The Biological Roots of Morality*

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ABSTRACT: The question whether ethical behavior is biologically determined may refer either to the *capacity* for ethics (i.e., the proclivity to judge human actions as either right or wrong), or to the moral *norms* accepted by human beings for guiding their actions. My theses are: (1) that the capacity for ethics is a necessary attribute of human nature; and (2) that moral norms are products of cultural evolution, not of biological evolution.

Humans exhibit ethical behavior by nature because their biological makeup determines the presence of the three necessary, and jointly sufficient, conditions for ethical behavior: (i) the ability to anticipate the consequences of one's own actions; (ii) the ability to make value judgments; and (iii) the ability to choose between alternative courses of action. Ethical behavior came about in evolution not because it is adaptive in itself, but as a necessary consequence of man's eminent intellectual abilities, which are an attribute directly promoted by natural selection.

Since Darwin's time there have been evolutionists proposing that the norms of morality are derived from biological evolution. Sociobiologists represent the most recent and most subtle version of that proposal. The sociobiologists' argument is that human ethical norms are sociocultural correlates of behaviors fostered by biological evolution. I argue that such proposals are misguided and do not escape the naturalistic fallacy. The isomorphism between the behaviors promoted by natural selection and those sanctioned by moral norms exists only with respect to the consequences of the behaviors; the underlying causations are completely disparate.

KEY WORDS: Sociobiology, evolutionary ethics, ethical behavior, norms of morality, animal ethics

INTRODUCTION

Ethics is a human universal. People have moral values, i.e., they accept standards according to which their conduct is judged either right or wrong, good or evil. The particular norms by which moral actions are judged vary to some extent from individual to individual, and from culture to culture (although some norms, like not to kill, not to steal, and to honor one's parents are widespread and perhaps universal), but value judgments are passed in all cultures. This universality raises the question whether the moral sense is part of human nature, one more dimension of our biological make-up; and whether ethical values may be the product of biological evolution, rather than simply given by religious and cultural traditions.

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Aristotle and other philosophers of classical Greece and Rome, as well as Thomas Aquinas and the scholastics, held that we are ethical beings by nature. Man is not only *homo sapiens*, but also *homo moralis*. But biological evolution adds the important diachronic dimension. We do not attribute ethical behavior to animals (at least not to all animals and not to the same extent as to humans). Even if we would agree with Aristotle and Aquinas, the following questions would remain: When did the capacity for ethical behavior come about? And why did it evolve? Is it a simple by-product of other attributes (intelligence, for example) or was it specifically promoted as a direct target of natural selection?

MORAL EVALUATIONS AND MORAL NORMS

The question whether ethical behavior is biologically determined may refer to either one of the following two issues: (1) Is the capacity for ethics — the proclivity to judge human actions as either right or wrong — determined by the biological nature of human beings? (2) Are the systems or codes of ethical norms accepted by human beings biologically determined?

The first question is more fundamental; it asks whether or not the biological nature of man is such that humans are necessarily inclined to make moral judgments and to accept ethical values, to identify certain actions as either right or wrong. Affirmative answers to this first question do not necessarily determine what the answer to the second question should be. Independent of whether or not humans are necessarily ethical, it remains to be determined whether particular moral prescriptions are in fact determined by the biological nature of man, or whether they are chosen by society, or by individuals. Even if we were to conclude that people cannot avoid having moral standards of conduct, it might be that the choice of the particular standards used for judgment would be arbitrary. The need for having moral values does not necessarily tell us what the moral values should be, like the capacity for language does not determine which language we shall speak.

The thesis that I will propose is that humans are ethical beings by their biological nature; that humans evaluate their behavior as either right or wrong, moral or immoral, as a consequence of their eminent intellectual capacities that include self-awareness and abstract thinking. These intellectual capacities are products of the evolutionary process, but they are distinctively human. Thus, I will maintain that ethical behavior is not causally related to the social behavior of animals, including kin and reciprocal "altruism."

A second thesis, which I will put forward is that the moral norms

according to which we evaluate particular actions as either morally good or morally bad (as well as the grounds that may be used to justify the moral norms) are products of cultural evolution, not of biological evolution. The norms of morality belong, in this respect, to the same category of phenomena as the political and religious institutions, or the arts, sciences, and technology. The moral codes, like these other products of human culture, are often consistent with the biological predispositions of the human species, and of other animals. But this consistency between ethical norms and biological tendencies is not necessary or universal: it does not apply to all ethical norms in a given society, much less in all human societies.

Moral codes, like any other cultural systems, depend on the existence of human biological nature and must be consistent with it in the sense that they could not counteract it without promoting their own demise. Moreover, the acceptance and persistence of moral norms is facilitated whenever they are consistent with biologically conditioned human behaviors. But the moral norms are independent of such behaviors in the sense that some norms may not favor, and may hinder, the survival and reproduction of the individual and its genes, which survival and reproduction are the targets of biological evolution. Discrepancies between accepted moral rules and biological survival are, however, necessarily limited in scope or would otherwise lead to the extinction of the groups accepting such discrepant rules.

THREE NECESSARY AND SUFFICIENT CONDITIONS FOR ETHICAL BEHAVIOR

The question whether ethical behavior is determined by our biological nature must be answered in the affirmative. By "ethical behavior" I understand the urge *to judge* human actions as either good or bad, rather than *good behavior* (i.e., choosing to do what is perceived as good instead of what is perceived as evil). Humans exhibit ethical behavior by nature because their biological constitution determines the presence in them of the three necessary, and jointly sufficient, conditions for ethical behavior. These conditions are: (i) the ability to anticipate the consequences of one's own actions; (ii) the ability to make value judgments; and (iii) the ability to choose between alternative courses of action. I shall briefly examine each of these abilities and show that they exist as a consequence of the eminent intellectual capacity of human beings.

The ability to anticipate the consequences of one's own actions is the most fundamental of the three conditions required for ethical behavior. Only if I can anticipate that pulling the trigger will shoot the bullet, which in turn will strike and kill my enemy, can the action of pulling the trigger

be evaluated as nefarious. Pulling a trigger is not in itself a moral action; it becomes so by virtue of its relevant consequences. My action has an ethical dimension only if I do anticipate these consequences.

The ability to anticipate the consequences of one's actions is closely related to the ability to establish the connection between means and ends; that is, of seeing a mean precisely as mean, as something that serves a particular end or purpose. This ability to establish the connection between means and their ends requires the ability to anticipate the future and to form mental images of realities not present or not yet in existence.

The ability to establish the connection between means and ends happens to be the fundamental intellectual capacity that has made possible the development of human culture and technology. The evolutionary roots of this capacity may be found in the evolution of the erect position, which transformed the anterior limbs of our ancestors from organs of locomotion into organs of manipulation. The hands thereby gradually became organs adept for the construction and use of objects for hunting and other activities that improved survival and reproduction, i.e., that increased the reproductive fitness of their carriers. The construction of tools depends not only on manual dexterity, but in perceiving them precisely as tools, as objects that help to perform certain actions, that is, as means that serve certain ends or purposes: a knife for cutting, an arrow for hunting, an animal skin for protecting the body from the cold. Natural selection promoted the intellectual capacity of our biped ancestors, because increased intelligence facilitated the perception of tools as tools, and therefore their construction and use, with the ensuing amelioration of biological survival and reproduction.

The development of the intellectual abilities of our ancestors took place over three million years or longer, gradually increasing the ability to connect means with their ends and, hence, the possibility of making ever more complex tools serving remote purposes. The ability to anticipate the future, essential for ethical behavior, is therefore closely associated with the development of the ability to construct tools, an ability that has produced the advanced technologies of modern societies and that is largely responsible for the success of mankind as a biological species. From its obscure beginnings in Africa, mankind has spread over the whole earth except the frozen wastes of Antarctica, and has become the most numerous species of mammal. Numbers may not be an unmixed blessing but they are a measure of biological success.

The second condition for the existence of ethical behavior is the ability to make value judgments, to perceive certain objects or deeds as more desirable than others. Only if I can see the death of my enemy as preferable to his survival (or vice versa) can the action leading to his demise be thought as moral. If the alternative consequences of an action are neutral with respect to value, the action cannot be characterized as ethical.

The ability to make value judgments depends on the capacity for abstraction, i.e., on the capacity to perceive actions or objects as members of general classes. This makes it possible to compare objects or actions with one another and to perceive some as more desirable than others. The capacity for abstraction requires an advanced intelligence such as it exists in humans and apparently in them alone.

The third condition necessary for ethical behavior is the ability to choose between alternative courses of actions. Pulling the trigger can be a moral action only if I have the option not to pull it. A necessary action beyond our control is not a moral action: the circulation of the blood or the process of food digestion are not moral actions. Whether there is free will is a question much discussed by philosophers and this is not the appropriate place to review the arguments. I only will advance two considerations which are common sense evidence of the existence of free will. One is our personal experience, which indicates that the possibility to choose between alternatives is genuine rather than only apparent. The second consideration is that when we confront a given situation that requires action on our part, we are able mentally to explore alternative courses of action, thereby extending the field within which we can exercise our free will. In any case, if there were no free will, there would be no ethical behavior; morality would only be an illusion. The point that I want to make here is, however, that free will is dependent on the existence of a well developed intelligence, which makes it possible to explore alternative courses of action and to choose one or another in view of the anticipated consequences.

In summary, ethical behavior is an attribute of the biological make-up of humans and, hence, is a product of biological evolution. But I see no evidence that ethical behavior developed because it was adaptive in itself. I find it hard to see how *evaluating* certain actions as either good or evil (not just choosing some actions rather than others, or evaluating them with respect to their practical consequences) would promote the reproductive fitness of the evaluators. Nor do I see how there might be some form of "incipient" ethical behavior that would then be promoted by natural selection. The three necessary conditions for there being ethical behavior are manifestations of advanced intellectual abilities. It rather seems to me that the target of natural selection was the development of these advanced intellectual capacities. This was favored by natural selection because the construction and use of tools improved the strategic position of our biped ancestors. Once bipedalism evolved and tool-using and tool-making became possible, those individuals more effective in these functions had a greater probability of biological success. The biological advantage provided by the design and use of tools persisted long enough so that intellectual abilities continued to increase, eventually yielding the eminent development of intelligence that is characteristic of *homo sapiens*.

THE EVOLUTION OF INFORMATION PROCESSING AND THE QUESTION OF ANIMAL ETHICS

The development of human intellectual abilities may be seen as one terminus of a process that is evolutionarily continuous and gradual. An evolutionary trend particularly apparent in animal lineages, is a gradual increase in the ability to obtain and process information about the external environment. This ability is adaptive because it allows the organism to react flexibly to the environmental conditions (Ayala, 1982a). A most rudimentary ability to gather and process information about the environment can be detected in certain single-celled organisms. A paramecium follows a sinuous path as it swims, ingesting the bacteria that it encounters. Whenever it meets unfavorable conditions, such as unsuitable acidity or salinity in the water, the paramecium checks its advance, turns, and starts in a new direction. This reaction is purely negative: the paramecium does not seek its food or a favorable environment but simply avoids unsuitable conditions. A greater ability to process information about the environment occurs in the single-celled alga Euglena, which has a sensitive spot by means of which it can orient itself towards the direction of light. Euglena's motions are directional; it not only avoids unsuitable environments, but it actively seeks suitable ones. An amoeba represents further development in the same direction; it reacts to light by moving away from it and also actively pursues food particles.

The ability to gather and process information about the environment has not increased through time in all evolutionary lineages. Today's bacteria are not more advanced in this respect than their ancestors of one billion years ago. In many evolutionary lineages some limited progress took place in the early stages, without further advances through the rest of their histories. In general, animals are more advanced by this standard than plants; vertebrates are more advanced than invertebrates; mammals more advanced than reptiles, which are more advanced than fish (see Ayala, 1982, for more details).

Vertebrates are able to obtain and process much more complicated signals and to produce a much greater variety of responses than invertebrates, including the insects and other anthropods. In animals in general, the ability to obtain and process information about the environment is rooted in the nervous system and in the brain, which integrates the sensorial signals transmitted by the nerves and coordinates the appropriate responses. The vertebrate brain has an enormous number of associative neurons with an extremely complex arrangement. Among the vertebrates, progress in the ability to obtain and to deal with environmental information is correlated with an increase in the size of the cerebral hemispheres and with the appearance and development of the neopallium. The neopallium is an organ involved in association and

coordination of all kinds of impulses from all receptors and brain centers. The neopallium appeared first in the reptiles. In the mammals it has expanded to become the cerebral cortex, which covers most of the cerebral hemispheres. The larger brain of vertebrates compared with invertebrates permits them also to have a large amount of neurons committed to information storage or memory. The relative size and absolute complexity of the brain, and in particular of the cerebral cortex, reach a maximum in humans, who have a much greater capacity than any other organisms to perceive the environment and to integrate, coordinate, and react flexibly to what is perceived. The extraordinary development of the brain has endowed humans with intellectual powers that make possible abstraction and self-awareness, i.e., the objectivation of the thinking subject, the ability of an individual to perceive itself as an object.

The question that arises is whether the capacity for ethical behavior, which as I have argued is associated with the advanced development of intelligence, might not also be present at least in a rudimentary fashion in other animals, in proportion to the development of their intelligence. My answer is negative (see also Stent, 1978). Certain animals exhibit behaviors analogous with those resulting from ethical actions in humans, such as the loyalty of dogs or the appearance of compunction when they are punished. But such behaviors are either genetically determined or elicited by training ("conditioned responses"). Genetic determination and not moral evaluation is also what is involved in the "altruistic" behavior of some animals. In my view, none of the three necessary conditions for ethical behavior obtains in animals.

The capacity for ethics is an outcome of gradual evolution, but it is an attribute that only exists when the underlying attributes (i.e., the intellectual capacities) reach an advanced degree. The necessary conditions for ethical behavior only come about after the crossing of an evolutionary threshold. The approach is gradual, but the conditions only appear when a degree of intelligence is reached such that the formation of abstract concepts and the anticipation of the future are possible. Thresholds occur in other evolutionary developments — for example, in the origins of life, multicellularity, and sexual reproduction — as well as in the evolution of abstract thinking and self-awareness. Thresholds also occur in the inorganic world; for example, water heats gradually, but at 100 °C boiling begins and the transition from liquid to gas suddenly starts.

MORAL NORMS: RELIGIOUS AND EVOLUTIONARY PROPOSALS

I have answered in the affirmative the first of the two questions I posed. Ethical behavior is rooted in the biological make-up of man. I have also proposed that ethical behavior did not evolve because it was adaptive in

itself, but rather as the indirect outcome of the evolution of eminent intellectual abilities. Now I turn to the second question: whether our biological nature also determines which ones are the moral norms or ethical codes that human beings must obey. My answer, is negative. The moral norms according to which we decide whether a particular action is either right or wrong are not specified by biological evolution but by cultural evolution. The premises of our moral judgments are received from religious and other social traditions.

I hasten to add, however, that moral systems, like any other cultural activities, cannot long survive if they run outright contrary to our biology. The norms of morality must be consistent with biological nature, because ethics can only exist in human individuals and in human societies. One might therefore also expect, and it is the case, that accepted norms of morality will often promote behaviors which increase the biological adaptation of those who behave according to them. But this is neither necessary nor indeed always the case.

Before going any further, it seems worthwhile to consider briefly the proposition that the justification of the codes of morality derives from religious convictions and only from them. There is no necessary, or *logical*, connection between religious faith and moral principles, although there usually is a motivational, or psychological connection. What I mean by this is that religious beliefs do explain why people accept particular ethical norms, because they are motivated to do so by their religious convictions. But in following the moral dictates of his religion, an individual is not rationally justifying the moral norms that he accepts. It may, of course, be possible to develop such rational justification; for example, when a set of religious beliefs contains propositions about human nature and the world from which the ethical norms can be logically derived. But in this case, the logical justification of the ethical norms does not come from religious faith as such, but from a particular conception of the world; it is the result of philosophical analysis grounded on certain premises. Theologians in general, and Christian theologians in particular, do often propose to justify their ethics on rational foundations concerning human nature. A notable example is the theory of "Natural Law" of Saint Thomas Aquinas, for long the most influential Christian theologian. I shall add that the motivational connection between religious beliefs and ethical norms is the decisive one for the religious believer. But this is true in general: most people, religious or not, accept a particular moral code for social reasons, without trying to justify it rationally by means of a theory from which the moral norms can be logically derived.

There are many theories concerned with the rational grounds for morality, such as deductive theories that seek to discover the axioms or fundamental principles that determine what is morally correct on the basis of direct moral intuition; or theories like logical positivism or

existentialism, that negate rational foundations for morality, reducing moral principles to emotional decisions or to other irrational grounds. After the publication of Darwin's theory of evolution by natural selection, philosophers as well as biologists have attempted to find in the evolutionary process the justification for moral norms. The common ground to all such proposals is that evolution is a natural process that achieves goals that are desirable and thereby morally good; indeed it has produced man. Proponents of these ideas see that only the evolutionary goals can give moral value to human action: whether a human deed is morally right depends on whether it directly or indirectly promotes the evolutionary process and its natural objectives.

Herbert Spencer was perhaps the first philosopher seeking to find the grounds of morality in biological evolution. More recent attempts include those of the distinguished evolutionists J. S. Huxley (1947, 1953) and C. H. Waddington (1960) and of Edward O. Wilson (1975, 1978), founder of Sociobiology as an independent discipline engaged in discovering the biological foundations of all social behavior.

In *The Principles of Ethics* (1893), Spencer seeks to replace the Christian faith as the justification for traditional ethical values with a natural foundation. Spencer argues that the theory of organic evolution implies certain ethical principles. Human conduct must be evaluated, like any biological activity whatsoever, according to whether it conforms to the life process; therefore, any acceptable moral code must be based on natural selection, the law of struggle for existence. According to Spencer, the most exalted form of conduct is that which leads to a greater duration, extension, and perfection of life; the morality of all human actions must be measured by that standard. Spencer proposes that, although exceptions exist, the general rule is that pleasure goes with that which is biologically useful, whereas pain marks what is biologically harmful. This is an outcome of natural selection — thus, while doing what brings them pleasure and avoiding what is painful, organisms improve their chances for survival. With respect to human behavior, we see that we derive pleasure from virtuous behavior and pain from evil actions, associations which indicate that the morality of human actions is also founded on biological nature.

Spencer proposes as the general rule of human behavior that anyone should be free to do anything that he wants, so long as it does not interfere with the similar freedom to which others are entitled. The justification of this rule is found in organic evolution: the success of an individual, plant or animal, depends on its ability to obtain that which it needs. Consequently, Spencer reduces the role of the state to protect the collective freedom of individuals to do as they please. This *laissez faire* form of government may seem ruthless, because individuals would seek their own welfare without any consideration for others' (except for respecting their freedom), but Spencer believes that it is consistent with traditional

Christian values. It may be added that, although Spencer sets the grounds of morality on biological nature and on nothing else, he admits that certain moral norms go beyond that which is biologically determined; these are rules formulated by society and accepted by tradition.

Social Darwinism, in Spencer's version or in some variant form, was fashionable in European and American circles during the latter part of the nineteenth century and the early years of the twentieth, but it has few or no distinguished intellectual followers at present. Spencer's critics include the evolutionists J. S. Huxley and C. H. Waddington who, nevertheless, maintain that organic evolution provides grounds for a rational justification of ethical codes. For Huxley, the standard of morality is the contribution that actions make to evolutionary progress, which goes from less to more "advanced" organisms. For Waddington, the morality of actions must be evaluated by their contribution to human evolution.

Huxley and Waddington's views are based on value judgments about what is or is not progressive in evolution. Contrary to Huxley's proposal, there is nothing objective in the evolutionary process itself (i.e., outside human considerations; see Ayala, 1982a) that makes the success of bacteria, which have persisted as such for more than two billion years and in enormous numbers, less desirable than that of the vertebrates, even though the latter are more complex. Nor are the insects, of which more than one million species exist, less desirable or less successful from a purely biological perspective than humans or any other mammal species. Waddington fails to demonstrate why the promotion of human biological evolution by itself should be the standard to measure what is morally good.[1]

A more fundamental objection against the theories of Spencer, Huxley and Waddington — and against any other program seeking the justification of a moral code in biological nature — is that such theories commit the "naturalistic fallacy" (Moore, 1903), which consists in identifying what "is" with what "ought to be." This error was pointed out already by Hume (1740; 1978, p. 469): "In every system of morality which I have hitherto met with I have always remarked that the author proceeds for some time in the ordinary way of reasoning . . . when of a sudden I am surprised to find, that instead of the usual copulations of propositions, *is* and *is not*, I meet with no proposition that is not connected with an *ought* or *ought not*. This change is imperceptible; but is, however, of the last consequence. For as this *ought* or *ought not* expresses some new relation or affirmation, it is necessary that it should be observed and explained; and at the same time a reason should be given, for what seems altogether inconceivable, how this new relation can be a deduction from others, which are entirely different from it."

The naturalistic fallacy occurs whenever inferences using the terms "ought" or "ought not" are derived from premises that do not include such

terms but are rather formulated using the connections "is" or "is not." An argument cannot be logically valid unless the conclusions only contain terms that are also present in the premises. In order to proceed logically from that which "is" to what "ought to be," it is necessary to include a premise that justifies the transition between the two expressions. But this transition is what is at stake, and one would need a previous premise to justify the validity of the one making the transition, and so on in a regression *ad infinitum*. In other words, from the fact that something *is* the case, it does not follow that it *ought to be* so in the ethical sense; *is* and *ought* belong to disparate logical categories.

Because evolution has proceeded in a particular way, it does not follow that that course is morally right or desirable. The justification of ethical norms on biological evolution, or on any other natural process, can only be achieved by introducing value judgments, human choices that prefer one rather than other object or process. Biological nature is in itself morally neutral.

It must be noted, moreover, that using natural selection or the course of evolution for determining the morality of human actions may lead to paradoxes. Evolution has produced the smallpox and AIDS viruses. But it would seem unreasonable to accuse the World Health Organization of immorality because of its campaign for total eradication of the smallpox virus; or to label unethical the efforts to control the galloping spread of the AIDS virus. Human hereditary diseases are conditioned by mutations that are natural events in the evolutionary process. But we do not think it immoral to cure or alleviate the pain of persons with such diseases. Natural selection is a natural process that increases the frequency of certain genes and the elimination of others, that yields some kinds of organisms rather than others; but it is not a process moral or immoral in itself or in its outcome, in the same way as gravity is not a morally-laden force. In order to consider some evolutionary events as morally right and others wrong, we must introduce human values; moral evaluations cannot be reached simply on the basis that certain events came about by natural processes.

SOCIOBIOLOGY: ALTRUISM AND INCLUSIVE FITNESS

Edward O. Wilson (1975, p. 562) has urged that "scientists and humanists should consider together the possibility that the time has come for ethics to be removed temporarily from the hands of the philosophers and biologicized." Wilson, like other sociobiologists (Barash, 1977; Wilson, 1978; Alexander, 1979; see also Ruse 1986), sees that sociobiology may provide the key for finding a naturalistic basis for ethics. Sociobiology is "the systematic study of the biological basis of all forms of social behavior

in all kinds of organisms" (Wilson, in the Foreword to Barash, 1977) or, in Barash's concise formulation, "the application of evolutionary biology to social behavior" (1977, p. ix). Its purpose is "to develop general laws of the evolution and biology of social behavior, which might then be extended in a disinterested manner to the study of human beings" (Wilson, *ibidem*). The program is ambitious: to discover the biological basis of human social behavior, starting from the investigation of the social behavior of animals.

The sociobiologist's argument concerning normative ethics is not that the norms of morality can be grounded in biological evolution, but rather that evolution predisposes us to accept certain moral norms, namely those that are consistent with the "objectives" of natural selection. It is because of this predisposition that human moral codes sanction patterns of behavior similar to those encountered in the social behavior of animals. The sociobiologists claim that the agreement between moral codes and the goals of natural selection in social groups was discovered when the theories of kin selection and reciprocal altruism were formulated. The commandment to honor one's parents, the incest tabu, the greater blame usually attributed to the wife's adultery than to the husband's, the ban or restriction of divorce, are among the numerous ethical precepts that endorse behaviors that are also endorsed by natural selection, as has been discovered by sociobiology.

The sociobiologists reiterate their conviction that science and ethics belong to separate logical realms; that one may not infer what is morally right or wrong from a determination of how things are or are not in nature. In this respect they avoid committing the naturalistic fallacy. According to Wilson, "To devise a naturalistic description of human social behavior is to note a set of facts for further investigation, not to pass a value judgment or to deny that a great deal of the behavior can be deliberately changed if individual societies so wish" (in Barash, 1977, p. xiv). Barash (1977, p. 278) puts it so: "Ethical judgments have no place in the study of human sociobiology or in any other science for that matter. What is biological is not necessarily good." And Alexander (1979, p. 276) asks what is it that evolution teaches us about normative ethics or about what we *ought* to do, and responds "Absolutely nothing."

There is nevertheless some question as to whether the sociobiologists are always consistent with the statements just quoted. Wilson (1975, p. 564), for example, writes that "the requirement for an evolutionary approach to ethics is self-evident. It should also be clear that no single set of moral standards can be applied to all human populations, let alone all sex-age classes within each population. To impose a uniform code is therefore to create complex, intractable moral dilemmas." Moral pluralism is, for Wilson, "innate." Biology, then, helps us at the very least to decide that certain moral codes (e.g., all those pretending to be universally

applicable) are incompatible with human nature and therefore unacceptable. This is not quite an argument in favor of the biological determinism of ethical norms, but it does approach determinism from the negative side: because the range of valid moral codes is delimited by the claim that some are not compatible with biological nature.

Wilson goes, however, further when he writes: "Human behavior — like the deepest capacities for emotional response which drive and guide it — is the circuitous technique by which human genetic material has been and will be kept intact. *Morality has no other demonstratable ultimate function*" (Wilson, 1978, p. 167, my italics). How is one to interpret this statement? It is possible that Wilson is simply giving the reason why ethical behavior exists at all; his proposition would be that humans are prompted to evaluate morally their actions as a means to preserve their genes, their biological nature. But this proposition is erroneous. Human beings are by nature ethical beings in the sense I have expounded earlier: they judge morally their actions because of their innate ability for anticipating the consequences of their actions, for formulating value judgments, and for free choice. Human beings exhibit ethical behavior by nature and necessity, rather than because such behavior would help to preserve their genes or serve any other purpose.

Wilson's statement may alternatively be read as a justification of human moral codes: the function of these would be to preserve human genes. But this would entail the naturalistic fallacy and, worse yet, would seem to justify a morality that most of us detest. If the preservation of human genes (be those of the individual or of the species) is the purpose that moral norms serve, Spencer's Social Darwinism would seem right; racism or even genocide could be justified as morally correct if they were perceived as the means to preserve those genes thought to be good or desirable and to eliminate those thought to be bad or undesirable. There is no doubt in my mind that Wilson is not intending to justify racism or genocide, but this is one possible interpretation of his words.

I shall now turn to the sociobiologists' proposition that natural selection favors behaviors that are isomorphic with the behaviors sanctioned by the moral codes endorsed by most humans.

Evolutionists had for years struggled with finding an explanation for the apparently altruistic behavior of animals. When a predator attacks a herd of zebras, these will attempt to protect the young in the herd, even if they are not their progeny, rather than fleeing. When a prairie dog sights a coyote, it will warn other members of the colony with an alarm call, even though by drawing attention to itself this increases its own risk. Examples of altruistic behaviors of this kind can be multiplied.

Altruism is defined in the dictionary I happen to have at hand (*Webster's New Collegiate*, 2nd ed.) as "Regard for, and devotion to, the interests of others." To speak of animal altruism is not to claim that

explicit feelings of devotion or regard are present in them, but rather that animals act for the welfare of others at their own risk just as humans are expected to do when behaving altruistically. The problem is precisely how to justify such behaviors in terms of natural selection. Assume, for illustration, that in a certain species there are two alternative forms of a gene ("alleles"), of which one but not the other promotes altruistic behavior. Individuals possessing the altruistic allele will risk their life for the benefit of others, whereas those possessing the non-altruistic allele will benefit from altruistic behavior without risking themselves. Possessors of the altruistic allele will be more likely to die and the allele will therefore be eliminated more often than the non-altruistic allele. Eventually, after some generations, the altruistic allele will be completely replaced by the non-altruistic one. But then how is it that altruistic behaviors are common in animals without the benefit of ethical motivation?

One major contribution of sociobiology to evolutionary theory is the notion of "inclusive fitness." In order to ascertain the consequences of natural selection it is necessary to take into account a gene's effects not only on a particular individual but on all individuals possessing that gene. When considering altruistic behavior, one must take into account not only the risks for the altruistic individual, but also the benefits for other possessors of the same allele. Zebras live in herds where individuals are blood relatives. An allele prompting adults to protect the defenseless young would be favored by natural selection if the benefit (in terms of saved carriers of that allele) is greater than the cost (due to the increased risk of the protectors). An individual that lacks the altruistic allele and carries instead a non-altruistic one, will not risk its life, but the non-altruistic allele is partially eradicated with the death of each defenseless relative.

It follows from this line of reasoning that the more closely related the members of a herd or animal group typically are, the more altruistic behavior should be present. This seems to be generally the case. We need not enter here into the details of the quantitative theory developed by sociobiologists in order to appreciate the significance of two examples. The most obvious is parental care. Parents feed and protect their young because each child has half the genes of each parent: the genes are protecting themselves, as it were, when they prompt a parent to care for its young.

The second example is more subtle: the social organization and behavior of certain animals like the honeybee. Worker bees toil building the hive and feeding and caring for the larvae even though they themselves are sterile and only the queen produces progeny. Assume that in some ancestral hive, an allele arises that prompts worker bees to behave as they now do. It would seem that such an allele would not be passed on to the following generation because such worker bees do not reproduce. But such inference is erroneous. Queen bees produce two kinds of eggs: some

that remain unfertilized develop into males (which are therefore "haploid," i.e., carry only one set of genes); others that are fertilized (hence, are "diploid," carry two sets of genes) develop into worker bees and occasionally into a queen. W. D. Hamilton (1964) demonstrated that with such a reproductive system daughter queens and their worker sisters share in two-thirds of their genes, whereas daughter queens and their mother share in only one-half of their genes. Hence, the worker bee genes are more effectively propagated by workers caring for their sisters than if they would produce and care for their own daughters. Natural selection can thus explain the existence in social insects of sterile casts, which exhibit a most extreme form of apparently altruistic behavior by dedicating their life to care for the progeny of another individual (the queen).

Sociobiologists point out that many of the moral norms commonly accepted in human societies sanction behaviors also promoted by natural selection (which promotion becomes apparent only when the inclusive fitness of genes is taken into account). Examples of such behaviors are the commandment to honor one's parents, the incest tabu, the greater blame attributed to the wife's than to the husband's adultery, the ban or restriction on divorce, and many others. The sociobiologists' argument is that human ethical norms are sociocultural correlates of behaviors fostered by biological evolution. Ethical norms protect such evolution-determined behaviors as well as being specified by them.

I believe, however, that the sociobiologists' argument is misguided and does not escape the naturalistic fallacy (see Ayala 1980 and Ayala 1982b for more extensive discussion). Consider altruism as an example. Altruism in the biological sense (altruism_b) is defined in terms of the population genetic consequences of a certain behavior. Altruism_b is explained by the fact that genes prompting such behavior are actually favored by natural selection (when inclusive fitness is taken into account), even though the fitness of the behaving individual is decreased. But altruism in the moral sense (altruism_m) is explained in terms of motivations: a person chooses to risk his own life (or incur some kind of "cost") for the benefit of somebody else. The isomorphism between altruism_b and altruism_m is only apparent: an individual's chances are improved by the behavior of another individual who incurs a risk or cost. The underlying causations are completely disparate: the ensuing genetic benefits in altruism_b; regard for others in altruism_m.[2]

The discrepancy between biologically determined behaviors and moral norms and, therefore, a radical flaw in the sociobiologists' argument for a naturalistic foundation for ethics, is enhanced by three additional considerations that I shall briefly enunciate.

The first observation is that our biological nature may *predispose* us to accept certain moral precepts, but it does not constrain us to accept them, nor to behave according to them. The same eminent intellectual abilities

discussed above that make ethical behavior possible and necessary, and in particular free will, also give us the power to accept some moral norms and to reject others, independently of any natural inclinations. A natural predisposition may influence our behavior, but influence and predisposition are not the same as constraint or determination.

This observation deserves attention because authors such as Konrad Lorenz (1963) and Robert Ardrey (1966) have presented aggression and the territorial "imperative" as natural tendencies, which might therefore be futile to try to resist. Whether or not aggression and the territorial imperative are ingrained in our genes is neither obvious nor needs to be explored here. What needs to be said, however, is (1) that the morality of the behaviors in question is to be assessed in any case by the accepted norms of morality and not by recourse to biological evidence, and (2) that if such tendencies or imperatives would exist, people would still have the possibility and the duty of resisting them (even at the expense of a fitness reduction) whenever they are seen as immoral (Dobzhansky, 1973).

A second observation is that some norms of morality are consistent with behaviors prompted by natural selection, but other norms are not so. The commandment of charity: "Love thy neighbor as thyself," often runs contrary to the inclusive fitness of the genes, even though it promotes social cooperation and peace of mind. If the yardstick of morality were the multiplication of genes, the supreme moral imperative would be to beget the largest possible number of children and (with lesser dedication) to encourage our close relatives to do the same. But to impregnate the most women possible is not, in the view of most people, the highest moral duty of a man.

The third consideration is that moral norms differ from one culture to another and even "evolve" from one time to another. Many people see nowadays that the Biblical injunction: "Be fruitful and multiply" has been replaced by a moral imperative to limit the number of one's children. No genetic change in human populations accounts for this inversion of moral value. Moreover, an individual's inclusive fitness is still favored by having many children.

Moral norms are not determined by biological processes, but by cultural traditions and principles that are products of human history. The evaluation of moral codes or human actions must take into account biological knowledge. But for deciding which moral codes should be accepted, biology alone is palpably insufficient.

NOTES

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[1] For an incisive criticism of Huxley's notion of biological progress, see Simpson (1949). Huxley's and Waddington's efforts to discover in biological evolution the foundations of ethical norms have been refuted by Simpson (1969) and Dobzhansky (1962, 1973).

[2] The two disparate meanings of altruism are well distinguished by Ruse (1986a, b; Ruse and Wilson, 1986) who in his recent writings has become an ardent proponent of the sociobiologists' thesis concerning the foundations of ethics. Ruse uses quotation marks ("altruism") to signify altruism in the biological sense and to differentiate it from moral altruism (which he writes without the quotation marks). Ruse has articulated perhaps more clearly than anybody else a sociobiological explanation of the evolution of the moral sense; namely that the moral sense — our proclivity to evaluate certain actions as good and others as evil — has evolved so that we behave in ways that improve our fitness, but do not do so in a way that is immediately obvious. Humans tend to be selfish because that usually serves best our fitness. Yet, there are situations where the (inclusive) fitness of our genes is enhanced by cooperation rather than selfishness; examples are cases of "altruistic" behaviors similar to those of adult zebras protecting the young in the herd or to the warning cry of a prairie dog. Natural selection has tricked humans into exhibiting such non-obviously (biologically) beneficial behavior by prompting us to evaluate such behavior as morally right, which in turn has necessitated the evolution of the moral sense. In Ruse's own words (1986b, pp. 97—99): "All such cooperation for personal evolutionary gain is known technically as 'altruism.' I emphasize that this term is rooted in metaphor, even though now it has the just-given biological meaning. There is no implication that evolutionary 'altruism' (working together for biological payoff) is inevitably associated with moral altruism . . . [Sociobiologists] argue that moral (literal) altruism might be one way in which biological (metaphorical) 'altruism' could be achieved . . . Literal, moral altruism is a major way in which advantageous biological cooperation is achieved . . . In order to achieve 'altruism,' we are altruistic! To make us cooperate for our biological ends, evolution has filled us full of thoughts about right and wrong, the need to help our fellows, and so forth." This is an explicit interpretation of Wilson's statement that I quote in the article ("Human behavior . . . is the circuitous technique by which human genetic material has been and will be kept intact. Morality has no other demonstrable ultimate function"). This justification of the evolution of the moral sense is in my view misguided. I have argued that we make moral judgments as a consequence of our eminent intellectual abilities, not as an innate way for achieving biological gain. I have also argued that the sociobiologists' position may be interpreted as requiring also that the preferred *norms* of morality be those that achieve biological gain (because that is, in their view, why the moral sense evolved at all). This, in turn, would justify social attitudes that many of us (sociobiologists included) would judge morally obtuse and even heinous.

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