

Review Essay

ON IAN BARBOUR'S *ISSUES IN SCIENCE AND RELIGION*

by David Ray Griffin

Abstract. Although Ian Barbour endorses process organicism in *Issues in Science and Religion*, his rhetoric against vitalism and dualism makes his discussion of life, mind, and the part-whole relationship sound like relational emergentism and hence like a denial of process philosophy's nondualistic interactionism. Also his rhetoric against a God of the gaps seems to exclude the God-shaped hole in Alfred North Whitehead's philosophy. A more consistent articulation of Whitehead's postmodern position would lead to greater adequacy and consistency on these issues, and perhaps also to a more radically postmodern view of science—a view which Whitehead himself only sometimes suggested.

Keywords: emergence; God-world relation; mind-body relation; postmodern science; process philosophy; science and theology.

Although Ian Barbour's *Issues in Science and Religion* has become the standard work on the subject in the English-speaking world since its publication in 1966, and although it thereby, because of its explication and endorsement of process organicism, has been a major event in the history of the influence of process philosophy, it has never received an extensive critique from within the process community. Such a critique is long overdue. A second reason for publishing this review essay at this time is that Barbour is scheduled to give the 1989-90 Gifford Lectures on natural theology. Because Barbour deserves all the constructive criticism he can receive, I wish to offer what I can and encourage others

David Ray Griffin is executive director of the Center for Process Studies and professor of philosophy of religion at the School of Theology at Claremont, California 91711, and founding president of the Center for a Post-Modern World in Santa Barbara. He is the editor of *Physics and the Ultimate Significance of Time: Bohm, Prigogine, and Process Philosophy* (SUNY Press, 1986) and *The Reenchantment of Science: Postmodern Proposals* (SUNY Press, 1988), and is general editor of the SUNY Series in Constructive Postmodern Thought.

[*Zygon*, vol. 23, no. 1 (March 1988).]

© 1988 by the Joint Publication Board of *Zygon*. ISSN 0591-2385

to do likewise. A third motivation arose from my belief that while Barbour endorses Whiteheadian-Hartshornean process philosophy, he does not always clearly present its distinctive emphases. Because I believe that the Whiteheadian-Hartshornean position on these issues is the most adequate of available options, and also because I think that the present climate of opinion allows this position to be taken more seriously now than in any other period since it was first developed, I am concerned that Barbour's important voice articulate this position clearly.

In the first three sections I examine Barbour's treatment of the relation of the whole to its parts in emergent realities with special attention to the status of life and mind. I suggest that, while Barbour endorses process organicism, his rhetoric against vitalism and mind-body dualism can be read as a rejection also of Whiteheadian nondualistic interactionism. In the fourth section I examine Barbour's treatment of divine causality in the world. I suggest that although Barbour endorses and accurately explicates Alfred North Whitehead's position, his rhetoric against a "God of the gaps" can be read as a rejection also of the "God-shaped hole" in Whitehead's philosophy. In the final section I suggest that the Whiteheadian position on these issues could lead to a more radical revision of the understanding of science and hence of the relationship between science and religion than that suggested by Barbour or even by Whitehead himself in many of his statements.

For the sake of clarity it may be helpful to mention at the outset a theme that runs throughout my interpretation of Barbour's interpretation of process philosophy. I suggest that on the three substantive issues—life, mind, and divine influence—Barbour's interpretation blunts the distinctive position of process philosophy. The main reason for this, I believe, is that Barbour's thinking and even more his rhetoric have been influenced by the polemics of modern physicalists against modern vitalists and dualists, and the polemics of modern atheists against modern supernaturalists.

Given the mechanistic, nonorganismic view of nature which is characteristic of modern thought, the rejection of a reductionistic interpretation of the world necessitates a dualistic view of the world and a supernaturalistic view of divine activity in the world. An organismic view of nature, at least of the Whiteheadian type, allows this modern debate to be transcended by providing a doctrine of emergence that is nonreductionistic without being dualistic, and a doctrine of the God-world relation that allows for genuine divine influence without being supernaturalistic. However, from the viewpoint of physicalists, an organismic view is as objectionable as a dualistic view since both views speak of higher-level entities or processes which

cannot be described in strictly physical terms and cannot be reduced in principle to lower-level entities or processes. Most physicalists are not able to take an organismic view of elementary particles seriously and seem to consider organismic philosophy to be simply dualism by another name. Hence, the polemics of physicalists, even if justified in terms of the problems inherent in any form of dualism, are generally couched in terms that apply to organismic philosophies as well. Likewise, a nonsupernaturalist doctrine of divine influence is as objectionable to atheists as a supernaturalistic view since both views speak of a nonlocal causal power which is not susceptible to scientific study. Most modern atheists are not able to consider seriously a view in which worldly processes are *naturally* open to divine influence and consider any appeal to that influence to be by definition an appeal to "the supernatural." Hence, their polemics against the idea of supernatural interventions are usually phrased so as to apply equally to a nonsupernaturalistic view of divine influence.

On each of these substantive issues I suspect that Barbour's formulations have been unduly influenced by the modern debates between reductionists and dualists and between atheists and supernaturalists, both of which debates process philosophy transcends. As a result, process organicism is portrayed as more "modern" and hence less "postmodern" than it is—to employ a distinction that I have developed elsewhere (Griffin 1985; 1986; 1987). Likewise, I believe that the distinctive position of process organicism on these substantive issues should lead to a postmodern view of the nature of science and hence of its relation to theology and metaphysics. I hope with this essay to lure Barbour and others in this direction.

EMERGENCE AND LIFE

The debate about the nature of emergent entities, and about the virtually identical question of the relation of wholes to their parts, has been among the most heated in theoretical biology. There are four major positions.

First, *ontological reductionists* claim that there is no emergence to speak of: that the whole is nothing but the sum of its parts. These thinkers may or may not also be *methodological reductionists*. If they are, they would claim that, in principle and so perhaps in the future, theories about wholes (e.g., molecules) could be reduced to theories about their parts (e.g., electrons and nucleons). However, one can reject methodological reductionism and still be an ontological reductionist, maintaining that nothing new emerges in reality, but that the sheer quantity and complexity of aggregates makes the reduction of biology to chemistry, and of chemistry to quantum physics, impossible.

In this view there is nothing wrong with the ideal of methodological reductionism in principle, but we can never hope to realize this ideal, due to invincible human ignorance.

Second, those whom I call *relational emergentists* say that no new *entities* emerge, but that new *relations* among them do. Thus, in a limited sense a whole is more than the sum of its parts in that it contains relations that the parts in isolation obviously would not have. It is suggested that life can thereby be accounted for without positing any new entities: it is a relation that emerges out of the incredible complexity of molecular relationships constituting cells. Relational emergentists hence reject methodological reductionism and are somewhere between those who strongly affirm and those who strongly reject ontological reductionism. In comparison with either vitalism or process organicism (to be explained below), relational emergentism is still *very* reductionistic. By rejecting the idea that emergence ever involves the emergence of higher-level actualities, relational emergentism implies that all wholes can be satisfactorily understood in terms of their subatomic particles and the relations among them. The words *atoms*, *molecules*, *macromolecules*, *organelles*, and *cells* do not refer to actualities or individuals, but only to more or less complex patterns of relations among subatomic particles. The only actual entities or true individuals in a living being would be those at the level of electrons, protons, and neutrons—or perhaps at the level of quarks.

Third, *vitalists* hold one or the other of the first two positions up through molecules but say that life cannot be thus explained. It requires the emergence of a new force, principle, or substance different in kind from any of the entities or relations constituting the nonliving world. Vitalism is hence a form of *ontological dualism*.

Fourth, whereas the debates have usually ranged among those three positions, Whiteheadian-Hartshornean *process organicism* offers a fourth position which was only partially anticipated by previous forms of organicism. It agrees with relational emergentism in stressing the reality of relations and the fact that the relations within all wholes give rise to emergent properties which make ontological reductionism false and hence methodological reductionism a false ideal. However, process thought distinguishes between two kinds of “wholes” which relational emergentism usually lumps together: those in which a new, higher-level entity emerges (Charles Hartshorne calls them “compound individuals”) and those in which this does not occur. These latter, nonindividuated (“corpuscular” or “democratic”) societies fit the description given to *all* wholes by the relational emergentists. Yet the compound individuals are regarded as including higher-level events which are distinct (although not separate) from the lower-level events

and equally actual. For example, besides the molecules in the living cell there are also “living occasions” which are just as actual. In this respect process thought agrees with vitalism.

However, process organicism differs from vitalism on three key points. First, living occasions are not thought to be ontologically different from so-called nonliving ones, but only different in degree (a position that is in harmony with the discovery of intermediaries between “ordinary” molecules and living cells such as macromolecules, viruses, and organelles, which makes it virtually impossible to draw a line between living and nonliving things). Second, one implication of this nondualism is that living occasions do not operate by a different causal principle from nonliving ones, that is, by final causation instead of by efficient causation (as most vitalists have held). *All* occasions include an element of both efficient and final causation; living occasions differ in this respect only in that final causation or self-determination plays a large role. A third difference from vitalism is that the emergence of life is not unprecedented; it is only one instance of a general pattern exemplified by other compound individuals. That is, the emergence of living occasions in the cell does not differ in kind from the emergence of “atomic occasions” in the atom and “molecular occasions” in the molecule (and the “dominant occasions” in the animal—to be discussed later).

Accordingly, while agreeing with the vitalists that the reductionists and relational emergentists cannot adequately account for the emergence of novelty, process thought does not have the features that have made vitalism problematic. It does not posit an *ontological dualism* which would make interaction between living and nonliving entities unintelligible; it does not introduce a *vital force* which is not subject to efficient causation; and it does not violate the *principle of continuity* presupposed and supported by evolutionary theory and research. The mere fact that process thought has one feature in common with vitalism—the idea that living cells contain higher-level “actual entities” than molecules—does not make it an instance of vitalism. Nor is the fact that it shares this one feature with vitalism sufficient to prove that it should be rejected: one would have to give an independent argument (i.e., one that does not invoke the horrors of vitalism) as to why this particular doctrine is false, or at least harmful.

I am taking pains to stress this point because I suspect that Barbour’s treatment of this issue has been influenced by the widespread repugnance with which any position having *anything* in common with vitalism is regarded by theoretical biologists and philosophers of science.

Barbour’s concern is to develop a position that affirms (versus mechanistic reductionism) the novelty and uniqueness of life and hu-

manity without positing any ontological gaps in the order of nature (Barbour 1966, 6, 8). He agrees with Whitehead and Hartshorne that the unique kind of entity postulated by vitalism to account for the special characteristics of living things would constitute an untenable ontological gap (Barbour 1966, 7). Yet Barbour's formulation of his nonvitalistic position, which he intends as a development of the views of Whitehead and Hartshorne, can be read as a statement of the position that I have termed *relational emergentism*. For example, in discussing molecules, he writes: "New wholes do not of course contain any mysterious entities in addition to their parts, but they do have distinctive principles of organization as systems, and therefore exhibit properties and activities not found in their components" (Barbour 1966, 297). The pejorative reference to "mysterious entities" can be taken as a rejection of the distinctive "molecular occasions" affirmed by Whitehead and even more clearly by Hartshorne.

Barbour's description of life seems also to exemplify relational emergentism. He says, "life is a type of organization, not an entity or a substance," and quotes with approval this principle: "Living things are ordinary chemicals organized in extraordinary ways" (Barbour 1966, 326). Furthermore, he not only says that his own "organicism" agrees with mechanism in rejecting "all nonmaterial vital agents" (Barbour 1966, 326), which by itself could be taken merely as a rejection of vitalism's dualism between wholly material and wholly nonmaterial agents. He also denies that there is a "distinctive entity" in the cell that is the locus of life (Barbour 1966, 324, 326), which seems to exclude Whiteheadian living occasions as well.

As I pointed out earlier, the crucial difference between process organicism and relational emergentism is that only the former clearly distinguishes between *compound individuals*, in which a higher-level actuality emerges, and *nonindividuated wholes*, whose emergent properties can be understood adequately in terms of the relations among their parts. In process organicism there is an organizational duality between these two types of "wholes"; in relational emergentism, there is at most a difference in degree. Barbour seems at one point to imply that the position of process organicism is no different from that of relational emergentism by apparently endorsing J. L. Woodger's analogy between an iron padlock and a living organism: the padlock is still composed of nothing but chemical elements, but it can no longer be described adequately by chemical concepts alone, since it now has an organization above the chemical level. "In the same way," Woodger asserts, an organism is still a chemical entity although it cannot be fully described in chemical terms. Because Barbour states that Woodger "endorses the thesis of process philosophy that activity and not matter,

relationships and not objects, processes and not components, are fundamental," he gives the impression that Woodger's analogy between a padlock and an organism is consistent with process organicism (Barbour 1966, 329-30).

This same tendency to suggest that the difference between nonindividuated aggregates (such as machines) and individual organisms is merely one of degree is shown by Barbour's suggestion that there would be some degree of mentality and hence freedom in stones and computers (Barbour 1966, 347, 354, 357). Whitehead and Hartshorne by contrast would say that there is some mentality and hence freedom in the molecules making up a stone or a computer, but none in the stone or computer as such.

The tendency of Barbour to write in a way more suggestive of relational emergentism than of process organicism is also manifested in some obfuscating language in a discussion of parts and whole. For example, he says that in emergence "there are no separate entities or substances at higher levels" (Barbour 1966, 313). However, the question at issue between process organicism, on the one hand, and reductionism and relational emergentism, on the other, is whether *distinct* entities emerge at a higher level, *not* whether there are *separate* entities. Since Barbour does not make this distinction, it is easy to read his statement in a reductionistic way. Also, he says that we can speak of the mutual influence of part and whole "without implying that the whole is somehow an entity existing independently of the parts" (Barbour 1966, 335). Yet the question at issue between process organicism and the reductionistic forms of nondualism is whether there is a whole *distinct* from the parts, so that it can act back upon them, *not* whether it exists *independently* from them. Barbour's obfuscating language can easily give the impression that he is rejecting the distinctive position of process organicism as well as that of vitalism.

Because Barbour explicitly endorses process organicism and yet enunciates a position that often seems to coincide with relational emergentism, it would be easy for the reader of his book to conclude that process organicism is simply a version of relational emergentism, and hence simply a tempered form of reductionism.

This impression can be reinforced by Barbour's treatment of reductionism. Although he says that reductionism is impossible, most of his statements about the impossibility of reductionism refer only to *methodological* reductionism which is the question as to whether laws, concepts, and theories applying to higher organizational levels can be reduced to lower-level laws, concepts, and theories (Barbour 1966, 7, 269, 273, 326). Many people who think that the complexity of organisms makes methodological reductionism impossible in fact such as

Ernst Nagel and Morton Beckner (whom Barbour quotes in this regard [Barbour 1966, 328, 331]) are ontological reductionists, believing that all causal power is *in principle* analyzable into the causal power exercised by the most elementary parts of every whole. Hence, Barbour's rejection of methodological reductionism could be consistent with an affirmation of merely relational emergentism. A passage in which he suggests that methodological reductionism is impossible because the concept of levels can be taken "metaphysically with the process philosophers" (Barbour 1966, 337) can, given Barbour's failure to distinguish clearly between process organicism and relational emergentism, be taken merely to mean that methodological reductionism is made impossible by relational emergentism.

I think that Barbour really endorses process organicism, not relational emergentism, and that the several passages that suggest otherwise are to be explained in terms of linguistic concerns, misleading statements (for example, Barbour has agreed in a letter that his citation of Woodger's analogy of the padlock and the organism may be misleading), and influence from the modern consensus. However, before looking more closely at the question of Barbour's true position and why it is not formulated as clearly as it might be, we need to explore his treatment of the mind-body relation.

THE SOUL: INTERACTIONISM AND DUALISM

Most modern discussions of the relation of the mind, psyche, or soul (which terms are here used synonymously) to the body (or the brain in particular) begin with René Descartes' dualistic position. Partly from the desire to provide a basis for a clear separation between science and theology, Descartes defined mind and body as complete opposites and as essentially independent of each other. However, the need to connect his theory with our experienced reality forced him to allow interaction between mind and body. His own theory of the pineal gland as the semiphysical mediator between these two opposites was rightly rejected as *ad hoc*. Later philosophers solved the problem by appeal to divine omnipotence which can transcend mere impossibility: Thomas Reid said that God can simply make opposites interact, while Nicolas de Malebranche relied upon God to produce the appropriate effects in mind and body at the appropriate time to make them seem to interact. However, it was Gottfried Wilhelm Leibniz who suggested the doctrine that was widely adopted, namely, parallelism. (Although Leibniz was not a dualist himself, the fact that his monads were "windowless" made any real interaction between the dominant and the bodily monads equally impossible.) Mind and body were said to run along in parallel with each other so that, for example, when the hand was on the hot

stove the mind felt pain and the mind would decide to move its hand just before the hand was to move. Leibniz accounted for this parallelism by the supposition of a harmony preestablished by God at the time of creation. In less supernaturalistic thinkers the parallelism has remained a mystery.

The unintelligibility of dualism, once its supernaturalistic support system is removed, has led most modern philosophers and scientists to affirm the identity of brain and mind. What we call *brain* when regarding it from without is *mind* from within. Although a few identists are panpsychists, attributing experience or proto-experience to all levels of matter (e.g., Rensch 1977), most identists think of experience as an emergent property of matter, occurring only when matter is organized in that very complex way we call a brain (e.g., Feigl 1969). In any case, human experience is considered a property of the brain resulting from its complex relations. This is the relational emergentist's view of the mind-brain relation.

There were two key features of the Cartesian dualism which led to this mind-body problem. First, the mind was taken to be *numerically distinct* from the body: they were said to be *two* things. Second, the mind was taken to be *ontologically different* from the body: they were said to be totally different *kinds* of thing. Minds were said to think, feel, desire, and will, but not be extended spatially, while bodies (including brains) were said to be extended spatially but not to have any activities even remotely analogous to feeling, thinking, desiring, and willing. It was this second point, which stipulated that mind and body have nothing in common, that made causal interaction seem impossible. Although this second point of course presupposes the first, it is only if this second point is also affirmed that the term *Cartesian dualism*, or simply *mind-body dualism*, should be used. The term *dualism* should not be used for a position that affirms the first point but not the second. Mere numerical distinctness hardly merits the emotionally-loaded term *dualism*, since this term inevitably conjures up the problem of how two ontologically disparate entities can interact. The assertion that mind and body are numerically distinct does not by itself create problems about interaction any more than does the assertion that the cue ball and the eight ball are distinct. Indeed, interaction *presupposes* numerical distinctness.

Process philosophy affirms the first point (numerical distinctness) but not the second (ontological dualism). It thereby affirms nondualistic interactionism. The mind is distinct from the brain, but it is not an ontologically different *kind* of thing from the brain cells, which are in turn not ontologically different from their molecular constituents, and so on. Mind, cells, molecules, and electrons differ enormously in degree, but do not differ in kind. This idea presupposes a panexperien-

tialist position, that all actual entities have (or *are*) experiences. To adopt panexperientialism is to reject the basic ontological premise of modern thought in all its forms (Cartesian dualism, vitalism, materialism, personal and absolute idealism), that is, that the fundamental units of nature are devoid of experience and aim.

In the Whiteheadian version of this postmodern panexperientialism, every actuality is first something “within,” for itself—a subject; then it becomes something “without,” for others—an object. Hence, we do not have the problem of understanding how a “subject” can interact with mere “objects.” A mind in each moment (i.e., an occasion of experience in the life history of a mind) is first a subject which becomes an object; the same is true for each brain cell. The interaction of the mind and the brain cells is not unintelligible since each has the same kind of “stuff” (i.e., experiences) to share with the other.

Whereas Cartesian dualism had divided actual entities into purely physical ones and purely mental ones, Whitehead states that *every* actual entity is partly physical and partly mental. Yet this distinction between the physical pole and the mental pole of an actual entity is not the same as the distinction between the experiencability, objectivity or without of an actual entity and its experience, subjectivity or within. Rather, the physical and mental poles are two aspects of an entity’s experience. The physical pole is the experience insofar as it repeats the feelings it has received from others; the mental pole is the experience insofar as it exerts self-determination, and introduces novelty into its experience. Thus, Whitehead uses *physical* and *mental* quite differently from modern thought, which equates *mentality* with experience and which uses *physical* to refer to that which can be experienced through the senses (either directly or indirectly, via instruments) but is itself devoid of experience.

However, there is a distinction in process philosophy that answers to the ordinary distinction between mental (experiencing) and purely physical (nonexperiencing) entities. This is the distinction referred to in the previous section between compound individuals and nonindividuated societies. In the former, the organization of a host of lower-level individuals (e.g., animal cells) enables a higher-level individual (e.g., a psyche) to emerge. In a nonindividuated society, on the other hand, such as a stone, no higher-level individual emerges to give the object any experience or subjectivity as a whole. Thus, a stone *as such* is what common sense considers it to be in calling it purely physical, meaning by this devoid of experience.

Process philosophy differs from this common sense position only in holding that things such as stones that are devoid of experience are not actual entities and are not even good analogues for any actual entities.

It holds that the stone is *composed* of actual entities understood as momentary occasions of experience, which are first experiencing subjects (physical and mental) and then experienced objects. The stone *as such* is not both physical and mental; these terms are properly applied only to individual actual entities. In particular, it is erroneous to say that the stone has any mentality, since only experiences have mentality, and the stone as such has no experience. (Process philosophy's panexperientialism or animism is postmodern; it is not a premodern animism in which experience and aim are attributed to everything.)

Process philosophy hence has only an *organizational duality* (between individuated and nonindividuated societies), *not* an *ontological dualism* between two types of actual entities. Process philosophy thus differs from Cartesian dualism on the point that caused the latter's difficulty. However, the two philosophies agree that the mind and the brain are two *distinct* entities (although process thought would stress that the mind at each moment is a genuine individual while the brain, considered in abstraction from the series of dominant occasions constituting the mind, is an aggregate of billions of low-grade individuals). Accordingly, process philosophy *differs* from all those who deny the distinct reality of mind.

Although Barbour means to be explicating the position of process philosophy on the mind-body relation, he generally enunciates a form of relational emergentism. Similar to Whitehead and Hartshorne, he wants to avoid both dualism and reductionism (Barbour 1966, 269). He agrees that the way to do this is by beginning with a panpsychist (I prefer "panexperientialist") position. He identifies panpsychism with what he calls "universal parallelism," according to which all events have physical and mental aspects. (He contrasts this view with "limited parallelism," according to which some events are purely physical, with mental phenomena occurring only at the higher levels of organization, for example, in brains [Barbour 1966, 354].) He calls the view parallelism to stress that mentality and physicality run parallel with each other rather than interacting causally. Causal influence always occurs between one physical-mental event as a whole and another physical-mental event (Barbour 1966, 355). While the description of process organicism as parallelism might be misleading, given the historic connotations of the word, the discussion does not distort process philosophy as long as it is only mentality and physicality that are said to be run parallel without interacting.

However, Barbour extends the notion of parallelism also to the relation between brain and mind. He does this because, accepting much from those who appeal to the idea of complementarity, he says that *mind* and *brain* do not refer to two distinct entities but to *two aspects*

of the same set of events. These events are brain when viewed from without, but mind when experienced from within (Barbour 1966, 4, 7, 269, 293, 317, 343, 346, 440-41). Whereas Whitehead and Hartshorne state that all actual entities, including those occasions of experience constituting that personally-ordered society of occasions which we call the mind or soul, have both a physical and a mental pole, *Barbour identifies the mind with the mental and the brain with the physical*. Accordingly, his assertion that the mental and the physical do not interact means that *mind and brain do not interact*. Barbour thereby fails to portray the fact that process organicism, by allowing for nondualistic interactionism, shows how dualism can be rejected without falling into identism.

The conformity of Barbour's rhetoric with that of relational emergentism is close. He writes that, although there occur in human beings "patterns of organization with which physics and chemistry do not deal," and also "types of events which differ from any event that occurs in an isolated atom," human beings are nevertheless "composed of nothing but atoms" (Barbour 1966, 336). The first phrase within quotation marks reflects the position of relational emergentists on methodological reductionism. The second phrase recalls their claim that complex sets of relationships among parts allows properties and types of events to occur that do not occur in any of the parts taken in isolation. The third phrase suggests the ontological reductionism involved in the position, according to which no higher-level actualities emerge in wholes, even in those wholes we call human beings. This statement stands in strong tension with the position of Whitehead, according to which the human being, besides atoms, also includes molecules, cells, and a mind or soul, all of which are as fully actual as atoms.

Barbour's confusion of the position of process organicism on the mind-body relationship with that of relational emergentism, which is a form of identism, appears to follow from three more fundamental confusions. The first one has already been discussed in the previous section, that is, the fact that Barbour tends to equate the process doctrine of emergence with that of the relational emergentists, thereby ignoring the process distinction between individuated and non-individuated societies.

The second confusion is between dualism and interactionism. As I stressed earlier, a position should not be called dualistic unless it holds not only that the mind is numerically distinct from the brain, but also that the mind is an ontologically different kind of thing from the brain and its constituents. Nevertheless, Barbour repeatedly refers to the idea that the mind is (merely) distinct from the brain as dualistic,

thereby falsely assuming that interactionism must necessarily involve dualism (Barbour 1966, 309, 310, 351-52, 358). Barbour accordingly rejects the distinctness of the mind from the brain on the basis that this distinctness would mean an ontological gap (Barbour 1966, 8).

In at least one place Barbour does correctly define dualism as the view “that there are in the world radically contrasting kinds of entity which follow principles unrelated to each other” (Barbour 1966, 358). Yet in that very paragraph he reverts to the insufficient definition: “*Mind-Body dualism* represents mind as a distinctive entity interacting with matter in the brain” (Barbour 1966, 358-59, cf. 351-52).

The third confusion on which Barbour’s equation of process organicism’s position with that of relational emergentist identism appears to be based is a confusion of the physical and mental aspects of things with their within and without. That is, he takes *mental* to refer to awareness or experience, and *physical* to refer to things as known through our senses or instruments. On this basis he correlates what Whitehead calls the physical pole of experience with the brain as known from without and the mental pole with experience. As I stressed earlier, Whitehead’s distinction between the physical and mental refers to two aspects of an occasion of experience *in its subjectivity*; it is not to be confused with the distinction between the occasion as subject and the occasion as object for other subjects. Because Barbour does confuse the two distinctions, thereby using *physical* and *mental* as the dualist does to refer to what is objective and subjective, Barbour is led to identism.

ACTIVITIES AND ACTUAL ENTITIES

Thus far I have presented a one-sided reading of Barbour’s portrayal of process organicism, with which he identifies himself. This reading is perhaps the most natural reading of the book and it is compatible with most of the relevant statements in the book. However, it is a one-sided reading which does not reflect the entirety of Barbour’s interpretation of process organicism and hence his own position on emergence, life, and mind.

At the heart of the distinction between Barbour’s true intention and the above portrayal of him as a relational emergentist is the distinction between “activities” and “actual entities” (which I know in part thanks to a letter from Barbour in response to a previous draft of this critique). In speaking of higher-level activities or events, he means to be affirming the higher-level “actual occasions” spoken of by Whitehead and Hartshorne. That is, he means these higher-level events or activities to be no less real than the lower-level ones. When in the context of saying that higher-level events or activities emerge he denies that any higher-level *substances*, *beings*, *things* or even *entities* emerge, this denial does

not reflect any reductionistic intentions but only his conviction that these latter words suggest to most readers a nontemporalistic, static, substantialist conception of actuality. (I base this statement of Barbour's true intention primarily on the letter, but this intention is somewhat reflected in Barbour 1966, 359.)

Read in this light, the statements that seemed to suggest relational emergentism can be interpreted in accordance with process philosophy's view of emergence. Let us look again at the statement about wholes made in the context of a discussion of molecules: "New wholes do not of course contain any mysterious entities in addition to their parts, but they do . . . exhibit properties and activities not found in their components" (Barbour 1966, 297). In the light of the new reading, the rejection of "mysterious entities" is meant to be only a rejection of static, non-Whiteheadian substances, not of molecular occasions in Whitehead's sense. In fact the reference to new "activities" is meant as an affirmation of molecular occasions. That this is Barbour's intention is made clearer by his endorsement of Whitehead's view that there are unitary "atomic events" and "unified events also in aggregates of atoms having *higher levels of organization*" (Barbour 1966, 451). He points to the Pauli exclusion principle (rightly, in my view) as empirical evidence of the power of wholes over their parts (Barbour 1966, 295-99, 333). Likewise, upon this reading, the assertion that life is only a type of organization among molecules, not an "entity or substance" (Barbour 1966, 326), is not meant as a rejection of Whiteheadian "living occasions." Finally, when Barbour says that human beings are "composed of nothing but atoms," with no other "entities or spatial 'wholes' as such" (Barbour 1966, 336), he does not mean to deny Whiteheadian "dominant occasions." Indeed, he means to refer to them in saying that "there occur in man *types of events* which differ from any event that occurs in an isolated atom" (Barbour 1966, 336). Barbour's intention is clearer in a passage in which he speaks of human experience as "an integrated event" involving "unitary organization at a higher level" (Barbour 1966, 314). He endorses Whitehead's view that it is the "individual moments of experience in integrated systems—and their analogues at lower levels—that are the locus of creativity" (Barbour 1966, 451).

In compliance with this reading of Barbour's interpretation of process organicism is his explanation and endorsement of the Whiteheadian-Hartshornean distinction between societies such as stones, whose members are all on the same level, and in which there is "no subjective experience as a whole," and those that have "radically dominant members" which give their societies a unified subjective experience (Barbour 1966, 334, 450-51). Also in accord with this read-

ing is the fact that a few of Barbour's statements about reductionism indicate that he does not merely deny the possibility of methodological reductionism (of higher-level theories to lower-level theories), but that he bases this denial on an organismic view of reality, according to which there are various levels of being understood as levels of "activity" (Barbour 1966, 327, 336, 337). The clarification that a higher level of *activity* can mean what Whitehead means by a higher-level series of *occasions of experience* makes clear that the ontological basis for the denial of methodological reductionism is not merely relational emergentism.

If this is indeed how Barbour means his interpretation of process philosophy and his own position to be understood, then he needs to make several changes so that the clear distinction between this view and that of relational emergentism will be consistently communicated. If he holds that individuated societies are categorically different from corpuscular societies in which there is no dominant member and hence no unifying experience, he should not imply that stones and computers are different from human beings only in degree in regard to the capacity for mentality and freedom. (Barbour has already agreed to this point in the aforementioned letter.) Likewise, he should make clearer not only that methodological reductionism is impossible because ontological reductionism is false, but also that it is false in a categorically different way for a dog or a human being than it is for a stone or a computer. Also, he should not suggest that mind and brain refer simply to the same events considered from within and from without, and that mentality in the Whiteheadian sense can be correlated with the mind while physicality can be correlated with the body (or brain). He should avoid the term *parallelism* as misleading since it suggests that mind and brain do not interact. In the same vein, he should not suggest that the idea that the mind is distinct from the brain and interacts causally with it is sufficient to characterize Cartesian dualism. He should avoid as extremely misleading the idea that a human being or any other animal is composed of nothing but atoms, and even that life is nothing but ordinary molecules organized in an extraordinary way. Furthermore he should avoid the pejorative rhetoric about "mysterious entities" that has its natural home in the polemics of reductionistic materialists or relational emergentists against dualistic and organismic philosophies, but is misleading from the pen of one who affirms the Whiteheadian view that higher-level actual occasions emerge.

Whereas I believe that much of the apparent confusion in Barbour's book is due to his adoption of the language belonging to more reductionist schools of thought, some of it is due to Barbour's deliberate

decision to avoid the terms *entities* and *things* (and for the most part *beings*) for the higher-level actual occasions, using instead the less substantialist sounding terms *events* and *activities*. I agree with Barbour that the terms *thing* and *entity* in our culture tend to suggest a static, substantialist, nontemporal, nonrelational view of actuality, so that such terms must be used with great care.

However, I find Barbour's way of responding to this problem misleading. By saying that the formation of wholes such as living cells and human beings involves the emergence of no new thing or entity but (only) of new events or activities, Barbour can easily be read as implying that the parts (such as the atoms) *are* things or entities in a sense in which the higher-level activities are not. The parts hence seem to have an actuality that the whole does not have. For example, when he says that the human being is composed of nothing but atoms, that there are no other entities, the impression given is that the atoms *are* entities in a way in which the activities constituting the life of a cell and the experiences constituting the mind are not. This inevitably gives rise, contrary to Barbour's meaning, to a reductionistic reading of him as a relational emergentist. Barbour's solution also appears to be a violation of the Whiteheadian ontological principle that only actual entities act in that Barbour appears to be speaking of higher-level activities that do not imply higher-level actual entities.

Barbour's meaning, in agreement with that of Whitehead, is that there are *no* actual entities that are not events or activities. (Not all events and activities are unified actual entities, but all actual entities are events or activities.) If that is the case, then the conventional connotation of the terms *actual thing* and *actual entity* needs to be reformed. Whitehead's strategy was to accomplish this by using the term *actual entity* interchangeably with terms such as *actual occasion*, *occasion of experience*, and *epochal event*. He thereby drove home the point that the old conception of an actual entity as an enduring substance was wrong, that an occasion of human experience "is its own standard of actuality" (Whitehead 1978, 145), so that any actual entity *is* an occasion of experience, to be understood by analogy with a moment of human experience. Yet Barbour, by refusing to use the term *entity* for a moment of human experience, loses this basis for reforming the meaning of the term.

In summary it seems to me that Barbour's intentions to avoid reductionism as well as dualism, and to overcome the static view of actualities at all levels, would be better served by affirming that higher-level actualities do emerge in some types of wholes.

I turn now to the other issue at the center of Barbour's discussion, the role of God in the world.

GOD OF THE GAPS AND A GOD-SHAPED HOLE

Since its use by Dietrich Bonhoeffer, *God of the gaps* has appeared often in theology. The idea to which the term refers is always taken to be a discredited one. The term arose in relation to the portrayal of theology since the seventeenth century as repeatedly supporting belief in the existence and present efficacy of God by positing God as the cause of a particular phenomenon for which contemporary science had no explanation, then retreating to another alleged gap in our scientific knowledge when the previously exploited one was closed by the advance of science. A paradigmatic example was provided by Isaac Newton's appeal to God as the source of the occasional readjustments in the course of the planets required by his faulty calculations; Pierre-Simon Laplace's later calculations removed this need for divine corrections. Other examples have been the alleged need for a special creation of life and of the human soul (Barbour 1966, 1, 53). This widely accepted portrayal of a series of undignified retreats (e.g., Küng 1980, 330, 332-33, 646, 649) has led many theologians to the view that the idea of God should not be used to explain *any* otherwise inexplicable features of the world since any such appeal appears to be only one more example of a procedure that has been repeatedly discredited.

Yet this decision seems to be self-defeating: if the appeal to God does not help illumine some area or feature of our experience that is less intelligible apart from reference to God, why talk of God at all? This could be considered modern theology's central dilemma: its talk of God is either dismissed as groundless and superfluous, or it is indicted for referring to a God of the gaps. This dilemma raises the question as to whether there might be a valid distinction between a "God of the gaps" and a "God-shaped hole." That is, could a world view have a God-shaped hole in it, pointing to the need to speak of divine activity that would differ in principle from the kind of gap properly referred to in the phrase "God of the gaps"? And if so, would reference to such a God necessarily be beyond the purview of "science"?

In Barbour's treatment of God's relation to the world, he makes clear through numerous references that he rejects those theologies that have a God of the gaps (Barbour 1966, 1, 53, 268, 380, 386, 390, 414). One such theology would be that affirmed by many Roman Catholics, according to which some events have no natural cause at all but only a supernatural one (Barbour 1966, 374-75, 380). Such events would be gaps in the natural order and would necessitate gaps in natural science's explanation of the world (since *natural* science by definition cannot deal with the *supernatural*). Yet the rejection of a God of the gaps can also be read as having a more sweeping meaning in some passages. It is said to mean the acceptance of secularization, which entails that *any*

theological ideas such as ideas about divine purpose are to be excluded from the scientific account of the world (Barbour 1966, 50, 59, 112, 383). This is more sweeping since it seems to exclude reference not only to supernatural divine causation that is thought to supplant natural causes, but to *any* divine causation whatsoever, no matter how it is thought to be related to worldly causes.

In line with this more sweeping exclusion Barbour rejects any appeal to God based on phenomena alleged to be *inexplicable* scientifically (Barbour 1966, 1, 112, 390, 414, 416). Substantively or theologically, the point behind this exclusion is that God does not operate “on the same level as natural forces,” nor produce “effects on the same level as natural causes” (Barbour 1966, 1, 112). Methodologically, the point is that science and religion ask different questions (Barbour 1966, 51, 224, 248).

However, these sweeping statements are in tension with Barbour’s affirmation of Whitehead’s ideas about divine influence. My critique in the previous sections concerned the correctness of Barbour’s characterization of process organicism on life, emergence, and mind. In regard to the God-world relation, I believe that Barbour correctly interprets process thought, but that he fails to bring his critical and methodological statements in the rest of the book into harmony with his advocacy of process ideas.

One place the tension appears is in Barbour’s endorsement of Whitehead’s view, according to which God is “one influence among others” (Barbour 1966, 442). Here it sounds as if God does indeed, in some sense, operate on the same level as natural forces, and produce effects on the same level. Furthermore, Barbour speaks of “signs” of God’s activity in the evolutionary process (Barbour 1966, 450). In particular he explicates the Whiteheadian God as the source of order and of novelty. He states that God is the answer to the questions, “why does the world have the particular type of order it has?” and “why do new kinds of things come into existence?” (Barbour 1966, 440, 441). These seem to be questions that are “incapable of scientific explanation,” and “inexplicable” apart from references to God. Barbour’s endorsement of Whitehead’s view seems to be an example of the God of the gaps rejected elsewhere. For example, Barbour criticizes LeComte Du Noüy for basing belief in God’s efficacy partly on the argument that chance alone could not explain evolution (Barbour 1966, 386). Yet the difference between Du Noüy’s appeal to God to explain the otherwise inexplicable, which Barbour criticizes, and that of Whitehead, which he endorses, is not obvious.

Barbour is aware that there is some tension, at least in appearance, between his strictures against a God of the gaps and his affirmation of

process philosophy's appeal to God to explain order and novelty. He asks whether it is possible to affirm divine activity without introducing dubious gaps, and whether process philosophy is guilty of simply replacing a few big gaps with many little ones (Barbour 1966, 386, 418, 463). However, Barbour's attempt to defend the Whiteheadian doctrine as not objectionable on these grounds shows the need for a more thorough explanation, and for qualifications of his sweeping rejection of every doctrine that has been dismissed as a God of the gaps.

Barbour's first defense involves a rejection of the modern assumption that scientific explanations in terms of natural causes provide sufficient explanations. Barbour states: "scientific laws are always selective and abstractive and often statistical" (Barbour 1966, 463). Barbour's point seems to be that scientific explanations, insofar as they are couched in terms of laws, do not give an exhaustive and hence sufficient account of the causes for any event. The implication is that divine causality could be among those sufficient causes for all events from which the scientific account abstracts. If this is his meaning, he should not have agreed with those who use the pejorative term *God of the gaps* to dismiss *all* appeals to divine causation to explain phenomena that are inexplicable scientifically (Barbour 1966, 390, 414).

Barbour's second defense of Whitehead is that his God's contribution "can never be separated out" because this God "always acts with other causes" (Barbour 1966, 463). I think Barbour's point is that in a Whiteheadian account divine causation never supplants finite causes so that there is never any interruption of the natural cause-effect nexus, never any events thought to occur without natural causes. If so, I agree that this feature makes the Whiteheadian account different from those accounts that gave rise to the term *God of the gaps*. However, Barbour's endorsement of the rejection of all appeals to a God of the gaps should have been more nuanced from the beginning.

I believe the distinction needed by Barbour to overcome the apparent inconsistency in his position on this point can be called the distinction between a "God of the gaps" and a "God-shaped hole." Any system of thought that required God would have a God-shaped hole in it, but only some of these systems would be guilty of having a God of the gaps. There can be a God-shaped hole that is not filled by a God of the gaps. I will seek to make this distinction clear.

The idea of a God of the gaps arose in the context of medieval and early modern theologies in which it was assumed that *most* events could be fully explained (in principle) without any reference to God, except as their "primary" cause. This primary causation was held to occur on a different level from the natural or "secondary" causes, so it did not need to be invoked except when a different kind of question was being

asked. For example, why does this sequence of events exist at all? When not dealing with such ultimate questions, reference to God's input was not necessary since God was not one cause among others but worked through the created natural causal order. God's causation was needed not to explain the "whatness" of an event but only its "thatness." However, it also originally belonged to this scheme that there were a few exceptional events, that is, "miracles," which God chose to cause directly without employing any secondary causes. God was the source of their whatness as well as of their thatness. Hence, from the point of view of the science of secondary causes, these events appeared to be causeless—there seemed to be a gap in the causal order. The appeal to God was here the appeal to divine causation as, first, occasionally working in a way that is different in principle from the usual divine *modus operandi*; second, interrupting the normal natural order by supplanting the natural causes altogether; and third, as sometimes producing effects that could in principle be produced by natural causes (such as the conception of a child, or the overcoming of the power of gravity). For these reasons the resulting being has been aptly named the *God of the gaps*. This God's activity was definitely supernatural; it was in no sense part of the natural order of things.

Whitehead's understanding of the relation of God to the world is quite different. In his postmodern metaphysics, *no* individual event's whatness can be accounted for apart from God's influence, for this influence is the source of every actual entity's "initial aim," out of which it fashions its "subjective aim." Thus, in one sense God's causation is on the same level as other causes, since it is partially responsible for the whatness of events. In another sense it is not since God supplies *what no finite event could in principle supply*, the basic order among possibilities, and an aim toward a novel possibility, for example, one that has never been actualized by worldly actualities and hence is not among their repertoire to proffer. God's causation is the same in principle for all events: God supplies them with an initial aim. Thus, there is a God-shaped hole in this metaphysics: God is needed to account for certain features of our experience and of the world in general. But the resulting concept of God should *not* be called a God of the gaps, despite some superficial resemblances. For this concept differs on the three points mentioned previously. In this Whiteheadian view, divine activity is regarded as *never* differing in kind from the usual divine *modus operandi*, as *never* interrupting the normal natural order (the worldly causes are *never* supplanted), and hence as *never* producing effects that could in principle be produced by finite agents. Accordingly, the appeal to God to explain otherwise inexplicable features of the world is not an appeal to any gaps in the normal order of things nor to a gap in

our present knowledge of finite causes that might in the future be filled.

Given this type of distinction, so that there can be a God-shaped hole that is not a God of the gaps, philosophers and theologians can reject every form of appeal to a God of the gaps without renouncing in advance every possible reason for speaking of God at all. I suspect that an intuition of this fundamental distinction lay behind Barbour's apparently contradictory statements. Bringing out this distinction explicitly would prevent the appearance of inconsistency.

SCIENCE, THEOLOGY, AND METAPHYSICS

Thus far I have discussed only Barbour's interpretation of process metaphysics and theology and the consistency of his endorsement of process thought with his other statements. However, Barbour's book is primarily about the *relationship* of theology and metaphysics to science. I conclude this critique by asking whether the interpretation of Whiteheadian organicism on life, mind, and God offered above would not lead to a position on the relationship of science to theology and metaphysics that differs somewhat from that suggested by Barbour. I should add that Barbour's treatment of this topic throughout the book is in general a sound and insightful one to which we are greatly indebted. I am raising a question about only one detail, although I think not an unimportant one.

There are two tendencies in Whitehead's statements about the relationship between science and metaphysics, one more conservative, one more radical or revisionary. In both tendencies metaphysics is portrayed as the "critic of abstractions," and modern science's account of the things it studies is portrayed as a selective abstraction based on limited interests, methods, and categories of thought. In the conservative tendency that fact that science abstracts from the full concreteness of the things it studies is all right if this abstraction is recognized. It becomes pernicious only when science becomes scientism, which involves the "fallacy of misplaced concreteness," in which the scientific descriptions are taken to be in principle exhaustive. As long as this pernicious positivism is avoided so that metaphysics is allowed to supplement the scientific account by including it in a larger synthesis, science as it has been practiced in the modern world is not in principle subject to criticism.

Barbour follows this conservative Whiteheadian view, referring to the fallacy of misplaced concreteness (Barbour 1966, 36-37), and quoting the passage in which Whitehead states that science's inability to find any enjoyment, aim, or creativity in nature is inherent in its methodology (Barbour 1966, 346). In line with this conservative side of White-

head's thought, Barbour suggests that metaphysics makes no contribution to science (Barbour 1966, 461). Although he has a section entitled "Derivations of Theology from Science" (Barbour 1966, 131-34), he has no corresponding section on derivations of science from theology.

However, there is a more radical or revisionary side to Whitehead's thinking about the relationship of science to metaphysics. He writes that he asks his questions about the most adequate categories of thought "in the interest of science itself," not believing that its categories are irreformable (Whitehead 1926b, 121). He also states that science cannot be sheltered from theology and that neither of them can be sheltered from metaphysics (Whitehead 1926a, 76-77). One could take these statements to imply that the methods and categories of science itself could and should be reformed, so that it *could* come to speak of enjoyment, aim, and creativity—in other words, so that it could employ the categories of subjectivity, not simply those of objectivity. If every individual event is for itself a moment of experience, as Barbour agrees with Whitehead in holding (Barbour 1966, 343-46), why should the enterprise that we call science be forever barred from saying this?

One possible reason for excluding all categories of subjectivity from science would be based on the desire for a unified science combined with the characteristically modern belief that purely objective categories are alone appropriate for the objects studied by physics and chemistry. Given this belief, a unified science of existence is impossible unless all things can be adequately described without resort to any categories of subjectivity such as purpose, will, desire, or awareness. Jacques Monod (1972, 21) reflects this position as indeed do most modern scientists and philosophers (except for vitalists and other dualists). Yet this position is not at all endorsed by Barbour, given his acceptance of panpsychism. Panpsychism (or panexperientialism) allows in principle for a unified science in which the categories of subjectivity and objectivity are both used for all individual events.

Barbour does not develop this possibility but says instead that science restricts itself to the external side of things leaving the internal side to metaphysics (Barbour 1966, 343, 346). This restriction is fully in accord with Barbour's endorsement of Whitehead's statement that it is inherent to the methodology of science that it does not speak of enjoyment, aim, and creativity.

The problem with this demarcation between science and metaphysics is the one already noted by Whitehead: bringing mind within nature entails that nature cannot be fully described without the categories of subjectivity. Treating psychology as a natural science means that the purely objectivist categories of modern science are not

sufficient for all of science. Barbour implicitly agrees since he rejects the claim of behaviorists that, if psychology is to be a genuine science, it must limit its categories to those referring to publicly observable events (Barbour 1966, 353-54). What Barbour evidently does not notice is that his endorsement of a nonbehaviorist science of psychology implies a denial of his assertion that science can only deal with the external side of things. Barbour's recognition that any adequate psychology must use the categories of thinking and feeling means that a science *can* refer to the internal side of things.

Furthermore, if human psychology can deal with feeling and thinking and hence with events in their subjectivity and still be a science, what reason is there, given a nondualistic ontology, for making it the one exception? Animal psychology can do without the categories of subjectivity such as desire, emotion, purpose, and awareness, little better than can human psychology. If a purely behaviorist approach is inadequate for chimpanzees and dogs, what reason is there for drawing a line somewhere below which a purely behaviorist approach is declared to be adequate in principle? If a purely externalistic, behaviorist science of human beings is inadequate, and a human being is only different in *degree* (however greatly) from a cell or an atom, then a purely externalistic approach to a cell or an atom is also inadequate (even if less so). Of course, the further removed organisms are from human beings, the less we can say anything concrete about their subjectivity. Under this postmodern conception of science, we would not have to try to understand the behavior of the objects studied by physics and chemistry and the simpler objects of biology *on the basis of the assumption that they have no subjectivity at all*. That by itself would have a major effect on the practice of science. Another effect would be to remove the defensiveness still associated with the use of subjective categories in describing the behavior of high-level organisms such as gorillas. Another effect would be to help overcome the anthropocentrism that will inevitably persist as long as categories of subjectivity are thought appropriate for human beings alone.

I turn now from the question of the treatment of life and mind by science to that of the idea of divine causality and science.

It has been increasingly accepted since the early days of the Royal Society that natural science (or natural philosophy, as it was then called) should exclude all talk of God. This exclusion was originally made partly for political reasons, as theological and political issues were closely intertwined. It was also based in part on the then reigning understanding of God, which was, at least in large part, a God of the gaps. The activity of such a supernatural agent clearly had to be eliminated from the descriptions and explanations offered by a science

of nature. However, now that the political situation has changed, and now that the supernaturalistic understanding of God is so widely discredited in intellectual circles, is it not possible to question the dogma that science cannot speak of God? If it is true (let us assume, for the sake of argument) that the novelty in the world is due in part to the causal influence of a universal agent with an aim towards novelty, why should science describe itself so as to rule out inclusion of such an agent in the scope of scientific theory? At least, if scientists *qua* scientists see it as part of their task to explain the origin of novel forms in the evolutionary process, why should some theories be considered acceptable in principle while one of the alternative theories is ruled out of the discussion in principle, even though it does not contradict any of the essential presuppositions of scientific method? Should the mere fact that the postulated agent is thought worthy of worship by some people, and hence deserving of the name *God*, rule out this agent from being discussed in scientific discourse?

If the agent which is called *God* by Whitehead and others does not have the features that first led to the dictum that science cannot deal with God, there is no more reason for applying this dictum to this agent than there would be to rule out any talk of gravitation if some religious group arose which referred to it as *God*. If a rose by any other name would smell the same, a power with or without the name *God* will create the same effects. If science aims at the most complete understanding of reality possible, then it should not, because of names and past dogmas, cut itself off from consideration of any agent for which there is some evidence.

Of course this suggestion points to the overcoming of the division, which arose at the beginning of the modern era, between science on the one hand, and metaphysics and natural theology, on the other. It may indeed be possible to formulate a clear distinction between science and the other two (see, e.g., Sheldrake 1981, ch. 12), and there may be good reason to maintain the distinction. However, the distinction and the reason for it need to be freshly thought through in terms of revised, postmodern understandings. The distinction should not be maintained simply because of received dogmas and the false assumption that the referents of such terms as *nature*, *causation*, *God*, *science*, *natural theology*, and *metaphysics* have remained unchanged.

REFERENCES

- Barbour, Ian G. 1966. *Issues in Science and Religion*. Englewood Cliffs, N.J.: Prentice-Hall.
- Feigl, Herbert. 1969. "Mind-Body, *Not* a Pseudoproblem." In *Dimensions of Mind*, ed. Sydney Hook. New York: New York Univ. Press.
- Griffin, David Ray. 1985. "Creativity in Post-Modern Religion." In *Creativity in Art, Religion and Culture*, ed. Michael Mitias, 64-85. Amsterdam: Editions Rodopi B.V.

- _____. 1986. "Faith and Spiritual Discipline: A Comparison of Augustinian and Process Theologies." *Faith and Philosophy* 3 (Jan.): 54-67.
- _____. 1987. "Of Minds and Molecules: Medicine in a Psychosomatic Universe." In *Towards a Process Theory of Medicine: Essays on a Post-Modern Medicine*, ed. Marcus P. Ford. Lewiston, N.Y.: Edwin Mellen Press.
- Küng, Hans. 1980. *Does God Exist? An Answer for Today*. Trans. Edward Quinn. Garden City, N.Y.: Doubleday.
- Monod, Jacques. 1972. *Chance and Necessity*. New York: Vintage Books.
- Rensch, Bernard. 1977. "Arguments for Panpsychistic Identism." In *Mind and Nature: Essays on the Interface of Science and Philosophy*, ed. John B. Cobb, Jr. and David R. Griffin. Washington, D.C.: Univ. Press of America.
- Sheldrake, Rupert. 1981. *A New Science of Life: The Hypothesis of Formative Causation*. London: Blond & Briggs.
- Whitehead, Alfred North. 1926a. *Religion in the Making*. New York: Macmillan.
- _____. [1925] 1926b. *Science and the Modern World*. New York: Macmillan.
- _____. [1929] 1978. *Process and Reality*. Corrected edition, ed. David Ray Griffin and Donald W. Sherburne. New York: Free Press.

Notice

Garland Publishing announces a series of introductory works on major theorists of myth—theorists from literature, religious studies, philosophy, anthropology, sociology, and psychology. Each volume in the series will be both an exposition and an assessment of the theorist. Since few, if any, theorists of myth are theorists of myth exclusively, each book will necessarily consider the figure's more general views—of culture, society, religion, or literature, for example—as well as the application of that view to myth. The series will, however, be limited to figures who have applied their more general view to myth. The first volume already published is on Joseph Campbell. Anticipated volumes will be on such figures as Eliade, Freud, Jung, Rank, Neumann, Frye, Barthes, Tylor, Frazer, Lévi-Strauss, later French structuralists (Vernant, Detienne, Vidal-Naquet), Malinowski, myth-ritualists (Robertson Smith, Hooke, Harrison, Hocart, Raglan, Hyman), Müller, and Cassirer. Other figures will certainly be considered. Persons interested in contributing to the series should write the series editor: Professor Robert Segal, Department of Religious Studies, University of Pittsburgh, 1604 Cathedral of Learning, Pittsburgh, PA 15260. Letters should include a curriculum vitae and a 500-word description of the proposed volume.