LETTERS

An Alternative Case for Sociobiology

Recently, the topic of sociobiology has been the target of much criticism and heated debate (News and Comment, 19 Mar., p. 1151; Letters, 30 Apr., p. 424). Discussion has centered on the book *Sociobiology: The New Synthesis* by E. O. Wilson (*1*), which has been attacked as a dangerously deterministic document with strong political overtones by the Science for the People group (*2*) and defended by its author (*3*).

When the smoke is cleared away, this debate is seen to center largely on the question of the limits of plasticity of human behavior—the degree to which genetic principles of evolutionary adaptation can be applied to the social behavior of man. The attack of the Science for the People group amounts to a resurrection and a rehashing of the old "innate versus learned" controversies that raged during the early phases of the development of the field of ethology. Those debates, although politically enlightening, proved largely unproductive scientifically and, in fact, hampered progress in the fields of both psychology and ethology. It would be a shame if the major contributions and potential importance of the new field of sociobiology were to be lost behind a diatribe of "determinism-environmentalism" rhetoric.

The field of sociobiology did not originate with E. O. Wilson's book. Rather, it has its roots in over a century's accumulation of field natural history studies on a wide range of animals. These studies, when viewed in terms of modern theoretical ecology and population genetics, provide the data base from which the general theories of sociobiology are emerging.

One of the strengths of this field is its ability to interpret and partially predict the social structure of a species on the basis of a limited set of environmental or ecological variables—the type of food resource together with its degree of stability and predictability; the dispersion pattern of different resource bases in both time and space; the types and strategies of potential predators or parasites and means for counteracting them; the need (or lack thereof) for rapid information exchange about the environment. These and other ecological parameters impose limits on the range of types of social organization that will be adaptive. With differences in the dispersion of a critical resource, the availability of mates, and other factors, optimal social strategies shift, resulting in a fine tuning of social organization to ecological constraints.

The importance of these predictive hypotheses lies in their broad applicability across phylogenetic lines. Similar ecological determinants seem to apply when we examine such diverse groups as dragonflies or frogs, coral reef fish or marine birds, tropical bats or weaver birds, African ungulates or primates (*4–6*). Animals faced with similar ecological "problems" exhibit a predictable convergence in their "solutions," as shown in their social organizations.

The Science for the People group is correct in noting that evolutionary biologists generally assume an observed behavior is the result of natural selection operating at the level of the individual. But the case for the importance of sociobiology need not rest on any premise of rigid genetic determinism of behavior. It is becoming increasingly apparent that social organization, even in so-called "lower" forms, exhibits a surprising amount of plasticity. What adds strength to the hypotheses of sociobiology is that often the form of this plasticity as well as the conditions under which it occurs are, in themselves, predictable. Thus the spatial organization of certain species may shift from being aggressively territorial to being nonaggressively nomadic or gregarious because of changes in predation pressure or in the economic defendability of certain resources (*4, 6, 7*). In fact, the shift from territoriality to nonterritorialty in some species can be predicted with quantitative precision (*8*) and, in others, can be experimentally induced through manipulation of the distribution of critical resources (*9*).

Similar plasticity occurs with respect to mating systems. Shifts between monogamy and serial polygyny and polyandry occur, as do shifts between serial polygyny and the formation of leks (or communal display grounds). Again, these shifts occur where they would be predicted on the basis of changes in predation pressure or in the potential for individual monopolization of critical ecological resources (*10*).

The observed plasticity of social behavior should serve as a warning to those who propose overly simplistic genetic explanations for such behavior patterns as monogamous mating systems or territorial imperatives in man. Indeed, it is unfortunate that many early popularizers of animal behavior did precisely this. But most of these writings preceded the synthesis stage of sociobiology, and few, if any, social behaviorists today would adhere to such strict genetic determinism.

Different species are expected to be

differentially flexible with respect to making rapid changes in social organization to meet environmental changes. The more stable and predictable the long-term environment for a species, the more we may expect genetic determinism of behavior. Wilson describes this in terms of the "phylogenetic inertia" that an animal carries with it. In species whose environment is highly variable or unpredictable or which show tremendous cultural plasticity (including, but not exclusive to, man), we expect this phylogenetic inertia to be less pronounced and the potential for rapid behavioral change to be greater. But this does not mean human societies are fundamentally different from all other species and are totally free from ecological constraints. Most human societies are still faced with ecological "problems," and we still should expect a limited range of resulting "solutions." Knowing whether the resulting social organization is arrived at through long-term genetic change by natural selection, through individual trial and error learning, or through a cultural transmission of the optimal strategies of resource utilization is not the crux to understanding the potential importance of sociobiology. An organism that has the cultural flexibility to adapt its social organization to changing ecological pressures merely has the capability of arriving at a more optimal social organization more rapidly than one that is locked into the slower process of evolutionary change in gene frequencies dictating changes in its behavior.

Indeed, studies of human societies that still retain a close connection to their environment tend to reinforce the predictions and findings of sociobiology. Understanding human resource bases in ecological terms (type, abundance, dispersion pattern, long-term predictability or reliability of food resources, and so forth) is proving valuable in explaining such features of human social organization as group sizes, types of interactions between neighboring groups, mating systems, and optimal foraging strategies (*11*).

The problems and challenges of sociobiology come in attempting to apply it to modern, industrialized societies. Here man no longer lives in harmony with his environment. Western man is buffered from the ecological consequences of his actions, and hence the feedback mechanisms (whether genetic or cultural) that normally promote changes in social organization and "adapt" it to the critical limiting features of the environment are broken. The problem of "adaptation" when such feedback loops are broken was eloquently discussed by Hardin in "The tragedy of the commons" (*12*). The resource bases of modern man are exceedingly complex and highly diversified. Technology and industrialization, exploitation and colonization, and mobile transportation of resources all complicate the picture to the point where sociobiology, at least in its current state, is unable to make strong statements or predictions concerning "optimal and nonoptimal" types of social structure. But this does not decrease either the potential political significance of sociobiology or its possible misuses.

The Science for the People group correctly point out the dangers of misusing biological determinism to justify the status quo. But to whatever degree phylogenetic inertia is of importance in humans (that we are carrying a genetic-behavioral heritage molded by natural selection to be adaptive to a hunting-gathering, preurban existence), it would be unwise to cease studies of sociobiology or to ignore the biological consequences of politically imposed social structures—regardless of their ideology.

In contrast to the Science for the People group, I see both the strengths and the dangers of sociobiology as extending far beyond the question of the genetic bases of human behavior. Suppose that studies ultimately reveal that human social behavior is infinitely malleable (which I strongly doubt). If future advances in sociobiology allow us to become increasingly precise in predicting the fine structure of social organizations of animals on the basis of ecological constraints, then why couldn't these principles be applied in reverse? Resource bases or distributions could be manipulated in an attempt to shape a particular, "desired" form of social organization. Who, in this case, should have the power to dictate what the politically or morally "optimal" type of society should be?

These are not hollow questions. In many Third World countries, human cultures exist whose social organization is in tune with their environment. As these nations attempt to rapidly enter the world of 20th-century technology, many industrialization and agricultural reforms are initiated. These frequently result in massive changes in the distribution of the resource bases of the country and lead to significant changes in the potential for monopolization of these resources by certain individuals or groups. This, in turn, can lead to increasingly stratified and nonegalitarian societies. Such changes are occurring constantly, in all corners of the world. Future sociobiological findings could be of impor-

tance in helping plan the types of technology that we should export and the detailed manner in which they could be applied in order to minimize the frequently chaotic changes they produce in the cultures of the recipient nations.

Neither the potential benefits nor the political dangers of sociobiology rest solely with the issue of genetic determinism of human social behavior. The best formula for increasing our understanding of sociobiology, while at the same time safeguarding against political misuse of information, lies in promoting basic research in this new field, and in disseminating the findings to as broad an audience as possible.

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Plutonium and Christian Ethics

Regarding the article "Plutonium: Its morality questioned by National Council of Churches" by Philip M. Boffey (News and Comment, 23 Apr., p. 356), I wish to inform your readers that I did *not* participate in the colorful debate at the Riverside Church in New York City on 28 January "appointed by the Atomic Industrial Forum" as the article says, but rather representing myself, at my own expense.

Since last fall, I have been actively assessing the views of both the World Council of Churches and the National Council of Churches on these matters and communicating the substance of them to the U.S. Congress, the Energy Research and Development Administration, the National Academy of Sciences, and the National Academy of Engineering.

The World Council's work is by far the best; they did not (contrary to the implication in Boffey's article) make a colorless "neutral" report; they said that they're not finished yet. Their working papers and report will be published as a book, but meanwhile can be found in issues 20 (May 1975) and 21 (October 1975) of their occasional journal *Anticipation*. They are excellent reading for all who seriously ponder these matters. Their interim report in issue 21 answers some of the questions and raises others (for example, What are the world's options?) and tries earnestly to structure each part of the debate so that it can be constructively continued.

The National Council's work is too narrowly constructed and very hubristic, as was also pointed out by the ethicists Maxey, Shinn, and Williams at the 28 January debate. It fails to introduce in any organized way any principles of ethics, Christian or otherwise, but builds its persuasions on the base of its own conclusions—a proclivity discussed in ancient times and found wanting (*1*).

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References

1. Jer. 23 : 21, "I have not sent these prophets, yet they ran; I have not spoken to them, yet they prophesied."

Boffey's report on the National Council of Churches' position on the "plutonium economy" was a sympathetic and balanced document. It started with a provocative quote from material I presented to the National Council's General Board complaining about their illegitimate ecclesiology, but regrettably omit-