

Sociobiology: The Conversation Continues

CHRISTIAN LOVE AND BIOLOGICAL ALTRUISM

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Abstract. The first part of my investigation of the Christian love command and biological research on altruism is organized around three key themes whose different forms both in the theological and in the sociobiological context are investigated: The *awareness of expanding inclusiveness* concerns the issue of extending love or altruistic behavior beyond the most immediate neighbor, even to enemies. The *awareness of excessive demand* concerns the question of the ability of the human being, to fulfill an excessive demand placed by the command of love or by altruistic admonitions. *Threshold awareness* finally concerns the question whether love or altruism constitutes a step on the way to a “new human” and a “new world.”

In the second part I introduce two models for the relationship between Christian religion or theology and sociobiology. The model by Ralph Wendell Burhoe is characterized by a functional approach toward religion, which is the crucial factor within culture for motivating human beings to act altruistically toward nonrelated individuals. This functional analysis of religion is a constructive contribution to a scientific description of the world. The other model, by Philip Hefner, is theologically oriented and emphasizes the intrinsic character of altruistic love, which has its origin in God and whose anthropological preconditions are elucidated in sociobiological research.

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The goal of this investigation is to show that a better mutual understanding is preferable to a total incorporation of the investigated domains into each other.

Keywords: altruism; Ralph W. Burhoe; Christian love; created co-creator; *creatio continua*; Philip Hefner; interdisciplinarity; mutual understanding; New Testament; religion; scientific theology, sociobiology.

[*Translator's Preface.* Altruism is a key problem for the scientific investigation of animal and human behavior. It also plays a central role in all moral and religious systems. In a detailed exegetical investigation of the love command, followed by an in-depth discussion of sociobiological arguments, Hubert Meisinger has presented a comprehensive analysis of this hitherto rather vaguely defined area. The following article is a translation of the final section of Meisinger's *Liebesgebot und Altruismusforschung* (*The Love Command and Research on Altruism*) (1996), in which the author presents the results of his study.

Meisinger's book is organized around three key themes, which, according to his analysis, recur in different forms on both the theological and the sociobiological side of the discussion. In the German original these themes are labeled (1) *Erweiterungsbewusstsein*, (2) *Überforderungsbewusstsein*, and (3) *Schwellenbewusstsein*. We have rendered these complex German terms as phrases: (1) awareness of expanding inclusiveness, (2) awareness of excessive demand, and (3) threshold awareness.¹

In the first part of the following paper, three sections briefly explain the three themes, recapitulate their biblical setting as the basis for their theological significance, and discuss their place within sociobiological altruism research. The main part of the paper then presents an analysis of two proposals for integrating the love command and biological altruism into a coherent model.

The text of the translation deviates from the German original only in that I have incorporated some of the original footnotes into the main body and omitted a few allusions specific to the German or European situation. As far as possible, references to books in German have been replaced by references to English editions. Early works of Ralph Wendell Burhoe contained in the anthology *Toward a Scientific Theology* (Burhoe 1981) are cited from the latter.

—Alfred Kracher]

RESULT OF THE INVESTIGATION

So far we have considered separately two areas: the love command in the New Testament within its general context, and altruism research in sociobiology. In this chapter we will try to relate them to each other, beginning with a synopsis of the individual results oriented on the three general themes—awareness of expanding inclusiveness, awareness of excessive demand, and threshold awareness. The aim will not be to present content

that is related in a systematic manner but rather dialogue based on a common methodological perspective. This approach will show in what respect it is possible to talk about prescientific and scientific perspectives of the same phenomenon, generally speaking, prosocial behavior. After that two models for a relational analysis between Christian religion or theology and sociobiology, which have been developed in the United States by Ralph Wendell Burhoe and Philip Hefner, will be presented. From these, new impulses may emerge for a further interdisciplinary dialogue between theology and science in the areas under discussion.

SUMMARY OF PREVIOUS ARGUMENTS

AWARENESS OF EXPANDING INCLUSIVENESS. This awareness pertains to the recipient of love or altruistic behavior and the extension of this circle of recipients beyond the most immediate neighbor.

The body of Hebrew Scriptures and early Jewish writings deal primarily with neighborly love among the Israelites. However, a number of texts begin to extend the neighborly love command of Leviticus 19:18 in a universal direction, and consider love an ethical obligation even toward non-Jews. Already in the Hebrew Bible we find an extension of the love command to the stranger residing in one's own (that is, Israelite) country (Leviticus 19:34). The Septuagint² lays the foundation for a universalistic understanding by translating the Hebrew concept as ὁ πλησίον, even though within the Septuagint this word still means "the brother in religion" in the Hellenistic diaspora. An explicit extension is found especially in TestIss 7:6, TestSeb 5:1, and Jub 20:2. Even the love of animals makes an appearance (TestSeb 5:1). It is noteworthy that these universal outpourings of love for neighbors have been possible both in Hellenistic and in Palestinian Judaism.

The New Testament continues this development. It reaches its climax in the command of Jesus to love our enemies (Luke 6:27–36 and Matthew 5:43–48); this is the test case of unconditional love. An investigation of the editorial history of the synoptic Gospels shows that Luke especially emphasizes the extension of the love command beyond all bounds. This becomes apparent in the passage of the Great Commandment of love to God and human beings, which is immediately followed by the parable of the Good Samaritan. We obtained from this passage a double invitation—to identify with the injured man as well as with the Samaritan—which aims at an extended understanding of the addressee of love and includes even the enemy. This tendency toward extending the perspective appeared already in the programmatic passage Luke 4:16–30, in which two Gentiles, the widow of Sarepta and the Syrian Naaman, are presented in contrast to Jewish groups, and in which it is made clear that the mission of Jesus is not limited to the Jews.

Similarly, for Paul agape love cannot stop with the members of the community. For religiousociological and theological reasons, agape love appears primarily as intracommunity love, but at the same time it extends dynamically beyond the limits of the community toward non-Christians, who may even be persecutors or enemies of the community or the individual Christian. This becomes apparent in the extension of agape love from the community to all people in 1 Thessalonians 3:11–13, the admonition to do good to everyone in Galatians 6:10 (emphatically placed at the end of the final exhortation), and the inclusion of enemies into the horizon of love (especially in Romans, where it is theologically prepared by Romans 5:10, the passage of God's love toward enemies).

In the letter of James, we can talk about extension only to a limited extent, inasmuch as the relationship between in-group and out-group cannot be determined with definite certainty.

In contrast, John's writings emphasize that, in comparison to the cosmos (the world), love cannot be limited to what is one's own (John 15:18–20). Contrary to a widespread opinion about the Johannine writings that classifies its ethic as exclusively directed at the internal life of the Christian community, there is a correspondence between the outward morality and the internal morality of the community.

Overall, expanding inclusiveness plays an important part in the New Testament writings and their immediate predecessors. This suggests that the question of an extension of the circle of addressees beyond the most immediate neighbor was considered very important and received thorough consideration. It was answered in the sense that, in the majority of the Scriptures, noncoreligionists and even enemies were regarded as proper recipients of love.

The fundamental problem of sociobiological altruism research is the extension of altruistic behavior to genetically unrelated fellow human beings. We defined as a criterion for altruism models their ability to explain altruistic behavior toward genetically unrelated individuals. This phenomenon, especially obvious with regard to human beings, of an extension of altruistic behavior beyond the most immediate neighbor and relative therefore plays an important role in the evaluation of various models that seek to explain altruistic behavior. Even the inclusion of animals among the potential objects of altruism was briefly considered in connection with the philosophical reception of altruism research by Peter Singer.

In both areas, the love command and sociobiological altruism, which up to now have been considered separately, therefore, the question of the addressee of love, the extension of the circle of addressees beyond the most immediate neighbor, and hence the awareness of expanding inclusiveness becomes important. A relationship can be established in the following way: In the Hebrew, early Jewish, and New Testament Scriptures, prosocial behavior beyond the most immediate circle of relations is called for in a

prescientific way and with the aim of establishing it as a fact, whereas sociobiological altruism research seeks the scientific causality of this factually existing behavior. Neither line of investigation stands in competition with the other, but each can complement the other from its own perspective, because each describes a different aspect of one and the same kind of behavior.

AWARENESS OF EXCESSIVE DEMAND. Here we deal with the question of the capability of human beings to meet what seems to be an excessive demand for love, or altruism.

The practicability of the commanded love is not explicitly doubted in the Hebrew Bible and early Jewish Scriptures, but the problem itself does not appear as a separate theme. Contrast this with the New Testament. In the synoptic Gospels the love command receives, in Matthew, a strongly demanding character in the context of the question of the law and higher righteousness (Matthew 5:17–20). Jewish and Gentile groups are presented as unable to fulfill the demand of love of neighbor and enemy, especially the love of enemies (5:43–48), although in the final analysis one may suspect that Matthew uses the reproach against Gentile and especially Jewish groups as a mirror for his own Christian community.

Paul considers it possible in principle for the human being directed by God's love to follow the love command. This is particularly evident in 1 Thessalonians, where Paul proceeds constructively from already-existing tendencies of conduct, and the awareness of an *excessive* demand to love seems to recede entirely. He is aware, however, that flawed attitudes are possible. This is particularly evident in the context of the discussion of "flesh" in Galatians. As demonstrated earlier, "flesh" (*sarx*) here is related to the biological inheritance of the human being. Paul draws particular attention, both formally and substantially, to the danger of *not walking in the spirit* (Galatians 5:25), as is apparent from the contrast between *works of the flesh* and *fruit of the spirit* in 5:16–26, placed between the references to agape love in 5:13–15 and 6:1f. Here the biologically determined human being and the person guided by the Holy Spirit stand in contradiction to each other.

In the letter of James the awareness of excessive demand occupies a central place. The community is characterized by a culpable lack of solidarity, which manifests itself in a communal bias in favor of the rich. James seeks to challenge this tendency in form of a letter of admonition.

The Johannine writings employ the literary figure of Peter (John 13:1–20, 36–38; 21:15–19) and the example of Cain (1 John 3:11–12) to demonstrate the difficult conduct required by the love command. The excessive character of the demand appears to be of a fundamental nature, given that Peter, one of the most important members of community, is selected as an example.

Thus, despite a generally positive attitude toward the practicability of the love command, obvious reservations become apparent, particularly in the New Testament. This suggests a differentiated understanding of the practice of the love command. The human being, too, is seen in multiple perspectives and relationships that can facilitate or impede observance of the love command.

In sociobiological-altruism research several models that try to reduce altruistic conduct solely to the genes (kin altruism, reciprocal altruism) were investigated. However, these purely biological considerations not only failed scientifically to deal adequately with the altruism problem (that is, explaining altruistic conduct toward non-kin) but also were problematic in and of themselves. This shows that, when they are viewed exclusively in biological terms, organisms, particularly human beings, are overtaxed by the demand to act altruistically beyond the circle of immediate kin. Thus we could speak of an awareness of excessive expectations.

It is especially remarkable how close this assertion from within sociobiological altruism research comes to Paul's statements in Galatians. In both cases it becomes apparent that a purely biological view of human beings is incomplete. It can neither motivate prosocial conduct in a pre-scientific context nor explain such behavior scientifically. From both perspectives, human beings have, on the basis of their biological nature, only limited scope for altruistic, loving, prosocial behavior.

THRESHOLD AWARENESS. Threshold awareness concerns the question of whether love, or altruism, constitutes a step on the way to a "new human being" and a "new world."

The Hebrew Bible and early Jewish writings reiterate that the Spirit of God in the human being is what makes the love of one's neighbor possible, and in this sense we can talk of a new human being and, hence, a *threshold awareness*.

In general, all the books of the New Testament advance this approach. They clearly show an awareness of the presence of a new human being and a new world that participate in the kingdom or the Spirit of God. Some books particularly emphasize this aspect, in relation to the two other principles of awareness.

This is primarily true of Mark, in whom the statements of the imminent kingdom of God, which has changed and will change the world, are directly connected with the love command, as shown in the passage of the Great Command of love (Mark 12:28–34). Here the love command has to be interpreted, from the perspective of Jesus' preaching of the kingdom of God, as a principle of conduct, expressed in the programmatic passage of Mark 1:14–15. The radical turn toward human beings by the eschatologically acting God must find a parallel in an equally radical turn of human beings toward each other and toward God.

Paul encourages the faithful to test their own actions in each situation against the love command. In this he appeals to their own specific insight, determined by God's agape, in which the faithful participate through the Spirit. It is through this love from internal motivations, in Paul's words as "new creation" (2 Corinthians 5:17), that is, as new human beings in the sense of *threshold awareness*, that fulfilling the love command becomes possible. This is a trait of all of the letters examined here but becomes particularly clear in 1 Thessalonians, where the sections about the problem of resurrection and the time of the second coming (4:13–18; 5:1–10) are framed by statements concerning agape love (4:9–12; 5:11–15): "new humanity" and "new world" are embedded in agape love.

James cites three closely connected arguments for overcoming partisanship and status differences: a recollection of baptism (anthropological argument), a reference to the coming judgment (eschatological argument in a cosmic context), and the grounding of all human being and action in God (theological argument). All three permit us to talk of *threshold awareness*.

The Johannine writings do not stop with showing us Peter as an example of one who faced difficulties in following the love command. Peter, even after his denial, is again called away from his fishing by the thrice-iterated question of his love for Jesus, to be restored and appointed shepherd (John 21:15–19). This indicates a fundamental change for Peter, who is transformed from fisherman to shepherd and so into a new human being with new responsibilities. In the Johannine letters love likewise crosses a threshold—from death to life—and so creates a "new" human being. In this motif of a transition from an old to a new state, one brought about by God, the *threshold awareness* finds a clear expression.

The relationship to God, who can change the world and human beings, constitutes a fundamental tenet of the New Testament, as of the Hebrew Bible and early Jewish writings. It is only through God that the human being is no longer overtaxed by the love demanded beyond the circle of most immediate neighbors.

In sociobiological altruism research, only models that include cultural aspects are able to meet the criterion of explaining altruistic behavior toward non-kin individuals. Even though such models are still in their infancy, it is clear that the step of including culture contains a *threshold awareness*. A purely biological consideration of human beings is incomplete; only by crossing the border between biological and cultural evolution can altruistic behavior toward non-kin individuals be explained.

Here a relation between the two areas can be clearly seen. In both cases one level has to be supplemented by another in order to cause or explain a certain behavior. Furthermore, religion can be seen as the part of culture that enables and fosters altruistic or loving behavior beyond the circle of most-immediate neighbors. This brings us to the first of two models for relating sociobiology and religion, or theology, to each other.

MODELS FOR THE RELATIONSHIP BETWEEN CHRISTIAN
RELIGION, OR THEOLOGY, AND SOCIOBIOLOGY

We now present and discuss two models that deal with the relationship between Christian religion, or theology, and sociobiology. To do this, we will take up two initiatives from the American discussion that are hardly known in Germany. These are the proposals of the theologians Ralph Wendell Burhoe and Philip Hefner, professors at two theological institutions in Chicago, Illinois.³ It would certainly be possible to present additional models of this relationship,⁴ but we limit ourselves to these two because they make explicit reference to the problem of altruism in sociobiology. In each case we will first present their positions with regard to altruism, then place this in the framework of their respective overall theoretical models, and finally evaluate their positions critically. In this way we hope to make these initiatives from the American scene fruitful for the dialogue in Germany.⁵

BURHOE—A FUNCTIONAL ANALYSIS OF RELIGION. Burhoe suggests the solution of the altruism problem as coadaptation between genotype and culturetype and the role of religion.

A Model of Symbiosis. Burhoe is a representative of the position that makes into a genetic rule that natural selection of competing alleles is unable to produce altruism that can go beyond the nearest kin in any species (Burhoe 1981, 162). Genes are "inherently selfish" (1981, 208) and cannot be forced into necessities other than their intrinsic ones, which ensure "survival of the genetic line" (1981, 163). It would thus appear that the question of whether altruistic behavior beyond closest kin can have a genetic basis would have to be answered no. This premature answer, however, does not do justice to Burhoe's suggested solution.⁶

Burhoe takes his departure from neo-Darwinism⁷ and biochemical evolution but adds a hypothesis about the mechanism of an independent sociocultural evolution, which is inspired by a symbiotic model.

For Burhoe symbiosis means "the mutual adaptation of different kinds (species) of creatures to provide by their mutual contributions a resulting ecosystem giving more viability to each of the component species than would be possessed by any one of them alone" (1981, 166).

Since this is the case, the apparent impossibility of a genetic foundation of social cooperation via natural selection is subverted in the same way as it is in kin selection. However, different mechanisms are at work. In kin selection a genetic advantage accrues to those genes whose phenotypes cooperate in strengthening or extending a common genetic line. The symbiosis model differs in that it involves two species, which are not engaged in intraspecific competition because they are genetically different. Moreover, intraspecific competition is excluded, because the two species belong

to different ecological niches. This opens the possibility for the genes of each of the separate species to compete within themselves to achieve better interspecific adaptation, in order to maximize their cooperative effectiveness at the level of the symbiotic community. In the ideal case a complete interdependence and cooperation of the two species is accomplished from which both derive benefits. Burhoe characterizes this adaptation as “symbiotic reciprocal cooperation”⁸ (1981, 168), which is subject to natural selection and encoded in DNA; it is thus genetically based.

Burhoe makes a crucial modification of this model. He takes up the ideas of scientists who deal with biological life under the aspect of system theories (1981, 169–72). “Living systems” are in a metastable equilibrium displaced from thermodynamic equilibrium. The instructions for this state can only partially originate in the genetic code. Living organisms likewise depend, with regard to life-sustaining behavior, on information that is not stored in chromosomes. The maintenance and development of these complex systems depends on an interaction of distinct hierarchic levels, which characterize the actual system (Burhoe 1981, 171–72, referring to Pattee 1973). Burhoe writes in this context:

Not only is the physical or organic environmental ecosystem of an organism full of “information” with which the genetic information interacts and becomes coadapted, but there is a special division of man’s environment which is structured by “culture” in the anthropological sense of the term. Human culture is so packed with the necessary information for life that the gene pool of *Homo* must have become inviable apart from it at least as far back as when we became dependent on the social transmissions of hunting-and-gathering lore and technologies. (Burhoe 1981, 172)

Cultural information is essential for life in our species—we only have to think of the many ecological niches which we could only make available by our cultural achievements.⁹

Burhoe believes that his concept transcends the altruism problem—that is, that any altruistic behavior cannot be rooted in a genetic basis if it goes beyond the promotion of inclusive fitness. His hypothesis states that there exists a new kind of living creature, independent of human beings, to which human beings must adapt themselves in a symbiotic relationship—the “sociocultural system” (Burhoe 1981, 174).¹⁰ This system is only partially programmed by the human gene pool and consists in its crucial elements of nongenetic or epigenetic cultural information, which he designates “culturetype,” in analogy to “genotype” (1981, 182, 209): “Culturetypes and their expression in sociocultural organisms are an independent ‘species’ of living substance symbiotic with populations of *Homo*—selected independently because the units of selection, while dependent upon a human population, are not dependent upon any particular human population” (Burhoe 1981, 209; this statement is further explained in Burhoe 1981, 173–85). The novel feature of this symbiotic model, which is specific to human beings, is that the sociocultural organism as one of the

symbiotic partners has cultural information as its most important and DNA-independent source. From this Burhoe concludes that “if individual apemen are bonded by the coadaptation of their genes in a symbiotic service to a sociocultural organism that is also an evolving system of living substance independent of any particular human genotypes and yet that binds its anthropoid population to serve it in exchange for reciprocal benefits provided by the species-specific behaviors selected in the coadaptation” (1981, 211), then the problem of explaining human (reciprocal) altruism disappears. This is because human behavior can then be explained within the framework of the symbiosis model as genetically generated reciprocity with an entity of an entirely different kind—the sociocultural organism.¹¹

I would like to discuss in a little more detail the sociocultural organism and the position of the human being in relation to it.

The sociocultural organism, according to Burhoe, arises from a new realm of life, different from the animal or plant realms of biology. It is a “parasite” (Burhoe 1981, 182, 221) that depends on human individuals, but the relationship is also symbiotic, as these likewise depend on it. We live within the organism, and it lives in us—in the brain as its information repository¹² (1981, 179–80). Separated from the sociocultural organism, the human individual loses its humanity and becomes a helpless hominid, nonviable in a noncultural environment. The most important element of this “organism” is the cultural information, or “culturetype,” which “shapes the specific characteristics of a sociocultural organism—its particular language, technology, rituals . . . etc.” (1981, 213; see also p. 183). It is an analogue to the genotype and, like it, is subject to a kind of natural selection but following different mechanisms that are not yet known. Burhoe compares the state of research in this area with the state of genetic research in the first half of the twentieth century (1981, 213).

Human beings are thus in their behavior simultaneously subject to two quasi-independent information systems: the genotype and the culturetype. According to the latter, it is possible for a person to risk his or her life even for cultural siblings—not just genetic ones:

Insofar as the cultural brother is an identical twin in the “value core” of his culturetype, and to the degree that under the circumstances the culturetype is operative in determining one’s behavior, to that extent one can expect motivation for such extremes of altruism as have not been seen, Wilson points out, since the first phylogenetic peak of altruism. (1981, 216)¹³

Genotype and culturetype cannot, however, determine human behavior apart from each other but have to stand in a relationship of “mutually optimal ‘symbiotic’ adaptation”¹⁴ (Burhoe 1981, 184)—a state that Alfred E. Emerson calls “dynamic homeostasis” (Emerson 1968, 129, 142). This requires a cybernetic control system—a role that according to Burhoe is occupied by religion.

*Religion as Cybernetic Mechanism.*¹⁵ Every living organism has “basic values”¹⁶ (Burhoe 1981, 217), which according to Burhoe are determined by information from the genotype. In human beings a second nature, the culturetype, is added; it also possesses basic values, which are not always identical with those of the genotype. The coadaptation is subject to a constraint. The fundamental value of the genotype—maximization of inclusive fitness—cannot be circumvented or repealed. So “the culture-typically transformed prescriptions . . . of what to do that did not immediately satisfy the genetic norms of the lower brain structures had to be ‘explained’ as somehow ultimately fulfilling the implicit goals of the genotype” (Burhoe 1981, 224). The role of statistics is important in this regard (1981, 188–89). Coadaptation between genotype and culturetype has to lead to a probability for the continuation of an individual genetic line that is at least as high as that in a primitive kin group, whose behavior is determined by genotype alone.

In order to coordinate the coadaptation of the two value systems—according to Burhoe’s hypothesis—religions emerged. Without them coadaptation would have been impossible. If it had not succeeded even with the help of religion, the culturetype—and thus its religion as one of its aspects—would be subject to negative selection. Consequently, according to Burhoe’s considerations, religions are subject to selection, and religious wisdom is a product of natural evolution.¹⁷

Let us turn to the question of why it is particularly religions that for Burhoe represent the mediating institutions. For this we must first consider investigations that deal with the function and structure of the brain (Burhoe 1981, 157–61).

According to the analysis of Hudson Hoagland, the brain, shaped in the course of biological evolution, is primarily an instrument that serves the survival of its owner (Hoagland 1966, 140–57, especially 152–57). Its primary function is the synthesis of sensory impressions into meaningful configurations so that the organism can respond effectively. In addition, the neocortex takes charge of rationalizing drives and desires that originate in the older parts of the brain, which have remained unchanged over the last 50 million years. Religious belief likewise is the product of the brain: it is a survival mechanism, which attempts to extract sense from the universe.

The brain is structured by a dual process: from the inside out by the genetic code and from the outside in by all the information received from the environment. George Edgin Pugh (1976, 2–24) distinguishes between “primary” and “secondary” values, which are coordinated in the brain as the central unit in our decision system.

Of particular importance is the work of Paul D. MacLean (1973, 113–27; see also Oeser 1987, 79–82. I can only briefly summarize the most important points here). According to MacLean the brain consists of three layers, which originated in different periods of evolution and which stand in mutual relationship.

The “reptile brain” is the oldest part. It is the basis for fundamental mechanisms of automatic or instinctive behavior (in order to ensure survival), and of ritual, preverbal communication. The next layer is the “older mammalian brain.” Its function is the acquisition and processing of external and internal informations. These become accessible to subjective experience as emotions. The third layer, the “younger mammalian brain,” or neocortex, “initially had the function of increasing the flexibility of behavior by processing and storing information from the outside world” (Oeser 1987, 81). Its most highly developed form is found in human beings. The three layers are interactively connected by “dual-direction cybernetic feedbacks” (Burhoe 1986, 453).

In Burhoe’s theory the neocortex is the place where the demands of the genotype and the culturetype are interwoven into a coherent assertion; the genetic requisites of this originate mostly in the reptilian brain (Burhoe 1981, 160–61; 1986, 452–53). Only as a consequence of the evolution of the neocortex can social cooperation with non-kin organisms of the same species arise.

Now we have the prerequisite knowledge to explain the mediating function of religion, as envisaged by Burhoe.

Burhoe recognizes four stages of religious evolution: (1) ritual, (2) myth, (3) theology, and (4) “scientific theology” (1975, 319). Here I can only discuss the significance of ritual. Myth is discussed in Burhoe 1981, 224–27, theology in Burhoe 1975, 319–21. On the fourth stage see the following section. All four are connected insofar as the later stages build upon the earlier ones (1986, 451). The crucial point in Burhoe’s argumentation is that religious ritual is established at the level of the reptile brain, and therefore of all the elements of culture it has the closest affinity to a segment that is largely determined genetically¹⁸ (1986, 452, 454): “The power of religion to motivate behavior comes from its contact with the basic motivational mechanisms of our earliest and most basic or genetic nature” (1981, 190).

It is through this original connection that religion is, even in its other expressions, always the part of culture that mediates between cultural and genetic necessities. Only through religion can altruistic behavior beyond nearest kin—that is to say, “trans-kin altruism”—arise. It is the most essential component of the sociocultural organism. Inasmuch as a mediation and coadaptation between the fundamental values of genotype and culturetype are permanently necessary for keeping a society intact (and only in such a society can human beings survive), therefore

religions or some functionally equivalent cultural agencies [are] . . . essential for any civilization at any stage, including ours, since, beginning with their genetically based rituals and on through myths and theologies, they are the cultural source of coadapted basic values which motivate that genetically selfish ape-man to serve his symbiotic sociocultural organism”¹⁹ (Burhoe 1981, 227).

Three points, which are significant for the following section, need to be stated:

1. *Homo sapiens sapiens* is always also *Homo sapiens religiosus* (Burhoe 1975, 344, 356; 1976, 20).
2. Religions that have so far fulfilled their function as mediating institutions are repositories of essential knowledge for human beings (see also Campbell 1975, 1103).
3. Even in our own age there has to be a form of religion that fulfills its mediating function, in order to keep our society alive.

CONSEQUENCES FOR RELIGION IN AN AGE OF SCIENCE—BURHOE'S PROGRAM OF A "SCIENTIFIC THEOLOGY." Having so far presented the function of religion in the emergence of trans-kin altruism, we can now turn to the derivation and explication of Burhoe's program of a "scientific theology."

The Current Crisis of Religion, and the Necessity for "Scientific Theology." The explosive development of science since the sixteenth century has led to a loss of importance of religious traditions on a cognitive-intellectual level.²⁰ Burhoe derives this loss of credibility from the inability to find adequate interpretations of the hidden wisdom of old religious traditions in the light of new cognitive patterns. In spite of a growing desire for religion and an intensifying crisis of values, which manifests itself most prominently in an instability and lack of orientation in society—primarily because of modern, science-based technology—traditional religions have lost their vigor. At a rational level the integrating capacity of religion, which would be important for the functioning of society under the conditions of a scientific worldview, has diminished:

Religion, continuing to be explained in the vocabulary and thought forms of Hellenistic and medieval Christianity, seems to be increasingly incredible in an ever more secular world, and it has left the growing and scientifically enlightened secular world with inadequate meaning, hope, morals, and morale as foundation stones for personal, national, or international living" (Burhoe 1986, 459; see also Burhoe 1981, 221–22).

In order to counter this situation's endangering "spaceship Earth" (Burhoe 1975, 324), Burhoe believes that a more effective form of religion is needed than that represented by Christian theology (1975, 319–21).²¹ This new religion has to interpret the inheritance of the older religions in light of contemporary science, in order to permit the integration of diverse cultures—the "human-value culture" and the "scientific-technology culture" (1975, 327)—at the intellectual level. Their existing separation is crucially responsible for the value crisis, and it is at the intellectual level that the loss of credibility is most serious (1975, 333). Consequently intellectuals and scientists are the primary addressees of his considerations.²² To

Burhoe the natural sciences, with their wealth of information about human nature and the world, represent the best hope for overcoming the value crisis. They are the “new revelations” about humanity and the world, which transcend all previous revelations.²³ A merging of religious and scientific “beliefs” is necessary²⁴ (Burhoe 1981, 221) in order to permit a successful symbiosis of genotype and culturetype—situated in the new sociocultural ecological niche, which has been provided by modern science and technology and in which the traditional formulations of religious faith are no longer adequate to their task as that basis of orientation and mediating institution. Only if this symbiosis succeeds can a “salvation” of humanity be reached, which neither science nor religion by itself can accomplish (1975, 357, 366; 1986, 464):

I prophesy human salvation through a reformation and revitalization of religion at a level superior to any reformation in earlier histories. . . . the religious reformation now will be a theological adaptation of traditional religious beliefs . . . to the modern sciences. The new religious and theological language will be as high above that of five centuries ago as . . . contemporary medicine, agriculture . . . are above those of the fifteenth century. (Burhoe 1975, 328)

This is a task set before a “scientific theology,” the fourth stage of the evolution of religion,²⁵ which intends “new translations or interpretations of religious wisdom in the light of scientific concepts and the revitalization of that wisdom for an age of science” (Burhoe 1981, 221–22). In other words, Burhoe is concerned with the search for “functionally equivalent” concepts from the natural sciences in order to revitalize religious insights.²⁶

The “scientific theology” is a religion of particular importance in a time of the emergence of a “one-world village” (Burhoe 1975, 328; 1981, 120–22; 1986, 461–63), which Burhoe sees anticipated in communication and the areas of economics and medicine. According to him only scientific theology is capable of providing orientation for the survival of this global society. It is thus necessary to gather the global population into a single “inside group,” a “universal spiritual kinship” (1986, 461). This can be accomplished if the particular religions understand themselves as local formations of an overarching “scientific theology” and if the latter likewise adapts itself to local culture.²⁷ In this regard it resembles medicine and agriculture, which can adapt themselves to local circumstances without losing their universality. And Burhoe establishes one further connection. The application of scientific conceptualizations to religious questions and problems afford theology—in analogy to medicine—the status of an “applied science” (1981, 37), although in the case of theology the boundaries of the field are delineated by its own specific questions and not determined by science.

How this program of a “scientific theology” can be filled with content is presented in the next section with the introduction of Burhoe’s hermeneutical approach to two of its most important aspects.

Burhoe's Hermeneutical Approach—God and Soul. After Christian religion had lost its vigor in the Western world, newer quasi-religions were, according to Burhoe, nonetheless unsuccessful in taking its place.²⁸ Burhoe attributes this to the fact that they have excluded two important religious elements from their conceptions.

The first element is the existence of a reality or force that is autonomous, over against the individual human being and the collective—the system of an evolving reality that has created humanity and everything else on which human beings are completely dependent and to which they have to adapt themselves if they are to survive.

The second element is the belief in a core of human nature that transcends the death of the body.

In Burhoe's opinion, Christian religion contains these two elements in the concepts of *God* and *soul*. Burhoe takes up these two concepts for the following reasons:

When human beings attempt to control their own fate, they lose themselves in the morass of human failures. Death—individual as well as that of the universe²⁹—seems the final, pointless goal. Although the natural sciences can dispense with the belief in an outside god, it appears that human societies are unable to survive without this belief (see also Wallace 1966, 60–81, especially 76–81). Thus a new god-concept is necessary.³⁰

Besides, in order to function, a society requires “long-range values” (Burhoe 1981, 118) that transcend those of the single individual.³¹ The genetic program by itself does not possess the vitalizing capacity that is necessary for a highly complex human society with technological capabilities at its disposal. The human soul appears to Burhoe to be lost also because the integration of private and social goals, necessary for a functioning society, is unsuccessful. For this reason a new soul-concept is required.

Burhoe wants to show “how belief in a reality sovereign over man (a *god*) and belief in the essential immortality of man's basic nature (a *soul*) . . . are . . . credible on the very grounds of science, which confirms insights common to the higher religious traditions of the world” (1981, 119). Besides, he wants to counteract the trend toward ethicization and moralization of religion—to him an indication of the loss of these two concepts (1981, 80–81). Burhoe's point of departure is the religious concept, to which he relates a scientific one. My own methodology matches this approach: first, I will comment on the respective traditional religious conception from Burhoe's viewpoint; and second, I will present his scientific interpretation or translation.

Burhoe's religious God-concept contains mostly attributes that he takes from the Judaeo-Christian tradition³² (1981, 124). Because of this limitation he cannot claim to give a comprehensive description of God. In this framework, God is the symbol for the “ultimate and true reality which created man, shaped and shapes his destiny, and provides meaning . . . and

direction for human life" (1975, 330). God is one, concealed and revealed, and is merciful to the human being (Burhoe 1981, 125 adds further attributes)—as a "system of forces . . . whose rules man must accept if he is to have life" (1981, 89).

A scientific concept that in his opinion has similar attributes is that of *nature* or *natural selection*—concepts isomorphic or functionally equivalent with God (Burhoe 1975, 361). He also talks about the "Lord of History" (1975, 361). Here the concept of nature stands for God's material aspect, while natural selection stands for the operational aspect. This is the same distinction also made by David R. Breed (1988, 334).

Burhoe understands nature as the "system of laws, according to which events in the . . . evolution of the underlying reality system proceed in time, which, together with . . . the 'hidden relations' of the reality system, explain . . . the varied . . . evolution of the universe and the living systems (including human minds and societies) in it" (Burhoe 1975, 361, and especially 1977, 381–83). It is important that he does not confine nature to visible and sensible phenomena but includes the "network of invisible forces and entities" (1975, 373 n. 79)—his understanding of contemporary physics incorporates the metaphysics of earlier times.³³

The operational aspect, natural selection, is the principle that underlies all processes in the universe—it applies to all levels of reality.³⁴ Human beings are subject to selection in a biological respect as well as a cultural one—they are fully dependent on the laws of nature.

Thus, the scientific and the traditional theological pictures of reality, and in particular of human beings, agree insofar as

man is neither the designer nor the determiner of the ultimate destiny of either himself or the cosmos. . . . Our life and destiny may be scientifically as well as religiously hypothesized to be fully determined by the only partially understood operations . . . of that vast, omnipotent system of the *nature* that created us, shaped our societies, and even shapes what we are thinking and feeling and willing at this moment. (Burhoe 1975, 360)

Burhoe adds, however, that the natural sciences, even though they cannot be limited with respect to the phenomena of our existence, can never provide "ultimate" explanations.

Human beings have to adapt to the necessities of nature in order to survive. Here, too, religion plays a crucial role. It not only mediates between the requirements of the genotype and the culturetype, but it also enables this symbiotic community to adapt to the entire ecosystem—the "cosmotype" as Burhoe calls it³⁵ (1981, 139; 1981, 192; 1975, 364, 375 n. 100). Only if this additional adaptation succeeds is the symbiosis of socio-cultural organism and human beings able to survive.

This deterministic picture is confronted by an affirmation of human freedom. Burhoe's basic idea is that selection as a nonrandom or deterministic process acts on variations that are individually considered ran-

dom—in the case of human beings, this means that their maximum freedom means “to find better interpretations of the phenomena we experience and their requirements for life” (Burhoe 1986, 466). Human beings themselves are a hypothesis on the altar of nature. Burhoe (1975, 333–46) presents the relationship in detail, which cannot be included here. Some of the problems, however, need to be sketched at this point. Burhoe says that when the good is selected, the bad disappears (1981, 103–5; 1975, 363). His view of selection is linked to his conviction that one can draw conclusions about objective values on the basis of scientific research, a position that is eminently open to criticism—as “naturalistic fallacy.” Hefner (1980, 58–78) investigates this problem and concludes that “the substance of scientific discovery . . . is also a resource for discovering values and *oughts*” (1980, 74). He rejects the reproach of a naturalistic fallacy (see also Hefner 1984, 185–207, especially 202–5, and Mortensen 1995, 185). According to J. E. Haugen (1995, 570), Burhoe achieves an ultimately inadequate resolution of the problem of evil, one that is intellectual and not existential.

Is Burhoe’s *God* a personal God? In order to determine this, it would first have to be clarified what is meant by “personal.” Here I merely point to the problem. Burhoe attributes the loss of credibility of the Christian religion in part to the use of the first person for the Creator. This is too anthropocentric and leads to an inability to appreciate the sacredness of the world³⁶ (Burhoe 1975, 365).

The religious concept of soul³⁷ Burhoe understands as an invisible something that animates human beings and is the source of their will and their reason. It is the true self of a person, different from the body—the extant phenotype—whose death it transcends.³⁸ It is the focus of human hopes.

From a scientific viewpoint Burhoe develops a triadic concept of the human soul, whose elements are the genotype, the culturetype, and the cosmotype in their mutual interdependence. They are independent of the death of the particular individual and do not perish with it. In conjunction with their interaction, they form a “permanent flow pattern” (Burhoe 1981, 140, 150 n. 28), which manifests itself in an unending sequence of newly evolving life forms. To him this accomplishes the goal “to express in the clearest, most rational possible scientific idiom the reality of a concept of *soul*” (1981, 142).

Let us take one more step and consider what further reflections develop.

The evolutionary process will continue; new coadaptations among the genotype, the culturetype, and the cosmotype will be required for the future survival of the human species. If religion continues in “God’s service as agent to maintain and to reform the information system on what is essential or ultimately necessary for life” (Burhoe 1975, 366) and succeeds in mediation, this means for Burhoe the “salvation” of humanity (1975, 366 and *passim*) at each new level of evolution—of a humanity that has

become a “co-creator”³⁹ with God. This salvation is the central goal to which he aspires with his program of a “scientific theology.”⁴⁰ Living in the kingdom of God is in his opinion possible here and now (Burhoe 1975, 348–49; 1976, 24), and religion may be called “as it was in the past, the *queen of the sciences*” (Burhoe 1981, 34; emphasis in original).

CRITICAL DISCUSSION. In this section we will focus on what are in my opinion the most important and most interesting aspects of Burhoe’s thought. This is meant as an attempt to develop Burhoe’s proposal further in a constructive and critical, albeit fragmentary and provisional, way. This should open up a possibility for the reader to add his or her own reflections.

In the first part I focus on points concerning Burhoe’s solution to the altruism problem. Following that, some aspects of his program of a “scientific theology” will be discussed.

On Burhoe’s Solution to the Altruism Problem. It is crucial to Burhoe that the human being has not only a biological but also a cultural nature. The requirements of these two natures must adapt to each other. Religion is the mediating institution. What remains problematic is how the relationship between biological and cultural evolution is to be determined—that is, to what extent there is an analogy. Burhoe himself relies on comparability but explains that there are differences. Cultural evolution proceeds far more rapidly than biological evolution, because unlike the latter it is not tied to a gene pool. Segments of culture can undergo decisive change within a single generation, something that is impossible for biological evolution (Burhoe 1975, 314; 1981, 91–95). Its advantage is that we can “let our hypotheses die in place of ourselves” (Popper 1972, 258), because biological evolution originally takes place in the brain and only in a secondary step becomes manifest in outside “products.” It is thus subject to a dual selection process: an internal selection in the brain and an external selection in the forum of the outside world, in which the new cultural unit of information has to prove itself (Burhoe 1981, 94–95). The mechanisms of selection are not identical. The cultural unit of information is subject only to “a kind of natural selection” (Burhoe 1981, 214). Burhoe does not expand on this, however, but leaves further clarification open.

For Gerd Theissen, culture advances precisely not by selection but by a mitigation of selection (Theissen 1985, 67–72). His thesis is that “if culture is in general a process mitigating selection, the religion is the heart of human culture” (1985, 71). This is because religion devotes itself to the “*disadvantaged* variants of human life” (1985, 71). With this Theissen makes an important statement about Western Christian culture in its ideal form. It is necessary, however, to make a distinction between two different levels: a general and a substantive level. Culture, or the units of cultural information—and so Christian religion as part of culture—are subject in a

general sense to a kind of selection: they have to prove themselves viable in their adaptation to a “central’ reality” (Theissen 1985, 43). In contrast, “mitigation of selection” is a category that qualifies the content of a selected culture, which does not repeal the principle of selection in its applicability to cultural evolution. In other words, at the general level of cultural evolution those cultures are selected whose content “(as a rule) aims to foster life even where nature would drastically reduce its chances” (Theissen 1985, 67).

The question of the relationship between biological and cultural evolution and their potential analogy is not thereby answered. Further help can come from recent works in the area of evolutionary epistemology. Gerhard Vollmer (1987, 140–55) distinguishes two disciplines within the field labeled evolutionary epistemology—an “evolutionary epistemology” in a narrow sense, and an “evolutionary theory of science.”⁴¹ This is interesting for two reasons. First, the sciences are part of culture. As Vollmer talks about their evolution, we become acquainted with part of cultural evolution. Second, sciences play an important part for Burhoe. They are the new (vehicles of) revelation about God.

Vollmer recognizes common features but also crucial differences in the two kinds of evolution (Vollmer 1987, 142 tab. 1; 145–46 tab. 3). As an example for the latter, I want to point out that he regards evolutionary behavior according to evolutionary epistemology as Darwinian in a strict sense but behavior according to evolutionary theory of science as non-Darwinian, with only a metaphorical relationship to biological evolution. This differentiated view of the two kinds of evolution could contribute to a better understanding of Burhoe’s views or lead beyond them. I see this as a rewarding project, which can be sketched here only in outline.⁴²

On “Scientific Theology.” Burhoe’s translation of religious concepts that he considers important into a scientific language is provocative—for theology and for science. He attempts to make a connection between the language games of two subsystems of a society differentiated within itself in multiple ways in order to overcome a crisis of human values and orientation, which itself stems from this differentiation. We will first address the question of the relationship in which the two language games stand to each other.

Burhoe does not simply equate religious and scientific language or replace one by the other. His method is more differentiated. The point of departure is religion, which is the carrier of essential knowledge about human beings but has lost credibility and communicability.⁴³ The concepts he considers important he presents within this (religious) framework. Subsequently he considers scientific concepts that he believes can be related to the theological concepts. He tries to bring out functional equivalences to revive traditional religious wisdom. In this the concepts are not raised out of their specific relational context. This process takes place at a highly

abstract level. His theology is “scientific” in the sense that it rests on an empirical basis, being mediated by scientific concepts that have proven useful. Nevertheless, theological concepts do not thereby depend on scientific ones in the sense that with the emergence of new theories both theological concepts and old theories would vanish together as irrelevant. New theories can again be examined to determine whether they aid the revitalization of traditional religious knowledge.⁴⁴

As a point of criticism, it should be noted that Burhoe ought to have reflected more thoroughly on the conditions and consequences of his bridge building between different language games.⁴⁵ He himself uses the term “equivalent” to illustrate his understanding of the relationship between the various concepts of science and theology (Burhoe 1977, 350). He also talks about “logical isomorphism” (1975, 361).

The most fully developed concept of the term “equivalence” is attributable to Niklas Luhmann (1977). To be sure, Burhoe cannot be held to this concept, for he does not know Luhmann. However, Luhmann’s approach will be briefly presented in order to draw attention to differences and similarities between him and Burhoe. This affords a further clarification of Burhoe’s position.

According to Luhmann, we live in a functionally differentiated society. Each part of society owns a separate functional primacy, its own “special function into which a functional system differentiates itself” (Luhmann 1977, 52) and which has to be fulfilled in order to keep society viable. From the viewpoint of society no individual function can claim priority. The function of religion according to Luhmann is the transformation of indeterminacy into definiteness,⁴⁶ which is especially important in rites of passage. In general no functional equivalences exist for this function outside religion. When society changes, religion, like any other subsystem, has to adapt to the new situation and continue to fulfill its function. This requires substitution of concepts within a subsystem. Burhoe’s proposal of a “scientific theology” can be seen as such a substitution within the religious subsystem, but Luhmann would reject Burhoe’s idea that scientific and theological concepts are equivalent. Were it so, one concept could be replaced by the other without loss. Applied to Burhoe, this means that a theological concept could be replaced by a scientific one without its being able to create a “scientific theology.” According to Luhmann, however, the natural sciences cannot fulfill the function of religion. This discussion shows that Burhoe uses the term “equivalent” in a different way than Luhmann does. Whereas Luhmann stresses the differences between different concepts, which at most can replace each other (provided they are equivalent), Burhoe wants to use this concept to point out the possibility of a combination of concepts from different areas (religion and science). This indicates that Burhoe’s method is the most crucial problem in his proposal.

However, it is not sufficient to argue that Burhoe can be criticized for “not paying enough attention to the structure of the bridge” (Breed 1992, 93) between theology and science. This does not take us beyond Burhoe. Perhaps evolutionary epistemology may help us along here for another step. Ulrich Lüke (1990), who discusses the relationship between evolutionary epistemology and theology extensively, voices the opinion that both science and theology deal with problems that greatly exceed our cognitive abilities, since the latter are adapted to the “mesocosmos” (Vollmer 1987, 161). In order to deal with scientific and theological phenomena, they have to be transposed into the mesocosmos. From this Vollmer infers a structural correspondence between science and theology: in parallel ways both have to deal with a relative unimaginability⁴⁷ on the conceptual level, which must be converted into partial imaginability if they are to be communicable (Lüke 1990, 174). Unlike Burhoe, however, Lüke does not claim any ontological correspondence between scientific and theological concepts. Here Burhoe’s roots in positivism and his high esteem for scientific language play an important role, when he identifies God and nature ontologically. Structural correspondence is thus a prerequisite for Burhoe’s method but not a sufficient explanation.⁴⁸

Let us turn to Burhoe’s epistemological position. To him “science says [is] the synonym for ‘truth’” (Burhoe 1975, 353) and elsewhere: “what sciences say is our best avenue to new truth” (Burhoe 1977, 370). The sciences are the new carriers of revelation about human nature and the world. He uses their insights—especially those of evolutionary theory—as a Rosetta stone of theology.⁴⁹ I would like to draw attention to several problems. First, even granting the presupposition that the genesis of religions as part of cultural evolution can be completely described in scientific categories, it cannot be expected that the totality of religious details can be expressed in scientific language. Although theology and the sciences aim to describe the same world, they do so from different perspectives and under different boundary conditions. If they were congruent, one of them would be dispensable. For Burhoe, however, that is not the case. Furthermore, scientific insight is dependent on the capability of our cognitive faculties (or artificial extensions of them, for example, in the form of analytical machines). This capability is—as evolutionary epistemology emphasizes (Riedl 1988)—a product of evolution.⁵⁰ Although it is legitimate to conclude from this “that there is a real world, that it has certain structures, and that these structures are partially knowable” (Riedl 1988, 37), we cannot infer from this position of “hypothetical realism” that the real world is completely describable by science. It is impossible *de facto*, because our cognitive apparatus is itself part of nature. This realization relativizes the insights of science—they are true only in a limited sense. Burhoe’s proposal would gain in conceptual depth if he paid closer attention to the limitations of science.⁵¹ Furthermore, the ambiguity of scientific-technological progress

must be pointed out. Scientific advances and the ensuing technological progress have certainly improved life in many respects, but they also have led to serious ecological problems such as environmental pollution and storage or reprocessing of nuclear materials for nuclear plants, not to mention all kinds of nuclear weapons, which are sufficient to destroy the earth several times over. This ambiguity is now entering ever more insistently the awareness of large parts of the populace. A more critical stance relative to the natural sciences would certainly increase the credibility of Burhoe's proposal. It would be necessary to understand the technological concept of rationality as part of a more comprehensive ontological concept of rationality—anything else is a distortion.⁵² Here I see a fertile area for future considerations with respect to Burhoe's proposal. The model to be avoided here is a hierarchical one, whether with science or theology on top. Burhoe's considerations could be pioneering in this regard, given that he avoids one-sided overemphasis. By perceiving in the sciences the new revelations of truth, he wants to restore theology as the queen of disciplines. Thus, both extreme models are being integrated.

A further aspect should be mentioned. It concerns the role of Judaeo-Christian religion and Western culture in Burhoe's thought.

Burhoe refers explicitly throughout to Judaeo-Christian tradition.⁵³ This he views abstractly and not always with as much differentiation as one would wish.⁵⁴ Other world religions play only a minor role.

The reasons for this are manifold. It surely has to be considered that he aims with his "scientific theology" at overcoming a crisis that primarily exists within, and has been caused by, a Western culture marked by Christianity. This requires a particular consideration of Judaeo-Christian tradition. But these are only boundary conditions. Burhoe's restriction (to Judaeo-Christian religion) has more fundamental reasons as well. Christian religion and Western culture as a whole have a special place for him. This becomes explicit with regard to Christian religion in his discussion of the third stage of religious evolution, theology. Here he refers exclusively to Christian theology, which he regards as a significant step toward the realization of his "scientific theology" (Burhoe 1975, 318–24). This was "a high step toward converting primitive or 'mythical' explanations of religious ritual into the sophisticated, rational, scholastic, or theological 'myths' of Greek philosophy" (1975, 321). A rationalization of religious myths had become necessary, because they had lost their effectiveness with the ascent of Greek philosophy. What Christian theology accomplished, then, is to Burhoe paradigmatic for dealing with the actual crisis now.

The dominance of Western culture becomes apparent when he writes that "the various cultures of the world are buying or adopting the scientific-technological culture of the West because of its advantages to them compared with their previous cultural tradition" (Burhoe 1981, 102).

Moreover, the translation of religious into scientific concepts that he

achieves is only possible if he regards his “physicalistic, scientific conceptual system” as “the crowning epistemological tool achieved *in the West* for providing coherent and ‘objective’ views or ‘truth’ in theology as well as in the sciences in general”⁵⁵ (Burhoe 1981, 212; emphasis added).

The inclusion of other religions and cultures is indeed provided, but this proposal does not achieve its realization. Indeed, given the close ties of Burhoe’s proposal to Judaeo-Christian religion and culture, it is questionable whether including other religions and cultures would even be capable of achieving the translation of religious concepts into scientific ones. If one considers religions, and cultures in general, products that have emerged as adaptive to a “central reality” (Theissen 1985, 43) through a trial-and-error process, the diversity of cultures and religions (which stand in a relationship of exchange with each other that contributes to mutual fertilization) would be an important aspect to amplify Burhoe’s proposal in a fruitful way. His sketch of a fourth stage of religious evolution either would then be embedded within more comprehensive considerations or would take on a different shape. This is a question of one’s perspective toward him.

Let us finally consider Burhoe’s proposal in its totality. Although Burhoe rejects being included in metaphysics (Burhoe 1977), Hefner could demonstrate convincingly that Burhoe’s proposal constitutes a metaphysical enterprise (Hefner 1977; see also Barbour 1990, 199–200). It has all the characteristics that it is supposed to have according to the definition of metaphysics by W. H. Walsh⁵⁶: it is a vision of the world in its entirety that is articulated in a theory and supportable by facts. From this perspective Burhoe interprets religious “truths,” not within a scientific but within a metaphysical representation of reality. Within this metaphysical framework Burhoe’s theory of altruism can be understood as a kind of applied “scientific theology.”⁵⁷ It is the attempt to supply credibility for his proposal by sorting out the scientific puzzle and even rendering it more complete by incorporating religion as part of culture. With that he achieves an important complementary contribution to scientific attempts to explain the altruism phenomenon. If his altruism theory, in which religion plays an important part, can make a serious contribution to the scientific investigation of the problem of explaining trans-kin altruism, such a theory reinforces the credibility of his vision. This points to the central place and significance of the altruism theory within Burhoe’s overall proposal.

Thus we have finally come back to the beginning of our presentation of Burhoe’s theory, which can be seen as an indication of its coherence.

PHILIP HEFNER: EVOLUTION AS *CREATIO CONTINUA*. Hefner respects the argument of those theologians, ethicists, or philosophers who are convinced that altruism from a sociobiological perspective and the Christian love command ought not be mingled. Nonetheless, Hefner’s reasoning presents as valid a view:

From the first moment that I read Wilson, I felt that a religious tradition that centers on a man dying on a cross for the benefit of the whole world could not responsibly ignore a scientific discussion about the emergence within the evolutionary process of the possibility of living viably so as to put the welfare of others so high on the agenda that one creature would put its own welfare in jeopardy for the sake of others. (Hefner 1993, 191; see also Hefner 1984, 197–98)

As also worked out in the present investigation, Hefner sees that the greatest problem is explaining altruism toward genetically unrelated persons, trans-kin altruism (Hefner 1993, 196), inasmuch as such altruism cannot be explained on a purely scientific basis⁵⁸ (Hefner 1993, 199). Following Burhoe, he considers the myths and rituals of religion carriers of the cultural program for trans-kin altruism.⁵⁹ These represent important information for an intentional and fruitful life of *Homo sapiens*. Hefner is here aware that this interpretation of myths and rituals is very speculative (Hefner 1993, 201). His most important major thesis is as follows:

1. “The concepts of altruism as articulated by the evolutionary biocultural sciences and the love command of the Hebrew-Christian tradition focus upon the same phenomenon: beneficent human behavior toward others, even those who are not genetic kin” (Hefner 1993, 197).

Three theses elaborate the first:

2. “The evolutionary biocultural sciences approach this beneficent behavior from the perspective of its placement in the natural history of life.”
3. “The study of myth and ritual approaches the same phenomenon from the perspective of the functioning of human culture.”
4. “Christian theology interprets this behavior as expression of basic cosmological and ontological principles” (Hefner 1993, 197).

Since in his opinion it is the same phenomenon of behavior that is described by sociobiological statements about altruism and demanded by the Judaeo-Christian love command, developing a relationship is necessary if Christian theology is not to lose its claim to a relevant interpretation of its content. This is a necessary presupposition of his central demand that “the theological elaboration of agape should not shy away from identifying it with altruism” (Hefner 1993, 208). But only by the following considerations is this provocative demand of an identification of agape and altruism sufficiently justified. In his opinion sociobiological models of altruism put excessively one-sided emphasis on the benefit for the altruist, and thus remove altruism from “altruism.”⁶⁰ They see in altruism merely “a self-seeking strategy for attaining other goods . . . the Christian love command can be identified with the behavior associated with the biocultural evolutionary concept of altruism, but the meaning and status of altruism are not

exhausted by those scientific concepts” (Hefner 1993, 208–9). So Hefner is concerned with considering the phenomenon of altruism in a way that is not reductionist but takes all aspects into account in its description. For Hefner this task of embedding sociobiological theories of altruism in a more comprehensive understanding of the altruism phenomenon belongs to the integrative tasks of theology and can only be accomplished by such an identification of agape with altruism. A subthesis elaborates this succinctly:

The significance of the theological concepts of altruistic love, elaborated from the myths and rituals and also by the scientific understandings, is this: Theology suggests that theories of epigenetic rules or strategies of self-interest are not enough to complete our understanding of altruistic love; we require also ways of discussing the hypothesis that altruism is an intrinsic value, rooted in the fundamental character of reality. (Hefner 1993, 209)

Especially this last sentence needs elaboration. Hefner sees the basis of agape in God, “that is, in the way things really are” (Hefner 1993, 207).⁶¹ Given this foundation of love in ultimate reality, altruistic love attains an intrinsic, ontic character. Love is “written into the fundamental nature of human reality” (1993, 208). It thus becomes apparent that altruistic love does not ultimately spring from the family or other human relations, as theories of kin selection or reciprocal altruism presuppose.

In the following section these considerations of the altruism problem will be placed in relation to Hefner’s theological program as a whole.

SCIENTIFIC INSIGHTS AND A THEOLOGICAL ANTHROPOLOGY—HEFNER’S PROGRAM OF THE HUMAN BEING AS “CREATED CO-CREATOR.” Hefner’s theological proposal rests on the presupposition that “large frameworks of meaning, like those proposed by religion and metaphysics, are unavoidable and required if the human quest for meaning is to be fulfilled. At the same time, those frameworks are useless and empty if they are not brought into conjunction in a credible manner with the concrete data of our scientific and social experience” (Hefner 1993, 8). Therefore natural sciences take a prominent place with him for doing theology (p. 14). His theological anthropology is illuminated by the natural sciences, in that the latter are in his view an attempt “to determine how things really are” (p. 101). His considerations aim at creating an interpretive framework that permits a comprehensive orientation for human living. On this basis we can conclude that he belongs to constructive theology but is in his own words distinguished from its most important representative, Gordon Kaufman, inasmuch as Kaufman takes his departure from a reconstruction of a concept of God, whereas Hefner is centrally concerned with the significance of myth and ritual.⁶² His main interest consists in presenting a proposal for a theological program, which is interesting and fruitful for further consideration. The “overarching purpose” of his theological construction is intended “to provide resources from the Christian tradition for

revitalizing the myth-ritual-praxis constellation” (1993, 224). He eschews a complete system.

In principle Hefner follows the epistemological scheme of Imre Lakatos, which he transforms by transferring it to religion.⁶³ Lakatos talks about so-called research programs, whose purpose it is to produce ideas whose suggestions can be tested for their fertility. He distinguishes between the hard core of this program and its auxiliary hypotheses. The central core of such a research program consists in an underlying idea, which is surrounded by a ring of supporting hypotheses that can be verified or falsified.⁶⁴ The central core itself is protected by them from direct verification or falsification. Only when the supporting hypotheses can be refuted can the core statement fall as well. If this does not happen, the research program makes a fruitful contribution to opening up constructive insights and new knowledge. In this way it is always oriented toward the future (Lakatos 1978; Hefner 1993, chap. 2).

Hefner bases his theological proposal on this model. The description of the human being as “created co-creator” forms the center, which is surrounded by nine hypotheses upon which Hefner elaborates.⁶⁵ We will focus our particular attention on the designation “created co-creator” in order to gain central access to Hefner’s proposal, and connect this with his considerations of the altruism problem.

The adjective “created” (Hefner 1993, 36) corresponds to the genetic and cultural facts that condition human beings and the ecosystem in which they live. Ultimately it refers to the creative act of God, which from its beginning enables all life to exist. The human being is understood as part of, and related to, the whole creation. The noun “co-creator” (Hefner 1993, 38–39) corresponds to the freedom of human beings for their own decisions, by which they can participate in the intentional fulfillment of God’s will (Hefner 1993, 32). Thus an eschatological (-teleonomical) perspective comes into play, which raises the question of which direction humanity and the evolutionary process as a whole are evolving (Hefner 1993, 43). The basis is a model of freedom of choice (1993, 98), since as a result of being created humans are not totally free. This points to a close connection rather than an opposition between determinism and human freedom (Peters 1994, 305; see also the section “On ‘Created Co-Creator’” below). It does not assert conformity with God the Creator, but it does claim a special quality of the human being as image of God (*imago dei*) in relation to the rest of creation. In human beings the symbiosis between genes and culture reaches (provisional) completion,⁶⁶ so Hefner can speak of *Homo sapiens* as “a proposal for the future of the planet” (Hefner 1993, 50). Human beings have the purpose of representing the entire creation:

Human beings are God’s created co-creators whose purpose is to be the agency, acting in freedom, to birth the future that is most wholesome for the nature that has birthed us—the nature that is not only our own genetic heritage, but also the

entire human community and the evolutionary and ecological reality in which and to which we belong. Exercising this agency is said to be God's will for humans. (Hefner 1993, 27)

The intrinsic character of altruistic love indicates that human beings were created with altruistic love. It is part of their basic equipment as the image of God (*imago dei*), which they have received through God's creative act.⁶⁷ For this reason Hefner sees in sociobiological altruism research an "archaeological expedition for the purpose of illuminating what biological (including genetic) building blocks make up the infrastructure of this biological *Homo sapiens*" (Hefner 1994, 72). In other words, "God is telling us something about who we are when new insights are gained into the structures which the past has bequeathed to us" (Hefner 1984, 204). Sociobiology is an exploration of the past of human beings—that is, their biological origins. Interpreted theologically this means that a theory based on evolutionary doctrine here recapitulates divine creation. Evolution can be understood as part of *creatio continua*, the sustaining and recreating activity of God: "The evolutionary process is the instrument of the Creator God" (Hefner 1984, 202). In this idea of *creatio continua* it also becomes apparent that the backward-oriented view needs to be complemented by the aspect of the future, which is expressed in human beings as the freedom of their co-creative nature: "the quintessential human stance is forward-looking" (Hefner 1994, 71–72). Human beings are no longer simply subject to their biological constraints but have freedom for their own decisions, which ought to be concordant with God's intention for divine creation. Human persons, according to Hefner, have the potential to actualize a radically new phase of evolution (Hefner 1993, 248), in that Jesus Christ is the "paradigm, the model of what it means to be humans in the image of God, of what it means to be the human being that God intended" (Hefner 1993, 243, following here Theissen 1985). In the light of this paradigm, the will of God consists of the principle of universal love, which transcends all bounds (Hefner 1993, particularly 248–50). Thereby human beings apply their freedom to the good.

In Hefner sociobiological altruism research thus undergoes a twofold contextualizing. First, he represents altruism as incomplete as long as the intrinsic character of altruistic love remains unacknowledged. Love is ultimately rooted in God, in the "way things really are." We may speak of a protological perspective, from which sociobiological altruism research derives its proper value as archaeological expedition into the fundamental biological conditions of humanity. Metaphorically speaking, it retraces the footprints of God in the human being. Second, however, sociobiological altruism research is also incomplete as long as it focuses exclusively on human origins. Human beings, as part of *creatio continua*, are patterned for freedom and the future. Crucial is the direction in which the "two-natured character" (Hefner 1993, 29), which consists in a symbiosis of

genes and culture, is changing. The problems of sociobiological altruism research in explaining trans-kin altruism can only be overcome from this eschatological perspective. This perspective opens for the free human being the possibility of unqualified neighborly love, and thus the fulfillment of the tendency that is already protologically, and thus intrinsically, present within him: "*Homo sapiens* . . . hears the natural (not supernatural) message from within its own history to move in the direction of transkin altruism" (Hefner 1994, 72). This is also the reason that Hefner utilizes a concept of teleonomy that explains goals and purposes based on particular structures and processes.⁶⁸ He attempts to deal with teleology as a teleonomic concept.

CRITICAL DISCUSSION. We conclude this exposition of Hefner's proposal with some critical considerations. As in the previous section, we consider first the altruism problem and then the proposal in general. Because Hefner has only recently presented his thought as a comprehensive whole,⁶⁹ discussion about it is as yet in an initial phase. We, therefore, will make only preliminary comments, unlike the preceding extensive discussion of Burhoe's proposal.

On Hefner's Consideration of the Altruism Problem. From a theological viewpoint Hefner emphasizes the intrinsic, ontic character of altruistic love. It has its source ultimately in God. This point is open to a critique from a humanistic perspective, which dispenses with the idea of an ultimate grounding.⁷⁰ Pursuing this further would be superfluous, however, because in this case there are simply two perspectives set against each other, each of which can be justified in its own way. A fruitful debate is not to be expected.

As a supplement to Hefner's statements about the intrinsic character of altruistic love, a further aspect needs to be pointed out with respect to sociobiological altruism research, one that Hefner could have taken up if he had wanted to consider these concepts of altruism critically and expand on them. Especially with regard to those models that seek to explain altruism solely through the biological mechanism of natural selection it has been emphasized that true altruism is eliminated from altruism.⁷¹ Altruistic behavior is ultimately selfish. To be sure, from the perspective of the altruist this is justified. The act remains altruistic, however, from the perspective of the recipient, who derives a benefit regardless of the effect of the act on the altruist. These different perspectives ought to be more seriously considered in the sociobiological conception, particularly because the sociobiological view approaches altruism by considering the consequences of behavior, providing further support for augmenting sociobiological models of altruism. Furthermore, attention should be drawn to the character of agape as commandment (see the foregoing section on inclusiveness).

If one considers Hefner's reflections on agape and altruism as a whole, their identification serves to further contextualize sociobiological concepts of altruism. This, however, need not necessarily be accomplished by means of an identification of agape with altruism. Although both deal with the same phenomenon—in Hefner's words "beneficent human behavior toward others, even those who are not genetic kin" (Hefner 1993, 197)—agape, being based on its foundation in God, can be distinguished from altruism, which lacks exactly this foundation. These considerations do not lead to a separation of altruism and agape but emphasize that, in spite of all commonality, important differences exist in the comparison of the individual concepts. Nonetheless, in this model, as in that of Burhoe, one may talk about an extension and embedding of sociobiological concepts of altruism within a more comprehensive perspective of agape grounded in God.

On "Created Co-Creator." Hefner's orientation on the epistemological program of Lakatos emphasizes the academic character of theology⁷² in its confrontation of the natural sciences. The two disciplines become methodologically commensurable inasmuch as theology, too, can talk about testable theories and hypotheses. The idea of a *hard core* fits theology very well, given that the relationship to the one God stands at the center of all theories (Hefner 1993, 259). Hefner's creation-based theological proposal is thus, just like revelation-based theology, "a proposal in the public marketplace of ideas that people of faith make for understanding human life and its meaning" (Hefner 1993, 18). The decisive characteristic is how convincingly such a proposal can interpret the processes and structures of the world in contemporary context. Hefner's methodological procedure is certainly provocative for both theology and scientific epistemology, because most of the time two domains are considered simultaneously and transformation will surely be necessary in the transfer. In the present investigation this topic can only be mentioned. An in-depth analysis of the application of Lakatos's program in Hefner's theological approach would require a separate investigation.

The difference between God and the world appears to have been abandoned by Hefner, who describes God as "the way things really are" (Hefner 1993, 207), and the natural sciences no less represent the project "to determine how things really are" (1993, 101). Here Hefner ought to express himself more carefully; it has long been *communis opinio* (generally agreed) that the natural sciences such as physics or biology do not consider the world per se but the world as it presents itself to our senses and their extensions in the form of scientific equipment. An epistemological distinction needs to be made between the appearance of the world for us and reality (Theissen 1994, 393–94). If this is not taken into account, there is a danger that science is not simply seen to trace metaphorically God's footprints in humanity and in the world but is perceived as direct access to God. But this is outside its capabilities.

With regard to his concept of the created co-creator, Hefner himself discusses two objections that are “almost polar opposites of each other” (1993, 236). On one hand, he has been accused of placing humanity at the level of God with his concept of the *co-creator*, or at least of placing their actions on the same level as the acts of God.⁷³ This partnership supposedly exalts the position of human beings and is excessive anthropocentrism. On the other hand, he is criticized for his use of the concept *created* and the consequent close embedding of humanity in nature, which is said to leave too little scope for the special place of human beings in the world—nature receives excessive emphasis. Both lines of argument, which could not be more opposed, accuse Hefner of a mistaken interpretation of the human being.

This criticism obviously springs from the fact that in each case either the adjective *created* or the noun *co-creator* is overemphasized. This is not the intention of Hefner’s proposal, which emphasizes the two elements in their mutual dependence. But Hefner draws profit from the two objections, because both demonstrate the “tremendous dynamism and energy” (Hefner 1993, 237) that lie in the image of the created co-creator.

Closely connected with this are his considerations on the relationship between determinism and freedom (Hefner 1993, chap. 7). These, too, are not opposites but must be seen in their mutual dependence as two elements of the created co-creator, which emphasize distinct aspects. Although human beings are created with certain preconditions, they possess the necessary freedom for applying them. Not only are we apparently “determined to be free, but we are free to be determined”⁷⁴ (Hefner 1993, 121). Hefner is convinced that biological evolution is the means by which God has created the culturally free human, and that with this freedom we strive for the goal which is in correspondence with God’s will for the future. “The activity that we fashion to meet the requirements of our destiny should conform to the sacrifice of Christ for the whole world and in such self-giving we find our deepest harmony with our destiny” (1987, 139). Since Jesus’ selfless sacrifice is understood in Hefner’s proposal to be the paradigm of altruistic, universal love, we have returned, as it were, to the beginning of our considerations. This indicates the inner coherence of Hefner’s considerations.

SUMMARY ON BURHOE AND HEFNER AND CONCLUDING REMARKS

For Burhoe it is crucial that human beings are both biological and cultural beings. The necessities of these two natures of the human person have to be adapted to one another. The mediating function is fulfilled by religion, which is the crucial factor within culture for motivating a person to act altruistically toward nonrelated individuals. As a result of this functional determination, religion plays an important part in the scientific discussion

of altruism. Furthermore, Burhoe uses his functional determination of religion as a basis for his considerations of a “scientific theology,” which he believes to be the suitable form of religion for a world characterized by natural science, and a contribution to the survival and further development of religion. In summary, he achieves with this functional analysis of religion a constructive contribution to a scientific description of the world.

The proposal of Hefner is theologically oriented. For him evolutionary theory is, as it were, retracing the thoughts of God. Evolution is understood as God’s acting in and on the world. This is not determinism, nor should it be understood as the claim that theology has already always known everything. The novelty of science and the autonomy of its laws are acknowledged, but its insights are interpreted as the footprints of God in the world. In this sense human research on sociobiological altruism helps to elucidate the anthropological preconditions of the human being, who is taken to be the “image of God” and both created and co-creator. At the same time Hefner emphasizes, from his theological perspective, the intrinsic character of altruistic love, which has its origin in God.

A judgment in favor of one or the other perspective is not being made. In my opinion it is a gain of freedom in interdisciplinary dialogue when it is possible to reconstruct diverse perspectives. The goal of such a dialogue should not be to incorporate one of the investigated domains into the other but rather a better mutual understanding. We hope that this investigation has made a contribution toward this goal.

NOTES

1. Some commentators refer to this as *liminal awareness*. In order to avoid confusion with anthropological terminology, where *liminal* has a well-defined meaning in the context of rites of passage, we prefer the semantically equivalent *threshold awareness*.

2. Official Greek translation of the Hebrew Bible written between the third and first centuries B.C.E.

3. The late Ralph Wendell Burhoe was professor emeritus of the Meadville-Lombard Theological School, a seminary of the Unitarian Universalist Association, which is affiliated with the Divinity School of the University of Chicago. He won the Templeton Prize for Progress in Religion in 1980. Philip Hefner is Professor of Systematic Theology at the Lutheran School of Theology at Chicago and Director of the Zygon Center for Religion and Science, which was founded by Burhoe and others in 1988.

4. See the presentation of various possibilities of a relationship between theology and natural science by Ian Barbour (1988).

5. Viggo Mortensen (1995) briefly presents both theologians in his comprehensive presentation of dialogue between theology and science. Burhoe especially is, in his view, a representative of a neonaturalist theology that, although practically unknown in Europe, is very influential in the United States. I present both positions more extensively, taking into account more recent publications, so as to permit a more detailed understanding of them. An English version of my considerations on Burhoe is presented in Meisinger 1995.

6. For the following explanation see especially Burhoe 1981, 161–79 and 206–17. Burhoe owes many of his ideas to Alfred E. Emerson, especially Emerson 1968, 129–68, where the fundamental ideas of Burhoe are anticipated. George C. Williams (1966) also is important for Burhoe’s consideration (see Burhoe 1981, 161–63). In analogy to Burhoe’s, my considerations will frequently be situated on a metaphorical level. This must particularly be kept in mind when it appears that genes are credited with certain intentions.

7. An extensive explication of various evolutionary theories can be found in Wuketits 1988.
8. Williams (1966, 92–124, e.g., 97) refers to such a symbiotic evolution within an ecosystem as “biotic evolution” in contrast to “organic evolution.”
9. See Gehlen 1988. The human being, characterized by its “openness to the world” (p. 38), is “by nature a cultural being” (p. 80).
10. He also talks of a “sociocultural organism” (Burhoe 1981, 209) or a “societal organism” (p. 173). Occasionally he uses the plural form, but mostly the singular, for which he gives reasons (p. 181). Therefore I consider it justified to use the singular throughout.
11. Consequently altruistic behavior toward non-kin can indirectly be traced back to a genetic predisposition. A critical gene frequency is not required (see Burhoe 1981, 222).
12. On the role of the brain see the following section.
13. With regard to the transfer of kinship terms such as “brother” or “sister” from the biological to the cultural realm, Gerd Theissen (1990, 64) refers to a *Wortgeschehen* (literally, a “word-event”), which changes reality, and by which the extension of concepts and behavior are intertwined. See also Theissen 1985, 179 and Monod 1971, 118–37 on the significance of the human capacity for symbolism.
14. Burhoe repeatedly implies, however, that satisfying the genotype is primary (see Burhoe 1981, 224). Richard D. Alexander (1987, 24) thinks along similar lines: “The often-used axis of genetic versus cultural, in respect to human behavior, is inappropriate.” In contrast to Donald T. Campbell (1975; 1991) and R. Boyd and P. J. Richerson (1985), in whose models cultural and biological evolution compete and may be in conflict, nature and culture do not stand in opposition in the symbiotic model.
15. See particularly Burhoe 1981, 30–35, 185–96, 217–28.
16. Burhoe understands “values” as informational structures, which determine the goals of our behavior. These are organized hierarchically—on lower levels we find more general information, whereas central, religious values take up the apex of the pyramid. Burhoe sees values represented by concepts such as “life” and “survival.” They can be elucidated scientifically (see Burhoe 1981, 30–35, 217).
17. Burhoe writes: “The religious stories or myths had to be ‘true’ in basic consequences for life and became so by the natural selection of culturetypes along with genes. Thus religious wisdom became sacred, and the gods were real” (1981, 225).
18. On the significance of ritual for religion see Wallace 1966a, 102 (“the primary phenomenon of religion is ritual”) and 216–70. See also Eugene G. d’Aquili and Charles Laughlin 1975 and d’Aquili 1978.
19. On the question of functionally equivalent mediating institutions see Burhoe 1986, 456–58, under the heading “The Relation of Religion and Civil Government,” and Burhoe 1975, 345: “In general the sociocultural value-transmitting institutions had their origins in religions.”
20. “There has been lost a needed conviction or faith in a system of transhuman powers that define our meaning and destiny and sanction our loyalties and morals in our sociocultural organism. Lost also is the equally necessary belief concerning the salvation of our soul in the end, if we behave properly” (Burhoe 1981, 220). With regard to the following see particularly Burhoe 1975, 321–23.
21. Here it becomes apparent why Burhoe places so much emphasis on rationalization: without that rationalization this third stage of religion would not have been reached. This does not thereby deny the emotional element (see also Burhoe 1975, 326; 1981, 57–58). On the place of Burhoe in the American dialogue between theology and natural science after World War II see Gilbert 1995. John C. Godbey (1995) deals with Burhoe’s sources in the Chicago School and in H. N. Wieman.
22. For a critical-constructive discussion of this see Haugen 1995, 566–68. For E. R. Cruz (1995) Burhoe’s vision is anachronistic, partly because Burhoe deals only with the “high culture” of the elite but not with the “popular culture” and its significance for the future of Christian religion. Cruz argues from the viewpoint of South American liberation theology. In my view there are two opposing fundamental experiences here, neither of which must be seen as absolute. Absolutism is a tendency in Cruz. It would in my view be an important task to facilitate a constructive dialogue between the two kinds of experience.
23. Quoted from Burhoe 1975, 328. See also Burhoe 1981, 157. P. C. W. Davies similarly says, “a growing number of people believe that recent advances in fundamental science are more likely to reveal the deeper meaning of existence than appeal to traditional religion” (1983, 8). The book offers a very good overview of the results of modern physics. The concept of religion

offered by it, however, is narrow. Davies accuses religion of undifferentiated dogmatic rigidity (p. 20), an accusation that leads to the statement quoted.

24. "Belief is the substance of religion and theology as it is of science" (Burhoe 1975, 322).

25. Burhoe (1975, 332–33) clarifies that this does not replace the previous stages of religion. They continue to exist.

26. "Nature . . . is the modern equivalent of the realm of God" (Burhoe 1975, 353). The concept of "functional equivalence" that Burhoe himself uses (1981, 227), can be taken from N. Luhmann. The functionalist method establishes a region of comparison and a determination that certain concepts can be replaced by others (Luhmann 1977, 15). These aspects are of importance here. See the section on Burhoe's "scientific theology," which follows.

27. In this context Burhoe uses "scientific theologies" to express the aspect of local adaptation (1975, 328). A related idea, in my view, can be found in D. Ritschl's concept of "implicit axioms" (Ritschl 1987, 108–11). These are basic statements of belief common to believers of diverse confessions that directly or indirectly control their theory formation and preaching. Expanding this concept to religions in general concerns the search for comparable or equivalent basic statements of different religions. These have to engage in a dialogue in which they can introduce the items by which they are characterized. The same is necessary for the emergence of a "scientific theology." In both cases the idea of a connection between diverse religious cultures plays a crucial role. A more detailed comparison of the two approaches would be rewarding. Here only their fundamental convergence can be pointed out.

28. On this section see Burhoe 1981, 116–19, and 1975, 353. See the discussion about "civil religion" in Bellah 1980.

29. On physical theories of the end of the universe see Davies 1983, 199–213.

30. Burhoe sets *god* and *soul* in italics to indicate that these symbols refer to both a traditional meaning and a scientific concept (1981, 116–19).

31. See also C. W. Forrester (1972, 145–67). According to him, societies need "long-term values" (p. 159) in order to survive. These find their expressions in religious codes.

32. In this he proceeds eclectically. One might disagree with his choice—particularly in view of the fact that he completely ignores the trinitarian God concept, which has traditionally been of enormous significance for the Christian religion. His starting point is a monistic-unitarian image of God. See, for example, Wolfhart Pannenberg (1991, 259–336), who places the significance of the Trinity in the foreground. Theissen (1985) goes further than Burhoe. He puts the three articles of faith in the framework of categories from evolutionary theory. See also S. Daecke (1987, 153–62), who discusses Pierre Teilhard de Chardin's and Theissen's proposals and presents a third model about Jesus Christ in light of evolutionary theory.

33. In his opinion modern physics has answered many of the metaphysical questions of the Middle Ages or antiquity by widely transcending the scope of everyday experiences and explaining (or being capable of explaining in its future development) hidden forces that were previously regarded as supernatural (see Burhoe 1981, 126–27; 1975, 352–53). Hefner (1977, 88–104) deals extensively with the metaphysical dimension of Burhoe's approach. See also the section on "scientific theology."

34. I am aware that "reality" (*Wirklichkeit*) in this place is a problematic concept. On natural selection, see Burhoe 1981, 73–111. Cruz is critical of Burhoe's use of the concept (Cruz 1995, 608 n. 26). In his opinion Burhoe is unaware of the metaphorical meaning of the concept. Godbey (1995, 548) has a different view.

35. Burhoe did not fully develop and publish the concept of the cosmotype.

36. See also the concept of *Resonanz Erfahrung* ("resonance experience") in Theissen [1978] 1988.

37. On this section see Burhoe 1975, 361–68; 1981, 130, 137–44). Burhoe states that this concept originates in Greek philosophy and only entered Christian writing at the time of Neoplatonism (1981, 137–38). Haugen (1995, 558–60, 569–70) deals with Burhoe's soul concept and comments on it critically.

38. This abstract formulation of "transcending" encompasses diverse possibilities—resurrection, reincarnation, or other concepts that have been developed with the aim of coherence and credibility of particular cultures (Burhoe 1975, 363).

39. Burhoe (1986, 465) refers thus to our conscious participation in the evolutionary process through cultural evolution. See also Hefner 1989, 211–33.

40. "And it is my view that the omnipotent process of the cosmos will continue and that men will be brought to their senses, will reform their ways and adapt themselves to the requirements

for life and ever more advanced life to which the Lord of History on earth has destined them” (Burhoe 1975, 367).

41. Vollmer (1987) connects *Evolutionäre Erkenntnistheorie* (evolutionary epistemology) with Konrad Lorenz, Rupert Riedl, and his own work, and *Evolutionäre Wissenschaftstheorie* (evolutionary theory of science) with Karl Popper, Stephen Toulmin, and D. T. Campbell. The author [Meisinger] criticizes Vollmer for equating *Wissenschaft*, a German word that encompasses both science and humanities, with *Naturwissenschaft*, or natural science. He considers equating *Wissenschaft* with science as an unwarranted abridgment of the former concept. Theology, too, may be considered a *Wissenschaft* (Pannenberg 1976). In the translator’s [Kracher’s] opinion the problem is largely due to the fact that neither *Erkenntnis* nor *Wissenschaft* have fully equivalent English terms. This predisposes the first three authors mentioned, who write in German, to adopt a different focus from the English-speaking latter three (although Popper, as a native German speaker, may have been aware of the difficulty). Usually both *Erkenntnistheorie* and *Wissenschaftstheorie* are rendered as “epistemology” in English, as the latter is really a “theory of science and humanities.”

42. See the differentiated presentation of analogies and differences between biological and cultural evolution in Theissen 1985, 26–41.

43. On religion as Burhoe’s starting point, see Godbey 1995, 547–48.

44. On this point my position differs from the interpretation of Breed (1988, 231–32), who diagnoses a dependence that exposes religious concepts to the risk of disappearing as irrelevant as new scientific theories appear. Breed interprets Burhoe on this point as too static. Within the theory of science, the question of how the relationship between new and old theories is to be described is controversial. Thomas S. Kuhn (1970) speaks of a “paradigm change.” W. Heisenberg (1958) develops the idea of “closed theories.”

45. Breed (1988, 230–31) criticizes, for example, Burhoe’s not entering into a discussion with positivism, which is his starting point. See also Mortensen 1995, 212, and Godbey 1995, 549–50.

46. “*von Unbestimmbarkeit in Bestimmtheit*” [translator’s note].

47. “*Unanschaulichkeit*.” This concept plays an important role in the German discussion about modern science, in particular quantum physics. Because of the awkwardness of “unimaginability,” the discussion in the English literature tends to be guided by different terminology [translator’s note].

48. Here a broad prospect of new considerations comes into view; for now we have to leave it at these preliminary thoughts.

49. This very appropriate metaphor is attributable to Edward O. Wilson (1978, 163).

50. I cannot discuss other epistemological approaches, such as constructivism, here.

51. Burhoe’s remark that the “scientific community” cannot produce final explanations goes in this direction but would have to be more tightly integrated into his thoughts (1975, 360). Burhoe should also take into account that the sciences do not correspond to the ideal of value neutrality and absence of bias, as emphasized by Kuhn (1970).

52. The distinction of the two concepts of reason by Paul Tillich (1951, 71–75) reflects the problem very well.

53. See Burhoe 1981, 124 and *passim*. Repeatedly comparisons surface with Paul (see Burhoe 1981, 219) and Psalm 139 (1981, 110).

54. This applies, for example, to his description of the image of God (Burhoe 1981, 125).

55. Burhoe relies here on considerations of F. S. C. Northrop (1977, 273–88). On the thesis of a dependence of the origin of modern science on Christian theology, see the brief but differentiated presentation of Ian Barbour (1988, 33–34), who believes additional factors are at work.

56. Metaphysics is “a set of principles . . . [that] would tell us how to organize the data of our experience in such a way that we could give a unitary account of them; it would thus help us to make sense of the scheme of things entire. . . . We should then be masters of an over-all point of view enabling us to see things synoptically or have a set of ideas which would allow us to differentiate the real nature of the universe from its merely superficial aspects. We should, in short, be in possession of metaphysics. . . . The deviser of a metaphysical theory thus becomes a man with a vision of the scheme of things entire. It is important to add, however, that he is not merely a man with a vision, in which case he would be indistinguishable from a philosophical poet. He needs to work his vision out in a theory; he needs to argue his case both by adducting those facts which immediately support it and explaining those which on the face of things do not” (Walsh 1967, 303).

57. With the label “applied scientific theology” we refer to Burhoe’s argument that theology

should be considered an applied science (Burhoe 1981, 37) and translate this into a metaphysical framework.

58. “Trans-kin altruism cannot be accounted for on grounds of genetic evolution alone” (Hefner 1984, 198).

59. “I speculate that myth and ritual are the chief carriers of the information that motivates and interprets the behavior beyond the biogenetic” (Hefner 1993, 149). Expressed more generally: “Culture is the stream of information that enables trans-kin altruism” (Hefner 1993, 200).

60. Since both reciprocal and kin altruism ultimately result in the enhancement of the altruist’s inclusive fitness, it may be said with R. L. Trivers (1971, 35) that models that explain altruism by natural selection “take altruism out of altruism.” There is, however, in this statement the imminent danger of confusing two different levels: at a phenotypic (individual) level we are indeed dealing with altruistic behavior, even though there is a “payback” at the genetic level. The confusion of the two levels has been criticized by I. Eibl-Eibesfeldt (1989, 101). From a “purely biological” viewpoint the behavior is not altruistic. Campbell (1991, 107; see also 1983, 177) speaks of “clique selfishness”; C. Vogel (1986, 474), following J. L. Mackie (1982), of “self-reflexive altruism” (translator’s note after Meisinger 1996, 240).

61. He refers to Matthew 22:34–40 (question of the most important commandment), John 13:34 (Jesus’ new commandment), Matthew 5:43–48 (love of enemy), Galatians 5:12–24 (love as opposed to *sarx*), and 1 Corinthians 13 (hymn of love). The phrase “the way things really are” is used by Hefner as a new equivalent for the concept of God.

62. On his association with constructive theology and his discussion with Kaufman (1993), see Hefner 1993, especially p. 216.

63. Before Hefner it was especially Nancey Murphy (1990) who tried to consistently transfer the approach of Lakatos to theology.

64. The problem of verifiability or falsifiability of a scientific theory would greatly exceed the scope of the present investigation. Only a few remarks: Inasmuch as a definitive verification of a theory is impossible, because there may always be a new object that puts it to the test, Popper introduced the criterion of falsifiability. A counterexample could demonstrate that a theory was invalid. But Popper’s principle of falsifiability is likewise not above controversy, for a counterexample might lead to a modification of a theory without fundamentally falsifying it.

65. A short summary of the theory of the created co-creator can be found in Hefner 1993, 264–65.

66. Hefner (1993, 29 and *passim*) speaks of a “two-natured character of the human,” because inherited genetic information and cultural information merge in the human central nervous system. He is aware, however, that at present there is no consensus on a theory of the interaction between biological and cultural evolution (cf. Hefner 1984, 199).

67. Hefner points out that the entire creation participates in the image of God, mediated by the human being: “Because the human is made up of the basic stuff of the planet, the image of God in that human being indicates that the world itself is capable of that special relationship to which the image of God points” (Hefner 1993, 239; see also 1984, 192, 204). Thus the anthropocentrism of the *imago dei* concept is in need of revision.

68. His teleonomic axiom is this: “The structure of a thing, the process by which it functions, the requirement for its functioning, and its relations with and impact upon its ecosystem form the most reasonable basis for hypothesizing what the purpose and meaning of the thing are” (Hefner, 1993, 40). On the concept of teleonomy in distinction to teleology, see Vollmer 1984. Teleonomy is not a doctrine (like teleology) but a property (like autonomy) and means “program-controlled, species-preserving fitness as result of an evolutionary process (not as the work of a planning, purpose-imposing being)” (Vollmer 1984, 206). Hence, it does not contain any metaphysical connotation.

69. Some chapters of Hefner’s book (1993) were previously published as papers. Several reviews of the book were published in *Zygon*—by d’Aquila (1994), M. Gerhart (1994), and Theissen (1994).

70. I refer to a critical commentary on Hefner by J. W. Robbins, which I have seen as manuscript.

71. See note 60.

72. The German *wissenschaftlicher Charakter* does not necessarily refer to a “scientific theology,” in the sense of Burhoe, but to a field of inquiry that shares some methodology with liberal arts and sciences. On *Wissenschaften*’s having a broader meaning than *sciences*, see the second part of note 41 [translator’s note].

73. So from the theological side. A similar reproach is made from the side of natural science: "For the scientists, who are deeply impressed with the awesomeness of nature, it seems simply absurd to suggest that human beings are more than tiny actors on a stage whose dimensions in time and space are beyond our capacity to comprehend" (Hefner 1993, 236).

74. According to Peters (1994, 305), "Hefner takes the long view, the coevolutionary view, according to which today's cultural freedom is the result of yesterday's biological determinism."

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