

NOTE

RELIGION AND SCIENCE: PAUL DAVIES AND JOHN PAUL II

In the *New York Times Book Review* for February 12, 1989, the distinguished novelist and journalist Dan Wakefield published a piece engagingly entitled "And Now, a Word from Our Creator."¹ In this article Wakefield traces the remarkable abundance of "works in which God—who for so long seemed absent, if not 'dead,' as a subject of concern in serious fiction, as in the culture at large—has returned as a force or a 'character' in the action." In these literary works "God is not only present . . . but even sometimes has a 'speaking part.'" Wakefield argues that this presence which God has been accorded in contemporary literature is not only surprising but significant. It indicates a radical change in the literary and educated culture.

To these literary hierophanies Wakefield joins those in contemporary physics. "Only a generation ago we enlightened intellectuals believed science has not only disproved, but replaced God; now science is one of the major factors making the idea of God a serious subject again. . . . It is the scientists who seem to be taking the lead from the theologians." Chet Raymo, a physics professor and science writer, advanced this same thesis in a recent essay: "Scientists are wresting from philosophers and theologians the biggest question of all: why is there something rather than nothing?" Raymo cites as representative of this trend the physical chemist P. W. Atkins' *The Creation*, Paul Davies' *The Cosmic Blueprint: New Discoveries in Nature's Creative Ability to Order the Universe*, Robert K. Adair's *The Great Design: Particles, Fields, and Creation*, and Harald Fritzsch's *The Creation of Matter: The Universe from Beginning to End*. The novelist John Updike makes this radical redefinition of the relationship between science and religion the context for one of his recent novels, *Roger's Version*. Stephen W. Hawking suggests a co-ordination between science and philosophy in the attempt to "discover a complete theory," one that will enable human beings to discuss why it is that they and their universe exist. "If we find the answer to that, it would be the ultimate triumph of human reason—for then we would know the mind of God."²

¹ Dan Wakefield, "And Now, a Word from Our Creator," *New York Times Book Review*, Feb. 12, 1989, 1 and 28-29.

² Stephen W. Hawking, *A Brief History of Time*, Introduction by Carl Sagan (Toronto: Bantam, 1988) 175.

Whether this deity would be God in any sense recognized by Christian tradition and theology constitutes a further question.

PAUL DAVIES

No book either embodies this remarkable trend more influentially or advances its claims more emphatically than *God and the New Physics* by the distinguished English theoretical physicist Paul Davies. Davies' work is not necessarily the best in the field, but it has assumed an importance that is both symptomatic and influential. As such, it deserves the attention of theologians.

Davies seizes his turf and stakes his claim with candor: "It may seem bizarre, but in my opinion, science offers a surer path to God than religion." And then, perhaps more modestly: "Right or wrong, the fact that science has actually advanced to the point where what were formerly religious questions can be seriously tackled, itself indicates the far-reaching consequences of the new physics."³ This claim of Davies suggests the necessity of two prenotes before evaluating its justification.

First, it is an astonishing claim to hear in the U.S. following the popular view, regnant in earlier decades of this century, regarding the relationship between science and any assertion of the existence of God. One can recall what perhaps the greatest of 20th-century American philosophers, John Dewey, maintained in his Terry Lectures of 1934: "The growth of knowledge and of its methods and tests has been such as to make acceptance of these [religious] beliefs increasingly onerous and even impossible for large numbers of cultivated men and women."⁴ Any postulation of the existence of "supernatural" realities such as God or even the use of the term "god" with any meaning other than "ideal values" is doomed or dying before the increased hegemony of the scientific method:

New methods of inquiry and reflection have become for the educated man today the final arbiter of all questions of fact, existence, and intellectual assent. Nothing less than a revolution in the "seat of authority" has taken place. . . . There is but one sure road of access to truth—the road of patient, cooperative inquiry operating by means of observation, experiment, record and controlled reflection.⁵

One can find similar statements in Sigmund Freud, Ernest Nagel, or A. J. Ayer—that the growth in the productivity and the self-validation of

³ Paul Davies, *God and the New Physics* (New York: Simon and Schuster, 1983) ix. Hereafter page references to this book will be included in the text within parentheses.

⁴ John Dewey, *A Common Faith* (New Haven: Yale University, 1934) 30.

⁵ *Ibid.* 31-32. For extended discussion of the meaning and implication of this mentality, see my "Experience and Culture: A Point of Departure for American Atheism," *TS* 50 (1989) 443-65.

some form of the scientific method has made it inevitable that the culture will outgrow those religious beliefs that project what is traditionally known as God. And if the term "god" is kept, its significance is so thoroughly altered that Harry Austryn Wolfson with quiet irony found its proponents "busily engaged in the gentle art of devising deities."⁶ Within an intellectual culture given something of its character by scientific sobriety, objectivity, and evidence, religious claims seemed of little cognitive seriousness.

One has only to recall discussions among theoretical physicists earlier in this century. From the celebrated Solvay Conference of 1927, Werner Heisenberg records a conversation he had with Wolfgang Pauli and Paul Dirac:

One of us said: "Einstein keeps talking about God: what are we to make of that? It is very difficult to imagine that a scientist like Einstein should have such strong ties with a religious tradition."

"Not so much Einstein as Max Planck," someone objected. "From some of Planck's utterances it would seem that he sees no contradiction between religion and science, indeed that he believes the two are perfectly compatible."

Planck was said to hold this position because of his belief that science deals with objective truth, while religion is concerned with subjective values. Neither Pauli nor Heisenberg will accept this subjective/objective dichotomy.⁷ In a later essay Heisenberg accepted the question directly from Pauli: "Do you believe in a personal God? I know, of course, how difficult it is to attach a clear meaning to this question, but you can probably appreciate its general purport." Heisenberg answers the question by first redefining the meaning of "God" as "the central order of things or events." He then rephrases the question accordingly: "Can you, or anyone else, reach the central order of things or events, whose existence seems beyond doubt, as directly as you can reach the soul of another human being? I am using the term 'soul' quite deliberately so as not to be misunderstood. If you put your question like that, I would say yes. . . ." The words "personal God"—like "soul"—refer to the central order, to the "inner core of a being whose outer manifestations may be highly diverse and pass our understanding."⁸

Paul Davies accepts something from this current of thought and then

⁶ Harry Austryn Wolfson, *Religious Philosophy: A Group of Essays* (Cambridge, Mass.: Harvard University, 1948) 271. Wolfson continues: "I wonder, however, how many of the things offered as God by lovers of wisdom of today are not again only polite but empty phrases for the downright denial of God."

⁷ Werner Heisenberg, *Physics and Beyond: Encounters and Conversations* (New York: Harper and Row, 1971) 82 ff.

⁸ *Ibid.* 215–16.

counters it. What he accepts is the warning "No religion that bases its beliefs on demonstrably incorrect assumptions can expect to survive very long" (3). How can one be sure of the correctness of one's assertions? By the use of contemporary science as the foundational approach to the reality of God. This is something of the point of the whole book. Where Davies will differ from Dewey or from Freud and even more from Ayer is in this: science does not invalidate the issue of God. In fact, more than religion, it will contribute to the search for a supreme being that can be called "God."

The second prenote that should contextualize Davies' project is something to which he does not advert: it is not quite the advance that *God and the New Physics* contends. It has been done before. In fact, one can find it throughout the history of physical and cosmological speculations from Plato's *Timaeus*, in Aristotle's *Physics* (with its carry-over into the *Metaphysics*), through the heady days of Boyle and Newton and the physicotheologies they inspired, to the cosmological writings of Alfred North Whitehead. In an extraordinary paragraph in the 28th query at the end of the *Opticks*, Newton proposed a project for mechanics or natural philosophy not unlike that of Davies: "The main Business of natural Philosophy is to argue from Phaenomena without feigning Hypotheses, and to deduce Causes from Effects, till we come to the very first Cause, which certainly is not Mechanical."⁹ In the 31st query, he indicates how this natural philosophy would provide the foundations for a moral philosophy that he elsewhere equates with religion. For Davies, then, to propose a god that comes out of physics is part of an honorable and lengthy tradition of wisdom. His project is not new. What is new, as his title indicates, is his physics—although even here one might want to make a few distinctions.

If this is the claim and the heritage of Davies' project, his book outlines the problems with which it must deal: "For the greater part of human history, men and women have turned to religion not only for moral guidance, but also for answers to the fundamental questions of existence: How was the universe created and how will it end? What is the origin of life and mankind? Only in the last few centuries has science begun to make its own contributions to such issues" (5).

Prescinding from the accuracy of the last remark, one might profitably assess the kind of questions Davies judges to be religiously fundamental. They do not deal with the knowledge or love of God in a community for which such faith and love is definitional; they do not touch upon our

⁹ Isaac Newton, *Opticks, or a Treatise of the Reflections, Refractions, Inflections and Colours of Light*, based on the 4th edition [London, 1730] (New York: Dover, 1952) III, query 28, p. 369.

relations one to another within that call to love and service to the human race; they say nothing about the finding or the experiencing of God in one's life or in the life of the gathering of people into community; they do not deal with personal experience or personal relations, with holiness and a commitment to the margined, etc.—in all of which Christianity and its questions principally consist. Further, to use a different set of coordinates, these questions say nothing about what Baron von Hügel has isolated as two of the three elements of religion: the institutional and traditional, the affective, experiential, and mystical. Hügel included the third, the speculative and rational constituents of religion. But Davies turns this into the "how" questions of the universe: How was the universe created? How will it end? How did life originate? How did humankind originate?

Catholic theologians would uniformly maintain that such questions belong to the inquiries of the various sciences. Unless one is something of a fundamentalist, Augustine or any number of patristic commentators on Genesis have convincingly indicated that Scripture deals in metaphors, figures of speech, and narratives not to answer the question "how" but to deal with the questions of "what" and "why." But Davies has taken these how questions and made them the fundamental problems of religion. It is no great wonder that contemporary science is then expected to answer them and in this way to take the lead in the religious search for God.

Sometimes, however, the how question slips over to God, and then the situation gets even more sticky. Davies argues, for example, that God cannot be both timeless and personal because "it is hard to see how a timeless God can act in time" (134). Indeed it is. To know how a thing works, one has to know what it is. To expect to know how God acts in human time and creates in His eternity supposes some grasp of the divine essence. To know the how of God's action, one would have to know what God is. Classically Catholic theology, however, has insisted that God is incomprehensible, i.e. inexhaustibly intelligible and so always disclosed to human beings as infinite mystery. Thomistic theology has insisted that we can only know that God is and what God is not, and that some things can be truly said of God. True assertions can be made about God, but precisely how they are true, how these analogical predicates are realized or reconciled in the divine nature, we do not know. Catholic theology is far more reticent (agnostic or skeptical, if you will) than is Davies.

We know, for example, that God creates, because there are creatures. We really do not know how God "pulls it off." Catholicism has found no great scandal in this admitted ignorance. In quantum mechanics some-

thing analogous lies behind the pervasive uncertainty principle in dealing with the subatomic, and Sir Brian Pippard has written that when we try to get behind the big bang and ask why the pistol was fired and what it is that is not the universe but that from which the universe sprang, "we are completely tongue-tied; only verbs without tenses and nouns without extension are permitted, and discourse is limited to mere ejaculation: Mind! Love!"¹⁰ If this is true of the subatomic, how much more should one expect it to be true of human discourse about God.

Such are Davies' project, heritage, and fundamental questions. What are its results? One negative result has been noted already. A more positive example can be taken from chapter five. Davies contends that "according to the theologians, life is the supreme miracle, and human life represents the crowning achievement of God's cosmic masterpiece" (58). I must confess, I know of no contemporary Catholic or Protestant theologian—or medieval, for that matter—who holds that life is "the supreme miracle." If that title were given by a theologian to anything, I suspect it would be given, analogically, to the Incarnation. But let us prescind from this for a moment. Davies proceeds to give a wonderfully lucid summary of contemporary explanations of life, moving from reductionism through vitalism to holism and the emergent qualities at the collective level of structure. He then suggests that the origin of life is illumined by Prigogine's research on the occurrence of "dissipative structures" and that life could be attributed to Miller-Urey's "primeval or prebiotic soup" and the external influence that would have upset the thermodynamic equilibrium and so occasioned a self-organization of the components that resulted in DNA. Fine. But this is followed by the question, "Does the study of life—its origins and function—yield any evidence for the existence of God?" At best, he answers that it "provides strong evidence for some sort of purpose in the universe." Any statement beyond this would be the return to a "God of the gaps" (70–71).

Davies turns to physics, then, for a clear and illuminating discussion of the fundamental structure of matter (chapters 11–14). He concludes that "perhaps future developments in science will lead to more direct evidence for other universes, but until then, the seemingly miraculous concurrence of numerical values that nature has assigned to her fundamental constants must remain the most compelling evidence for an element of cosmic design." (189). But physics cannot carry this any further. Why not? For Davies will later contend, "I don't believe that

¹⁰ See Werner Heisenberg, *Physics and Philosophy: The Revolution in Modern Science* (New York: Harper and Row, 1958) 181. For this reason Weizsäcker distinguished various levels of language. For the quotation see Sir Brian Pippard, "Master-minding the Universe," *Times Literary Supplement*, July 29, 1983, 795.

physics can tackle questions about, for example, purpose or morality" (227).

Davies' finding strong evidence of purpose in the biological phenomena and in the cosmological constituents of the universe somewhat parallels the thinking of great theologians. Bonaventure's *Journey of the Mind to God*, for example, opens with this recognition that creatures indicate God's power, wisdom, and goodness, and thus the various sciences can be integrated with theology and serve the mystical ascent. But Bonaventure would never argue from this that "science offers a surer path to God than religion" (ix). For Bonaventure, religion has its own evidence in Christ and in religious experience.

What is Davies actually left with? Fascinating hints and suggestions of purpose, but nothing more. Contemporary science finds in the universe "strong evidence for some sort of purpose." Where could one go with this? It seems to me that it might function in two ways: (1) It could offer a harmonious correlation—in service to personal integration—between what one finds in the world through science and what one's religious view encompasses. (2) It could raise the religious question for those whose lives are dedicated to this scientific inquiry—a question raised but not answered by physics: Is there, then, really purpose in the universe?

Both of these functions might allow one to argue further that science (like almost every discipline human beings engage in) yields questions with which it can go no further—hints and suggestions of something more to reality which is beyond the methodology of physics and biology, or of literary criticism or history for that matter. In this way it opens the door eventually to some metascience which deals with the hints and issues that it has raised, but with a different methodology. Aristotelian metaphysics—or "theology," as he termed it—was conceived as such a metadiscipline. Perhaps a theology in which philosophy was an integrated albeit autonomous discipline should attempt something of the same. All of these possibilities will be considered at the end of this paper.

But if, on the contrary, one goes further than this, brackets the specific religious dimensions of life, and makes biology or physics or any science as such the foundation of religious assertions, it will be only a question of time until what is interpersonal commitment becomes provisional hypothesis. As a science insists upon its own integrity, its own methodology, and its own language, religious assertions grounded directly upon it will become quite literally baseless. This is the lesson Christian Europe should have learned from the early centuries of modernity and the origins of atheism.¹¹

¹¹ Cf. Michael J. Buckley, S.J., *At the Origins of Modern Atheism* (New Haven: Yale University, 1987).

To return to Davies: what looks like a very strong foundation claim at the beginning of his book actually becomes a much milder assertion towards its end. Why does science offer a surer path than religion in the search for God? Not because it even attempts answers to the questions which lie at the foundation of religion, like the existence of God: "It would be foolish to suppose that the fundamental questions concerning the existence of God, the purpose of the universe or the role of mankind in the natural and supernatural scheme have been answered by these advances [in science]," he finally concludes (218). It is rather because "science does have something to say about religious matters" (218). And what are those religious matters? The nature of time, the origin of matter and life, causality and determinism.

These refined physical concepts constitute "religious matters," writes Davies, because they form the "very conceptual" framework in which the religious question are posed." As a culture changes in its understanding of time and causality and life, it inescapably alters the framework in which the properly religious questions are cast. This seems a much weaker claim than Davies' original one. Parallel to the anthropic principle, one might want to distinguish between a Strong Davies Claim and a Weak Davies Claim. The SDC would be the comparative statement, "Science offers a surer path to God than religion" (ix). The WDC would be the more mild "Science does have something to say about religious matters" (218).

Davies seems here to be making a valid and an important point. Human understanding of religious realities—as of all reality—is conditioned by the conceptual structures influentially present in the common culture. These are often taken so much for granted that they may not even be adverted to. But there is a constant dialogue in process between (a) human subjectivity, individual or communal, with its prior conceptual content and structures, and (b) that which confronts this subject as the object of inquiry and interpretation. Contemporary hermeneutics has disclosed some of the factors dynamically active in this interchange, and the scholastics were aware that "whatever is received, is received according to the mode of the one receiving it."

Human beings of a particular culture think in a certain way, within a certain frame of reference or intelligibility that makes some things plausible and others absurd. Olympian gods or a flat earth or the values to be obtained through human sacrifice do not claim credibility. Our culture has passed beyond these—so far beyond that assertions of the contrary would only provoke laughter. Dewey made this point repeatedly. So also, touching closer to home, the heliocentric universe and the evolutionary development of all physical reality are part of our intellec-

tual culture. They have altered our understanding of Scripture and of theology—not totally, but perhaps in some places significantly. What Davies urges is that contemporary relativity theory and quantum mechanics will play or do already play a similar role. This insight bears crucially upon theology. Christian theology is an attempt to understand what is given to us in the revelation of Christ. Many of the thought-forms we bring to understand this reality must be and will inevitably be those of our own culture.

JOHN PAUL II

If this is all Davies finally asserts, then his position is not so different from that of John Paul II as exhibited in his recent public letter to the director of the Vatican Observatory, George Coyne, S.J. "Christians will inevitably assimilate the prevailing ideas about the world, and today these are deeply shaped by science. The only question is whether they will do this critically or unreflectively, with depth and nuance or with a shallowness that debases the Gospel and leaves us ashamed before history."¹² The pope's central question, however, is quite different from the thesis advanced initially by Davies. He is not trying to prove a thesis, nor is he suggesting the converse of Davies' stronger claim, i.e. that religion is foundational to scientific discovery. In general, the letter proposes "to address some issues which the interactions among natural science, philosophy and theology present to the Church and to human society in general" (375b). Papal reflections here have not always been happy. Paradoxically, neither Urban VIII on Galileo nor Pius XII on the big bang has added distinction to its history: Urban because his Curia condemned Galileo's science for contradicting the teaching of Scripture, and Pius because he complimented contemporary cosmologists for tending to confirm it.

This is not the place to attempt a detailed exploration of this careful papal statement on so complicated a matter. One can, however, focus upon its leitmotiv: the movement towards union—not identity, but union in the collaborative building of an integral human culture. Over the centuries the relationship between the Church and science has often been supportive, sometimes conflictual. Now, as human beings move

¹² John Paul II, "Letter to the Reverend George V. Coyne, S.J., Director of the Vatican Observatory," published as the prefatory document to the papers from the Study Week at Castelgandolfo, Sept. 21–26, 1987, in *Physics, Philosophy, and Theology: A Common Quest for Understanding*, ed. Robert J. Russell, William R. Stoeger, S.J., and George V. Coyne, S.J. (Vatican Observatory, Vatican City State: Libreria Editrice Vaticana, 1988). References to the papal statement will be given from the letter as it was published in *Origins* 18, no. 23 (Nov. 17, 1988). These references will be set off and supplied by means of parentheses in the text of the article.

towards the new millennium, the pope urges a more vital interchange.

This movement towards union is a dynamic that can be observed within each community, that there is some symmetry here between the scientific community and the Church. For both, the drive towards love and the quest for meaning are a search for unity. "Unity involves the drive of the human mind toward understanding and the desire of the human spirit for love" (377a). Each of these unities is at issue here.

One sees the Church reaching out to ecumenical union with all Christians, to an increasing communion with Judaism, emphasizing its origins and its debt to Israel, to the great world religions with which Christians share common religious experiences and commitments. Western nations are gradually losing their exclusive hold over the leadership of the Church, with the responsibility for its direction passing to members of all nations and races (Vatican II was the obvious beginning of such a development), so that gradually the Church can be called "world Church." In the development of science one can trace a similar movement towards unity, here of conceptual intelligibility, for "understanding is achieved when many data are unified by a common structure . . . we move towards unity as we move towards meaning in our lives" (377a-b). Scientific research possesses an underlying dynamic "towards the discovery of levels of law and processes which unify created reality and which at the same time give rise to the vast diversity of structures and organisms which constitute the physical and biological, and even the psychological and sociological worlds" (376b). Striking examples of this drive are furnished by contemporary physics in its developments towards grand unified field theory and superunification and by molecular biology's discoveries of the constituents of living organisms.

Now the pope asks a question something like this: Will these two communities move further into unity, one with the other? The pope is not talking about the reduction of diversity, not about identity, but unity; for "the church and the academy engage one another as two very different but major institutions within human civilization and world culture" (375b).

There are, maintains John Paul II, at least five diverse relationships possible between the scientific community and the religious, here specified as the Church, and the history of the world has seen moments when each of them was prominent. First, there can be intractable contradiction and war; second, there can also be an indifferent neutrality. The pope notes both, regretting the first as "those needless conflicts that have marred both of our histories" (375b) and judging that the second "is no longer acceptable" because it would divide the community into separate compartments. "A divided community fosters a fragmented vision of the

world; a *community of interchange* [please note the phrase] encourages its members to expand their partial perspectives and form a new unified vision" (377a). Two other alternatives are mentioned and dismissed: "Religion is not founded on science nor is science an extension of religion. Each should possess its own principles, its pattern of procedures, its diversities of interpretation and its own conclusions" (377a). This is critically important: unlike Davies' program, science is not expected to form the premise of religion nor to substitute for it; science, on the other hand, must bear witness to its own value, not expect to justify this *a priori* from religion.

Hostility, indifference, one foundational to the other—in rejecting these four possibilities, what kind of union is the pope urging? A union of interchange in which each unit maintains its own autonomy and language and yet is open through dialogue "to the discoveries and insights of the other." The distinguished philosopher of science Ernan McMullin has called this the central theme in the papal letter:

The human quest for understanding requires us to draw on a diversity of different sources. Science is not merely a means to technical control or accurate prediction; religion is not just a matter of moral action or private converse between the individual and God. Each contributes to our understanding of the complex world in which we are set. The quest for understanding is thus necessarily a collaborative one in which the autonomy of the constituents must be respected.¹³

What would be examples of this interchange? First, there is the common collaboration on mutually involving projects or mutually engaging questions. Second, the building of the university or of the academy together, since the meaning or vitality of such institutions is determined by the interchange among its departments or faculties. Third, the discussions about the issues of nuclear weapons among the physicists at the Lawrence Livermore Laboratories, the political scientists and physicists at the University of California at Berkeley, and the theologians at the Graduate Theological Union. One can also cite, both for its accomplishments and for its great promise, the Center for the Study of Religion and the Natural Sciences under the distinguished leadership of Robert Russell. The great issues of genetic engineering and world population cry out for this kind of collaborative study as subjects of common interest.

But besides these "subjects of common interest"—projects or questions—to which each contributes, is there any mutual influence of these

¹³ Ernan McMullin, "A Common Quest for Understanding," *America* 160, no. 5 (Feb. 11, 1989) 104. McMullin contrasts this with the position recently enunciated by the National Academy of Sciences, maintaining that religion and science are, in principle, mutually exclusive realms of human thought, and hence of no possible relevance to one another (*ibid.* 101).

areas of knowledge, one upon the other? This is a much more difficult matter, because the languages and the enterprises of both are so different. The pope gave two classic examples of such internal influence—knowledge from one field providing heuristic devices by which knowledge in another field is expanded: the purification and adoption of the cosmologies of ancient Mesopotamia for the priestly creation account in Genesis, and the medieval incorporation of Aristotelian hylomorphism to explore the reality of the sacraments and the hypostatic union. Then he comments: “Theologians might well ask, with respect to contemporary science, philosophy and the other areas of human knowing, if they have accomplished this extraordinarily difficult process as well as did these medieval masters” (377b-c). For contrary to Davies, religion and theology also use models—not exclusively, but really. They take from the intellectual culture of the time those forms and structures which will illumine the self-disclosure of God as it has come into human history in and through Christ. Theology does not attest to the truth of these conceptual structures, but uses them to illumine and to bring into congruence a set of data.¹⁴ Teilhard de Chardin is a particularly well-known example of this, but one thinks also of Rahner’s “Christology within an Evolutionary View of the Universe” or Schillebeckx’ employment of philosophical and historical hermeneutics.

Science, like any human enterprise, can influence theology positively in the growth of its conceptual richness, as concepts such as field or energy or vector or organism or (even) the second law of thermodynamics pass as analogous conceptual structures into theology, broadening the possibilities for standard theological reflection and making for a fuller set of terms for common human discourse, without reducing the language of one to that of the other. It is in this sense that the papal letter asks theologians if they have anything to learn about the human as the *imago Dei*, the image of God, from contemporary cosmogenesis, from the evolution of the species, or from theories concerning the fate of the universe for our still very primitive eschatology or even, one might add, for our understanding of the projectory of the Church.

On the other hand, does theology offer any comparable service for science? In a very real but different way, because the two are so different. Standard histories of science report that certain concepts and questions were first pursued in religion or in theology before they made their way into science. They also report the religious influences upon major scientists either as motivation or as ideological context. This influence of theology has been both negative and positive. It has been suggested that

¹⁴ Cf. Thomas Aquinas, *Summa theologiae* 1, 32, 1, ad 2. Aquinas uses the astronomical systems of cycles and epicycles to illustrate his point.

Fred Hoyle's indefatigable defense of the steady-state model of the universe comes out of his persuasion that the big bang would involve one in a theistic universe or one of theistic suggestions, just as many theologians in the 19th century battled theories of evolution because they saw them as denying the truth of Scripture. On the other hand, in the 14th and 15th centuries the proposals about impetus in the motion of projectiles were taken from the retrieval of this ancient notion by sacramental theology in its discussions of the agency of Christ in the sacraments, and the concept of "organic development" was made current coin by Newman in theology some years before Darwin in biology. But all of this seems of secondary importance.

A much more significant service might occur if theology were to take up some of the hints and suggestions that science discovers and take them up precisely as *questions*. For what happens to these physical and biological suggestions of purpose or of order or of cosmic unity in the universe? They cannot ground or justify religious assertions, contrary to the proposals of Davies, but can they contribute something to religious questions? Can they, do they actually, enter into the contemporary religious problematic situation? For science, as every human enterprise, generates questions which it cannot answer; it comes upon suggestions that it cannot follow. Would theology serve science by taking such emergent questions seriously?

Cannot theology make a contribution to scientific inquiry here in two ways? (1) Insisting upon a pedagogy that can train human beings not to push science into theology and to live with reticence about the statements that human beings can make about God, so that one is not dismayed by paradoxes nor tempted to wring from science religious affirmations; (2) taking seriously the questions that emerge from the scientific enterprise.

If, for example, the cosmological constants in all of their extreme precision and mutual balance catch one up short and one finds oneself writing sentences like "the seemingly miraculous concurrence of numerical values that nature has assigned to her fundamental constants" (Davies 189) and simply wondering if purpose or design is actually present in our universe, then a methodological issue arises, one with several alternatives: whether (a) physics is to be expected to consider and decide questions of this kind of ultimacy, as Newton would have it; or (b) whether one says this question of purpose is such that one may not legitimately examine it further at all; or (c) whether one says this is a very important question, an inescapable question, but it cannot be examined further in physics, but that one ought to try some other discipline. If, to use another example, both Einstein and Heisenberg assess scientific inquiry as suggesting that there is a fundamental order

of the universe so profound that it can be called "God," can or should theologians take that seriously—not as a fact, not as a buttress or foundational reassurance for religions, but as a question? Should they be willing to inquire whether there are other grounds for such an assertion and whether such a reality would necessarily be personal in a refined but real use of this word? This is a service to science which the pope generically suggests: "For science develops best when its concepts and conclusions are integrated into the broader human culture and its concerns for ultimate meaning and value." If the scientific enterprise, like any other human endeavor, raises questions beyond its own capacities to resolve, perhaps one way of the integration of science into broader human culture may occur when the questions it generates are taken up by another form of disciplined reflection.

If this is true, then contemporary theology can profitably interact with science by reflecting upon questions about purpose or cosmic order or integration, which contemporary science may find suggested but which it does not possess the methodology or data to pursue. This is not the god of the gaps nor is it Davies' project to use science to provide "a surer path to God." It rather suggests the need for a metascience, a disciplined inquiry, whose problematic area is fed by all human projects, including science. I have cited Brian Pippard once before; let me cite him once more on the cosmological constants:

One is strongly tempted to feel that the numbers were chosen with us in mind. It must not be forgotten, however, that for all we know the totality of things may include every possible sort of universe, each closed in upon itself and inaccessible from the others, and that only those that can support life in some form will contain creatures questioning the origin of their being. And each will be similarly tempted to feel specially chosen. If this is as far as physics can take us, it leaves us still in the dark about man's place in the scheme.¹⁵

Does theology have anything to contribute in the exploration of these strong temptations to feel that what is, is chosen?

What the papal letter leads to, then, is a question about a question: Granted that contemporary science does not settle the issue of the existence of God one way or the other—as Newton or Dewey had argued with such different conclusions that it should—and that it does not provide the path to religious affirmations, which the stronger Davies claim proposes, does it in some way raise the question of purpose within the universe, contribute to the question about the existence of God, or at least make the question of God a more plausible one in contemporary culture?

¹⁵ Pippard, "Master-minding the Universe" 796.

Something co-ordinate with this is what the papal letter suggests as the mutual service between science and religion: "Science can purify religion from error and superstition; religion can purify science from idolatry and false absolutes. Each can draw the other into a wider world, a world in which both can flourish" (378a-b).

The contrast between the stronger Davies claim and the papal position is sharp. Davies maintains that science can deal with the search for God better than religion; science is thus foundational for any religion or theology. The pope rejects this foundational priority of one over the other in the fields of their own subject matter. He indicates five possibilities and comes out against mutual rejection, mutual indifference, or subsumption of one by the other. What he suggests is a unity of interchange between the scientific community and the Church, each in discussion with the other for whatever influence and contributions one can legitimately make to the other without infringing upon its integrity. This will be different for each, because each is different. Such a community of interchange can foster, as well as instantiate, the unity of the human culture in which we live, and even contribute to a love for the world of creation and hence for the God of whom it is a signature of love.

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