IV.C.1

Is Science a Religion?

RICHARD DAWKINS

It is fashionable to wax apocalyptic about the threat to humanity posed by the AIDS virus, "mad cow" disease, and many others, but I think a case can be made that faith is one of the world's great evils, comparable to the smallpox virus but harder to eradicate.

Faith, being belief that isn't based on evidence, is the principle vice of any religion. And who, looking at Northern Ireland or the Middle East, can be confident that the brain virus of faith is not exceedingly dangerous? One of the stories told to young Muslims suicide bombers is that martyrdom is the quickest way to heaven—and not just heaven but a special part of heaven where they will receive their special reward of 72 virgins. It occurs to me that our best hope may be to provide a kind of "spiritual arms control"—send in specially trained theologians to decouple the going rate in virgins.

Given the dangers of faith—and considering the accomplishments of reason and observation in the activity called science—I find it ironic that, whenever I lecture publicly, there always seems to be someone who comes forward and says, "Of course, your science is just a religion like ours. Fundamentally, science just comes down to faith, doesn't it?" Well, science is not religion and it doesn't just come down to faith. Although it has many of religion's virtues, it has none of its vices. Science is based upon verifiable evidence. Religious faith not only lacks evidence, its independence from evidence is its pride and joy, shouted from the rooftops. Why else would Christians wax critical of doubting Thomas? The other apostles are held up to us as exemplars of virtue because faith was enough for them. Doubting Thomas, on the other hand, required evidence. Perhaps he should be the patron saint of scientists.

One reason I receive the comment about science being a religion is because I believe in the fact of evolution. I even believe in it with passionate conviction. To some, this may superficially look like faith. But the evidence that makes me believe in evolution is not only overwhelmingly strong, it is freely available to anyone who wants to read up on it. Anyone can study the evidence that I have and presumably come to the same conclusion. But if you have a belief that is based solely on faith, I can't examine your reasons. You can retreat behind the private wall of faith, where I can't reach you.

Now in practice, of course, individual scientists do sometimes slip back into the vice of faith, and a few may believe so single-mindedly in a favorite theory that they occasionally falsify evidence. However, the fact that this sometimes happens doesn't alter the principle that, when they do so, they do it with shame and not with pride. The method of science is so designed that it usually finds them out in the end.

Science is actually one of the most moral, one of the most honest disciplines around—because science would completely collapse if it weren't for a scrupulous adherence to honesty in the reporting of evidence. (As James Randi has pointed out, this is one reason why scientists are so often fooled by paranormal tricksters and why the debunking role is better played by professionals (scientists just don't anticipate deliberate dishonesty as well.) There are other professions (too need to mention lawyers specifically) in which falsifying evidence or at least twisting it is precisely what people are paid for and get brownie points for doing.

Science, then, is a free of the main vice of religion, which is faith. But, as I pointed out, science does have some of religion's virtues. Religion may aspire to provide its followers with various benefits—among them, consolation, uplift. Science, too, has something to offer in these areas.

Humans have a great hunger for explanation. It may be one of the main reasons why humanity so universally has religion, since religion do aspire to provide explanations. We come to our individual consciousness in a mysterious universe and long to understand it. Most religions offer a cosmology and a biology, a theory of life, a theory of origins and reasons for existence. In doing so, they demonstrate that religion is, in a sense, science; it's just bad science. Don't fall for the argument that religion and science operate on separate dimensions and are concerned with quite separate sorts of questions. Religions have historically always attempted to answer the questions that properly belong to science. Thus religions should not be allowed now to retreat from the ground upon which they have traditionally attempted to fight. They do offer both a cosmology and a biology, however, in both cases it is false.

Consolation is harder for science to provide. Unlike religion, science cannot offer the bereaved a glorious reunion with their loved ones in the hereafter. Those wronged on this earth cannot, on a scientific view, anticipate a sweet consequence for their tormentors in a life to come. It could be argued that, if the idea of an afterlife is an illusion (as I believe it is), the consolation it offers is hollow. But that's not necessarily so; a false belief can be just as comforting as a true one, provided the believer never discovers its falsity. But if consolation comes that cheap, science can weigh in with other cheap palliatives, such as pain-killing drugs, whose comfort may or may not be illusory, but they do work.

Uplift, however, is where science really comes into its own. All the great religions have a place for awe, for ecstasy transported at the wonder and beauty of creation. And it's exactly this feeling of spine-shriving, breath-catching awe—almost worship—this flooding of the chest with cosmic wonder, that modern science can provide. And it does so beyond the wildest dreams of saints and mystics. The fact that the supernatural has no place in our explanations, in our understanding of so much of the universe and life, doesn't diminish the awe. Quite the contrary. The more glassy glance through a microscope at the brain of an ant or through a telescope at a long-sighted galaxy of a billion worlds is enough to render poky and parochial the very psalms of praise.

Now, as I say, when it is put to me that science or some particular part of science, like evolutionary theory, is just a religion like any other, I usually deny it with indignation. But I've begun to wonder whether perhaps that's what's being said. Perhaps the right tactic is to accept the charge gracefully and demand equal time for science in religious education classes. And the more I think about it, the more I realize that an excellent case can be made for this. So I want to talk a little bit about religious education and the place that science might play it in.

I do feel very strongly about the way children are brought up. I'm not entirely familiar with the way things are in the United States, and what I say...
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it, the other don’t exist. Then again, there might be a Darwinian selection among universes.

So science could give a good account of itself in religious education. But it wouldn’t be enough.

I believe that some familiarity with the King James version of the Bible is important for anyone wanting to understand the allusions that appear in English literature. Together with the Book of Common Prayer, the Bible gets 58 pages in the Oxford Dictionary of Quotations. Only Shakespeare has more. I do think that not having any kind of biblical education is unfortunate if children want to read English literature and understand the provenance of phrases like “through a glass darkly,” “all flesh is grass,” “the race is not to the swift.”

I would want to deny even the lesser charge of purely verbal reality. There is a very important difference between feeling strongly, even passionately, about something because we have thought about and examined the evidence for it on the one hand, and feeling strongly about something because it has been internally revealed to us, or internally revealed to somebody else so that the world seems different in the way that one is prepared to defend by quoting evidence and logic and a belief that is supported by nothing more than tradition, authority, or revelation.

Nonoverlapping Magisteria

STEFAN JAY GOULD

Incongruous places often inspire anomalous stories. In early 1984, I spent several days at the Vatican, hosted in a hotel built for itinerant priests. While pondering over such puzzling issues as the intended function of the bikers in each bathroom, and bungling for something other than jam on my breakfast rolls (why did the basket only contain hundreds of identical plum packets and not a one of, say, strawberry?), I encountered yet another among the unanswerable issues of contrasting cultures that can make life so interesting. Our crowd (present in Rome for a meeting on nuclear winter sponsored by the Pontifical Academy of Sciences) shared the hotel with a group of French and Italian Jewish priests who were also professional scientists.

As lunch, the priests called me over to their table to pose a problem that had been troubling them. What, they wanted to know, was going on in America with all this talk about “scientific creationism”? I asked one of them: “Is evolution really in some kind of trouble, and if so, what could such trouble be? I have always been taught that no doctrinal conflict exists between evolution and Catholic faith, and the evidence for evolution seems both entirely satisfactory and utterly overwhelming. Have I missed something?”

A lively pastiche of French, Italian, and English conversation ensued for half an hour or so, but the priests all seemed reassured by my general answer. Evolution has encountered no intellectual trouble; no new arguments have been offered. Creationism is a homegrown phenomenon of American sociocultural history—a splinter movement (unfortunately rather more of a beehive than these) of Protestant fundamentalists who believe that every word of the Bible must be literally true, whatever such a claim might mean. We all left satisfied, but I certainly felt humbled by the enormity of my role as a Jewish agnostic, trying to reassure a group of Catholic priests that evolution remained both true and entirely consistent with religious belief.

Another story in the same mold: I am often asked whether I ever encounter creationists as a live issue among my Harvard undergraduate students. I reply that only once, in nearly thirty years of teaching, did I experience such an incident.

In very sincere and serious freshman student came to my office hours with the following question that had clearly been troubling him deeply: “I am a devout Christian and have never had any reason to doubt evolution, and an idea that seems both existing and particularly well documented. But my roommate, a proselytizing Evangelical, has been insisting with monstrous vigor that I cannot be both a real Christian and an evolutionist. So tell me, can a person believe both in God and evolution?” Again, I gulped hard, did my intellectual duty, and reassured him that evolution was both true and entirely compatible with Christian belief—a position I hold sincerely, but still an odd situation for a Jewish agnostic.

These two stories illustrate a cardinal point, frequently unrecognised but absolutely central to any understanding of the status and impact of the scientifically potent, fundamentalist doctrine known by its self-proclaimed oxymoron as “scientific creationism”—the claim that the Bible is literally true, that all organisms were created during six days of twenty-four hours, that the earth is only a few thousand years old, and that evolution must therefore be false. Creationism does not pits science against religion (as my opening stories indicate), for no such conflict exists. Creationism cannot theorise any unanswerable intellectual issues about the nature of biology or the history of life. Creationism is a local and parochial movement, powerful only in the United States among Western nations, and prevalent among the few sectors of American Protestantism that choose to read the Bible as an inerrant document, literally true in every jot and tittle.

I do not doubt that one could find an occasional man who would prefer to teach creationism in their parochal school biology class, or an occasional orthodox rabbi who does the same in his yeshiva, but creationism based on biblical literalism makes little sense in either Catholicism or Judaism, for neither religion maintains any extensive tradition for reading the Bible in literal terms rather than illuminating literature, based partly on metaphor and allegory (essential components of all good writing) and demanding interpretation for proper
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good men, but above all to the true and loyal sons of the Church, especially today, when we see the principles of Christian culture being attacked on all sides.

Pius lashed out, in turn, at various external enemies of the Church: pantheism, existentialism, dialectical materialism, historicism, and, of course and preeminently, communism. He then noted with sadness that some well-meaning folks within the Church have fallen into a dangerous relativism—"a theological pacifism and relativism, in which all points of view become equally valid"—in order to include people of wakening faith who yearn for the embrace of the faith of the traditions of the Church but do not wish to accept the particularly Catholic magisterium.

What is this world coming to when these notions are so discommodious, a revealed and established order? Speaking in a conservative's conservative, Pius laments:

Novelties of this kind have already borne their deadly fruit in almost all branches of theology. ... Some question whether angels are personal beings, and whether matter and spirit differ essentially. ... Some even say that the doctrine of Transubstantiation, based on an antiquated philosophy of substance, should be so modified that the Real Presence of Christ in the Holy Eucharist be reduced to a kind of symbolism.

Pius first mentions evolution to decries a misuse by overextension often pronounced by zealous supporters of the athenaeistic "sins":

Some imprudently and indirectly hold that evolution ... explain the origin of all things. ... Communists gladly subscribe to this opinion so that, when the sons of men have been deprived of every idea of a personal God, they may the more efficaciously defend and propagate their dialectical materialism.

Paul's major statement on evolution occurs near the end of the encyclical in paragraphs 35 through 37.

He accepts the standard model of NOMA and begins by acknowledging that evolution lies in a difficult area where the domains press hard against each other. "It remains for us now to speak about those questions which, although they pertain to the positive sciences, are nevertheless more or less connected with the truths of the Christian faith."

Pius then writes the well-known words that permit Catholics to entertain the evolution of the human body (a factual issue under the magisterium of science), so long as they accept the divine Creation and infusion of the soul (a theological notion under the magisterium of religion).

The Teaching Authority of the Church does not forbid that, in conformity with the present state of human sciences and canon theology, research and discussions, on the part of men experienced in both fields, take place with regard to the doctrine of evolution, in as far as it inquires into the origin of the human body as coming from pre-existent and living matter—for the Catholic faith obliges us to hold that souls are immediately created by God.

I add, up to here, found nothing surprising in *Humani Generis*, and nothing to relieve my puzzlement about the nature of the Pope John Paul's recent statement. But I read further and realized that Pope Paul had said more about evolution, something I had never seen quoted, and that made John Paul's statement most interesting indeed. In short, Pius forcefully proclaimed that while evolution may be legitimate in principle, the theory, in fact, has never been proven and might well be entirely wrong. One gets the strong impression, moreover, that Pius was rooting pretty hard for a verdict of falsity. Continuing directly from the last quotation, Pius advises in about the proper study of evolution:

However, this must be done in such a way that the reasons for both opinions, that is, those favorable and those unfavorable to evolution, be weighed and judged with the necessary seriousness, moderation and measure.... Some, however, rather transgress this liberty of discussion, when they act as if the origin of the human body from pre-existing and living matter were already completely certain and proved by the facts which have been discovered up to now and by resting on those facts, and as if there were nothing in the sources of divine revelation which demands the greatest moderation and caution in this question.

To summarize, Pius generally accepts the NOMA principle of nonoverlapping magisteria in permitting Catholics to entertain the hypothesis of evolution for the human body so long as they accept the divine infusion of the soul in the same way that the conciliar fathers advised scientists about the status of evolution as a scientific concept; the idea is not yet proven, and you all need to be especially cautious because evolution raises many troubling issues right on the border of my magisterium. One may read this second theme in two different ways: either as a gratuitous incursion into a different magisterium or as a helpful perspective from an intelligent and concerned outsider. As a man of good will, and in the interest of conciliation, I am happy to embrace the latter reading.

In any case, this rarely quoted second claim (that evolution remains both unproven and a bit dangerous) and not the familiar first argument for the NOMA principle (that Catholics may accept the evolution of the body so long as they embrace the divinity of the soul)—defines the novelty and the interest of John Paul's recent statement.

John Paul begins by summarizing Pius's older encyclical of 1950, and particularly by reaffirming the NOMA principle—nothing new here, and no cause for extended publicity:

In his encyclical "Humani Generis" (1950), my predecessor Pius XII had already stated that there was no opposition between evolution and the doctrine of the faith about man and his vocation.

To emphasize the power of NOMA, John Paul poses a potential problem and a sound resolution: How can we reconcile science's claim for physical continuity in human evolution with Catholicism's insistence that the soul must enter at a moment of divine infusion?

With man, then, we find ourselves in the presence of an ontological difference, an ontological leap, one could say. However, does not the posing of such ontological discontinuity run counter to that physical continuity which seems to be the main thread of research into evolution in the field of physics and chemistry? Consideration of the method used in the various branches of knowledge makes it possible to reconcile two points of view which would seem irreconcilable. The sciences of observation describe and measure the multiple manifestations of life without discovering preexistent and necessary conditions that would change as time, the moment of transition to the spiritual cannot be the object of this kind of observation.

The novelty and news value of John Paul's statement lies, rather, in his profound revision of Pius's second and rarely quoted claim that evolution, while conceivable in principle and reconcilable with religion, can cite little persuasive evidence, and may well be false. John Paul's statement—and I can only say amen, and thanks for noticing—that the half-century between Pius's surveying of the runs of World War II and his own pontificate heralding the discovery of a new millennium has witnessed such a growth of data, and such a refinement of theory, that evolution can no longer be doubted by people of good will.

Pius XII added ... that this opinion [evolution] should not be adopted as though it were a certain, proven doctrine. ... Today, almost half a century after the publication of the encyclical, new knowledge has led to the recognition of more than one hypothesis in the theory of evolution. It is indeed remarkable that this theory has been progressively accepted by researchers, following a series of discoveries in various fields of knowledge. The convergence, however, sought or fabricated, of the results.
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of work that was conducted independently in itself a significant argument in favor of the theory.

In conclusion, Pius had gradually admitted evolution as a legitimate hypothesis that he regarded as only tentatively supported and potentially (as I suspect he hoped) untenable. John Paul, nearly sixty years later, reaffirms the legitimacy of evolution under the NOMA principle—no news here—but then adds that additional data and theory have placed the factuality of evolution beyond reasonable doubt. Since Christians must now accept evolution not merely as a conceivable but also as an effectively proven fact. In other words, official Catholic opinion on evolution has moved from "no" to "yes" but we can deal with it if we have to" (Pius's granting view of 1956) to John Paul's entirely welcoming "it has been proven true; we always celebrate nature's factuality, and we look forward to increasing discussions of theological implications." I happily endorse this turn of events as gospel—literally good news. I may represent the magisterium of science, but I welcome the support of a primary leader from the other major magisteriums of our complex lives. And I recall the wisdom of King Solomon: "As cold waters to a thirsty soul, so is good news from a far country" (Prov. 25:25).

John Paul must bear the crown of his hardliners, I have some scientific colleagues, including a few prominent enough to wield influence by their writings, who view this rapprochement of the separate magisteria with dismay. To colleagues like me—agnostic scientists who welcome and celebrate the rapprochement, especially the pope's latest statement—they say: "Czynski, be honest; you know that religion is adlegated, superstition, old-fashioned b.s.; you're only making those welcoming noises because religion is so powerful, and we need to be diplomatic in order to assure public support and funding for science." I do not think that this attitude is common among scientists, but such a position fills me with dismay—and I therefore end this essay with a personal statement about religion, as a testimony to what I regard as a vital consensus among thoughtful scientists (who support the NOMA principle as firmly as the pope does).

I am not, personally, a believer or a religious man in any sense of institutional commitment or practice. But I have enormous respect for religion, and the subject has always fascinated me, beyond almost all others (with a few exceptions, like evolution, paleontology, and baseball). Much of this fascination lies in the historical paradox that throughout Western history organized religion has fostered both the most unpalatable horrors and the most heart-rending examples of human goodness in the face of personal danger. (The evil, I believe, lies in the occasional conflation of religion with secular power. The Catholic Church has sponsored its share of horrors, from Inquisitions to liquidations—but only because this institution held such secular power during so much of Western history. When my folks held similar power more briefly in Old Testament times, they consoled just as many atrocities with many of the same rationales.) I believe, with all my heart, in a respectful, even loving concordance between our magisteria—the NOMA solution. NOMA represents a principle position on moral and intellectual grounds, not a mere diplomatic stance. NOMA also cuts both ways. If religion can no longer dictate the nature of factual conclusions properly under the magisterium of science, then scientists cannot claim higher insight into moral truth from any superior or knowledge of the world's empirical constitution. This mutual humility has important practical consequences in a world of diverse passions.

Religion is too important to too many people for any diminution or denigration of the comfort still sought by many from theologies. I may, for example, privately suspect that papal insistence on divine infallibility of the soul represents a step to our safe, a device for maintaining a belief in human superiority within an evolutionary world offering no privileged positions to any creature. But I also know that souls represent a subject outside the magisterium of science. My world cannot prove or disprove such a notion, and the concept of souls cannot threaten or impact my domain. Moreover, if evolution is the grounding of predatory teeth upon the screaming, living flesh and bones of prey, . . . if evolution be true, my faith has rougher seas to sail.

I don't agree with this man, but we could have a wonderful argument. I would push the "cold bath" theory; he would (presumably) advocate the theme of inherent spiritual meaning in nature, however opaque the signal. But we would both be enlightened and filled with better understanding of these deep and ultimately unanswerable issues. Here, I believe, lies the greatest strength and necessity of NOMA, the nonoverlapping magisteria of science and religion. NOMA permits—indeed requires—the prospect of respectful discourse, of constant input from both magisteria toward the common goal of wisdom. If human beings are anything special, if we are the creatures that must ponder and talk, Pope John Paul II would surely point out to me that his magisterium has always recognized this distinction, for in principi vel verum—"In the beginning was the Word."

Postscript

Carl Sagan organized and attended the Vatican meeting that introduces this essay; he also shared my concern for fruitful cooperation between the different but vital realms of science and religion. Carl was also one of my dearest friends. I learned of his untimely death on the same day that I read the proofs for this essay. I could only recall Nehru's observations on Gandhi's death—that the light had gone out, and darkness reigned everywhere. But I then contemplated what Carl had done in his short sixty-two years and remembered John Dryden's ode for Henry Purcell, a great musician who died even younger: "He long ere this had tuned the jarring spheres, and left no bell below." The days I spent with Carl in Rome were the best of our friendship. We delighted in walking around the Eternal City, feasting on its history and architecture—and its food! Carl took special delight in the anatomy of the food we enjoyed in a nation that had not yet aired Cosmos, the greatest media work in popular science of all time.
I dedicate this essay to my memory. Carl also shared my personal suspicion about the nonexistence of souls—but I cannot think of a better reason for hoping we are wrong than the prospect of spending eternity recycling the cosmos in friendship and conversation with this wonderful soul.

NOTE

1. Interestingly, the main thrust of these paragraphs does not address evolution in general but lies in raising the doctrine that Pius calls "polygenism," or the notion of human ancestry from multiple parents—by means of which, through generations, is raised on to all and is as everyone as his own." In this one instance, Pius may be transcending the NOMA principle—but I cannot judge, for I do not understand the details of Catholic theology and therefore do not know how symbolically such a statement may be read. If Pius is arguing that we cannot entertain a theory about derivation of all modern humans from an ancestral population rather than through an ancestral individual (a potential fact) because such an idea would question the doctrine of original sin (a theological construct), then I would declare him out of line for letting the magisterium of religion dictate a conclusion within the magisterium of science.

IV.C.3

Faith and Science: Lessons from the Galileo Case and Message on Evolution

POPE JOHN PAUL II

Pope John Paul II, originally Karol Jozef Wojtyła (1920–2005), served as Pope of the Roman Catholic Church from 1978 until his death in 2005. The present selection consists of two of his most important addresses on the relationship between faith and science. Lessons from the Galileo Case (1992) and Message on Evolution to the Pontifical Academy of Sciences (1996). In these essays, he argues that although there can be no true conflict between religion and science, apparent conflicts sometimes do arise. When that happens, we must take care to see that divine revelation has been properly interpreted and understood, but we must also distinguish between those aspects of scientific theory that report the observed data and those aspects that, in one way or another, go beyond the data.

Faith and Science: Lessons from the Galileo Case and Message on Evolution

5. A twofold question is at the heart of the debate of which Galileo was the centre. The first is of the epistemological order and concerns biblical hermeneutics. In this regard, two points must again be raised. In the first, place, like most of his adversaries, Galileo made no distinction between the scientific approach to "natural phenomena" and a reflection on nature, of the philosophical order, which that approach generally calls for. That is why he rejected the suggestion made to him to present the Copernican system as a hypothesis, inasmuch as it had been confirmed by irrefutable proof. Such therefore, was an exigency of the experimental method of which he was the inspired founder.

Secondly, the geocentric representation of the world was commonly admitted in the culture of the time as being strictly connected with the teaching of the Bible of which certain expressions, taken literally, seemed to affirm geocentrism. The problem posed by theologians of that age was, therefore, that of the compatibility between heliocentrism and Scripture.

Thus the new science, with its methods and the freedom of research which they implied, obliged theologians to examine their own criteria of scriptural interpretation. Most of them did not know how to do so.

Paradoxically, Galileo, a sincere believer, showed himself to be more perceptive in this regard than the theologians who opposed him. "If Scripture cannot err," he wrote to Benedetto Castelli, "certain of its interpreters and commentators can and do so in many ways." We also know of his letter to Christine de Lorraine (1615) which is like a short treatise on biblical hermeneutics. 2

6. From this we can now draw our first conclusion. The birth of a new way of approaching the study of natural phenomena emphasizes a clarification on the part of all disciplines of knowledge. It obliges them to define more clearly their own field, their approach, their methods, as well as the precise impetus of their conclusions. In other words, this new way requires each discipline to become more rigorously aware of its own nature.

The upset caused by the Copernican system thus demanded epistemological reflection on the biblical sciences, an effort which later would produce abundant fruit in modern exegetical works and which has found sanction and a new stimulus in the Dogmatic Constitution De Verbo of the Second Vatican Council.

7. The crisis that I have just recalled is not the only factor to have had repercussions on biblical interpretation. Here we are concerned with the second aspect of the problem, its pastoral dimension.

By virtue of her own mission, the Church has the duty to be attentive to the pastoral consequences of her teaching. Before all else, it is clear that this teaching must correspond to the truth. But it is a question of knowing how to judge a new scientific datum when it seems to contradict the truths of faith. The pastoral judgement which the Copernican theory required was difficult to make, in so far as geocentrism seemed to be a part of scriptural teaching itself. It would have been necessary all at once to overcome habits of thought and to devise a way of teaching capable of enlightening the people of God. Let us now, in a general way, see the way the pope ought to show a genuine boldness, avoiding the double trap of a hesitant attitude and of hasty judgement, both of which can cause considerable harm.

8. Another crisis, similar to the one we are speaking of, can be mentioned here. In the last century and at the beginning of our own, advances in the historical sciences made it possible to acquire a new understanding of the Bible and of the biblical world. The rationalist context in which these data were most often presented seemed to make them dangerous to the Christian faith. Certain people, in their concern to defend the faith, thought it necessary to reject firmly-based historical conclusions. That was a hasty and unhappy decision. The work of a pioneer like Fr. Lagrange was able to make the necessary discernment on the basis of dependable criteria.
functions as the centre of the world, as it was then known, to the system of Copernicus. The error of the theologians of the time, when they maintained the centrality of the earth, was to think that our understanding of the physical world's structure was, in some way, imposed by the literal sense of Sacred Scripture. Let us recall the celebrated saying attributed to Irenaeus: "Spirtual Sancto mentem fundo ris docere gnomiano ad aurem creatur, non quomodo eodem gradu.

In fact, the Bible does not concern itself with the details of the physical world, the understanding of which is the competence of human experience and reasoning. There exist two realms of knowledge, one of which has its source in Revelation and one which can discover by its own power. To the latter belong especially the experimental sciences and philosophy. The distinction between the two realms of knowledge ought not to be understood as opposition. The two realms are not altogether foreign to each other, they have points of contact. The methodologies proper to each make it possible to bring out different aspects of reality.

Pope John Paul II: Faith and Science: Lessons from the Galileo Case

Evolution and the Church's Magisterium

Taking into account the scientific research of the era, and also the proper requirements of theology, the encyclical Humani Genri treats of "evolutionism" as a serious hypothesis, worthy of investigation and serious study, alongside the opposite hypothesis. Pius XII added two methodological conditions for this study: one could not adopt this opinion as if it were certain and demonstrable doctrine, and one could not totally set aside the teaching of Revelation on the relevant questions. He also set out the conditions on which this opinion would be compatible with the Christian faith—a point to which I shall return.

Today, more than a half-century after the appearance of this encyclical, some new findings lead us toward the recognition of evolution as more than an hypothesis. In fact it is remarkable that this theory has had progressively greater influence on the spirit of research, following a series of discoveries in different scholarly disciplines. The convergence in the results of these independent studies—which was neither planned nor sought—constitutes in itself a significant argument in favor of the theory.

What is the significance of a theory such as this one? To open this question is to enter into the field

MAGISTERIUM IS CONCERNED WITH QUESTION OF EVOLUTION

FOR IT INVOLVES CONCEPTION OF MAN

Science at the Dawn of the Third Millennium

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1. Before offering a few more specific reflections on the theme of the origin of life and evolution, I would remind you that the magisterium of the Church has already made some pronouncements on these matters, within her own proper sphere of competence. I will cite two such inter-connections here.

In his encyclicl Humani Generi (1950), my predecessor Pius XII has already affirmed that there is no conflict between evolution and the doctrine of the faith regarding man and his vocation, provided that we do not lose sight of certain fixed points.

For my part, when I received the participants in the plenary assembly of your Academy on October 31, 1992, I used the occasion—and the example of Galileo—to draw attention to the necessity of using a rigorous hermeneutic approach in seeking a concrete interpretation of the inspired texts. It is important to set proper limits to the understanding of Scripture, excluding any unreasonable interpretations which would make it mean something which it is not intended to mean. In order to mark out the limits of their own proper fields, theologians and those working on the exegesis of the Scripture need to be ready and disposed regarding the results of the latest scientific research.
of epistemology. A theory is a meta-scientific elaboration, which is distinct from, but in harmony with, the results of observation. With the help of such a theory a group of data and independent facts can be related to one another and interpreted in one comprehensive explanation. The theory proves in validity by the measure to which it can be verified. It is constantly being tested against the facts; when it can no longer explain these facts, it shows its limits and its lack of usefulness, and it must be revised.

Moreover, the elaboration of a theory such as that of evolution, while obedient to the need for consistency with the observed data, must also involve importing some ideas from the philosophy of nature.

And to tell the truth, rather than speaking about the theory of evolution, it is more accurate to speak of the theories of evolution. The use of the plural is required here—in part because of the diversity of explanations regarding the mechanism of evolution, and in part because of the diversity of philosophies involved. There are materialist and reductionist theories, as well as spiritualist theories. Here the final judgment is within the competence of philosophy and, beyond that, of theology.

3. The magistrate of the Church takes a direct interest in the question of evolution, because it touches on the conception of man, whom Revelation tells us is created in the image and likeness of God. The conciliar constitution Gaudium et Spes has given us a magnificent exposition of this doctrine, which is one of the essential elements of Christian thought. The Council recalled that “man is the only creature on earth that God wanted for its own sake.” In other words, the human person cannot be subordinated as a means to an end, or as an instrument of either the species or the society; he has a value of his own. He is a person. By his intelligence and will, he is capable of entering into relationship, of communion, of solidarity, of the gift of himself to others like himself. St. Thomas observed that man’s resemblance to God resides especially in his speculative intellect, because his relationship with the object of his knowledge is like God’s relationship with his creation. (Summa Theologiae I-II, q. 3, a. 1d) But even beyond that, man is called to enter into a loving relationship with God himself, a relationship which will find its full expression at the end of time, in eternity. Within the mystery of the Incarnation and the grandeur of this vocation is revealed to us. (Gaudium et Spes, 22) It is by virtue of his eternal soul that the whole person, including his body, possesses such great dignity. Pius XII underlined the essential point: “if the origin of the human body comes through living matter which existed previously, the spiritual soul is created directly by God (“animas ensin a Deo immediate creati catholica fides non retinere itub”). (Humanae Gentis)

As a result, the theories of evolution which, because of the philosophies which inspire them, regard the spirit either as emerging from the forces of living matter, or as a simple epiphemomenon of that matter, are incompatible with the truth about man. They are therefore unable to serve in the basis for the dignity of the human person.

6. With man, we find ourselves facing a different ontological order—an ontological leap, we could say. But in posing such a great ontological discontinuity, are we not breaking up the physical continuity which seems to be the main line of research about evolution in the fields of physics and chemistry? An appreciation for the different methods used in different fields of scholarship allows us to bring together two points of view which at first might seem irreconcilable. The sciences of observation describe and measure, with ever greater precision, the many manifestations of life, and write them down along the time-line. The moment of passage into the spiritual realm is not something that can be observed in this way—although we can nevertheless discern, through experimental research, a series of very valuable signs of what is specifically human life. But the experience of metaphysical knowledge, of self-consciousness and self-awareness, of moral conscience, of liberty, or of artistic and religious experience—these must be analyzed through philosophical reflection, while theology seeks to clarify the ultimate meaning of the Creator’s design...