A RETROSPECTIVE ON SOCIOBIOLOGY

by Michael Cavanaugh

Abstract. *Zygon* has been discussing the implications of sociobiology for twenty-five years, ever since E. O. Wilson's book by that name first burst upon the stage. In the course of that discussion there have been many heated exchanges, but in this journal, at least, the heat has also generated light. Thus it is now timely and useful to review and consolidate *Zygon*'s approach to the sociobiology construct, not only as it was originally presented but as it has changed over time. The goal of this article is to recapitulate and summarize the dialogue that has taken place here. But my aim is not merely to rehash the discussion; it is more precisely to extend and continue it. Specific proposals are offered that are designed to ground future conversations on the solid foundation that has been established over the last quarter century.

Keywords: behavioral ecology; emergence; evolutionary epistemology; psychobiology; reductionism; sociobiology; theological anthropology; E. O. Wilson; *Zygon*.

From its very first issue in 1966, *Zygon* has been concerned to explore the relevance of biology and sociology to each another and to religion,[1] but it was not until June 1976 that the word *sociobiology* found its way onto the journal's pages. It could hardly have been otherwise, since the word was not coined until 1975, when E. O. Wilson published a book by that name. In some quarters the publication of Wilson's book unleashed a storm of protest, but the dialogue here has always taken sociobiology quite seriously. Indeed, after twenty-five years of dealing with the concept and the controversies it has spawned, it seems useful and appropriate to recapitulate and then extend *Zygon*'s approach to sociobiology. After a brief introduction, I will attempt to trace the history of the *Zygon* conversation, and then I will offer proposals for future dialogue.

Michael Cavanaugh is a lawyer. His address is 744 Dubois, Baton Rouge, LA 70808, and his e-mail address is MichaelCav@aol.com.

[*Zygon*, vol. 35, no. 4 (December 2000).]
 ISSN 0591-2385

Although the word *sociobiology* may seem to imply a synthesis between sociology and biology, it has come to mean much more than that. The claim seems to be that biology is critically important not only to human sociology but also to our psychology, politics, art, religion, and virtually everything else. Of course, there are levels at which nobody disagrees with that; for example, it is impossible to imagine how any of these dynamics would operate without the involvement of individual human brains, their neurons firing and their chemicals flowing. The real questions concern *how* important biology is to these established disciplines, in what way or ways it is relevant to them, and what practical results flow from a biological analysis. Those were the issues at the outset, and in many ways those are the issues today, though I believe that some progress has been made both in clarifying the issues and in beginning to resolve some of them. To show how that has happened, I present a historical review of *Zygon*'s response to sociobiology and the issues it raises.

From 1966 through the 1970s

Zygon has always been interested, even before the advent of sociobiology, in exploring the relevance of biology to social life, to culture, and especially to religion. Dozens of articles demonstrate that, and it is only with the utmost discipline that I refrain from exploring some of the early ones at length. The precursor of sociobiology, namely ethology (the study of animal behavior and psychology), was occasionally mentioned and its adherents cited (for example, Hoagland 1967; Burhoe 1975, 370), and many specific issues relevant to sociobiology were discussed in detail, such as cooperation (Mather 1967), aggression (Hoagland 1969), altruism (Cloak 1976), individuality (Ingle 1971), purpose (Birch 1973), and ethics (Dobzhansky 1973; Morrison 1966). Indeed, there was a rich literature treating the relevant issues long before sociobiology burst on the scene and began to redirect the conversation, and *Zygon* contributed an important part of that literature, especially insofar as it involved discussions related to ethics, morality, and religion.

An occasional contributor to *Zygon* in those early days was well-known psychologist Donald Campbell, who was completely familiar with the literature of ethology and with the earliest writings of E. O. Wilson. Campbell had elsewhere (1975a) reintroduced Konrad Lorenz, one of ethology's founders, to American psychology, and in a September 1975 *Zygon* article (1975b) he noted several of Wilson's writings, albeit without mentioning the word *sociobiology*. Of course, one must remember that it takes time for an article to be published after it is written, and it takes time for scholars to begin digesting ideas after they are introduced. Thus it is particularly interesting to note how promptly sociobiology was mentioned here, with the republishing in June 1976 of a paper that had been presented by Bernard

Davis at Star Island in the summer of 1975 (Davis 1976). Despite this early mention, however, we should not be surprised to learn that it took a while, here as elsewhere, for the full impact of sociobiology to be felt. For example, the article written by Davis, a bacterial physiologist at Harvard (where Wilson was teaching) and entitled "Evolution, Human Diversity, and Society," barely mentioned sociobiology at all, though it did point out the importance of the evolved tension between cooperation and competition and suggested that sociobiology has something to say in exploring the ethical implications of that tension. (Note also that Davis later edited the 1980 two-issue treatment of sociobiology to be discussed below.) Another article in that same issue, entitled "Reflections on Some Social Implications of Modern Biology," written by Robert Morrison, a visiting professor of biology at M.I.T., also cited Wilson's new book in the references but did not actually use the word *sociobiology* in the text.

From this humble beginning *Zygon* did not much address sociobiology for the rest of the 1970s, though there is persuasive evidence that its impact was already beginning to be felt within the science/religion community. For example, there was an intriguing article in March 1977 (the first *Zygon* article with "sociobiology" in its title) contrasting the philosophy of Ralph Wendell Burhoe to that of Ian Barbour, in which the author, John R. Miles, accused Burhoe of having too much affection for sociobiology in his program of redefining myth. In his conclusion, Miles penned the following comment, which was to prove prophetic for the 1980s and beyond: "whether sociobiology can serve such mythological purposes responsibly is open for discussion, to put it mildly" (Miles 1977, 67). The only other article in the 1970s to contain sociobiology in its title was in March 1979 (Miller and Faux 1979).[2] Things were to be much different in the 1980s.

The Stormy 1980s

By 1980 sociobiology was five years old, and *Zygon* dedicated the entire September and December issues of that year to discussing it. The lead September article, entitled "Sociobiology and Its Critics" (Frankel 1980), took a very moderate tone but forcefully raised the reductionism question, accusing Wilson of illegitimately trying to reduce all human interactions to molecular events at genetic levels and concluding that the neurology produced by genetics cannot possibly account for "love," "hate," "good," or "bad." While the article acknowledged sociobiology's contributions in a narrow range, its overall tone was more negative than positive toward sociobiology. That neurology cannot account for anything very profound was to be a frequent theme of the 1980s, though *Zygon* never engaged in the "sociobiology bashing" that was common elsewhere. Even the scientific materialist in that September issue (Alexander J. Morin) did not completely agree with Wilson, warning against making science a religion, even

though he expressed some sympathy for Wilson's role as a missionary from the biological sciences.

Four years later an issue of *Zygon* (June 1984) was again dedicated to discussing sociobiology, with articles or comments by Michael Reiss, Peter Singer, William Rottschaefer and David Martinsen, Arthur Peacocke, Philip Hefner, E. O. Wilson, and others. Reiss (1984, 117) began by redefining sociobiology ("Sociobiology is the systematic study of the biological basis of all social behavior") but ultimately focused on some technical aspects of particular issues (such as altruism and aggression), leaving the all-important ethics issues for other contributors to discuss. Yet Reiss did conclude in passing that sociobiology is ultimately antagonistic to religion because of its reductionist stance. Peter Singer, discussing ethical issues, said that ethicists would be very wrong to ignore sociobiology because, whatever else, it does link facts and values. Singer also defended sociobiology against certain charges leveled by early commentators, namely, that it is sexist and perhaps even fascist. Yet he too denied that sociobiology (or any science) can supply us with ultimate ethical principles, and he argued that Wilson was himself guilty of ethical subjectivism. Singer was criticized and Wilson defended on this last point by Rottschaefer and Martinsen, who reviewed the philosophical differences between "pure" reason and "empirical" reason, identified Singer as being in the former camp and Wilson as being in the latter, and came down on the side of empirical reason as our best hope for grounding ethics in anything substantive and for establishing strong links between science and religion.

That sociobiology is essentially reductionistic was also argued by guest editor Arthur Peacocke in his exploration of the theological implications of sociobiology (Peacocke 1984b). While he affirmed the new science's right and its power to say how things *are* and even quoted Karl Peters's comment (albeit with a strong reservation) to the effect that there is no "totally other" supernatural, Peacocke ultimately criticized sociobiology for its confident and explicitly deterministic, reductionistic, and functionalistic approach. Interestingly, he acknowledged that the two principal spokespersons for sociobiology, E. O. Wilson and Richard Dawkins, had avoided the worst offenses of such an approach, but he ended by urging theologians to insist that "God has made human beings thus with their genetically constrained behavior—but, through the freedom God has allowed to evolve in such creatures, he has also opened up new possibilities of self-fulfillment, creativity, and openness to the future that requires a language other than that of genetics to elaborate and express" (Peacocke 1984b, 178–79). Philip Hefner (1984) partly agreed, but his tone was more open to sociobiology. He said the task of ethics is to understand what sociobiology can tell us about our essential humanity, and the task of theology is to affirm that all of this transpires within the creative will of God.

Fast-forward another four years, when the December 1988 issue (dedicated to "Evolutionary Biology and the Problem of Evil") again fanned the fires of controversy. George C. Williams kicked off the debate with the observation that throughout the animal world nature supports rape, incest, and all sorts of other nasty things that we find morally reprehensible, ending with the clear claim that sociobiology cannot give much guidance when it comes to ethics. He invoked T. H. Huxley to support his conclusion that our task is not to live consistently with our biology but to overcome it (Williams 1988). To underscore his point with a catchy title, Williams later (1993) published similar ideas as a book chapter entitled "Mother Nature Is a Wicked Old Witch."

Sarah Blaffer Hrdy (1988) took exception, commenting that in its deepest sense morality must be understood in relation to each particular species, and she questioned whether Williams or anyone else could come up with a broadly acceptable moral system that would not be constrained by the insights of sociobiology. Michael Ruse (1988) also found Williams's examples unpersuasive for showing that nature is morally evil or that we should vigilantly resist it. He argued that, on the contrary, the products of evolution are neutral. Morality is functional. The moral sense is an adaptation that makes us more social and thereby helps us survive better by providing a sense of right and wrong.

Burhoe (1988), in his comment on Williams, emphasized a concept that would, in the 1990s, go a long way toward resolving many of these controversies, and that is the concept of *emergence*. We must fully consider the biological facts, but then we must emphasize that culture emerges from biology and that sociocultural evolution provides the key to our ethical orientation and improvement. Burhoe ended by pointing to a then-recent book by Richard Alexander (1987), later reviewed in *Zygon* by William Irons (1991b), which Burhoe believed would consolidate the gains of the past and rescue us from the quagmire Williams had surveyed and incorrectly interpreted.

All in all, Franz Wuketits was quite right when he concluded in that same December 1988 issue that Darwinism is "still a challenge for philosophy," but Burhoe's comment signaled a turn toward the more fruitful dialogue that was to come. And indeed, the decade ended with a graceful "reaching out" by E. O. Wilson's coauthor Charles J. Lumsden (1989), who discussed both the strengths and weaknesses of a sociobiological approach to theological issues and made a strong case for a richer dialogue between the two. In my opinion, that article, combined with Burhoe's insight and with an ongoing deepening in the understanding of sociobiology's power and limits, paved the way for the 1990s, which became in *Zygon* a time of less controversy and more thoughtful reflection about sociobiology and its relevance for religion.

Mature Reflection in the 1990s

At *Zygon* the 1990s began, insofar as its treatment of sociobiology is concerned, with an exchange between E. O. Wilson and several commentators. Wilson's article was entitled "Biology and the Social Sciences" (1990), and it described his concept of "antidisciplines." He used that phrase to emphasize the creative tensions that exist between any two adjacent disciplines, and he proposed that biology has matured (through its subdisciplines neurobiology and sociobiology) to the point where it has become an antidiscipline for the social sciences. He predicted that additional subdisciplines will arise to plumb the depths of those creative tensions, just as molecular biology arose to resolve the tensions between chemistry and biology. Wilson ended with an acknowledgment of the limits of the reductionist methodology, pointing out how unpredictable each emergent set of dynamics is from the fundamental laws it is built upon. In his conclusion he said, "Biology is the key to human nature, and social scientists cannot afford to ignore its emerging principles. But the social sciences are potentially far richer in content. Eventually they will absorb the relevant ideas of biology and go on to beggar them by comparison" (1990, 260).

In response, Nancey Murphy (1990) adapted Wilson's schema to propose that the social sciences serve as antidisciplines to theology. That means the social sciences are more interested in a detailed and essentially reductionistic understanding of the overlapping subject matter, and it means further that theology will eventually incorporate the findings of social science but go far beyond it to create a richer and more general understanding. She even went so far as to claim that the predicted failure to reduce theological principles to social ones is a proof of the existence of God (!), but that was not her main point. Her intent was to agree with Wilson's proposed schema and to extend it. She did that by pointing out that the methodology of theology is the same as that of both the natural and social sciences, because all three operate out of a Lakatosian "core," and by suggesting that this common methodology can be employed to continue exploring the creative tension between theology and the social sciences. Theologian and medical ethicist Kenneth Vaux (1990) agreed with Murphy and argued that theology should reclaim its prophetic function, challenging idolatries whether in the natural or social sciences and humbly helping the other disciplines develop an adequate ethics for their endeavors.

Next came a fascinating article by anthropologist William Irons (1991a) entitled "How Did Morality Evolve?" which seemed a prompt fulfillment of Wilson's prophecy about new subdisciplines. Irons pointed out how sociobiology had already begun to produce spin-off disciplines with names like behavioral ecology, biocultural science, biosocial science, evolution and human behavior, and neo-Darwinism, and he noted that these subdisciplines had begun to deal more substantively and thoughtfully with the issues critics had raised.[3]

In March and September of 1994 a telling exchange took place between anthropologists Roy Rappaport and Lee Cronk. Ostensibly the exchange was about the role of manipulation in communication theory, but I think the exchange was significant for two reasons other than the substance of the arguments presented. First, it is clear that both disputants think understanding moral systems and sentiments depends mightily on understanding evolutionary biology, and second, it is noteworthy that the exchange did not require any rehash of sociobiological theory; knowledge of sociobiology's impact was assumed, and the interesting questions had shifted to a consideration of sociobiology's important implications.

The move toward examining the implications of sociobiology and its offshoots rather than disputing about its basic theory was continued in December 1996, when philosopher Marya Schechtman explored recent developments in clinical psychology and "psychobiology," concluding that those developments offer exciting new possibilities for overcoming the apparent duality that results from contemplating human beings as both subjects (with beliefs, goals, and actions) and objects (whose actions must be explicable by scientific laws). Her article was important, in my opinion, because it indicated that not only had biologists and anthropologists grasped the significance of biological analyses; mainstream philosophers had begun to do the same. Schechtman was particularly interested in the way Peter Kramer's popular book *Listening to Prozac* grappled with the genetic underpinnings of human psychology and philosophy. In a similar vein psychologist John Teske, in the June 1996 issue, examined the role of neurophysiology in accounting for human spirituality. This article articulated a baseline conclusion that I believe has by now achieved widespread acceptance: neurology is a *necessary* condition of spirituality, but neurology is not all that is necessary—it is not a *sufficient* condition in and of itself to explain spirituality (see also Ayala 1998).

In that same June 1996 issue, Patricia Williams also established common ground with her article, "Christianity and Evolutionary Ethics: Sketch toward a Reconciliation," in which she equated sociobiology's establishment of the disposition to love self, kin, and friend rather than one's neighbor as a scientific parallel to the concept of original sin, the disposition to disobey God's command and practice self-love and nepotism rather than neighbor-love. Steven J. Pope's June 1998 article, although its conclusion may seem exactly the opposite, was quite compatible with Williams's. Pope nicely integrated Catholic theology with sociobiology by arguing that self-love and the care of a community are all *Christian* principles as well as sociobiological ones.

Other articles made progress in harmonizing religion and sociobiology insofar as they relate to specific issues, including altruism (Browning 1992),[4] sex and aggression (Nessan 1998), and moral discourse (Rue 1998).[5] The Nessan piece was particularly interesting in the way it harnessed sociobiology to the task of showing how our aggressive and sexual tendencies relate

to a credible and useful "theological anthropology," which I take to voice the claim that one can better understand human beings by understanding God, and vice versa. Nessan acknowledged that we tend to follow gender-specific strategies, display aggression, and respond to pain much as other animals do, but our ability to understand those tendencies gives us new options for dealing with them that are appropriate to our present context, both by exercising our individual intellectual facilities and by designing social strategies.

At the end of the decade there was also a very graceful article by biophilosopher Paul Thompson (1999), who acknowledged early mistakes of sociobiology—sociobiology had been too dependent on group-selection accounts of behavior and too deterministic—and yet made a strong case for the relevance of sociobiology for analyzing human ethics. But perhaps the most useful efforts at harmonization for our purpose are to be found in two articles that strove for a more general synthesis. Those were authored by Allen Drew and Karl Peters.

At first blush, Drew's 1997 article, "Genes and Human Behavior: The Emerging Paradigm," is a hard-hitting pro-sociobiology article that emphasizes the biological roots of behavior, recounting twin studies and other evidence to assert that somewhere between 30 and 70 percent of a wide range of human behaviors can be attributed to genes. But then Drew made a dramatic shift, noting that neither 30 percent nor 70 percent amounts to a 100 percent correlation, nor even the 90 percent correlation that one finds between the heights of identical twins. This led him to the observation that a fundamental commonality within our species must be balanced against a recognition of individual variety. Accepting the fact of variety demands tolerance of traits that were previously considered abnormal, such as homosexuality. Moreover, the large percentage that is still missing after factoring in genetic causes can only be accounted for by nongenetic, environmental factors, and those factors are the province of culture, religion, and community. In the emerging paradigm such factors must not contravene the biological substrate, but they are free to work within it according to their own dynamics.

The penultimate issue of the journal in the 1990s (September 1999) contained a section on "Evolutionary and Religious Perspectives on Morality." The lead article in this section, by Karl Peters, was a thoughtful and quite personal musing over questions that had been raised at the 1997 Star Island Conference entitled "Reflections on the Evolution of Morality." More generally, Peters was thinking about the larger implications of sociobiology for ethics and religion, and his thinking was so effective that the present article would be unnecessary, except that he purposely avoided coming to any conclusions. Nonetheless, he made several observations that lead directly to my concluding section. For example, it is hard to avoid the implication that Peters believes several dynamics are of crucial

importance, even though he presented them as questions rather than answers. Matter matters, biology matters, motivation matters, worldviews matter, and morality matters.

But Peters was clear that "biology doesn't do the whole job" by itself (1999, 425). Culture matters, too, and we are faced with three choices in thinking about how biology and culture interact. Their relation can be looked at as (1) antagonistic, and while Peters respects traditions and scholars who take this approach, it is clear that he prefers one of the other two; (2) continuous, in the sense that culture builds on a biological substrate; or even (3) transcendent, by which Peters means that culture somehow takes flight from its biological substrate and operates above and beyond it. Reading between the lines I deduce that Peters resonates with the second of these choices but still wants culture to soar.

Ultimately Peters wondered what the bottom line is in terms of personal meaning, given his belief that biology definitely constrains culture and his further belief that sociobiology discourages confidence in inbuilt biological progress. He concluded that personal meaning has to do with our response to change, in which progress is seen as a legitimate personal and cultural goal even if it is not a biological one. In expanding this idea, he reflected on various salvation doctrines and remembered a conversation with Philip Hefner about dividing such doctrines into two categories, namely those that result in a "grand culmination" and those that result in human fulfillment, in the sense of making things better for oneself and one's community. He believes our biological understanding must be incorporated into "wider systems of meaning" such as the various religious traditions. At the personal level, he believes sociobiology makes us aware of the origin of conflicts within our individual being, and that seems to be the forward edge of his own growth (Peters 1999).

Where Does the Discussion Stand Today, and Where Do We Go from Here?

Sociobiology and its spin-offs have become much too complicated to summarize in a short concluding section, and I have been altogether too brief in trying to share the flavor of *Zygon*'s many sociobiology-relevant articles,[6] but I believe it is possible to extract several points of agreement that have emerged within the science/religion community over the last twenty-five years and especially over the last decade. Some of these points of agreement might seem quite bland today, but the fact that they would not have seemed bland in 1975 is the surest warrant that progress has been made. Even though not every participant in the dialogue would agree with all of these points, they can serve as foci for the next stage of the dialogue.

1. Biology is relevant, and not just because it is necessary to have a biological body or brain in order to have the conversation.

2. Evolutionary dynamics produced certain tendencies in us, which were favored by the circumstances under which they arose but which may or may not be appropriate to the circumstances under which we now live. Human motivation has biological roots as well as cultural ones.
3. Morality emerged because it aided survival, most likely by limiting conflict within groups. This is not merely a contractual arrangement but also a biological one, and it includes socially necessary coercive qualities as outlined by William Irons (1991).
4. Specific aspects of sociobiology (kin selection and altruism, for example) pass the test of mathematical theory and verification and give hope of further understanding of our nature.
5. Despite these affirmations of sociobiology, it is still true that our "strictly biological" nature is only the necessary condition for morality and religion, and that a full discussion requires an analysis of other dynamics, such as language and culture, that are not strictly biological. And even though culture itself has biological roots, it must be augmented and even implemented by processes like law and education, which are not initially contained within the brain, having emerged long after the brain evolved to its current state. It is granted that such cultural processes themselves modify neural pathways and stored information,[7] so that it makes a certain amount of sense to talk about a "biology of education" or even a "biology of culture." However, for both heuristic and analytical purposes, and certainly for historical purposes, it is useful to distinguish between purely biological and distinctly cultural dynamics. I will return to this observation shortly.
6. Sociobiology is not inherently contradictory to religious principles such as love; on the contrary, it may offer important and exciting insights into the dynamics of such principles.[8]

Even if the reader is prepared to grant these points of agreement, he or she will realize that there is still plenty of room for disagreement. That is, of course, both unavoidable and creative. And yet, I think some of the disagreement can be further reduced by adding some "principles of dialogue" that are relevant to future conversations. I therefore propose several such principles, which I believe will continue and expand the productive approach *Zygon* has taken in the first twenty-five years of including sociobiology in the science/religion dialogue. In my opinion, we should:

1. Avoid extreme claims. Sociobiology is not inherently fascist or sexist, though it is certainly fair to criticize any tendency to expand its theories beyond what can be supported by the evidence or by reasonable extensions of the evidence.

2. Seek to build bridges instead of walls. It is easy to proof-text either biology or religion to find and magnify their differences in content and methodology, and some participants in the conversation are quite adept at using provocation to make their arguments. I certainly agree that provocation can be productive, and I would not deny those who rely on it the right to participate in the conversation because they capitalize on differences. But I think it more in the spirit of *Zygon*'s mission when Patricia Williams or Steven Pope or Philip Hefner eschew provocation (to pick three salient examples from among many possible ones) and seek instead to find common ground. In other words, we should identify ways that culture and religion *build* on biology rather than contravene it, in order to articulate and establish valid precepts and encourage ethical behavior.
3. Continue to take our understanding of science from the most credible sources rather than try to fashion a "private" science. That means we must give sociobiology credence, since it has clearly established its place within mainstream science. Moreover, we must stay alert to the working out of sociobiology's implications in other scientific fields, especially psychobiology and psychoneurology, and to the resulting philosophical implications à la Schechtman and Teske.
4. Go an extra mile to clarify when we are speaking about the underlying biology, the biology-dependent but conceptually distinguishable cultural dynamics, or some irreducible interaction between the two. I am aware that my point-of-agreement 5 from the previous section is easier said than done. It is difficult to distinguish between purely biological dynamics, distinctly cultural ones, and those that are irreducibly intertwined. This principle will help avoid the frustration that results when we seem to be talking past one another but are actually addressing the same dynamic from different angles.
5. Avoid language that raises the specter of the naturalistic fallacy. It is my guess that almost nobody in the conversation really feels that "whatever is natural is good," and almost every participant has an interesting strategy for avoiding the potential nastiness of our various innate tendencies, usually by relying on our individual and/or social ability to make evaluations and channel them into positive directions. But it is all too easy, in the enthusiasm of pursuing biological insights, to forget to include this dynamic in one's conversation or analysis. Thus, each speaker or writer should be quick to mention this part of the equation, and each listener or reader should be slow to assume that the naturalistic fallacy has been committed.

If these "points of agreement" and "principles of dialogue" are kept in mind, I am confident that after another twenty-five years, *Zygon* will be the repository of some of the most profound understandings in existence

of the implications of sociobiology and its offshoots, based on the foundation established over this first twenty-five years. It will be even more true then than it was when Arthur Peacocke wrote in his June 1984 guest editorial that "*Zygon* is *the* journal of science and religion."

Notes

1. That first issue, in March 1966, emphasized theological resources that exist within both the biological and the social sciences, with lead articles from George Wald and Anthony F. C. Wallace and with commentaries from such thinkers as Alfred E. Emerson, Ralph Wendell Burhoe, and Henry Nelson Wieman.
2. Although I have not chosen to discuss this article in the text, it is of both philosophical and historical interest because, in searching for the mechanisms of cultural selection (as more than a simple analogy to natural selection in biology), the authors argued that the reinforcers known to behaviorism can serve as good candidates for such mechanisms.
3. Other labels that have also "spun off" sociobiology or received new vitality from it are evolutionary epistemology (see Rolston 1995) and evolutionary psychology.
4. Browning, somewhat like Pope (1998), found sociobiology's ideas on altruism to be quite compatible with Christian, especially Roman Catholic, ideas on love. Protestant ideas on agape love have developed in extreme directions that seem at variance with sociobiological altruism, whereas several other (Catholic) definitions of love are more compatible. Browning especially emphasized how the family mediates the apparent philosophical distance between ultimately selfish and ultimately unselfish definitions of altruism.
5. Rue asked why humans, who share so many biological and psychological systems with chimpanzees, behave so differently from them. He concluded that it is because we employ one system they don't, namely our symbolic system. That system permits us to, in a sense, override the default systems mandated by sociobiology. Most significantly, we can (and must, in Rue's opinion) think and act globally, not just on behalf of our local group.
6. There were about twenty-six *Zygon* articles (through the end of 1999) with the word *sociobiology* in the title, not to mention all the many others that discussed the construct either directly or indirectly.
7. I use the word *stored* here as a metaphor, not as an attempt to name a literal neurological dynamic, because I give weight to the criticism of the concept by Camilo Cela-Conde and Gisèle Marty (1997). They also criticized the word *processing*, but I am not persuaded that there is anything particularly wrong with using that word.
8. This is by no means universally agreed to, of course. Frequent contributor Michael Ruse continues to argue that Christian ethics and evolutionary theory are in fundamental disharmony (see Ruse 1994). But in my reluctant opinion—reluctant because in most ways I am a fan of Ruse's—Ruse is decidedly out of step with *Zygon*'s effort to build bridges instead of walls.

References

Alexander, Richard D. 1987. *The Biology of Moral Systems.* New York: Aldine de Gruyter.

Ayala, Francisco J. 1998. "Biology Precedes, Culture Transcends: An Evolutionist's View of Human Nature." *Zygon: Journal of Religion and Science* 33 (December): 507–23.

Birch, Charles. 1973. "A Biological Basis for Human Purpose." *Zygon: Journal of Religion and Science* 8 (September–December): 244–60.

Browning, Don. 1992. "Altruism and Christian Love." *Zygon: Journal of Religion and Science* 27 (December): 421–36.

Burhoe, Ralph Wendell. 1975. "The Human Prospect and the 'Lord of History.'" *Zygon: Journal of Religion and Science* 10 (September): 299–375.

———. 1988. "On 'Huxley's Evolution and Ethics in Sociological Perspective' by George C. Williams." *Zygon: Journal of Religion and Science* 23 (December): 417–30.

Campbell, Donald T. 1975a. "Reintroducing Konrad Lorenz to Psychology." In *Konrad Lorenz: The Man and His Ideas*, ed. Richard I. Evans, 88–128. New York: Harcourt Brace Jovanovich.

———. 1975b. "The Conflict between Social and Biological Evolution and the Concept of Original Sin." *Zygon: Journal of Religion and Science* 10 (September): 234–49.
Cela-Conde, Camilo J., and Gisèle Marty. 1997. "Mind Architecture and Brain Architecture." *Biology and Philosophy* 12 (July): 327–40.
Cloak, F. T. Jr. 1976. "The Evolutionary Success of Altruism and Urban Social Order." *Zygon: Journal of Religion and Science* 11 (September): 219–40.
Cronk, Lee. 1994a. "Evolutionary Theories of Morality and the Manipulative Use of Signals." *Zygon: Journal of Religion and Science* 29 (March): 81–101.
———. 1994b. "The Use of Moralistic Statements in Social Manipulation: A Reply to Roy A. Rappaport." *Zygon: Journal of Religion and Science* 29 (September): 351–55.
Davis, Bernard D. 1976. "Evolution, Human Diversity, and Society." *Zygon: Journal of Religion and Science* 11 (June): 80–95.
Dobzhansky, Theodosius. 1973. "Ethics and Values in Biological and Cultural Evolution." *Zygon: Journal of Religion and Science* 8 (September–December): 261–81.
Drew, Allen. 1997. "Genes and Human Behavior: The Emerging Paradigm." *Zygon: Journal of Religion and Science* 32 (March): 41–50.
Frankel, Charles. 1980. "Sociobiology and Its Critics." *Zygon: Journal of Religion and Science* 15 (September): 255–73.
Hefner, Philip. 1984. "Sociobiology, Ethics, and Theology." *Zygon: Journal of Religion and Science* 19 (June): 185–207.
Hoagland, Hudson. 1967. Review of *On Aggression* by Konrad Lorenz. *Zygon: Journal of Religion and Science* 2 (March): 120–23.
———. 1969. "Biological Aspects of Aggression and Violence." *Zygon: Journal of Religion and Science* 4 (September): 206–21.
Hrdy, Sarah Blaffer. 1988. "Comments on George Williams's Essay on Morality and Nature." *Zygon: Journal of Religion and Science* 23 (December): 409–11.
Ingle, Dwight J. 1971. "Genetic Bases of Individuality and of Social Problems." *Zygon: Journal of Religion and Science* 6 (September): 182–91.
Irons, William. 1991a. "How Did Morality Evolve?" *Zygon: Journal of Religion and Science* 26 (March): 49–89.
———. 1991b. Review of *The Biology of Moral Systems* by Richard D. Alexander. *Zygon: Journal of Religion and Science* 26 (June): 324–28.
Lumsden, Charles J. 1989. "Sociobiology, God, and Understanding." *Zygon: Journal of Religion and Science* 24 (March): 83–108.
Mather, William J. 1967. "Man's Ability to Co-operate: A Contribution of Anthropology to the Christian Religion." *Zygon: Journal of Religion and Science* 2 (September): 246–61.
Miles, John R. 1977. "Burhoe, Barbour, Mythology, and Sociobiology." *Zygon: Journal of Religion and Science* 12 (March): 42–71.
Miller, Harold L. Jr., and Steven Faux. 1979. "On the Commonalities among Religious and Moral Codes: Proximate Analysis from a Sociobiological-Behavioristic Integration." *Zygon: Journal of Religion and Science* 14 (March): 83–93.
Morin, Alexander J. 1980. "Sociobiology and Religion: Conciliation or Confrontation?" *Zygon: Journal of Religion and Science* 15 (September): 295–306.
Morrison, Robert S. 1966. "Darwinism: Foundation for an Ethical System?" *Zygon: Journal of Religion and Science* 1 (December): 347–53.
———. 1976. "Reflections on Some Social Implications of Modern Biology." *Zygon: Journal of Religion and Science* 11 (June): 96–114.
Murphy, Nancey. 1990. "Theology and the Social Sciences—Discipline and Antidiscipline." *Zygon: Journal of Religion and Science* 25 (September): 309–16.
Nessan, Craig L. 1998. "Sex, Aggression, and Pain: Sociobiological Implications for Theological Anthropology." *Zygon: Journal of Religion and Science* 33 (September): 443–54.
Nitecki, Matthew, and Doris Nitecki, eds. 1993. *Evolutionary Ethics*. Albany: State Univ. of New York Press.
Peacocke, Arthur. 1984a. Editorial. *Zygon: Journal of Religion and Science* 19 (June): 115–16.
———. 1984b. "Sociobiology and Its Theological Implications." *Zygon: Journal of Religion and Science* 19 (June): 171–84.
Peters, Karl E. 1999. "Reflections on the Evolution of Morality." *Zygon: Journal of Religion and Science* 34 (September): 419–33.

Pope, Steven J. 1998. "Sociobiology and Human Nature: A Perspective from Catholic Theology." *Zygon: Journal of Religion and Science* 33 (June): 275–91.
Rappaport, Roy A. 1994. "On the Evolution of Morality and Religion: A Response to Lee Cronk." *Zygon: Journal of Religion and Science* 29 (September): 331–49.
Reiss, Michael J. 1984. "Human Sociobiology." *Zygon: Journal of Religion and Science* 19 (June): 117–40.
Rolston, Holmes, III. 1995. Review of *Evolutionary Epistemology and Its Implications for Humankind* by Franz M. Wuketits and *Evolutionary Ethics*, edited by Matthew H. Nitecki and Doris V. Nitecki. *Zygon: Journal of Religion and Science* 30 (September): 513–17.
Rottschaefer, William A., and David L. Martinsen. 1984. "Singer, Sociobiology, and Values: Pure Reason versus Empirical Reason." *Zygon: Journal of Religion and Science* 19 (June): 159–70.
Rue, Loyal. 1998. "Sociobiology and Moral Discourse." *Zygon: Journal of Religion and Science* 33 (December): 525–33.
Ruse, Michael. 1988. "Response to Williams: Selfishness Is Not Enough." *Zygon: Journal of Religion and Science* 23 (December): 413–16.
———. 1994. "Evolutionary Theory and Christian Ethics: Are They in Harmony?" *Zygon: Journal of Religion and Science* 29 (March): 5–24.
Schechtman, Marya. 1996. "The Story of the Mind: Psychological and Biological Explanations of Human Behavior." *Zygon: Journal of Religion and Science* 31 (December): 597–614.
Singer, Peter. 1984. "Ethics and Sociobiology." *Zygon: Journal of Religion and Science* 19 (June): 141–58.
Teske, John A. 1996. "The Spiritual Limits of Neuropsychological Life." *Zygon: Journal of Religion and Science* 31 (June): 209–34.
"Theological Resources from the Biological Sciences." 1966. *Zygon: Journal of Religion and Science* 1 (March): 49–59.
"Theological Resources from the Social Sciences." 1966. *Zygon: Journal of Religion and Science* 1 (March): 81–96.
Thompson, Paul. 1999. "Evolutionary Ethics: Its Origin and Contemporary Face." *Zygon: Journal of Religion and Science* 34 (September): 473–84.
Vaux, Kenneth. 1990. "Theology as the Queen (Bee) of the Disciplines?" *Zygon: Journal of Religion and Science* 25 (September): 317–22.
Williams, George C. 1988. "Huxley's Evolution and Ethics in Sociobiological Perspective." *Zygon: Journal of Religion and Science* 23 (December): 383–407.
———. 1993. "Mother Nature Is a Wicked Old Witch" In *Evolutionary Ethics*, ed. Matthew H. Nitecki and Doris V. Nitecki, 217–31. Albany: State Univ. of New York Press.
Williams, Patricia A. 1996. "Christianity and Evolutionary Ethics: Sketch toward a Reconciliation." *Zygon: Journal of Religion and Science* 31 (June): 253–68.
———. 1998. "Evolution, Sociobiology, and the Atonement." *Zygon: Journal of Religion and Science* 33 (December): 557–70.
Wilson, E. O. 1975. *Sociobiology: The New Synthesis*. Cambridge: Harvard Univ. Press, Belknap Press.
———. 1990. "Biology and the Social Sciences." *Zygon: Journal of Religion and Science* 25 (September): 245–62.
Wilson, Edward O., John Mattox, Anthony Quinton, John Turner, and John Bowker. 1984. "Discussion: Genes, Mind and Culture." *Zygon: Journal of Religion and Science* 19 (June): 213–32.
Wuketits, Franz M. 1988. "Darwinism: Still a Challenge for Philosophy." *Zygon: Journal of Religion and Science* 23 (December): 455–67.