

## Reviews

*Chaos and Complexity: Scientific Perspectives on Divine Action.* Edited by ROBERT JOHN RUSSELL, NANCEY MURPHY, and ARTHUR R. PEACOCKE. Vatican City State: Vatican Observatory Publications; Notre Dame, Ind.: Univ. of Notre Dame Press, 1995. viii + 416 pages. \$21.95 (paper).

Robert J. Russell of the Center for Theology and the Natural Sciences at Berkeley has organized and directed several study conferences with joint sponsorship by the Vatican Observatory. These conferences have led to books that are compilations of papers contributed by the various participants. *Physics, Philosophy, and Theology: A Common Quest for Understanding* was published in 1988 as a result of such a consultation. More recently the process has resulted in a series of conferences followed by books, all with the same subtitle as given above. The first volume of the series is *Quantum Cosmology and the Laws of Nature: Scientific Perspectives on Divine Action*, published in 1993. The volume under review here is the second in the series. It is envisioned that subsequent conferences and books will deal with (3) evolutionary and molecular biology, (4) neurobiology and brain research, and (5) quantum physics and quantum field theory. As the subtitle indicates, the theme is, "Does God act in the world, and, if so, how does it happen?"

To wrestle with such a difficult intellectual problem, Russell has assembled a superb collection of thinkers. Their professional expertise spans theology, physics, chemistry, mathematics, and philosophy. Their confessional backgrounds include Roman Catholic, Anglican, Quaker, Reformed, and Lutheran. The authors did not work in isolation, a fact that is evident by the numerous cross-references to others' contributions. It is to be noted that the authors did not solve the problem; rather, they explored it.

There are many possible ways of looking at God's action in the world, and many of them are reviewed in this book. The way of classical theism, for example, in past ages has been to assign to God's action anything that appears miraculous or impossible to understand according to any existing rational paradigm. A god who acts this way has been derisively called the "God-of-the-gaps," whose importance appears to wane as science achieves ever greater success at filling in the gaps. In this volume a serious attempt is made to look past the sarcasm to find what possibilities might have intellectual respectability.

An ingenious explanation for God's action in the world was suggested as long ago as 1958 by William Pollard, the Episcopal priest from East Tennessee who was also a nuclear physicist at Oak Ridge National Laboratory. His model of Providence is based on the fundamental indeterminacy of quantum mechanical transitions. Suppose that a system is in an excited state (the *initial state*) and that there are several states of lower energy (*target states*) into which it may make a

transition. Quantum mechanics says that it is impossible in principle to tell which one of the target states will be the one in which the system will land in any particular trial. If the experiment is replicated many times, quantum mechanics enables you to calculate the relative probabilities of the various target states, but these predictions are only statistical. The Pollard hypothesis says that God can control which target state is actually realized in a transition of this type; by exerting microscopic control over the small processes, God guides the destiny of macroscopic events. The Pollard hypothesis has never been accepted by very many people, doubtless because (1) so few people understand quantum mechanics, (2) so few people believe in quantum mechanics, (3) even those who understand and believe in quantum mechanics are reluctant to believe that phenomena on an atomic scale can have much influence on macroscopic events, (4) Pollard has presupposed a reductionism that is increasingly out of style, and (5) the hypothesis is not subject to testing in any scientific sense.

Another attractive proposal is that of top-down causality. The usual "scientific" notion of causality is bottom-up, as in reductionism or in the use of Newton's laws to predict the subsequent behavior of a system for which the initial conditions are adequately specified. The bottom-up approach has historically been taken for granted by physicists; it has been attractive to scientists in all fields; and it is still favored by many molecular biologists. But the top-down approach, in which an organizing principle causes systems to behave as if goal directed, has started to become respectable, even fashionable in some circles.

As the title of the book indicates, the ideas of chaos are taken very seriously. Several essays in the book are devoted to an exposition of just what is meant by *chaos* in the modern scientific sense; sensitivity of a system to its initial conditions so as to render it impossible to make accurate predictions about the future of the system, even if it is governed by laws that are incontrovertibly deterministic. The expository material is very well done, with enough mathematics to satisfy the most sophisticated reader, but with that mathematics carefully flagged with markings in the margins so that those less mathematically inclined will know what to skip without breaking the flow of the arguments. The old friends of the chaos theorist are all here: the butterfly effect, the logistic map, the Hopf bifurcation, the Feigenbaum constant, the attractor of Hénon and Heiles, the Lorenz attractor, and the beauties of Rayleigh-Bénard convection. The point of introducing all the machinery of chaos is to show that God would not have to do very much to a chaotic system in order to drive it from one type of future state to one of a very different complexion. The suggestion is that here is a mechanism for God to produce divine action in the world without leaving fingerprints.

The exquisite sensitivity of a chaotic system makes it reasonable to believe that the quantum mechanical indeterminism could be capable of influencing macroscopic events. In other words, the aleatory nature of quantum transitions as mentioned above could be the mechanism for moving a chaotic system from one track to another. Yet there is a source of scientific discomfort here, since the relation between quantum mechanics and chaos theory is still not totally understood. For example, the most commonly used criterion for whether a classical physical system is chaotic (the algebraic sign of the Lyapunaoff exponent) is not capable of definition in quantum mechanics. These are two different paradigms

that are not really compatible. However, it will not do to assign to God the gap between the two paradigms as the locus in which to perform divine activity; perhaps science (with the aid of mathematics) will close this gap.

The other word in the title of this book is *complexity*, and I am puzzled about why it was included there, since only one essay out of seventeen deals primarily with the topic. Further, anyone not already familiar with the technical use of this term will look in vain for a definition of it. The concept of complexity is one whose time has come; entire institutes inspired by Nobel laureates (such as Murray Gell-Mann and Ilya Prigogine) are devoted to exploration of its ramifications in multiple fields of science. The discussion given here is quite good, but it is limited to certain philosophical categories related to complexity and lacks the rich background comparable to that used to set up discussions of the theological importance of chaos theory.

Another topic that I wish had been discussed in this book is that of control of chaotic systems. The subject is still in its early stages, but recent work has led to the observation that the very sensitivity of a chaotic system makes it susceptible to control without the expenditure of great amounts of energy. Two metaphorical examples come to mind.

It has long been known that extreme stability is not a good property for a bicycle. Bicycles that are very stable can be designed and built—you can push the riderless bicycle and it will go in a straight line and not fall over, but if you try to ride it, you will find it nearly impossible to turn a corner. The bicycle resists control; it is too stable. Conversely, one can construct a bicycle that is so unstable that the slightest wobble in the handlebars will cause the thing to topple. Real bicycles are built closer to the division point between stability and instability, slightly in favor of the former.

The second metaphor is similar: an airplane that is too stable cannot be controlled; one that is unstable will crash. In practice, an airplane is built on the stable side of the division point—how close depends on the function of the airplane. Passenger planes emphasize stability; fighter planes and crop dusters emphasize maneuverability and are built with less stability.

It is part of the creed of complexity that the most interesting systems are those near the cusp between stability and instability. Such systems are eminently controllable, and if God wishes to act in the world and remain undetected, what better place could be found? Life itself is balanced on this narrow edge between stability and chaos. So it should be no surprise that after eons of evolution there should appear living creatures who perceive divine action in life.

This is a very important book. It was designated one of four outstanding books published in 1995 on theology and the natural sciences in a competition funded by the John M. Templeton Foundation. Never mind that the relation of complexity to theology will have to be addressed by future publications—this book is for now the definitive work on the relation of chaos to theology.

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*The Transformation of Consciousness in Myth: Integrating the Thought of Jung and Campbell.* By JOHN W. TIGUE. The Reshaping of Psychoanalysis Series, vol. 4. New York: Peter Lang, 1994. vii + 53 pages. \$39.95.

In *The Transformation of Consciousness in Myth*, John Tigue advocates an approach to myth taken from C. G. Jung and Joseph Campbell. The meaning of myth is psychological, and the function of myth is to foster self-realization.

As a work of scholarship, Tigue's book fails on all counts. To begin with, the author takes for granted exactly what he seeks to establish: that the nature of myth is psychological. Instead of arguing for the claim, Tigue simply proclaims that "myths communicate to human beings using the language of symbols and metaphors. . . . This language arises in response to the unrelenting demand from the unconscious to find an outlet for its energies, namely, the archetypes" (p. 19). Tigue never discloses how he knows that the meaning of myth is other than literal and the subject of myth other than the external world. Theorists of myth as notable as Edward Tylor, James Frazer, Bronislaw Malinowski, and Mircea Eliade read myth literally. Why are they wrong? At most, Tigue, following Campbell, says that myth read literally somehow has the effect of making adherents narrow-minded: "When myths are viewed more as factual occurrences, people tend to become one-sided, closed-minded, and biased, because a challenge to literal interpretations can be viewed as a challenge to their belief systems" (p. 13). The effect of an interpretation on adherents to myth determines the validity of the interpretation!

Similarly, Tigue never reveals how he knows that myth originates and functions to connect one to the unconscious rather than to explain natural events (Tylor), to provide food (Frazer), to bolster loyalty to society (Malinowski), or to abet contact with the gods (Eliade). The sole alternative approach to myth he considers is Freud's, which he rejects in typically question-begging fashion: because the author likes myth, a theory that contends that myth harms rather than helps its adherents must be wrong. It seems gratuitous to note that contemporary Freudians such as Jacob Arlow assess the function of myth positively.

After presenting the theories of Jung and Campbell in his first three chapters, Tigue in the next four chapters applies their theories to the Epic of Gilgamesh, the Bhagavad Gita, the Arthurian legend Owein (The Lady of the Fountain), and the movie *Star Wars*. Tigue barely justifies his selection of these four myths or even the categorization of them *as* myths. Furthermore, he never sees the need to determine whose myths they have been. Surely *Star Wars* is considered fiction even by those most smitten with it. Can Tigue really elevate it to the status of modern counterpart to the Epic of Gilgamesh? Undaunted, Tigue goes so far as to declare that "If people would regard myths more as they do fairy tales, as make-believe stories, then through their imagination, they would be able to derive from them the benefit that was intended" (p. 15). Tigue never wonders why many theorists of myth insist on distinguishing myths from fairy tales on precisely the grounds that adherents deem myths true rather than, like fairy tales, imaginary.

Tigue's Jungian application is crude. Every figure in a myth symbolizes an archetype. On the basis of his ability to interpret his four chosen myths à la Jung and Campbell, Tigue is prepared to generalize to all myths: "My basic objective is to show that there exist universal categories operating in mythic literature which reveal the journey towards psychic completeness" (p. 10). Going further, Tigue generalizes to all human beings: "I am claiming that these categories are universal and appear not only in myths, but in the lives of all persons" (pp. 10–11). That myth even refers to human nature is the key claim that Tigue must establish in the first place.

Suppose Tigue could show that the meaning of all myths is psychological; he would still have to show that the origin and function of myth are psychological. Although every theory of myth assumes a symmetry among the meaning, the origin, and the function of myth, each claim must be substantiated on its own. Ordinarily, one must venture outside a myth to ascertain its origin and function, though undeniably the meaning provides a clue. Tigue, however, never ventures outside myth to consider other interpretations. From his rendition of the meaning of myth, he (like Campbell) infers why it was created. If myth depicts an encounter with the unconscious, myth must have been devised to provide that encounter.

The author takes for granted that Jung and Campbell espouse a common view of myth: "Furthering Jung's journey into the unconscious was Campbell. He applied Jung's theories of the archetypes and the collective unconscious to charting the territory of myths" (p. 4). Tigue thereby presupposes the very "integration" of Jung with Campbell that his book is supposed to forge. In fact, Jung and Campbell held contrary views of myth, and Campbell regarded himself as an original theorist rather than as a disciple of Jung's. For example, Jung interprets myth almost wholly psychologically. By contrast, Campbell interprets myth metaphysically as well: myth refers to the universe as well as to the unconscious. Jung interprets myths individually, however recurrent the archetypes in them. By contrast, Campbell interprets myths generally; for him the universal hero merely wears a thousand faces, and a single god wears multiple masks. Jung does not assume that all myths preach the balance between consciousness and unconsciousness that he himself espouses. By contrast, Campbell assumes that all myths preach the mystical fusion of consciousness with unconsciousness that he espouses. Jung does not see myth as sufficient or even necessary for self-realization. By contrast, Campbell sees myth as both necessary and sufficient. In all these respects, Tigue follows Campbell rather than Jung but without recognizing the divide between them. (On the differences between Campbell and Jung, see my *Joseph Campbell: An Introduction*, rev. ed. [New York: Penguin, 1990], chap. 12.)

Some of Tigue's applications of Jung and Campbell to his four chosen myths are tenuous. For example, he interprets Gilgamesh's return from the world of the immortal Utnapishtim as the successful completion of the heroic quest. For Tigue, Gilgamesh may return without immortality, but his recognition that immortality was a one-time gift bestowed only on Utnapishtim and his wife yields the wisdom to accept the human lot: "The supposed boon he is to bring back to his people in the form of this magic elixir is lost. It is not until this last

calamity that he realizes the boon to be shared is not a thing, a magic potion, but himself, his wisdom, his newly matured nature" (p. 71). For Campbell, however, successful heroism means exactly bringing back divinity to the human world. It means making the human divine. Indeed, it means recognizing that the human was divine all along: "The hero adventures out of the land we know into darkness; there he accomplishes his adventure, or again is simply lost to us, imprisoned, or in danger; and his return is described as a coming back out of that yonder zone. Nevertheless . . . the two kingdoms are actually one. The world of the gods is a forgotten dimension of the world we know" (Campbell, *The Hero with a Thousand Faces*, 2d ed., Princeton: Princeton Univ. Press, 1968, p. 217). The wisdom that, to fit Campbell's scheme, Gilgamesh should be bringing back is the recognition that human beings are immortal and are so because they are gods themselves. Gilgamesh's recognition that human beings are not gods is the opposite of the integration of divinity with humanity that Campbell says all hero myths tout.

Having analyzed four myths with male heroes, Tigie feels compelled to offer a penultimate chapter on feminine heroes. He has no difficulty placing female heroes in a Jungian scheme, but he glides over the issue of the male slant of Campbell's heroic pattern. He cites Campbell's stress on the power of females in myths (p. 123), but he never considers how Campbell's pattern is geared to male heroes, even though Campbell himself cites many female heroes.

Finally, Tigie's obliviousness to all of the scholarship on Campbell that has arisen in the past decade is shocking. For Jung, he relies on a few standard secondary sources by Jungians. Overall, Tigie's book is so simple-minded as to be of no academic use.

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