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Book Review of *The Far-Future Universe: Eschatology from a Cosmic Perspective*, edited by George F. R. Ellis

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THE FAR-FUTURE UNIVERSE: ESCHATOLOGY FROM A COSMIC PERSPECTIVE. Edited by George F. R. Ellis. Philadelphia and Vatican City: Templeton Foundation with the Pontifical Academy of Sciences and the Vatican Observatory, 2002. Pp. vii + 384. \$39.95.

Produced from a conference held in Rome in November 2000, this anthology provides thought-provoking essays by prominent scientists, theologians, and philosophers who have been exploring issues at the boundaries of their disciplines for several years. They gathered to discuss no less than the distant future of the universe and life. Cosmologist George Ellis, editor of the volume, has contributed extensively to the advancement of interdisciplinary dialogue.

In the opening essay, Jesuit astronomer George Coyne, director of the Vatican Observatory, explains the basic theological assumptions from which dialogue about the far-future universe proceeds. he

perceptively insists that the speculative scenarios proffered by scientists constitute new opportunities for using our intellectual capabilities to seek "the fullness of God in creation" (15).

The remaining 17 essays stir the religious imagination and moral sensibilities. Organized into four categories (cosmology and physics, biology and the future of life, humanity in relation to the far-future universe, and theology), each essay is strong in its disciplinary perspective, several essays present historical background on the topics, and some point to areas for future research.

In the cosmology and physics section appear superb essays by astrophysicist John Barrow on past and present predictions about the end of the universe; by theoretical physicist Paul Davies on six cosmological options for thinking today about a beginning and corresponding end of the universe; and by Michael Heller, philosopher of science and Roman Catholic priest, on the notion of time as an atemporal and aspatial emergent reality at the most fundamental level of physics. Theoretical astrophysicist Martin Rees, who chaired the conference, focuses on the possibility of an infinite ensemble of universes, a "multiverse," within which Earth is an important part of the "cosmic patch" (73). This possibility poses some profound moral issues, he contends, especially in the light of our current technological capacity to "trigger global catastrophe" (83) and obliterate biological life. Rees urges governments to halt technologies and physicists' experiments that could destroy the world, advocates the development of self-sustaining "space habitats" where the human species will be "invulnerable to any global disaster on Earth" (83), and encourages the downloading of human DNA into self-duplicating "organic memories" that could be launched into the cosmos (84).

The section on biology in relation to cosmology features fascinating articles by chemist Graham Cairns-Smith on the possibilities of new life emerging elsewhere in the universe; and two essays by physicist Freeman Dyson, one a reprint of his influential "Time Without End" (1979), the other centering on the possibilities for life (defined as a system of acquiring, storing, processing and using information) to continue in closed, decelerating, open, and accelerating models of the universe. Particularly stimulating for moral reflection is the essay by evolutionary paleobiologist Simon Conway-Morris who explores some consistencies between biological evolution and a universe with a beginning and an end. The evolutionary process appears to have "inherent probabilities, if not inevitabilities, of complex forms emerging" (162), including sentience, which has implications for how humans view and treat the world out of which our species evolved. Conway-Morris urges the redirection of our self-understanding "away from destructive impulses to recognizing the natural order as integral to ourselves" (170). We need to engage in a "Job-like interrogation of the world" (172), acknowledge our accountability for the gifts of the physical creation, and anticipate its potential into the future.

In the theology section appear four outstanding essays. Keith Ward identifies in the New Testament several eschatological notions that are "wholly consistent" (247) with the idea that space-time has a temporal end, and he stresses the need for Christians to embrace an understanding of salvation as the destiny of the entire universe. Jurgen Moltmann examines cosmic eschatological scenarios in the Christian tradition and demonstrates the richness of theological reflection when informed by the open universe model. Ellis explores the connection between temporal and eternal natures of existence and astutely concludes that an individual's view of the far future depends on his or her ontology. The most methodologically oriented essay is that by theologian-physicist Robert John Russell, a minister in the United Church of Christ and founding director of the Center for Theology and the Natural Sciences. he

considers options for interdisciplinary dialogue on resurrection, eschatology, and cosmology, and he outlines a stepwise method of "creative mutual interaction" through which theologians and scientists can reconstruct Christian eschatology in the light of scientific findings and speculations. The research programs Russell delineates should keep scholars busy far into the near future.

This collection adds significantly to the sparse scholarly literature in which cosmological speculations on the future universe and Christian eschatology are interfaced. Graduate and upperclass undergraduates should be able to read most of the essays without background preparation, although knowledge of advanced mathematics will facilitate following Cairns-Smith and Dyson.