could the process of natural selection provide an adequate explanation for the origin of the behavior of animals? Could it explain why some species have monogamous mating systems and some are promiscuous, or why some species rely more on sound communication and some focus on chemical communication? Ewer (1968, p x) summarized the challenge with his statement that "unless the mechanisms which produce the behavior are explicable in terms of natural selection working in the orthodox manner, we will be forced to postulate special creation or some unknown mystical-magical process." In many cases, convincing microevolutionary explanations could be given. A very sticky problem remained, however, in attempting to explain altruistic behavior. Strict Darwinian reasoning would predict that an individual animal would compete to survive rather than act selflessly toward other individuals, especially if that act may put its own fitness into jeopardy.

An altruistic act is any behavior that benefits another individual at the expense of or risk to the one performing the behavior. For example, a ground squirrel that gives an alarm call when a hawk appears will warn others to hide, but it also draws attention to itself, and may even increase the chances that it will be the one caught by the hawk. In evolutionary terms a squirrel that is prone to give alarm calls may be decreasing its own fitness, because it is decreasing the probability that it will live to reproduce. A squirrel whose genes predispose it to cheat, by benefiting from the alarm calls of others without giving calls itself, would appear to be the one with the best chances of reproductive success, and thus the highest fitness.

There are some species of birds, such as the Florida Scrub Jay and the African bee eaters whose nests are cared for by the parents with the assistance of one or more other adult "helpers at the nest." Why would one of these helpers decrease its own fitness by helping other birds raise their young, rather than making its own nest and raising young that carry its own genes?

An extreme example of apparent altruism is found in the social insects of the Order Hymenoptera — the ants, bees, and wasps. Most of the individuals in a honey bee hive, for example, are workers, or females that do not produce any offspring of their own but spend their lives helping the queen to raise her offspring. It would appear that the

workers' fitness is zero. If this is so, it would also appear that natural selection would favor any worker with altered genes that allowed it to produce its own young.

Many who accept some form of creation by God consider the creation of man and morality to have been a separate and special act from other acts of creation. It is therefore tempting for a creationist to simply dismiss any evolutionary claims for possible mechanisms to explain what appear to be altruistic behaviors. However, even creationists who believe that true altruistic behavior was common in animals and humans as originally created must explain why post-creation genetic mechanisms have not eliminated altruistic behaviors. Thus the question regarding the existence of altruism in animals remains essentially the same for everyone, no matter what philosophy they start from.

SOCIOBIOLOGY: A PROPOSED ANSWER TO ALTRUISM

In 1975 the Harvard entomology professor Edward O. Wilson published a book entitled *Sociobiology: the New Synthesis*. In this book he developed a new paradigm which he defined as "the systematic study of the biological basis of all social behavior," "a branch of evolutionary biology and particularly of modern population biology." This paradigm stimulated a considerable amount of controversy, but in large measure has been generally accepted. "In 1989 when the fellows and officers of the Animal Behavior Society were asked to name 'the most influential book in animal behavior in the last 20 years,' their overwhelming choice was *Sociobiology*" (Fisher 1991).

In *Sociobiology* Dr. Wilson proposes to have solved the problem of altruism. A cornerstone of sociobiology theory is the concept of inclusive fitness, which in simple terms refers to the rate at which an animal's own offspring and its close relatives' offspring (who share many of its genes) are successfully reared to reproductive age. While *fitness* is an animal's rate of success in passing its genes directly to its own offspring, that animal's *inclusive fitness* is its rate of success in passing its own genes directly to its offspring and indirectly to the offspring of its close relatives, because its relatives have many of those same genes. Two sisters share, on the average, 50% of their genes in common. If one sister helps the other to successfully raise her offspring to reproductive age, she assists in passing on many genes that she shares with her nephews and nieces, thus increasing her inclusive fitness. There will be more genes like hers in the next generation if her sister is success-

ful, than there would be if her sister is not successful in helping her young to survive.

With this concept of sharing genes among relatives, sociobiology theory predicts that altruistic behavior should exist only in situations in which the "altruistic" individual would actually increase its inclusive fitness by that behavior. The biologist J. B. S. Haldane once said that he would lay down his life for two brothers or eight first cousins. His reasoning was that brothers share, on the average, half of their genes, and first cousins share one eighth of their genes. If Haldane died for one brother (thus eliminating his own chance to reproduce), this brother could only pass on half as many of J. B. S. Haldane's genes as J. B. S. himself could have done. However, if he died to save two brothers, in terms of statistics he would come out even, since they could still pass on as many of his genes as he could have done himself (Fisher 1991).

If we apply this principle to our alarm-calling squirrels, sociobiology theory predicts that squirrels should be most likely to give alarm calls in situations in which they are surrounded by many close relatives, so that the squirrels that are helped by the calls will share many genes with the caller, thus increasing the caller's inclusive fitness. Research has shown this to be true. When young ground squirrels mature, the males disperse to distant places before they settle down and choose a territory. Young females set up territories near home. Consequently, females have many close relatives living near them, but males do not. Just as the theory predicts, it is the females who give the alarm calls, and many of the squirrels who are helped will be relatives who share her genes. Even if she is caught by the predator, her relatives who run for cover will pass on the genes that caused her to give the alarm call (Holmes & Sherman 1983, Sherman 1977).

When natural selection is applied to this situation in which genes are passed on through relatives, it is called kin selection — selection that acts on individuals and their families. Favorable traits are shared by close relatives (kin; family members), and families that have such favorable traits in their behavior — that assist other family members to survive — will have more reproductive success than other families. Their behavioral traits are the ones that will survive.

Can sociobiology also explain the helpers at the nest? Kin selection would predict that a bird nest will have non-parent adult helpers only when the helpers are close relatives of the nest owner, and only in situations in which the helpers' inclusive fitness will he higher from

helping relatives than from trying to raise their own young. Research has confirmed that this prediction is correct (Krebs & Davies 1987, p 270-276; Fisher 1991) for the Florida Scrub Jay and the African bee eaters, and that the helpers are close relatives, usually offspring from a previous season helping their parents. They cannot secure territories of their own, or are too inexperienced to be very successful in raising their own young; so until they are ready to do so, their inclusive fitness will be higher if they help raise their relatives who share many of their genes than if they try to produce their own young.

On the African plains are two species of social animals which act very differently when their young are attacked by predators. Zebras will try to defend each other's young, but wildebeests do not. Sociobiology would predict that this behavior indicates that zebras are more likely than wildebeests to be in the company of close relatives, and research has confirmed that explanation. Zebras generally stay in family groups, whereas wildebeests wander randomly within the very large herd and do not stay together as families. Consequently, if a zebra sees a nearby baby being attacked, that baby is likely to be close kin, and it would increase the adult's inclusive fitness to save the baby. However, a wildebeest in that same situation would not improve its inclusive fitness by being heroic, because the baby is not likely to be a close relative (West-Eberhard 1975).

Even the seemingly impossible case of the honey bee workers is, on closer inspection, explained by kin selection. In the reproduction of the social bees, ants, and wasps there occurs a phenomenon called haplodiploidy. Females develop from fertilized eggs in the usual way. Males of these groups, however, develop from unfertilized eggs. While females have diploid chromosomes, males have only haploid chromosomes. When males mate, they contribute all of their alleles, instead of only half, as would occur if they were diploid. A result of this scheme is that each female offspring shares half of her mother's alleles, but all of her father's alleles. Another result is that sisters have 75% of their alleles in common, or have a relatedness of 75%, rather than the 50% relatedness that results from the more common diploid arrangement. The simple mathematics of this system indicate that a worker (female) passes on more of her genes by helping to rear her sisters than by rearing her own offspring, at least in a colony that produces more females than males (Fisher 1991, Trivers & Hare 1976).

The processes of *mutation* and *kin selection* and their effects on *inclusive fitness* are the basic elements of sociobiology theory, and are the elements of the mechanism by which sociobiology proposes to explain the origin of altruism and all other social behavior. According to this theory all behavior is the result of evolution. Sociobiology theory says that the entire focus of life is reproductive success; animals are "sex machines" (Anderson 1982) whose function is to pass on those favorable genes that will improve the inclusive fitness of their offspring.

The evolution process has no room for unselfish actions that help a non-kin at the expense of the one performing the action, and thus one corollary of sociobiology theory is that there is in fact no such thing as truly altruistic behavior. Some apparent exceptions to this are explained as *reciprocal altruism*: "You scratch my back and I'll scratch yours."

For example, olive baboon males will solicit help from an unrelated male in an aggressive interaction against a third male. It often occurs that on another occasion the roles will be reversed, and the original solicitor will help the same partner who is now the solicitor (Packer 1977; see also Trivers 1971). In the behavior of non-human animals the theory has been quite successful in explaining how apparent altruistic behaviors can be actually favored by kin selection and may be explained without invoking the assumption of altruism at all.

BEHAVIORAL STRATEGIES

As animals compete with each other for resources such as food, living space, or mates, various behavioral strategies could be employed, and the application of sociobiology theory suggests ways to predict which strategy will be most effective in different situations. For example, two competitors could simply fight, with the winner of the fight taking the resource, or they could employ some type of conventional strategy (symbolic battle), like a stereotyped arm-wrestling match that indicates which animal is stronger or more aggressive without the risk of anyone getting hurt. Game theory, and the principles of sociobiology can be used to predict the benefits of each strategy (Krebs & Davies 1987, p 134-160). In general, natural selection (including kin selection) is expected to favor conventional strategies over all-out "war" in animal conflicts (Maynard Smith & Price 1973).

Many examples of this can be seen in nature. Male rattlesnakes wrestle with each other, and the winner is the one that can pin the other's head to the ground with his own body. Some lizards "battle" by

hitting each other with their tails, or by butting their heads together and trying to push each other backward. Deer and antelopes have potentially lethal antlers or horns, but when the males battle over mates they do not try to impale each other. They butt their heads together and wrestle in ways that usually do not cause serious damage (Wallace 1973, p 221-229). Animals also commonly use aggressive displays to communicate the nature of their aggressive state to other individuals of their species. This apparently allows the other individual to respond appropriately, thus reducing the amount of fighting (Drickamer & Vessey 1992, p 211, 220, 237-255; Marler & Hamilton 1967).

On the other hand, there are some specific situations in which more destructive tactics are used, and are thought to be favored by selection. Research under the guidance of sociobiology theory has led ethologists to recognize the role of some animal behaviors that were previously thought to be only bizarre abnormalities. For instance a male African lion will sometimes kill all the babies in his pride. If there is a battle between males in which the ruler of the pride is deposed, the new dominant male will generally kill all of the young, the offspring of his deposed rival. Consequently he will be able to mate and produce his own offspring much more quickly than if the females were occupied with offspring of his former rival (Bertram 1975). Such infanticide is also known to occur in Hanamun langurs, mountain gorillas, chimpanzees, African wild dogs, and rodents (Fisher 1991).

Some research data are difficult for sociobiology to explain, but it appears to us that sociobiological reasoning provides in many instances useful and testable scientific predictions in animal behavior studies.

IMPLICATIONS FOR HUMAN BEHAVIOR

Sociobiology has become the prevailing synthesis in the study of animal behavior, and would seem to be very successful in explaining the behavior of the many animal species to which its principles have been applied. What are its implications for human behavior? Most researchers do apply sociobiology to the study of human behavior, and if that application is correct, this theory has enormous implications for the nature of man.

A basic claim of sociobiology is that human behavioral traits are not a result of special creation, but are genetically and environmentally determined and have developed through evolution from non-human ancestors. Human behavior is assumed to be the direct result of kin

selection combined with cultural evolution. The ultimate object of that behavior, important elements of which are programmed into each individual's genes, is the maximization of his or her inclusive fitness. If the human species were the result of an evolutionary origin, it would be difficult to escape such a conclusion.

Increased inclusive fitness is gained by increased reproduction by oneself or one's close relatives. Consequently, according to sociobiology, reproductive success is the dominant factor determining human behavioral tendencies, and though we may think that we are rational, moral beings, our behavior is more programmed than we think it is. In other words, "sociobiologists contend, we were designed to be reproduction machines" (Anderson 1982).

Many Christians believe that mankind has been given a set of moral rules for sexual behavior. These rules tell us what is right or beneficial, and what behavior is wrong and is to be avoided simply because it is damaging to human relationships or will harm ourselves or others. Sociobiology says there are no morally right or wrong behaviors; our behavior is determined by the selection pressures that have created us. One author has summarized the concept this way:

> *The type of man who leaves the most descendants is the one who cuts his reproductive costs on all sides, by keeping a close watch on his mate and making sure he has no rivals; supporting his mate, if it seems that all her children were sired by him; and mating with other females — additional wives, single women, other men's wives — whenever a safe opportunity arises* (Anderson 1982).

It has been recognized that society has tended to have a double standard; being more tolerant of sexual promiscuity in males than in females. Sociobiology says that the double standard has a biological basis — it is not moral or immoral; it simply is a strategy that produces more children. It also has a deeper biological basis. A female produces a small number of eggs in her lifetime, and when one of them is fertilized she puts a tremendous amount of energy into the production and rearing of that offspring. Males, in contrast, produce millions of sperm continuously, and although males may be involved in helping to care for the young one, they do not directly put any significant amount of energy into producing the baby. Thus a female has a much greater investment in her offspring than a male does, and has much more to lose by making mistakes in her reproductive effort. Also, since a female produces the

baby in her own body, she has no doubt which offspring are hers, whereas a male, unless he knows that he can trust his wife, does not have any innate way to know for sure that any given offspring is really his. Thus the double standard — a female's reproductive success will be advantaged if she is faithful to the male who is helping her raise her offspring, but since the male cannot be sure which children are his, his best strategy for maximizing his reproductive fitness will be to spread his genes around to a number of women (Anderson 1982). Other authors suggest that promiscuity is advantageous for females as well (Bellis & Baker 1990).

Why do men rape? "New sociobiological analyses conclude that rape evolved as an adaptive strategy benefiting males who had lost out in the competition for mates." Though it is recognized that rape is often more of an act of violence than a sexual act, it is concluded that rape was originally programmed into our behavior because of the reproductive advantage to the rapist (Nalley et al. 1982).

Many human societies tend toward polygamy rather than monogamy. Is this behavior morally wrong, resulting from human sinful nature, or is it an evolutionarily advantageous strategy? A woman's reproductive output may not be reduced by being in a polygamous family, but a male's reproductive output could definitely be increased by being polygamous (at the expense of other males who lose in the competition for mates). Consequently, says E. O. Wilson, "fidelity ... evolves only when the advantage of cooperation outweighs the advantage of seeking extra mates" (Nalley et al. 1982).

SOCIOBIOLOGY: AN ALTERNATIVE TO RELIGION

These examples illustrate that in sociobiology theory there is no right or wrong behavior in a moral sense, only different behavioral strategies with different effects on inclusive fitness. Sociobiology could be said to be the naturalistic answer to Christianity's value system. In fact it attempts to answer the same great questions that Christianity addresses. In an interview, E. O. Wilson stated that sociobiology is "important because it addresses the most fundamental questions of humanity: Who are we? Where did we come from? Where do we want to go? How do we get there?" (Anderson 1982). When asked what we should do with sociobiology (i.e., what are the answers to some of those questions?), Wilson said, "I don't want to seem to be avoiding the question. But I can't answer that now — we don't know enough. We'll have to feel our way as we go along" (Anderson 1982). The fact is that

Wilson has already given his answer: mankind "lacks any goal external to its own biological nature" (Wilson 1978).

Christians would do well to be aware that sociobiological claims appear to replace the core of the Christian belief system. "Wilson openly challenges Christian faith by offering a substitute belief system based upon scientific materialism" (Rothrock & Rothrock 1987). Wilson believes that man has an innate tendency toward religious belief, because in the past it conferred an adaptive advantage. He also believes that the content of religious belief is false, and that we should develop a more correct mythology, which will take the place of Christianity (Rothrock & Rothrock 1987). "This mythopoeic drive (i.e., the tendency toward religious belief) can be harnessed to learning and the rational search for human progress if we finally concede that scientific materialism is itself a mythology defined in the noble sense" (Wilson 1978). He urges us to "make no mistake about the power of scientific materialism. It presents the human mind with an alternative mythology that until now has always, point for point in zones of conflict, defeated traditional religion" (Wilson 1978).

Wilson does not deny that religion and religious moralism have any value. He believes that they can encourage reciprocally altruistic behavior by discouraging cheating. If a person is saved from drowning, he could accept the benefit of his rescue, but cheat the system by refusing to take the risk involved in helping his benefactor out of a similar difficulty. Wilson (1980a) states that the answer to this possibility is that "in an advanced, personalized society, where individuals are identified and the record of their acts is weighed by others, it does not pay to cheat even in the purely Darwinist sense." "Aggressively moralistic behavior, for example, keeps would-be cheaters in line — no less than hortatory sermons to the believers."

A major difference between this view and what Wilson calls traditional religion or fundamentalist religion is that to the scientific materialist the decision as to what behaviors should be encouraged should be based entirely on scientific findings, especially on an understanding of man's evolutionary history, and not on religious input. Wilson feels that as more scientific information becomes available, it would seem "far better to make final decisions concerning social control (of moral behavior) by democratic consensus, not by religious or ideological dogma" (Wilson 1980b). He further states that "science has demythologized most of human experience by disproving traditional religious accounts of the origin of the world and substituting in their place a network of precise and experimentally testable, materialistic explanations. The discussion

of interest now is between scientists and liberal theologians." He does not define his usage of the term "liberal theologian," but the context indicates that, as Wilson understands it, such persons would accept an evolutionary origin of man, but would still argue for some type of communication from a supreme intelligence into the deep recesses of the mind. He is confident, however, that as science makes progress in its study of the human mind, it will disconfirm the hypothesis of input from a transcendent god (Wilson 1980b).

Wilson has said that "fundamentalist religion ... in its aggressive form is one of the unmitigated evils of the world" (Wilson 1980b). He feels that the answer to this problem comes from science, which offers the "possibility of explaining traditional religion by the mechanistic models of evolutionary biology.... If religion, including the dogmatic secular ideologies, can be systematically analyzed and explained as a product of the brain's evolution, its power as an external source of morality will be gone forever" (Wilson 1978). One of the areas that Wilson feels should be changed is that our ideas of sexual morality should be more liberal. He bases this conclusion on a survey of the behavior of our presumed non-human ancestors and on his convictions that Christianity's moral laws did not come from God (Wilson 1978).

Some current ethics books are based on the principles of sociobiology. For example, both *Search for a Rational Ethic* (Snell 1988) and *The Biology of Moral Systems* (Alexander 1987) base their ethical systems on the assumptions that man has evolved from other primates and that we must look to that evolutionary history and the principles of sociobiology to develop ethical principles for humans to follow. Both books, especially Snell (1988), at times refer to concepts from the Bible and other religious books, but only as far as the authors feel that those concepts are supported by evolutionary principles. Their standard for making ethical decisions is clearly humanistic, evolutionary thinking. Religion, to them, is a human invention. Alexander (1987, p 207) states that "Gods are inventions originally developed to extend the notion that some have greater rights than others to design and enforce rules."

Alexander (1987, p 3) concludes that "despite our intuitions, there is not a shred of evidence" to support the view that humans now and then engage in genuinely altruistic acts. Both Alexander (1987) and Snell (1988) explain all seemingly altruistic human behavior on the basis of reciprocal altruism — our instincts have been fine-tuned by evolution to recognize when it is in our own best interests to do something good

for someone else. Alexander (1987, p 253) concludes that conscience is "the still small voice that tells us how far we can go without incurring intolerable risks. It tells us not to avoid cheating but how we can cheat socially without being caught." Alexander (1987, p 19) also accepts the conclusions of other philosophers that "'pleasure' and 'happiness' [are] the leading candidates for the status of supreme goods or ultimate goals." He quotes a question asked by the philosopher MacIntyre who titled a paper "Crisis in moral philosophy: why is the search for the foundations of ethics so frustrating?" (Alexander 1987, p xiv). His answer is that the missing concept that others have left out is that human behavior is the result of evolution.

IS SOCIOBIOLOGY REAL?

To what extent are the proponents of sociobiology correct? In order to address this question, several different concepts can be isolated and dealt with separately.

1) The proposed naturalistic origin of the higher groups of organisms, including the origin of man and the human brain.

Sociobiology theory, as proposed by Wilson, is built on the assumption of the naturalistic evolutionary descent of all organisms from a common ancestor. Sociobiology by itself does not provide, nor claims to provide, evidence for that evolutionary descent, however. It merely assumes the naturalistic evolutionary origin of animals and develops hypotheses and explanations for behavioral changes which are based on that assumption. The question of whether the scientific data support the theory that humans evolved from non-humans and that the major groups of animals are also the result of evolution would have to be addressed through other areas of science than sociobiology, and are beyond the scope of this article. We will discuss a religious perspective on this issue below.

2) Kin selection and the evolution of behavior, at the level of species or genera of animals.

The evidence for this concept seems to us, in many cases, to be quite convincing. The non-reproducing worker bees, the alarm-calling female ground squirrels, the bird helpers at the nest, and a host of other examples certainly fit the theory very well. Whether future research will continue to support it as well remains to be seen; but with mutations causing random damage to the genes that influence behavior, it does

seem very likely that behaviors which are not supported by some type of selection process would eventually be weakened or eliminated by mutational damage. One possibility which sociobiology does not consider is the concept that animals were originally designed with more altruistic behavior, but those altruistic behaviors which are not favored by kin selection have been lost through the action of mutation and selection.

3) Kin selection and its genetic influence on human behavior: genetic control over human behavior.

Aside from the question of whether man is the result of evolution, it can be asked whether human behavior is controlled by genes, as claimed by sociobiology, or whether human behavior is mostly culturally determined — i.e., learned, rather than inherited. This has been debated ever since (and before) sociobiology was introduced. Wilson (1975) actually does recognize that culture is an important component of human behavior, but he maintains that there are also important themes of primate behavior that are present by inheritance in humans. Others disagree, including those scientists who believe that Wilson's sociobiology goes too far in presuming biological determinism. Perhaps the most widely known person in this group of challengers to biological determinism is Stephen J. Gould, a colleague of Wilson's at Harvard. Gould praised most of Wilson's sociobiology, but rejected what he saw as biological determinism in humans. He and others argue that there is no evidence for genes that determine human behavior and that the theory of such genes is not testable (Fisher 1991). When Wilson was scheduled to speak at the 1973 meetings of the American Association for the Advancement of Science, opponents of his theory "commandeered the podium ..., delivered a five-minute diatribe against him and his works, and concluded by pouring a pitcher of water over him as one heckler said, 'We think you're all wet'" (Fisher 1991). Unfortunately, the debate surrounding sociobiology has often created judgmentalism and overt emotionalism, rather than a dispassionate search for truth.

There are others who carry the concept of genetic control of human behavior farther than Wilson does (Barash 1979, Nalley et al. 1982, Anderson 1982, etc.) and who attribute to genes even stronger influence over human behavior.

In non-human animals there is evidence for genetic control of behavior (e.g., Bentley & Hoy 1972, Berthold & Querner 1981, Brandes 1991, Hirsch & McGuire 1982, Kyriacou 1990, Plomin, DeFries &

McClearn 1990, Provost 1991, Ricker & Hirsch 1988, Roubertoux & Carlier 1988), and consequently, even though much of human behavior seems to be modifiable by culture, the possibility that significant genetic control of behavioral tendencies exists in man needs to be considered. If such control exists, there is the strong possibility, perhaps certainty, that mutations could alter that behavior. With random genetic damage of genes occurring, it would be difficult to escape the conclusion that some human behaviors can be altered or eliminated by mutations and would be subject to the processes of natural selection, including kin selection.

CONCLUSIONS

Concepts of right and wrong for Christians are understood as a moral code given to mankind. The Ten Commandments and the teachings of Christ have provided a standard for human behavior, a standard that is God-given rather than innately produced. Christians have reason to believe that when humans were created, their behavior was naturally altruistic and in harmony with God's moral law, but that part of our altruistic tendencies has been lost. Sociobiology, on the other hand, states that there is no God-given moral law, and that human behavior has evolved from the behavior of our non-human ancestors and is not genuinely altruistic.

Christians can respond to the claims of sociobiology in various ways. Some may choose to view any aspect of evolutionary theory as anti-Scripture and therefore totally incorrect and worthless. Others see the utility of sociobiology in answering questions regarding social behavior of man and animals, including seemingly altruistic behavior, and may conclude that the concept of a God-given moral law is therefore superfluous and/or only epochal. We would like to suggest that neither of the above extreme responses are necessary. We believe that an alternative hypothesis needs to be developed proposing that God's laws of nature apply to both humans as well as animals, and that organisms were created with behaviors as well as morphologies that have since undergone generations of change driven by mutations, recombination and shaped by natural selection. As a result, part of man's character reflects generations of natural selection which has emphasized the selfish side of our nature. However, we accept by faith (and by reasoning which is at least logical, even though not scientifically testable) that man is not totally biologically destined but has a measure of free will —

a free will which allows him to seek the ability from God to act in ways that are truly altruistic and not just the result of gene modification and biological determination. In other words, we agree that there is a genetic process which has modified the behavior of humans and of other animals in the post-creation sinful world, and perhaps sociobiology theory correctly describes at least part of that process. Our view differs from current evolutionary thinking in an important respect. We do not believe that the data require us to accept the sociobiological assumption that all living organisms and their behaviors *originated* by that same process. The basic process of kin selection and its effect on inclusive fitness has operated within both humans and the other groups of animals, but does not require that higher taxa of animals or the behavior of the animals in those groups have evolved from common ancestors.

The application of sociobiology theory as a research tool for studying human behavior must be done with great care, as human behavior is the result of such a complex blend of inherited traits and cultural influences (learning). Hypotheses that explain any given human behavior as resulting from kin selection should be rigorously tested against alternative hypotheses incorporating the influence of learning on that particular behavior. As long as the above-mentioned cautions are applied, to guard against simplistic conclusions, sociobiology theory can be a research tool to assist in illuminating the behavior of both humans and other animals.

When we are traveling down a road and come to a fork in the road, it often is not easy to tell which fork to take without a road map. Both forks may look similar and seem to be going through similar terrain. In order to make an intelligent choice, we need to view all the information available (both scientific and non-scientific) to us and to understand as clearly as possible where each road will eventually take us.

As Christians approach a philosophical fork in the road where they must decide whether the creation of man really happened or whether man originated exclusively through an evolutionary process, it may not at first look like a critical choice. In order to fully evaluate the choice, we must not ignore where the road takes us. The development of sociobiology has helped to clarify the ultimate implications of naturalistic evolution theory to the concept of man and morality. If man really was only the product of evolution, then there would be no genuine basis for defining moral behavior; any behavior would be only a matter of evolutionary strategy. Morality born out of an evolutionary ethic is self-interested at best and may only be correct for a given ecological situation,

environment, or reproductive system at a specific time in history. Sociobiology proposes to replace all of Christianity's values and beliefs with an alternative philosophical system — a system that is built on Darwinian fitness, as measured by reproductive success. This system produces ethics which deny the existence of any true altruism or any absolute moral principles. Morality would therefore presume selfishness to be normative and reproductive interests to be the glue that holds society together.

We hope that students of the Scriptures will not feel the necessity to reject all of sociobiology or the Scripture. In an age when society is searching for the moral strength to handle the crisis of cultural and ethical ruin, we believe civilization will be benefited by considering the belief that the Bible presents standards that are moral absolutes. Now more than ever before when mankind is searching for ways to replant the seeds of morality back into society, it is incumbent upon Christians to develop ways to integrate truths that are revealed from all sources of revelation, biblical as well as scientific.

Ultimately the test case for the belief that God is the giver of all moral laws will be in the evidence that comes from lives of individuals who through the power of God are able to live in truly unselfish ways — ways that are freed from negative environmental input and years of genetic mutational load.

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