THEOLOGICAL APPROPRIATION OF SCIENTIFIC UNDERSTANDINGS: RESPONSE TO HEFNER, WICKEN, EAVES, AND TIPLER

by Wolfhart Pannenberg

Abstract. Philip Hefner's focus on contingency and field as the guiding concepts in my thinking and his characterization of my theological enterprise as a Lakatosian research program are appropriate and helpful.

I welcome Jeffrey Wicken's holistic approach to the emergence of life. Theology can appropriate the language of self-organizing systems exploiting the thermodynamic flow of energy degradation for interpreting organic life as a creation of the Spirit of God.

However, I cannot sympathize with Lindon Eaves's equation of "hard science" with a reductionism which raises the double helix to the status of icon; the "meaning" of DNA derives from its place in the total phenomenon of life—not the reverse.

Frank Tipler's cosmology raises the prospect of a rapprochement between physics and theology in the area of eschatology. A Christian cosmology, however, would require at least three modifications: contingency in the history of creation; the uniqueness of Jesus' resurrection; and the relation of these to the problem of evil.

Keywords: contingency and field; double helix; eschatology and the Omega Point; Lakatosian research program; self-organizing systems; thermodynamics.

First of all I want to express my gratitude for Philip Hefner's lucid and brilliant presentation of the intentions implicit in my theological work (Hefner 1989). Much of what he describes is not just my personal vision of theology but spells out what theology, if properly done, should be like—and that is indeed "breathtaking." It is the subject matter of theology, the reality of God, that urges upon the theologian such a venture. I am far from pretending that I have accomplished the task.

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But as a theologian one should be aware of the fact that this *is* the task and that it is not impossible; rather, it is extremely rewarding and exciting to devote to theological service whatever strength a human being is given. I hope that others will take up where I shall have to leave, so as to transcend the limitations of my own understanding—and not least in the sciences, lest those limitations might count against the viability of the theological enterprise as such.

My specific way of dealing with the theological task of interpreting reality in terms of God's action is characterized, as Hefner presents it, by the notions of contingency and field. The issue of contingency in historical experience—as a mark of God's action—impressed itself upon my mind early in the course of my studies, in connection with the medieval doctrine of God's prescience and predestination. Later on I found it useful in dialogue with scientists. It was rather late, however, that I took the risk of transferring the field concept to theology, especially to the doctrine of God as spirit. In doing so, the field concept gets slightly transformed, especially by the framework of eschatology and the concomitant idea of the future shaping the present. While this temporal reinterpretation of the field concept allows us to conceive of contingency as a manifestation of such a field, I am well aware that this is no longer the field concept of classical electrodynamics and gravitational theory. But it should not be considered illegitimate (as in Wicken 1988) to use a scientific concept in a new way as long as the reshaping is deliberate (does not simply emerge as accidental equivocity)—especially, first, when it is done in continuity with the profound implications of its conceptual history and, second, when it sheds new light on current scientific problems. The first point is valid because Michael Faraday intended the concept of field to function not only as a correlate with physical bodies, but as a final explanation of bodily phenomena (see Berkson 1974, 39 and 50). The classical notion of field as correlative with body can be accounted for as a special case of this more fundamental concept.[1] The second point might emerge in relation to quantum mechanics and thermodynamics. The philosophical interpretation of quantum mechanics is still very controversial; indeed, it has proven impossible to account for all sides of the experimental situation in terms of either field or particle. But it was only the classical definition of the field concept that had limited value. A reformulation of the field concept in connection with the assumption of a priority of the future over present and past might create new possibilities of interpretation, particularly so because it allows us to consider contingency as a manifestation of a field (and perhaps also by overcoming the dualism of object/observer). For the same reason there might be applications to the task of comprehensively accounting for the processes studied by non-equilibrium thermodynamics.

The theological use and reinterpretation of the field concept was not aimed at such applications, however. I decided to take the risk of using that concept in theology for strictly theological reasons; that is, in order to obtain a better understanding than the traditional one for the idea of God as Spirit. For many years I had been dissatisfied with the traditional association of spirit with mind and intellect. That conceptuality, introduced by Origen, does not do justice to the biblical and especially the Old Testament usage of the word *spirit* in the sense of breath or wind. In modern times, the equation of God's Spirit with mind gave rise to the charge of excessive anthropomorphism in our conceptions of divine reality. Thus it became one of the more serious reasons for modern atheism. It occurred to me like an illumination, then, when in studying the history of field theory I learned from Max Jammer that the modern field concept emerged as a further development of the Stoic doctrine of *pneuma* (spirit), which was related to the early Greek idea of *pneuma* as moved air—an idea which is rather close to the ancient Hebrew term for spirit (*ruaḥ*). At that moment I decided that I had to appropriate the field concept for theological discourse in order to describe in a more appropriate way how we might think of God as spirit.

There are, of course, systematic parallels to field language in other areas of my work, as Hefner has pointed out. It is related, especially, to the category of *whole* over against *part*, which has occupied my attention since my early efforts at coming to terms with the problems of hermeneutics and history. It was from Wilhelm Dilthey's hermeneutical theory that I first derived the notion of the whole as superior to the parts: the whole is superior because it already contains everything that might be called its part, though not always explicitly so. Nevertheless, the whole remains dependent upon whatever parts it may contain. The notion of *environment* is somewhat analogous, except that the environment does not actually contain the organism, but surrounds it. Is that separation overcome when one speaks of *ecosystems*? An ecosystem is of course intended to include organisms, even species, as parts. It also appears more clearly as a whole than the concept of environment. Nevertheless, the term does not provide all the advantages of the idea of a whole, because the notion of system is more dependent on the parts from which it is built, whereas a whole may be perceived as a unity without discerning any of its parts. The case of the field concept is different, especially if it is not taken simply as a dimensional whole (like space-time) but as dynamic field that produces its "parts," like Faraday seemed to envision. The priority of the whole over its parts is better expressed, then, by such a notion of dynamical field than by the notion of the whole itself.

The application of the field concept to the concept of God does not—as Jeffrey Wicken (1988, 52) suspects—"physicalize" the concept

of God. I rather think that the modern concepts of fields and energy went a long way to "spiritualize" physics, as the German physicist Georg Süßmann (1980) holds. One is able to see the point in this judgment as soon as one relinquishes an identification of spirit with mind. According to the biblical tradition, spirit is rather a kind of force, comparable to the wind but prior to bodily phenomena. If theology wants to be true to the biblical witness, the concept of God as spirit has to be disentangled from the customary identification with mind, an identification which entails an all-too-facile image of God as "personal." Certainly theology wants to affirm the personal character of the divine reality, but the image of mind offers a deceptive self-evidence of that claim. It dissolves the mystery that reveals itself as "personal" (in a sense of this word that has to be reconceived) when it manifests itself especially in being revealed as "father" to the "son" and through him. The reformulation of the idea of God as spirit in terms of field language enables the theologian to recapture a sense of mystery in talking about God instead of the facile anthropomorphism that often accompanies the image of God as mind. The phenomenon of mind itself—the human mind, with its distinctive form of consciousness and self-consciousness—needs to be reinterpreted as a special manifestation of "spirit" in the sense of field. This establishes new connections with the task of accounting for the phenomenon of human consciousness and self-consciousness in a scientific description. Ultimately, it will be the field of God's spiritual presence that constitutes the human mind. But it might be mediated by other field factors. This does not mean to identify God with the most comprehensive physical field, say of space-time. Against pantheism, theology always insists on the specific nature of the divine as distinct from all finite reality. But the finite realities of physical fields can be imagined as constituted by the presence of the divine spirit, as forms of its creative manifestation.

Philip Hefner characterizes the systematic structure of my theological project as a "research program" in the sense defined by Imre Lakatos (Hefner 1989, 146-48). I have no problems with such a description. I could have used that notion myself in describing the theoretical form of theological explanation if the work of Lakatos had been available to me when I wrote my book *Theology and the Philosophy of Science*. But at that time, around 1970, the latest phase of the discussion was represented by Thomas Kuhn. I perceived Kuhn's ideas on revolutionary science and paradigm shift not as proposing a relativistic outlook on science, like some of his critics did, nor did I take his opposition to Karl Popper as a complete rejection of his ideas, but rather as a refinement of Popper's approach. To me the most important point was a less restricted recognition of the role of rival metaphysical visions in

the history of science and the description of scientific theories as interpretations of empirical evidence, more comparable to hermeneutics than Popper would admit. Thus, use of Kuhn's ideas was not very far from the strategy of Lakatos in defending and developing Popper's description of scientific explanation.

Some of the more specific ideas of Lakatos were, of course, not explicitly present in my account of theological explanation. This applies especially to Lakatos's distinction between *hard core* and *auxiliary hypotheses*. I do not know whether I could have offered such a description, because I would tend to emphasize more strongly the unity of elements in a systematic interpretation. In a metaphysical consideration, the content of both kinds of theory is closely related. But by way of methodology there may be reason for making such a distinction. It is easy to detect that kind of structure in the way theological systematics actually must operate. Therefore, I have no objection to Hefner's attempt at reconstructing my way of organizing systematic theology in terms of Lakatos's research program. Such a description was also offered by Nancey Murphy (1988) as an "alternative account" of my theology in the place of what she considers to be my own description. The account she gives is actually closer to my view of the task of theology than the image of concentric circles which she attributes to me. In terms of *systematic structure* the framework of theological explanation as I envision it may be adequately described in Lakatosian terms.

The question of *method* is somewhat different.[2] Hefner concurs with Lindon Eaves (1989) in pointing out that my method in dealing with the secular sciences, and also with historical data related to the biblical tradition, has been to take "secular descriptions as provisional versions of reality" which imply a further dimension, the dimension of reality as constituted by the presence of God. It is the task of theology to make that dimension explicit. That will always involve some transformation of the phenomenon as described by the secular disciplines, but such a transformation has to be argued for on the basis of the evidence studied by those disciplines. If that can be achieved persuasively, the theological interpretation of the phenomenon (or range of phenomena) can be considered justified.

The emerging picture of any particular such interpretation may be termed an auxiliary hypothesis in the sense of Lakatos. It does not, in the first place, predict new facts, but produces new interpretation. However, a new interpretive scheme will evaluate hitherto neglected facts to be relevant in the way described by Nancey Murphy as effectively supportive of a research program. Examples from the field of biblical studies related to the question of Christian origins are the

reevaluation of Jewish apocalyptics in connection with the doctrine of revelation and a new emphasis on Jesus' resurrection as historical event. An example from the field of history could be the reinterpretation of the rise of secular culture in the West as resulting from the period of post-Reformation religious wars. Examples from anthropology include the importance of religion in the formation of individual identity in the authority of cultural systems, in the origin of language, and in summary, in identifying what is distinctive of the human phenomenon in comparison to other animals. With regard to physics, I have already noted how the theological emphasis on contingency in connection with the theological use of the field concept could suggest new possibilities of theoretical description. Frank Tipler's proposal (1989) in itself offers another example. Regarding the biological sciences, the question I once raised in perhaps a somewhat cryptic form—whether biology has a place for the explanation of life by the power of the divine spirit—was related in my mind to the current research and discussion on the thermodynamic conditions of the emergence of organic life as well as to the "openness" of each organism to its environment. For the degree of clarity I could obtain in these matters, I am greatly indebted to Wicken's book *Evolution, Thermodynamics, and Information* (1987). His holistic approach to the emergence of life opens new possibilities for theologians. We can appropriate the language of self-organizing systems (exploiting the thermodynamic flow of energy degradation) for interpreting organic life as a creation of the Spirit of God. The thesis that self-organization itself depends on a dynamic context wherein it functions and thus evolves is crucial. It is obvious from Wicken's argument that he presupposes more general ideas about part-whole relationships, where the whole is never reducible to the parts because the function of parts is inconceivable without presupposing the whole in the framework of which such function is defined. In this way the whole is itself constitutive of the parts. In his contribution to the present discussion Wicken explicitly applies this reasoning to the interrelation of science and religion (as well as theology).

This perspective is helpful in bridging the gulf that otherwise exists between theology and evolutionary biology, a gulf which according to Wicken's penetrating analysis is separating religion and modern biology as long as the doctrine of evolution is interpreted in reductionistic terms. Wicken's critique of these reductionistic tendencies is extremely valuable, and so is his use of the part-whole relationship. The latter is familiar and congenial to theology because it was also basic in the hermeneutic tradition, especially in the hermeneutics of Dilthey. The meaning of parts is dependent on wholes, though there is also a corresponding dependence of wholes upon parts as soon as the whole

is perceived as subdivided into parts. To secure the priority of the whole over its parts in hermeneutical theory, however, requires avoiding the reduction of the concept of meaning to that of action. If meaning is dependent on human action, then there cannot be any superindividual whole of meaning that constitutes the meaning of individual existence and action. At this point, the danger of reductionism raises its head within the theory of meaning itself, and it has to be resisted here as anywhere else. Meaning is not dependent on and created by human (purposive) action, but human action shares in the spiritual reality of meaning that is based on the priority of wholes over parts.

With regard to the phenomenon of life, however, the priority of wholes over parts not only provides their meaning; it also has a dynamic quality.[3] The parts are nothing except for their function within the whole. To put it more cautiously: the parts are something different if considered without the functions they obtain within that context. Hence the reality of the parts as parts is constituted by the whole. But is not the whole also dependent on the parts? The problem may be solved if one takes recourse to that power which constitutes the wholeness of the whole itself and also the parts as characterized by their specific functions. As mentioned before, the field concept is distinguished from that of an extensive whole by precisely that mark: the dynamic field can be conceived as creative of its "parts" and therefore as constitutive of them as well as of the whole that is dependent on them as elements. In contemporary discussions among biologists it has become fashionable to speak of ecosystems rather than fields, if one wants to refer to the most comprehensive unities of organic processes. But conceptually the term ecosystem has its problems, because it does not illumine the unity that constitutes such an organized totality which is intended to integrate such different phenomena as self-organizing animals and plants and their typical surroundings. At this point, Michael Polanyi's choice of the field concept as an explanatory category in evolutionary theory could have continuing value, although it must be rephrased in terms of ecological units rather than species and individual organisms taken out of their ecological context (see Wicken 1988, 53-54).

If one talks about a dynamic field that constitutes an ecosystem or even the biosphere as a whole, it is not simply equivalent to the thermodynamic energy flow that provides the occasion for the emergence of self-organizing entities which nourish their life by exploiting the thermodynamic flow. The emergence of self-organizing systems itself must be accounted for by the same principle that is responsible for the thermodynamic situation they exploit. It is this kind of principle that is

referred to in theological language about the dynamics of God's spirit as creator of life. Such language does not exclude scientific exploration of the processes which contribute to the total situation of life's emergence. But it preserves a sense of mystery which only the pretentious, claiming that nothing is left for future research, could deny.

Perhaps this is the appropriate point to engage in dialogue with Lindon Eaves's essay. He describes the situation between theology and science in such a way that the scientist is not content with presenting "provisional versions" of the reality he or she explores. Rather, according to Eaves, the scientist produces *icons* of reality that claim the status of definitive knowledge. In this connection, Eaves compares the double helix as an icon of modern biology to the function of Jesus Christ as "the eikon of the invisible God" in Colossians 1:15 (Eaves 1989, 196). If this were so indeed, biologists should not be surprised to be charged with idolatry. That there is a temptation in this regard may be undeniable. All disciplines including theology share such a temptation, and it may become manifest in a particular way in reductionistic tendencies in the sciences. Perhaps that explains why Eaves in some places seems to sympathize with a view that the Christian faith is to be affirmed "in spite of" the data of science. Sometimes in the history of science the situation may present itself in dramatic colors like that. But it can never be the whole story. In principle, science cannot be idolatrous, for according to the Christian faith the divine Logos incarnate in Christ is the same through whom the world was created and continues to be created. In searching for the universal Logos, the scientist is after the same truth that is the object of the Christian confession of faith, and precisely for that reason Christians should not be afraid of science or erect barriers against scientific inspection of their own affirmations.

If one does not want to mistake the scientific claim to knowledge for idolatry, it might be better to keep the notion of *model* rather than exchanging it for icon. However, I agree with Eaves that talk about models easily suggests an understatement of the truth claims that go with scientific theories. They certainly intend the truth about nature. But at the same time—and this also applies to theological language—we have to be aware of the difference between our conceptualities and the reality they represent. The image of the double helix may be here to stay (like Darwinian evolution by natural selection), but even at present it turns out to be in need of further interpretation: if I am not mistaken, this is precisely the point in Wicken's critique of biological approaches that reduce everything in the phenomenon of life to genetic replication. Such criticism does not deny that the genetic factor is of central importance, but it insists that it is not equivalent with the total phenomenon of life, nor should it be expected to clarify every-

thing. That means that the phenomenon of life as a whole has to be accounted for in a more comprehensive way without closing one's eyes to the explanatory power of genetics.

Eaves confesses that in reading my book on anthropology he experienced "some frustration" (Eaves 1989, 203), because there the argument is based more on the humanities than on biological anthropology. What he misses seems to be in the first place genetics, especially as it has been used as an explanatory principle in sociobiology. But of course genetics is not the only biological discipline. Behavioral studies have a much more substantial place in the argument of that book than genetics, and to reconcile behavioral phenomenology and the explanatory claims of genetics seems to be an issue within biology itself, an issue which is by no means definitively settled (although sociobiology claims as much).

Eaves's criticism suggests that I avoided confronting the "hard sciences" ("where it hurts most") in order to settle for the humanities, as if that were an easier line. In my experience, theological dialogue with the secular disciplines engenders no less conflict in the case of the humanities than the natural sciences. But the main point is that I am not as shy to enter into dialogue with the "hard sciences" as Eaves wants to make the reader believe. The attempt to find some common ground with physics has occupied more of my time than engagement with any other discipline except perhaps history. When it comes to biology itself, there is a promising field of convergence in the exploration of the thermodynamic framework of the emergence and evolution of organic life. I do not share creationist reservations about the Darwinian theory of evolution as long as it can be read as the first major contribution to an understanding of natural processes in terms of their historicity rather than as reducing the emergence of human life and history to some mechanistic process. It was just one particular theoretical model, the Wilsonian type of sociobiology, which I took the liberty of investigating with the eyes of a sceptic. The reasons for my scepticism have been enunciated by Wicken (1989) in a more specific and incisive form than I could hope to give them myself. In the book on anthropology I restricted my criticism to the question of whether an adequate account of the diversity of human cultures can be derived from the principle of the selfish gene. In the limited framework of anthropology as compared to the broader one of the phenomenon of life, this seems to be the most relevant issue. But in principle the more basic criticism of a predominantly genetic theory of explanation in biology is the one which has been pointed out by Wicken in his argument against a reductionistic conception of organic life. This is a question that can hardly be handled appropriately within the more limited scope of

anthropology. But surely the way we conceive of life in general cannot fail to have a profound impact on how we understand human life.

Murphy (1988) correctly surmised that one reason for not including the sociobiology of Wilson or Dawkins in my description of human nature could be that this theory belongs to an alternative research program that constitutes one of the principal rivals of a theological anthropology. I think this is true to the degree that sociobiology is reductionistic in the sense criticized by Wicken. It is of course possible to imagine a non-reductionistic type of sociobiology, and there is no reason why theology should not admit the important role genes actually have in shaping human behavior. But in the absence of a sufficiently balanced theory on this issue in contemporary biology, it seems difficult to judge how the influence of genetic heritage can be systematically integrated with other factors responsible for animal or human behavior. It is certainly not the task of the theologian to interfere in the details of such a discussion. However, on the basis of general considerations about the nature of life and evolution provided by the modern view of thermodynamic conditions for the emergence of life, we may anticipate (among other things) increasing emphasis on the factors of openness and superabundance; these characterize, in some way or other, every form of organic life and apply to the human situation in a special way described as *eccentricity*.

The most comprehensive issue arising from theological dialogue with the sciences is certainly that of cosmology. Contemporary scientific cosmology is a highly speculative discipline with a plurality of rival theoretical models. In addition, the scene has been changing quickly over the decades. Nevertheless it is very encouraging to see in the contribution of Frank Tipler (1989) the surprising degree of convergence that is possible between science and theology in this field, where a century ago no reconciliation seemed to be imaginable. This is even more remarkable with reference to eschatology than in relation to the "big bang."

Concerning the assumption of a finite "age" of the universe in the standard cosmological model of an expanding universe, there has been some discussion of whether and how it can or should be related to the Christian doctrine of creation. The discussion is interesting as an example of how convergences between theology and science should be evaluated. The hasty identification of the "big bang" with a temporal beginning of the universe in a theological doctrine of *creatio ex nihilo* should be met with caution. The assumption of a cosmological singularity at the beginning of the expansion of the universe need not imply the idea of a first event without predecessor. On the other hand, theology would continue to speak for *creatio ex nihilo* even if the stand-

ard model of an expanding universe was abandoned. Yet, after all that has been said, it remains that "if the universe began in time through the act of a Creator, from our vantage point it would look something like the Big Bang that cosmologists are now talking about" (McMullin 1981, 39). If this is so, one should be less rigorous than Ernan McMullin in rejecting statements that affirm some supportive function of the standard model of modern cosmology in relation to the Christian doctrine of creation. Certainly, the Big Bang model of an expanding universe does not imply in the strict logical sense of the word the Christian notion of *creatio ex nihilo*, but there is a relation of coherence between the two, and such coherence surely "supports" rather than contradicts the theological assertion that the world was created (in the sense that there was a beginning of the world). Admittedly, the idea of beginning is very difficult, because ordinarily it suggests an event *in* time. Christian doctrine since Augustine has insisted that the beginning of creation also involves the origin of time itself. Time, then, is not an independent reality but qualifies finite existence. In any event, the concept of creation always implies the idea of a beginning of the creature in addition to its continuous dependence on its creator, and if it makes sense to speak of a creation of the world at large, then the world also must have a beginning in some sense, though not a beginning "in" time.

In a similar way the recent development of Tipler's ideas about cosmology converges with a Christian eschatology and thus "supports" the eschatological affirmations of the theologian. These are affirmations that the theologian should dare to make anyway on the basis of a systematic treatment of data from biblical exegesis and in view of the task of reconceiving the relationship between God and the world. But such affirmations begin to make sense, cosmological sense, in a new way in the perspective of Tipler's argument. The absence of such a perspective in the past discouraged many theologians, probably a majority of them, from taking the affirmations of the Christian tradition concerning eschatology seriously. Even their defenders argued primarily on the basis of anthropological considerations, but their conclusions stood in sharp contrast to our knowledge about the physical universe. In consequence of the kind of work that Tipler pursues in cosmology, this situation may be changing significantly. This is not to say that Tipler's project concurs in every respect with traditional Christian affirmations. There are still a number of points that are difficult to reconcile with a Christian doctrine of creation and eschatology, even if one allows generous space for its reformulation. But in the general thrust of Tipler's project there is a remarkable convergence with Christian theology, and the mere possibility of such a development in science cannot fail to strengthen the confidence of the theologian (and indeed

of every educated modern Christian) with regard to the truth claims of traditional eschatological affirmations.

A first problem for theology is presented by the postulate of the continuous existence of life in the universe. The basis of this postulate is the three-stage anthropic principle developed by Tipler and J. D. Barrow in their comprehensive work on *The Anthropic Cosmological Principle* (1986). The "weak" form of this principle is undeniable; it states that the emergence of life and intelligence in the universe cannot be considered an accidental feature. Still, only in a deterministic universe would material processes *necessarily* produce organic life and intelligence. The Christian concern for contingency in the history of creation is not easily reconcilable with that strong version of the anthropic principle. Only in a theological perspective that already presupposes the existence of God and an ultimate completion of creation in such a way that this completion addresses the relation of human existence to the creator (which is the point of incarnation doctrine) can it be said theologically that the emergence of life and intelligence is a necessary feature in the overall design of creation.

But even on this basis it is not immediately evident that life must continue forever in the history of the universe. Certainly, if the emergence of life and intelligence in the course of the physical universe is not accidental, but constitutive of the overall character of the universe, it cannot simply disappear after a relatively short period. But would it not be enough to assume that its emergence is preserved and "remembered" in God's eternity? If in a closed universe organic life will vanish in the contraction phase of the cosmic process, cannot that be the price to be paid for the emergence of life at one point in its history? Just as billions of years had to pass before life and intelligence could emerge, so the price for their emergence at one point of cosmic history would be a correspondingly extended phase in that history after life's vanishing point. Still, new life could be remembered in God's eternity so that it could be resurrected at the end of cosmic history. The phase of contraction of the universe after the disappearance of organic life could even be considered a condition for the replacement of this world by a "new heaven and a new earth" in the eschaton or, more precisely, for its transformed (by participation in God) "simulation," as Tipler puts it.

In considerations of this sort, however, one aspect is still missing. The emergence of human life in the course of the cosmic process must also be related to that process as a whole in such a way that it determines the structure of the entire universe. Salvation cannot be conceived as occurring separately for humans at the end of history. What happens to human beings has to be related to the entire world process, if indeed

all creation is related to the appearance of human beings. Therefore, the argument of Tipler and Barrow makes an important point; namely, that intelligent life, if its emergence is of ultimate significance to the universe, must be conceived of as actually determining its entire structure. But according to Christian theology, this is achieved in one instance of human life, in the person of Jesus, because in him the intended destiny of the human creature (and thus the destiny of all created existence) in relation to God was realized. The continuous importance of this fact is expressed in the Christian doctrine that the risen Christ shares in God's rule over the universe. Thus, in the case of Jesus Christ there is indeed continued existence in a form that includes control over the processes of the universe, while the existence of all other persons is "remembered" in the eternity of God in order to be granted a share in Jesus' kingdom in the eschatological future when they will be raised from the dead.

One theological problem, then, in the present form of Tipler's ideas is that he has not yet dealt with Christology. Could his thought be developed in such a way as to focus the postulate of continued existence of intelligent life on just one person in order to take control of the universe? Is it conceivable, furthermore, that this event has already happened in the past—in the resurrection of Jesus Christ—while it will include the rest of humankind, but manifestly so not before the eschatological future? If so, then Tipler and Barrow's problematic construction of the possible continuation of intelligent life in non-human form—computer-based rather than carbon-based—would appear to be dispensible. The "computer capacity" of the divine Logos that was connected with the human life of Jesus in the incarnation and became fully available to him in his exaltation would be sufficient.

These considerations seem to differ from Tipler's argument on a further point. They proceed by presupposing the existence of a creator God, while Tipler reaches that idea only in consequence of his final anthropic principle.[4] This difference may be largely superficial, however. Both Tipler and a Christian theology that takes eschatology seriously in talking about God agree that it is only in the eschaton that the reality of God and his kingdom over his creation will become fully manifest in relation to the temporal course of its process.[5] Furthermore, there is agreement that Omega is both transcendent and immanent in relation to the process of the universe and consequently both changing and unchanging—unchanging in its eternal aspect, changing in its "immanent temporal aspect." Theologically, this temporal aspect of becoming is discussed in terms of a history of divine revelation in the context of the history of human religion. In Tipler's conception, it is bound up with the emergence of life and intelligence. These descrip-

tions are compatible, if the requirement that the universe must be "capable of sustaining life indefinitely" may be interpreted in Christological terms to the effect that the risen Christ is forever alive and gains "control of all matter and energy sources available near the Final State." This does not separate Jesus from the rest of humankind, since all those who are united with him by faith and sacraments will participate in his kingdom at the end of time. Tipler's description of the way this could happen does not cause particular theological difficulties. The resurrection of the dead may occur in the form of a "simulation" of their earthly life (Tipler 1989, 244-50). Such a "simulation" seems sufficient to secure identity with the former person, though admitting of a transformation by participating in God's eternity. Christian theology would insist, however, that in the case of Jesus this occurred in the Easter event such that in him human nature already became united with Omega and obtained control of the universe; for others, participation in this new life will only occur in the eschaton.

That a place for Christology is missing in Tipler's concept of the universe may be related to the way that the problem of evil is addressed. The classical tradition of eschatological thought is profoundly concerned with the overcoming of evil. Tipler's interaction with Flew reveals that the problem of evil does stand behind the Omega Point theory (Tipler 1989, 251). But it is not developed in the theory. This especially applies to the correspondence between physical evil and sin. Is there an element of failure involved in the phenomena of our temporal universe? And is eschatological hope related to the overcoming of such evil? Tipler's consideration of resurrection by simulation disposes of some of the resources that allowed classical eschatology to answer the problem: the evil of death will be overcome by the resurrection. That includes the species along with the individuals as indicated in the idea that in the resurrection of Jesus a "new humanity" made its first appearance (1 Cor. 15:45-57) to overcome the power of death. But it also overcomes the root of death in sin: and thus the transformation of our present lives by an event which means judgment as well as glorification.

Finally, there is agreement in principle on the constitutive role of Omega in relation to the process of the universe. However, if this role is to be characterized in such a way that Omega "creates the physical universe," it must mean more than that the "ultimate future guides all presents into itself." What it means to say that Omega *creates* the universe needs more detailed explication than Tipler has offered so far. The ideas of John A. Wheeler, to which Tipler briefly refers, may be helpful in pursuing such clarification. They presuppose, however, a different interpretation of quantum mechanics than the "many worlds"

interpretation which Tipler otherwise utilizes in his argument (Tipler 1989, 251). The task of producing a more detailed interpretation of the creative function of Omega in relation to the universe obviously requires some reexamination of what type of quantum cosmology should be used.

At this point, the present form of Tipler's argument does not seem congruous with a Christian doctrine of creation. The adoption of Hugh Everett's Many Worlds interpretation seems to entail a deterministic picture of the physical universe.[6] The contingent existence of this particular world and even of each of the events the sequence of which forms the line of its particular history seems to be dissolved into what appears to be an ontological hypostatization of the probabilistic pluralism of quantum theory. It may be the case that on the basis of this assumption not only God but also the physical universe or even a multitude of such universes would exist necessarily. But this does not square with Christian faith in the creation of the world, because that faith involves the contingent character of the world's existence, contingent in the sense that it depends on God's free decision. In the history of Christian philosophical theology, the idea of necessary existence has been limited to God alone. With respect to the world, the most that can be claimed seems to be the hypothetical necessity, depending on the will of the creator. From the perspective of God's eternity, the decision to create the world is certainly not arbitrary; the act of creation is not in that sense contingent. But still all finite existence is to be conceived as contingent in the sense that considered by itself it need not be. I cannot see how this basic affirmation of the Christian faith in creation can be accounted for on the basis of the present form of Tipler's argument. On the other hand, one can imagine different interpretations of quantum physics that would incorporate the element of indeterminacy that occurs on the experimental level into an ontological model that provides a place for indeterminate occurrences in connection with an open future. Could not such an interpretation of quantum physics also be more consistent with Tipler's Teilhardian emphasis upon the final future of Omega as creating the universe?

When in the seventeenth and eighteenth centuries the principle of inertia became the source of alienation between the new physics and theology, it was because that notion rendered the idea of a continuous creative activity of God in the processes of nature superfluous. When I called attention to this problem several years ago (Pannenberg 1981), it was understood that this issue primarily concerns the history of relations between theology and modern science. Clearly, however, the problem continues to reappear in a variety of forms. In the theory of relativity (see Russell 1988, 31-33), the question has been answered by

reference to the reduction of inertia to gravitation, but the problem can still return on other levels. The function of the principle of inertia in post-Newtonian mechanistic physics, adumbrated as early as Descartes, had been to exclude divine intervention by conceiving of the universe in terms of a completely autonomous system. This problem is profoundly bound up with the place of contingency in physical processes. It does not appear to be overcome in relativistic cosmologies as long as they are developed in the form of deterministic theory. If the idea of Omega as ultimate future of the universe is taken seriously, however, it may be possible to develop a concept of nature that incorporates the element of contingency as resulting from the tension between the eschatological future and the finite present.

NOTES

1. Wicken (1988, 52) limits the use of the field concept to such a reciprocal correlation with "material elements."

2. In the case of philosophy or theology it could hardly be said that these disciplines in their systematic structure were constituted by method. The subject-matter of the discipline does not first come into view by a certain procedure. The procedure presupposes a preliminary knowledge of the subject to be investigated. The systematic structure of explanation, however, concerns the systematic presentation of the subject-matter.

3. Perhaps here I use a more restricted notion of "meaning" than Wicken does in his contribution to the present issue of *Zygon*. I agree with Wicken's assertion that all meaning "depends on some kind of part-whole relationship." But how is this related to his concept of the "functional whole of an organism"? How is meaning related to dynamics? Certainly the two must not be bifurcated, but their unity seems in need of explanation.

4. I do not enter into a discussion of the question whether Omega should be conceived of as "mind" or "person." I have already indicated reservations with regard to the dangers of anthropomorphism concerning traditional conceptions of God as mind. Tipler himself seems to be aware of this problem. The biblical references to God as spirit should not be identified with mind for the reasons indicated above. Concerning the term, person: the Christian doctrine does not speak of God as a person but rather of trinitarian persons, which means that the divine reality becomes manifest as person in form of Father, Son, and Holy Spirit. It is personal because of the interrelations of the three, not because of the intellectual capacity of the divine nature.

5. Tipler and I also agree that his argument is not a modern version of the old design argument. Tipler has been criticized by Craig (1987) for despising the design argument. As I see it, however, part of the strength of Tipler's program derives from his avoidance of that argument and its inescapably anthropomorphic analogies.

6. Tipler himself, however, claims that on the level of quantum cosmology there can be no determinism since there is no time factor. On this issue see Hesse (1988). With respect to the use of the Many Worlds interpretation of quantum physics, I share some of the critical reservations expressed by Craig (1987).

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