



The Easter season is over and we have settled into "Ordinary Time" as the Church calls it. But there are extraordinary things happening all around us.

The most extraordinary thing may be the ordinariness of the time. With all the dire predictions of weather and global warming, the political races, terrorism and so forth, the human race is still here and so far catastrophe has been averted. To the believer in God that, in itself, is proof of the existence of God. Or so it would seem to me. But the real proof of the existence of God lies ahead of us -- in the eschaton. That is what we were made for -- the period when we shall begin "to know as we are known" and love as we are loved.

What is the greatest virtue of the eschaton? Is it not love? St. Paul tells us in Corinthians that knowledge may puff us up, but it is love that makes the building grow. Love may or may not be used as much as other words in Scripture, but it is the most important one used. Take just a couple of sayings from the Scripture: "God loved the world so much that he gave his only Son ..."; "A person can have no greater love than to lay down his life for his friends ..."; "what I command you is to love one another ..."; "As the Father has loved me, so I have loved you..."

What is this love that we must have? It is "Love one another as I have loved you." Christ has loved us with both a fully human love and a fully divine love. So we are commanded to love one another fully, completely and without hesitation. That is our mandate as Christians. Is it difficult sometimes to love others? Of course it may be! It would not be a command if it were automatic. We're bound into ourselves at birth and we live our lives trying to control others -- either in a "nice" way or in hostility or indifference. It is not to be that way with us. We are to love each other -- or at least work at developing that attitude. That is the highest commandment we have: to love one another. Let's get to work. "Ordinary time" is as good as any time for us to be at our Father's work.

Robert Brungs, S.J.

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ANNOUNCEMENTS

1. **ITEST CHANGE OF ADDRESS NOTICE:** As of July 1, 2004 ITEST will no longer retain the 221 North Grand Boulevard address. From now on please address all mail to:

**ITEST
3601 Lindell Blvd.
St Louis, Missouri 63108**

We have not moved to a new location; the Grand Blvd. address mail makes its way slowly through the St Louis University system; whereas, Lindell Blvd. mail is delivered directly to our office building. Moreover, the personnel turnover in the Saint Louis University mail room has reached the stage where "they know not Joseph." We have evidence of mail sent to us that was returned to the sender marked "Person Unknown." The new address will obviate the problem.

2. Registration reminder: Invitations to the October 15-17, 2004 workshop on *Computers, Artificial Intelligence and Virtual Reality* have been sent to all ITEST members in the U.S. To view the information on the Web, access our web site at <http://ITEST.slu.edu>. Then click on Current Items of Interest. That will lead you to multiple pages describing various aspects of the workshop. Please register early if you wish to attend the weekend workshop since we have a limited number of rooms at Our Lady of the Snows Conference Center, in Belleville, Illinois. Dues-paid members receive a special rate. See the web site for detailed information or contact the ITEST staff. Student scholarships: Through several members' generosity in the past, we have been able to offer scholarships to college and graduate students. If you would like to contribute \$135.00 to sponsor a student let us know and we will get the good news to the students.

3. **New publication:** Congratulations to S. Mary Timothy Prokes, FSE, an essayist for our October workshop, who has recently completed her latest book, *At the Interface: Theology and Virtual Reality*, Tucson, Arizona: Fenestra Books, 2004, pp. 181. We will be reviewing this book in the Fall or Winter Bulletin. Sister Timothy has other books to her credit, namely, *Mutuality: the Human Image of Trinitarian Love*, New York: Paulist Press, 1993 and *Toward a Theology of the Body*, Grand Rapids, Michigan: William B. Eerdmans Publishing Company, 1996.

4. The latest book of proceedings, *Globalization: Christian Challenges*, has been sent to all dues-paid 2003 and 2004 members. If you have not received your copy, let us know and we will send it to you. We plan to put the cover, table of contents and foreword to the book

on our web site. One of our volunteers will add this information to our site during the early summer. Click on ITEST publications and then Publications of the New Millennium.

We have received a number of compliments on the design and content of the book. Among them, our representative at Sheridan Books, noted that of the hundreds of books they print yearly, our artist's cover design is one of the best. Designer, Len Buckley, manages with each successive cover to capture the essence of the workshop in a single and unified image inviting the "browser" to explore the contents further. Copies of *Globalization* are available for sale at \$19.95 each, postage and handling included.

4. We have secured a date for our workshop on *Biotechnology and Law* -- October 14-16, 2005. The ITEST Board considered various topics for this workshop and in the end agreed that these significant and timely issues were well worth revisiting. Because our last workshop on biotechnology and law took place several years ago, the Board felt that it was important to update our study of the technological advances made since then, such as fetal and adult stem cell research, cloning, new aspects of gene patenting, and the application of principles of law relating to science and technology as they evolve in 21st century society. With increasing frequency we learn in the popular press of "miracle" cures promised through the future use of certain genetic research and therapies. Scientists, ethicists and humanists working in the area of biotechnology will present arguments pro and con.

We welcome suggestions for essayists to invite to this workshop. On the one hand, you may have a contact or a colleague who could speak to these issues. On the other, if you yourself would like to do an essay on some aspect of the topic of biotech and law, contact Fr. Brungs at ITEST. At this point we are searching for people who could make valuable contributions to the discussion; we remain open to your recommendations.

5. This is the last chance to renew your membership for calendar year 2004. We plan to send first renewal letters and notices in October for calendar year 2005. The dues will remain the same this year: \$50.00 for regular members; \$25.00 for students. Institutional membership remains at \$125.00. You may pay with a VISA, MasterCard or check. Reminder to our members overseas: please be sure that the bank includes a routing number on the check. If that number is omitted, the bank will not deposit it to our account unless we agree to pay more than a 50 percent service charge.

THEOLOGICAL & NATURAL SCIENCE

Thomas F. Torrance

(Wipf & Stock: Eugene, Oregon, 2002)

Reviewed by Dr. John McKenna,
Worldwide Church of God, Pasadena, CA

In his preface to this collection of his later essays, gathered together here by his son, Thomas Spear Torrance, Professor Thomas Forsyth Torrance seeks to rehearse the arguments he has made over the years on behalf of the 6th century Alexandrian John Philoponos. Here he sets the Alexandrian into strong resonance with his (Torrance) countryman, James Clerk Maxwell, and in so doing argues that the Church needs to take a long and hard look at its condemnation of Philoponos as she seeks to relate her theology to the natural sciences developed in our modern civilization. These essays represent in this way more than thirty years of explorations Torrance has made into the relationship of the Word of God with the substantial contingency of the world. As such, we are readily aware of an amount of repetition and overlap in the content of the essays. But if we do grasp the direction in which Torrance would point his readers, I do not believe any apology is necessary. The theological science and the scientific theology for which he argues throughout their concerns possess a relational unity we only grasp with much reinforcement and encouragement. I will attempt in fact to review these contents so that certain emphases in all their repetition and overlap are brought as fully to light as possible.

In chapter one, Professor Torrance seeks to explore the development of scientific method as we find it laid down at the Academy of ancient Alexandria. This method is represented by the works of John Philoponos as one utterly committed to understanding anything 'according to its nature'. This is the primary and fundamental principle employed by the Grammarian at the Academy, one which served him with great fruitfulness in his efforts to take seriously in the ancient world the significance of the Logos of God upon the science of his day. It is this principle, Torrance argues, that allows the science of Philoponos to resonate with that of Maxwell and later even Albert Einstein, whose epistemology is shaped and formed in our time under the weight of this principle. Because of this, Torrance can see Philoponos' light and impetus theories as forerunners to Maxwell's dynamical field theory for electromagnetism and Einstein's gravitational theory, reason enough to suspect that we would be helped by removing the Anathema from the works of the Alexandrian.

When Philoponos took seriously for the physics of the world the incarnation of the Logos of God, he had laid

hold of the 'reason incarnate in existence' that Einstein later proclaimed as the realm of wonder and awe where religion and science must be understood as helpers to each other. The nature of our understanding of the nature of the world had to be grasped in the depths of this kind of reality, if we were (to) guard against abstract or existential mistakes about them. The *nature* of both had to be respected without divorcing them utterly from one another. A relational unity obtains that requires both differentiation and integration. Torrance can identify this case with the theology he found in his mentor Karl Barth, the great Swiss theologian. Barth sought always to understand the dynamical *nature* of the covenanted relationship between God and His People in His Creation in terms of the Being of God in His acts in history and the acts of God in His being with His Logos or Word in the history of the Creation. It is perhaps fair to think that Einstein never read Barth and Barth never read Einstein because of the lack of understanding between theology and science in their times. Perhaps a better understanding would have led them to a better integration of things. The Anathema of John Philoponos may have some significance in this case, who without confusing the Logos of God with the logos of the universe, sought to understand the contingency that was fundamental for grasping the reality of their *natures*.

A lecture I heard Tom give at the Center for Theological Inquiry at Princeton forms the second chapter of the book. I sat beside my old physics teacher, John Archibald Wheeler, listening to Professor Torrance express his deep appreciation of the science of Einstein, the great legend. The point of this appreciation is centered on Einstein's grasp of the importance of the 'why' question in physics -- (*warum die Natur so und nicht anders ist*). The 'warum' of the universe must become vital to us for real progress to be made. John Wheeler has called the scientific community to seek to do 'meaning physics' because of the importance of this point. We cannot be content merely with knowing 'how' the universe goes, but we must be able to penetrate into its meaning, where both moral and physical laws are found inherently in the nature of the universe. Such concerns have driven out into the open of our scientific consciousness the need to explain what ought to be and what is not self-explaining, when the substantial contingency of the rationality and intelligibility of the universe demands explication from beyond itself. It is

this kind of epistemology that is demanded as we seek to explore with our modern cosmologies a rational unity in the world.

In chapter three, Torrance explores this kind of contingency. He would show us how overcoming the dualistic splitting apart of the intelligible and sensible dimensions of the realities of the universe, inherited from Greek Science and its marriage to Christian Theology, allows us to grasp afresh, according to its true nature, the truth of God's real dialogue with us in His Creation. He sees Philoponos as understanding the Cosmos of God's 'Good' Creation out of nothing as possessing a substantial and real contingent order and nature, so that the appearances or the phenomena of our experience cannot be explained by the use of either 'necessary' or 'accidental' ways of carving up reality. Philoponos in this way developed 'field' and 'particle' interactions in the development of his understanding of light and impetus with which Maxwell and Einstein can both be seen to resonate. The profound relationship between mathematics and physical law or nature is inherent in their efforts to grasp the reality of the 'field' and the 'particle'. Today, when we are struggling to resolve this problem still, contingency remains a challenging and vital concept for our progress. To integrate them into a unified field would indeed give a whole window onto the nature of the universe. Philoponos' dynamical views of the relationship between the 'whole' and the 'parts' not only effected [affected?] his concept of the Creation, but also his concept of the Creator, the Word become flesh of God. The condemnation of his Christology reflects upon our misunderstanding of the dynamical ways that we may think about the relationship between the Creator and His Creation.

Here, the Christian doctrine of Creation out of nothing and the Incarnation are both important both for understanding the Light that God is and the light that is fundamental to the nature of the Creation and the experience of Mankind within this world. Torrance refers to thinkers such as Kurt Gödel, George Cantor, and Alan Turing to help us understand the compelling character of contingency upon our thought. The orders, unity, and complexity of the nature of the Creation are bound up with the speaking of this Creator. Its light and matter have been invested with a power we must respect, but this power is bound up with the power of the nature of the Creator. We need to be able both to differentiate their natures from one another while learning to integrate them into a whole that rests ultimately upon the life of the Word of God for them. With the works of thinkers as different as Soren Kierkegaard and Ilya Prigogine, we are led to understand that the nature of 'created time' has not been properly integrated into our struggle to find correspondence or complementarity between the physical nature of the universe and its

mathematical properties. Here, Torrance points us to the notion of the 'redemptive' character of time for us as well as its irreversibility and ability to perish. It is within this struggle that we may appreciate the dynamical aspects of the thought of Philoponos, where uncreated realities assume a vital relationship to created realities and that which is inherently perishable may not perish.

To this character of Creation then we may seek to grasp the moral order of the universe as well as its physical nature. We may take seriously the question 'why' (*Warum?*). We may seek in this light to integrate what is or what is merely possible with what ought to be. Real authority, says Torrance, is bound up with the freedom to pursue this 'oughtness' in both science and theology. Science is certainly right to answer Wheeler's call for 'meaning physics' in our time.

Chapter four is an address given at Kings College, London, entitled *Contingent and Divine Causality*. Again, the contingency of world reality is to be understood as a substantial reality over against any notions about the 'accidental' or 'necessary' nature of the universe. In this lecture, Torrance points to Richard Sorabji of Kings College and Shmuel Sambursky of the Hebrew University on the works of John Philoponos. Because of these scholars, Philoponos has begun to get the kind of attention that he deserves.

The concept of 'necessity' that we find in the world and the kind that we do not find in the world is vital for any understanding of the contingency of the world. In the Middle Ages, bound up with the idea of the Creator as the Unmoved Mover and First Cause, impassible and immutable in Himself, Christian Theology married to Aristotle's physics and Ptolemy's Cosmos, both Thomas Aquinas and Isaac Newton could conceive a kind of mythological relationship between the physical nature of the world and the world's relationship to God. Newton well knew that his mechanical universe with its absolute space and time could not apply to the Beginning of the world. He left ambiguous the relationship between the Beginning and the Mechanics of this world. But when we take seriously the doctrine of Creation out of nothing along with its affirmation in the Incarnation, however much the mystery remains, the ambiguity does not. As far as the relationship between God and the world is concerned, the only 'necessity' about which we can speak is the 'necessity' that belongs uniquely to the freedom of God's Being and His Act in Being with His Creation. There is this 'created necessity' that is bound up with this 'uncreated necessity' of the Free Will of the Creator whose nature's power to cause cannot be read off the surfaces of the created necessities we discover within His Creation. When these 'necessities' are confused with one another, much misunderstanding

can occur, especially between theology and science. When we do not confuse them, however, and seek to respect both the contingent necessities found within the orders and freedoms of the Creation and the unity created by the Will of God Himself, then we can see clearly what Professor Torrance is after and his appreciation for the epistemic poise in the science of Maxwell and Einstein. They respect the contingency of the world as it comes for us from God Himself.

Especially in understanding the debates between Einstein and Niels Bohr may we gain some appreciation for this point. The development of General Relativity Theory and Quantum Theory as One Unified Theory is an effort to integrate the causality of a continuum with the non-causal and statistical nature of particularity in the world. Einstein insisted upon causality in the ultimate theory. Bohr could settle for an uncertainty principle and a principle of complementarity bound up with indeterminism. Torrance sees the debate as a movement away from dialectical entanglements and into a supra-causality that respects the real contingency of the universe. The unity of the world possesses a wholeness that belongs, beyond itself, to the will and reason of the Creator's Nature and Being as Word. Today, Einstein's longing for a unified field may not be shaped by anything he could imagine, but his longing is justified with all the efforts of our modern scientific culture. We can easily pray with Torrance for the being of our knowing and the knowing of our being to experience a deepened understanding of this wholeness and unity, when the Creator's interaction with the Creation is better grasped by our mathematics and our imaginations. The dynamics of the relations between God and the world are to be found in Mankind in an integration of both levels of reality -- the whole and the parts as one reality.

Chapter five explores then the possibilities of our access from within the Creation's order of the Creator. Knowing God is not the same as knowing the Universe. Each is known strictly 'according to its nature', the divine as divine reality, the natural as natural reality. Torrance again turns to Alexandria and the dogmas of the sciences developed there, the scientific theologies of Athanasius, Cyril, and Philoponos especially. Against the polytheism and Aristotelianism popular in the Graeco-Roman Empire, the biblical doctrine of God as One God and the Creator of the one cosmos as contingent upon His will in its form and content allowed Christian Theology to develop over against the Ptolemaic Cosmology and Physics common among thinkers. John Philoponos especially attacked the understanding of the Cosmos as Eternal and the notion of the divinity of the logos of the heavens, with its fifth substance, to think of the whole of the heavens and the earth as one

created reality as coming from the hand of the Word of God. The split between the intelligible world of the heavenlies and the sensible world of the temporal realities experience on earth was to be denied our understanding of the Cosmos as the Cosmos of the Logos of God. In this attack, Philoponos developed a theory of the created light of the Cosmos as bound up freely and contingently with the uncreated light of God Himself. It was in accordance with this light that Philoponos also conceived of his impetus theory of motion, which would become so influential with the works of Copernicus and Galileo and Newton. But most importantly, it allowed the Alexandrian to conceive of a real relationship between the uncreated Spirit of God and the created spirit of Mankind in the Cosmos. It was in this way that we must seek to understand the correspondence between the Eternity of God and the Time of Mankind in the world. Obviously, he called for what we may speak of as differentiation in unity in order to grasp the dynamical relations here. We must distinguish the one from the other without divorcing them from each other. The creative power and creativity of the Word of God must be understood, in this case, from Beginning to End.

It is my belief that the difficulty in understanding the dynamical nature of this correspondence eventually led to the condemnation of Philoponos by the Byzantine Church in the East. The dynamics of integrating the whole of the divine nature with the whole human nature in the Person of Jesus Christ, according to Philoponos, sounded in the ears of others like Tritheism or Monophysicism. My book *The Setting in Life of 'The Arbiter'* by John Philoponos argues that this is a mistake of epoch making proportions. Professor Torrance has helped overturn this mistake in our time, when he relates Philoponos beyond Galileo and Newton to Faraday and Maxwell and Einstein. One wonders with him that, if Barth and Einstein could have read one another, how much further we would be along in developing a capacity to relate a Theological Science to a Scientific Theology. When I visited Tom most recently in a nursing home in Edinburgh, he wondered out loud what Barth would think of the direction in which he has taken his understanding of his *Church Dogmatics*. Surely, the physical and mathematical nature of the universe, unable to explain their meaning to us, must come to be grasped in all of their depths as the universe which Barth believed was the universe of the Word of God!

The sixth chapter integrates directly the life and thought of John Philoponos in Sixth Century Alexandria in a short essay. Torrance rehearses again Philoponos' reliance upon Athanasius and Cyril, and upon Basil of Caesarea as well. A full bibliography of recent work and

some 16th century translations is provided here. It is claimed that the science developed by Philoponos undergirds what we are presently experiencing in our modern scientific culture. But we will not realize all the potential of the possibilities here until we are willing to take seriously the relationship of the Incarnation of the Logos of God to the Creation of God. Again, creation out of nothing, the rational contingency of the substantial intelligibility of its reality, and the need for transcendent as well as immanent orders open beyond the contingent to the non-contingent reality of God Himself must be respected in our thought. The created light of the universe and the fundamental impetus of motion in the world belong to a unity as bound up with the Uncreated Light and Power of the Creator. This Logos of this Light is embodied in the Person of the Lord Jesus Christ, who as the Son of His Father participated with Him in the Beginning. In this way, the Wisdom and Word of God are found as One God, Creator of the All. This is the foundation upon which Philoponos sought to build his understanding of the architecture of Moses' confession of the Creation. Torrance argues that this foundation is nothing but the Orthodox Confession of the early Church. Tom quotes my translation of a letter Philoponos wrote to the Emperor Justinian, where we can clearly understand Philoponos not as a tritheist or heretical monophysite, but as a scientist, a Christian believer seeking to integrate the Incarnation with the Triune God as the Creator of the Cosmos. It continues to amaze me that so much misunderstanding prevails about Philoponos even with us today. John Philoponos sought to develop his science 'according to the nature' of any reality to which we are called to attend, and the nature of the Creator and Redeemer of the All that created reality is must be attended to through the One Reality that is the Person of the Lord Jesus Christ, the Son of the Father by the Spirit of the Holy God.

Chapter seven repeats the argument Torrance (at the Pascal Centre in Canada) makes for the strong resonance of Philoponos' thought with that of James Clerk Maxwell. Torrance once more lays down the fundamentals for developing a real grasp of the depths of our 'scientific methodology'. The reader will appreciate by this time the importance of the principle of 'according to nature' in science. The dynamical way in which epistemology and cosmology and God are to be related to one another would establish a correspondence or complementarities between them that takes the knowing of

our being quite beyond any self-centered notion we might like to retain about the wholeness of the universe in relations with Man and God. An open-structured dynamic is to be contemplated in which each 'nature' is respected for what it actually is in relationships with one another. The regulative impact of the created and creative character of relations between the contingent and the non-contingent requires an attention that we must not allow to escape our attention without real consequences. Mythologies, phantoms, and aberrations of every kind and all sorts can occur without this attention. Our being and existence in this world very much depends upon a proper understanding of the relationship between our theology and our cosmologies, etc.

Then chapters eight and nine give the reader personal accounts of Professor Torrance's relations with Michael Polanyi, the Hungarian physical and social scientist escaped from Communism to the West, and the Vatican. Torrance considers Polanyi to have made a major contribution towards our understanding of Einstein's Relativity Theory and the role of the transcendent in the ontological and epistemological aspects in the character of our scientific methods. His work with the Vatican has made him hopeful that, like the Greek Orthodox Church, Rome will eventually lift the Anathema from Philoponos. These go a long way towards understanding our need for understanding the relationship between a Scientific Theology and a Theological Science. I like to think that what Professor Torrance has accomplished does take the *Church Dogmatics* of Karl Barth in a direction that will interest readers, beyond his contradiction of 'natural theology', into a real appreciation for the epistemic poise Barth attempted to maintain throughout his work and its value in relationship with our scientific culture. Certainly, Torrance is right to call for the better understanding of these relations.

For many readers, many Greek terms like much mathematics can make this book seem daunting. Also, we are in the process of correcting errors in going from the essays of lectures to book form. In any case, Philoponos cannot make for easy reading. Torrance does not make for easy [reading] any more than Barth or Einstein make for easy reading. Some exercise of human will is required. But I believe that the many insights found in this book will reward any reader for such use of his or her attention.

MEDIEVAL GLOBAL WARMING: THE PERILS OF LETTING POLITICS SHAPE THE SCIENTIFIC DEBATE

A controversy over 15th century climate shows the peril of letting politics
shape the scientific debate.

By Richard A Muller

This article is reprinted with permission from Technology Review, 17 December 2003; http://www.techreview.com/articles/wo_muller122703.asp?p=2. Professor Richard A. Muller, a 1982 MacArthur Fellow, is a physics professor at the University of California, Berkeley, where he teaches a course called "Physics for Future Presidents." Since 1972, he has been a Jason consultant on U.S. national security.

SEPP Comment: Keep your eye on the "Hockeystick" controversy. Nature magazine is now investigating whether the data of a crucial 1998 paper by Mann et al were "manhandled." Since it forms a major support for the IPCC conclusion about Global warming, this may have consequences.

Six hundred years ago, the world was warm. Or maybe it wasn't. What's the truth? Beware. This question has recently been elevated from a mere scientific quandary to one of the hot (or cold) issues of modern politics.

Argue in favor of the wrong answer and you risk being branded a liberal alarmist or a conservative Neanderthal. Or you might lose your job.

Six editors recently resigned from the journal *Climate Research* because of this issue. Their crime: publishing the article "Proxy Climatic and Environmental Changes of the Past 1,000 Years," by W. Soon and S. Baliunas of the Harvard-Smithsonian Center for Astrophysics.

Without passing judgment on this particular paper, I can still point out that our journals are full of poor papers. If editors were dismissed every time they published one, they would all be out of work within a month or two. What made the Soon and Baliunas situation different is that their paper attracted enormous attention. And that's because it threw doubt on the hockey stick.

If you don't know what the hockey stick is, do a Google search, including the word "climate." You'll learn that it is the nickname for a remarkable graph that has become a poster child for the environmental movement. Published by Michael Mann and colleagues in 1998 and 1999, the plot showed that the climate of the Northern Hemisphere had been remarkably constant for 900 years until it suddenly began to heat up about 100 years ago - right about the time that human use of fossil fuels began to push up levels of atmospheric carbon dioxide. The overall shape of the curve resembled a hockey stick laying on its back - a straight part with a sudden bend upwards near the end.

The hockey stick was turned from a scientific plot into the most widely reproduced picture of the global-warm-

ing discussion. The version below comes from the influential 2001 report of the Intergovernmental Panel on Climate Change (IPCC). The hockey stick figure appears five times in just the summary volume alone.

Soon the graph acquired a very effective sound bite: 1998 was the warmest year in the last thousand years. This carried a compelling conclusion: global warming is real; humans are to blame; we must do something -- hurry and ratify the Kyoto treaty on limitations of fossil fuel emissions. Yet some scientists urged caution, a go slow approach. As a wise man once warned, "do not let the merely urgent interfere with the truly important."

There was a minor scientific glitch. The hockey stick contradicted previous work that had concluded that there had been a "medieval warm period." In fact, it disagreed with a plot published by the IPCC itself a decade earlier (in its 1990 report) that showed pronounced warm temperatures from years 1000 to 1400.

Such inconsistencies are common in science, and scientists love them. They mean more work, maybe a little public attention (which can't hurt funding), and the excitement that comes with the effort to resolve uncertainty. The Soon and Baliunas paper was part of this process. Their paper presented all the data in favor of the medieval warm period.

The debate grew. Critics of Soon and Baliunas charged that their paper wasn't balanced. Because it consisted of a compilation of data showing warming at different locations at different times, the criticism went, the work was not a valid refutation of the hockey stick analysis, which had combined a much larger set of data. That was a valid concern, but it didn't necessarily mean that the Soon and Baliunas results should be ignored. It simply meant that the issue was still open.

Meanwhile, critics excoriated *Climate Research* for al-

legedly failing to vet the Soon and Baliunas paper properly. The publisher, a German company called *Inter-Research*, agreed, leading to the resignation of the journal's editor-in-chief and, eventually, five other editors.

Then last month the situation became even more complex. Canadian researchers S. McIntyre and R. McKittrick published a paper in *Energy and Environment* with a detailed critique of the original hockey-stick work. They stated bluntly that the original Mann papers contained "collation errors, unjustifiable truncations of extrapolation of source data, obsolete data, geographical location errors, incorrect calculations of principal components, and other quality control defects." Moreover, when they corrected these errors, the medieval warm period came back - strongly. Mann, et al., disagreed. They immediately posted a reply on the Web, with their criticism of McIntyre and McKittrick's analysis.

The disagreement is not political; most of it arises from valid issues involving physics and mathematics. First the physics. An accurate thermometer wasn't invented until 1724 (by Fahrenheit), and good worldwide records did not exist prior to the 1900s. For earlier eras, we depend on indirect estimates called "proxies." These include the widths of tree rings, the ratio of oxygen isotopes in glacial ice, variations in species of microscopic animals trapped in sediment (different kinds thrive at different temperatures), and even historical records of harbor closures from ice. Of course, these proxies also respond to other elements of weather, such as rainfall, cloud cover, and storm patterns. Moreover, most proxies are sensitive to local conditions, and extrapolating to global climate can be hazardous. Chose the wrong proxies and you'll get the wrong answer.

The math questions involve the procedures for combining data sets. Mann used a well-known approach called principal component analysis. This method extracts from a set of proxy records the behavior that they have in common. It can be more sensitive than simply averaging data, since it typically suppresses nonglobal variations that appear in only a few records. But to use it, the proxy records must be sampled at the same times and have the same length. The data available to Mann and his colleagues weren't, so they had to be averaged, interpolated, and extrapolated. That required subjective judgments, which -- unfortunately -- could have biased the conclusions.

When I first read the Mann papers in 1998, I was disappointed that they did not discuss such systematic biases in much detail, particularly since their conclusions repealed the medieval warm period. In most fields of science, researchers who express the most self-doubt and who understate their conclusions are the ones that

are most respected. Scientists regard with disdain those who play their conclusions to the press. I was worried about the hockey stick from the beginning. When I wrote my book on paleoclimate (published in 2000), I initially included the hockey stick graph in the introductory chapter. In the second draft, I cut the figure, although I left a reference. I didn't trust it enough.

Last month's article by McIntyre and McKittrick raised pertinent questions. They had been given access (by Mann) to details of the work that were not publicly available. Independent analysis and (when possible) independent data sets are ultimately the arbiter of truth. This is precisely the way that science should, and usually does, proceed. That's why Nobel Prizes are often awarded one to three decades after the work was completed -- to avoid mistakes. Truth is not easy to find, but a slow process is the only one that works reliably.

It was unfortunate that many scientists endorsed the hockey stick before it could be subjected to the tedious review of time. Ironically, it appears that these scientists skipped the vetting precisely because the results were so important.

Let me be clear. My own reading of the literature and study of paleoclimate suggests strongly that carbon dioxide from burning of fossil fuels will prove to be the greatest pollutant of human history. It is likely to have severe and detrimental effects on global climate. I would love to believe that the results of Mann et al. are correct, and that the last few years have been the warmest in a millennium.

Love to believe? My own words make me shudder. They trigger my scientist's instinct for caution. When a conclusion is attractive, I am tempted to lower my standards, to do shoddy work. But that is not the way to truth. When the conclusions are attractive, we must be extra cautious.

The public debate does not make that easy. Political journalists have jumped in, with discussion not only of the science, but also of the political backgrounds of the scientists and their potential biases from funding sources. Scientists themselves are also at fault. Some are finding fame and glory, and even a sense that they are important. (That's remarkably rare in science.) We drift into *ad hominem* counterattacks. Criticize the hockey stick and some colleagues seem to think you have a political agenda -- I've discovered this myself. Accept the hockey stick, and others accuse you of uncritical thought.

There are also the valid concerns of politicians who have to make decisions in a timely way. In 1947, Harry

Truman grew so annoyed at the prevarications of economists that he joked that he wanted a one-armed advisor -- who could not hedge his conclusions with the phrase "on the other hand."

Some people think that science is served by open debate between left-handed and right-handed advocates,

just as in politics. But the history of science shows it is best done by people who have two hands each. Present results with caution, and insist on equivocating. Leave it to the president and his advisors to make decisions based on uncertain conclusions. Don't exaggerate the results. Use both hands. We cannot afford to lower our standards merely because the problem is so urgent.

OMNIPRESENCE

by Thomas P. Sheahen

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When asked what "Omnipresence" means, most people would reply "God is everywhere." But it also means that God is *present* to all *time*, and this is the part that is totally beyond human comprehension. The prefix "omni" gets attached to a term that we do comprehend, so we seldom notice the enormity of the gap.

To say *Omnipresence* and mean "God is everywhere" is perfectly comfortable to most people. But to say "God is *present* to all time" is quite another matter. People may nod in agreement with a theological statement like that, but can't really internalize it. The idea of perceiving *all* time - ancient, now, future - in some unified way called "present" is incomprehensible to nearly everyone. But here is the significant point: the reason for that great difficulty is because of a *human* limitation.

The notion that space and time are linked, that they are somehow "the same", does *not* come from human experience. No one has any experience at all of time distorting in any way - rather, experience seems to indicate that time is absolutely immutable. *Time Marches On* is the standard slogan. Consequently, our thought structure, culture and language have all developed in conformity with the perception that time is totally independent of space, independent of anything else.

Physics and Beliefs

The association of time and space comes from physics, in particular from the Theory of Relativity.¹ Often people think that relativity only involves things moving

very fast, near the speed of light; but much more important is the *relationship* between space and time stated by the theory: space and time are mathematically equivalent. All four dimensions (3 space, one time) appear in exactly the same way in the equations of physics. There is observational data that supports the theory, but the main reason this theory is universally accepted among physicists is because of the exquisite symmetry. The beauty in the mathematical equations is awesome.

Believing in symmetry and "beauty" in equations is an *article of faith* among physicists. The way we interpret all kinds of complicated data from experiments on atoms, nuclei, quarks, etc., is entirely dependent upon our belief in the validity of certain symmetry principles. Looking at the equations and say "it just couldn't be any other way."

We can assert the validity of our beliefs cogently, but ... only to other physicists and mathematicians. The arguments *really are* very good, with excellent reasoning and clearly beautiful symmetry, but we must leave conventional language behind and only deal in the language of mathematics. To the great majority of mankind who don't understand the math, we wind up saying "trust us" -- a phrase heard from high priests and gurus for thousands of years.

Nevertheless, because of these beliefs (linked to observation via reasoning), we have accomplished a lot. TV, lasers, medical devices like MRI - all are results of the package of mathematics that underlies physics. Physicists

are so united in our belief in symmetry that our phrase "trust us" sounds pretty convincing. The Theory of Relativity offers an explanation of how galaxies and stars formed, and the story hangs together exceptionally well. We feel fully justified in saying that physics has *discovered* that space and time are linked, even though direct human experience cannot confirm this principle.

The Pathway

What has all this got to do with God's purpose? How does it relate to *omnipresence*? The pathway to expanding our understanding of the term is fairly straight:

Start off believing that nature makes sense, that it is subject to rational thought, that it can be understood through investigation and study. That goes under the name of the *scientific method*. Next, agree (with Galileo) that mathematics can be a useful tool to describe nature. After that, accept that *symmetry* in mathematics is a form of beauty, which is good. Our next belief is that when mathematical symmetry describes nature, that description is correct.

The Theory of Relativity is one such example, and its beauty and symmetry are compelling. So we believe it is an accurate description of nature. A precautionary principle in science says that any theory is always subject to revision, so we won't claim "certainty" for Relativity; but it is definitely a *very* good theory. Believing in it is quite comfortable for physicists. A belief like this, one that is backed up by sound reasoning and observational data, is awarded a much higher status than other notions.

A cornerstone of the theory is this: Relativity says that space and time comprise a four-dimensional *manifold*, in which space and time are on an equal footing. Space and time are best understood in a unified way.

Almost trivially, we add that of course God understands our best human theories. So God readily understands space and time in a unified way. Consequently, God's *omnipresence* applies to time as well as to space. The fact that *human* understanding has fallen off the train here is *our* problem, not a limitation upon God. There are a number of consequences for humans if we "allow" God to have the attribute of being *present* to all time.

Conveying the Idea

In America we are taught to be tolerant of others' beliefs, but the tolerance that scientists extend is often a kind of benign contempt: "If only those people out there understood mathematics better, they too could realize the obvious truth of what we're saying." The

average person's response to the Theory of Relativity is simply to disconnect, attending to other topics that have a higher comfort level, and regarding physics as "out there." The ability to communicate is impaired by the language gap -- mathematics vs. conventional words (English, Japanese, Spanish...) -- and without communication, people go their separate ways.

Even when talking to each other, physicists still are human beings and use human language, rooted in human experience. It is not easy for *anybody* to think of time as "just like space." The mathematical equations certainly say so, but our senses tell a different story, and that obstructs us from internalizing the idea. Even after studying the Theory of Relativity, the mind still boggles at the notion of grouping space and time together. Without any direct human experience for reference, we cannot adjust our thinking, let alone our communication skills, to make time and space truly equivalent.

Nevertheless, one point that has universal validity is worth insisting upon: *Never underestimate God*. Never think that God's mind is as small as your own. Do not assume that God is subject to the same limitations as people.

Every time science discovers some secret of nature, we are peeling back the veil covering God's creation, inching closer to appreciating God's purpose. Some scientists will say, "No big deal, it *has to be* that way, because of the mathematics." Einstein himself was notorious for trying to find such principles of physics, thinking that God *had to* create in only one certain way. He had no luck with that pursuit. Attempts to confine God within the limitations of the human mind never work out.

If instead we bring some humility to the table, we can agree that we *don't* know a lot more than we *do* know. God can understand everything quite differently from human beings. The linkage between space and time contained in the Theory of Relativity is an example of peeling back the veil. Because we have the language of mathematics, we can transcend the limitations of conventional languages, and discover a new relationship that isn't obvious to the senses. To accept Relativity is to agree that time is a dimension akin to space, and interchangeable with space on the level of mathematics.

The book *Flatland*, written in 1872 originally for junior-high boys, helps to illustrate the problem that everyone faces here.² On one level, *Flatland* is an entertaining fantasy involving geometry; on another level, it draws attention to the problem of encountering something entirely beyond experience. The two-dimensional

inhabitants of *Flatland* were totally unable to grasp the concept of "upward, but not northward." This is amusing to the human reader, but it makes the point that we too misunderstand because of our limited thinking ability. The accurate word here is *transintelligible*, and this is quite different from unintelligible. A statement can be true and yet beyond the reach of a finite mind. The word *mystery* is commonly used in spiritual and theological writings to convey the same notion.

The human mind struggles to describe how God sees time and space together: our mathematics works okay, but we can't put it in words, because everyone's ordinary language is constructed on the assumption (and conventional human experience) that time is something unique and absolute. To treat *time* as symmetrical with *space* requires a *leap of faith* into the realm of mathematics and symmetry principles. Among people who don't understand the mathematics, the only way to make that leap is to "trust us."

Regrettably, a finite fraction of scientists have used their superior knowledge to express contempt for the concept of God, and hence the public at large often gets the impression that religion and science are enemies. A lot of people don't want to hear "trust us" from scientists, and run the other way. They have lived okay all their lives thinking that time is an absolute, and see no compelling reason to change. The Theory of Relativity is okay if it's "out there" in the land of physicists, but becomes a very hard sell when it tries to tell humans that they suffer from a severe limitation -- indeed, a limitation that gets in the way of their ability to understand God.

History

One of the earliest thinkers who dealt with space and time was St. Augustine, who wrote about the year 400, long before anybody ever heard of the Theory of Relativity. Augustine said³ that God created space and time together, and that was the beginning of creation. The ancient Greeks had just taken the *coordinate system* for granted, but Augustine pointed out that it too is a creation of God. This may well be the single most underrated achievement in the entire field of theology. Augustine also solved the time-dependent riddle "What was God doing before the creation?" by noting that the word "before" has no meaning whatsoever until "after" the creation of space and time. Clearly, Augustine places space and time in a position subordinate to God.

Over many centuries, the wisdom of Augustine was forgotten, and the notion of an absolute coordinate system fixed in space and eternal in time took hold. Indeed, the earth was defined as the center of the universe.

Everyone naturally agreed to these "absolute" notions. Nobody even noticed that space and time had been elevated to a position superior to God, and that God supposedly existed *within* space and time. The very idea that this might be placing a false god before God never entered the minds of people, who simply were not able to think in any other way.

When Copernicus, Galileo and Newton came along with a new explanation that moved the earth away from the center of the universe, they still treated the coordinate system as absolute, fixed in space and eternal in time. It was not until Einstein in the 20th century that the coordinate system received any attention. Even then, the insight of St. Augustine was not rediscovered. The ancient question stuck around, now reformulated as "What was God doing *before* the Big Bang?" Some people still ask that today. They imagine God as *subordinate* to time, rather than as the *creator* of time.

Resolving Old Problems

Beyond the realm of physics, other problems have also been caused by imposing the limited human perception of time when constructing an image of God.

1. The entire argument about *predestination* is rooted in the "either/or" position that God supposedly must take with regard to events happening sequentially in time. Because of the human way of considering time, it is mind-boggling to imagine that God could know the future without forcing the past. To rise above an "either/or" position, adopting a "both/and" position, requires stepping up to a more advanced level of thinking.

2. *Process Theology* imagines that God changes and develops with the passage of time. This basic notion began late in the 19th century, when Newtonian physics (containing absolute time) was at its zenith and determinism was believed to be built into the laws of nature. To get away from static determinism, it seemed perfectly natural to have God change over time, just as human beings do. After a century of progress in modern physics, determinism has been swept away, but the supremacy of time lingers on.

It is eminently valid to say that mankind's *perception* of God develops over time, but that certainly doesn't mean that God changes.

3. *Evolution*: A derisive question posed by those who don't wish to believe in God takes the form: "Well, why did your alleged God have to take *so long* to create the world as we see it?" The questioner obviously considers God inferior to time here; but the trouble is that too

many religious people *accept that premise* and hence are unable to give a satisfactory answer! Confronted with this dilemma, they may resort to rejecting the whole idea of evolution, the age of the universe, etc. They have fallen into the trap of imagining a contradiction between God having a plan and God utilizing long times to make it come true. It's only a contradiction if God is subordinate to time.

The significant point to note about each of these three issues is that they came to prominence by failing to notice a human limitation being imposed on God.

God's Interactions with Humanity

It is important not to claim too much. No physics theory is ever going to address satisfactorily a great number of theological questions. Can God, who is the creator of time and transcends time, choose to enter into humanity with all its limitations, including becoming subordinate to time? That topic has been discussed for centuries; the Christian answer is "yes." Can God enter into a relationship with mankind and yet preserve that transcendence to time? The entire Bible replies "yes." What does *resurrection* mean for a standard human being? Does it have to be linked to time? These questions remain in the realm of mystery -- they are beyond human comprehension, *transintelligible*.

Conclusion

Everyone will agree that we have only limited images of God, and limited grasp of God's purpose. Still we try to make progress by associating certain terms with the various attributes of God. Then we hope we understand what those terms mean. We don't always succeed.

Our questions may have answers of the form "both/and"

but we pose them under conditions where our human limitations demand "either/or." We are like the Flatlanders, presented with "upward but not northward." The only way to tackle this problem is with a large dose of humility: we are *not* going to understand how God comprehends time, no matter how hard we try.

Properly understood, *omnipresence* applies to both space and time. God is everywhere. God is also *everywhen*. This requires a major readjustment of our thinking. We must recognize that a human limitation has been a serious impediment to our understanding of God. Mankind has placed a false god (time) before God.

The barrier identified here is the natural human tendency to assume that time is immutable and everything is subject to it, including God. Acknowledging a limitation is one small step forward. We can realize that there are qualities of God for which a human treatment of time is insufficient. With the human misconception about time removed, we can progress beyond some of the dilemmas of the past.

However, there is still a very long way to go. Nothing said here even begins to address the central mysteries of theology, involving God's transcendence and immanence. In the future, others who are free of past burdens and restraints will think and understand at a new, higher level. That higher level will enable mankind to form a better image of God.

References

- 1.) The distinction between Special Relativity and General Relativity need not concern us here.
- 2.) Edwin A. Abbott, *Flatland*, 6th edition (Dover: 1952).
- 3.) St. Augustine, *The City of God*, book XI, section 6 (Modern Library Edition, Random House: 1950).

WHAT KIND OF REVOLUTION IS THE DESIGN REVOLUTION?

A reflection on William Dembski's *The Design Revolution*.

Jakob Wolf

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As Dembski begins his book by saying: "Ever since Thomas Kuhn published *The Structure of Scientific Revolutions* in the 1960s, just about every idea in science has been touted as the latest scientific revolution"¹ Indeed, Dembski was himself involved in chaos theory, a development hailed as a revolution in science in the late 1980s. "But after the revolution ran out of steam, our scientific conception of the world remained largely unchanged." Most scientific revolutions are overblown. But this experience notwithstanding, Dembski now proclaims a "Design" revolution.

I share Dembski's view that the Intelligent Design theory (hereafter ID theory) has the makings of a revolution, but I am not sure that I agree with him on the nature of the revolution the theory has the potential to bring about. Dembski calls it a scientific revolution, but what exactly does that mean? The problem is that the term science is not a well-defined term. We face a huge problem when we have to decide whether something is science or not because we do not have a clear definition that tells us what to rule in and what to rule out.

Larry Laudan has argued that it is impossible to define the term science in the abstract.² If true, that poses a problem, but not one that dismays Laudan since what ultimately matters, he claims, is not whether or not a theory is science, but whether or not it is true. This is surely a valid point. After all, the debate about Darwinism and ID theory is primarily about which position is correct and not whether ID theory qualifies as science. However, the latter question frequently crops up in discussion and is not an irrelevance. It is particularly important when we are interested in clarifying exactly what kind of revolution ID theory, should it fulfil its protagonists' expectations, will bring about.

One way to define something is to delimit it: you specify what something is by saying what it is not. Dembski pursues this tack. He points out that ID theory is not scientific creationism. The theory is not deduced from religious dogma, it is inferred from the data of nature. I concur. Nor, he adds, is ID theory what has traditionally been termed natural theology. If "natural theology" is taken to refer to the project of seeking to establish the existence of a God possessed of specific attributes, I accept this too. All that ID theory

claims is that the natural order exhibits intelligent design, a phenomenon that is open to a religious interpretation, but the interpretation is not part of the theory. Dembski denies that ID theory is identical with the design arguments encountered in the philosophical and theological tradition. Traditional design arguments are often loosely formulated, and closer scrutiny shows them to be predicated on projections and illusions. By contrast, the design arguments of ID theory are precise and susceptible of formalization. I agree. Dembski further claims that ID theory is not based on mere intuition, it is scientific: "Proponents of intelligent design, known as design theorists, are not just content to regard such signs as mere intuition. Rather, they insist on studying them formally, rigorously and scientifically."³ I agree that ID theory is a formal and rigorous study of the relevant signs, but I do not go with the idea that it is natural science in any precise acceptation of that term.

My own position is that ID theory is indeed based upon a species of intuition: it is based on an intuitive analogy.⁴ When we observe a complex biological system that performs a particular function, we are struck by its similarity to a man-made machine. This intuitive insight is as old as philosophy and as near-universal. As Dembski is concerned to point out, ID is a simple and straightforward idea, commonly shared. It is even shared by Darwinists, although they consider it an illusion. Richard Dawkins says it with the quotation, "Biology is the study of complicated things that give the appearance of having been designed for a purpose."⁵ But is it only an "appearance"? Are the Darwinists able to prove that it is? I suspect not. The intuitive analogy in play is not subjective, arbitrary, it is intersubjective and involuntary, spontaneous. The contribution made by ID theory is to have studied this intuition formally and rigorously. Michael Behe's work on irreducible complexity and Dembski's work on specified complexity each represent very significant advances. Another very important achievement of ID theory is its detailed criticism of Darwinian theory. Strictly speaking, this critique does not further ID theory so much as it makes a contribution to natural science theory in that it constitutes a critique of a particular piece of natural science on its own terms. All the same, it offers indirect support for the plausibility of ID theory. For ID theory claims to be doing something more than providing an account of some subjective belief; it purports to account for an

objectively cognisable natural phenomenon. The apprehension of this phenomenon involves a subjective element, but that fact does not have the effect of turning it into an arbitrary opinion. On the contrary, it is intersubjective and involuntary. Dembski devotes some discussion to this point, drawing on John Searle's *The Construction of Social Reality*.⁶ The fact that a given cognition involves subjectivity does not disqualify it as an epistemic claim. Indeed, hermeneutical philosophy has shown that all cognition involves subjectivity. The definition of the natural science project as a project in which only natural, immanent causes properly occur in explanations of natural phenomena also involves subjectivity: somebody has defined that project.

I am not altogether happy with the appeal to John Searle's work. I think that the characterization of the intelligent design intuition as a cognition in its own right as found in Kant and phenomenological philosophy is more to the point. Kant had a hard time deciding where to place this mode of cognition in his system. It did not belong in the *Critique of Pure Reason*: it is not natural science. He called it teleological judgement and placed it alongside aesthetic judgement in the *Critique of Judgement*. It is an analogical mode of cognition and, to repeat, it is a mode of cognition in its own right. It is not merely a pre-scientific cognition that attains scientific status as a result of formal and rigorous study. ID theory bolsters the intuitive analogy but the latter does not thereby become part of the natural science project. It remains an analogy, but a strengthened one. For instance, Dembski's explanatory filter does not make the design inference scientific rather than analogical. To determine that something exhibits specified complexity involves, as Dembski explains, the identification of an independent pattern, but the identification of this pattern is an analogical recognition and it will never be more than an analogical recognition. If we say that the sequence of the nucleotide bases in the DNA molecule is a "code" that resembles a text written in a human made alphabet, it is just an analogy. If we say that the DNA molecule contains "information", it is just an analogy, because we only know of information as something caused by human intelligence. By the way, if everybody agrees on Nobel Laureate David Baltimore's remark, "Modern biology is a science of information",⁷ then everybody in fact agrees that the object of biology is intelligently designed. The Darwinist try to avoid this consequence by saying that information in biological systems only give the appearance of being information, because the evolution of this "information" can be explained by unintelligent causes, so it is not really information.

I get the impression that Dembski thinks that all knowledge of nature that is not mere subjective belief is

natural science. I find such a definition of science too broad. To define science so liberally is to conflate elements that should be kept apart. Confusion results. I miss a particular distinction in Dembski. I think we need to distinguish between scientific knowledge of nature and analogical knowledge of nature. Both modes of cognition are objective, but they are distinct. It is surely to concede far too much to scientific imperialism to claim that epistemic claims that amount to more than subjective belief are ipso facto scientific. We can think of any number of analogical and phenomenological insights which clearly qualify as more than subjective belief without thereby qualifying as science. Dembski operates with just one distinction: science/philosophy and theology. I miss a demarcation between science and analogical cognition.

Larry Laudan is probably right in claiming that it is impossible to define what science is in the abstract, but that does not mean that there is no definition of what science is in our common historical tradition, to which we are committed and by whose old-established understandings we are to some extent bound. To imagine that we can elect to separate ourselves off from that tradition is to fall prey to an illusion. That is not to say that we cannot question our tradition and seek to renew it, but it does mean that there are limits to how far it may be revolutionized. Tradition has framed natural science as a project whose defining purpose is the explanation of natural phenomena in terms of natural, immanent causes alone. Natural science originated as a revolt against the religiously-informed explanation of nature. The process began when the Ancient Greeks conceived the radically new idea that the action of natural phenomena is not the consequence of the free decision of the gods but is impelled by forces internal to nature itself. For centuries, natural science was commingled with religious ideas and ID theory. Kepler, for instance, explained the correction of planetary movement along elliptical rather than circular orbits by reference to the agency of angels, who brushed the planets in place with their wings. Over time, the scientific tradition was purged of such religious and ID theory elements, leaving the natural science project in a purer state. Natural science, as tradition conceives it, admits only those explanations that refer to natural, immanent causes. This clear demarcation has been key to its progress. Any purported explanation that invokes God as the cause of some natural phenomenon disqualifies itself as a contribution to science. There is common agreement on that.

The history of science has seen many paradigm shifts. One such occurred when Darwinism and quantum physics introduced chance into scientific explanation. Chance, like necessity, was enfranchised as an explanatory concept. For his part, Einstein refused to counte-

nance it. All his instincts as a scientist were against it. One of the marks of science is that its explanations turn primarily on necessity. The reason why, despite initial repugnance, chance was accepted in science is that chance proves to be an immanent, mechanical factor in explanation. Quite clearly, this paradigm shift respected the overall definition of the natural science project. It respects the intrinsic integrity of the natural science project.

Today, while science admits chance, it does not admit intelligent causes. Is it conceivable that intelligence might similarly qualify as a cause in a scientific explanation? I think not, nor do I think it would be desirable since its admission would undermine the natural science project as such. It is de facto impossible not to conceive of an intelligent cause in natural science as a transcendent cause. In archaeology and other human sciences, an intelligent cause is not a transcendent one since in these cases the relevant intelligence is human intelligence. But in the natural sciences, it is highly unlikely that an intelligent cause would be anything other than a transcendent cause. True, the relevant intelligence might stem from aliens, but what, then, is the cause of the intelligent alien? We quickly end up with a universe-transcendent cause. So once we admit intelligence as a cause in natural science, we admit a transcendent cause. A paradigm shift that admitted intelligence would not be a paradigm shift that respected the overall definition of the natural science project.

Dembski conceives of the design revolution as a paradigm shift that permits reference to intelligence as a cause in a natural science explanation. This version of the design revolution is one I am unable to accept. It would not simply lead us to rethink natural science, it would change it into something entirely different.

There is, I believe, widespread acceptance that ID theory is not natural science in any traditional sense. Both Darwinists and ID theorists would agree. To Darwinists, this means that ID theory is not natural science and is therefore a false theory. To Dembski, the corollary is that the natural science tradition itself is in need of total transformation. I take issue with both sides. Darwinists are mistaken in thinking ID theory to be erroneous. It is supported by valid and weighty arguments. I disagree with Dembski, firstly, because when he seeks to assimilate ID theory to natural science confusion follows, and secondly, because it is immodest to want not merely to inject new thinking into a centuries-old tradition, but to transform it into something else -- into an amalgam of natural science and ID theory.

While believing ID theory to be true, I would contend that it is not part of natural science. However, the fact

that ID theory is not part of natural science does not mean that it is irrelevant to natural science. It is highly relevant, and to biology in particular. When I say that ID theory is not science, Darwinists tend to breathe a sigh of relief, reassured to hear that no serious challenge is being posed. ID theory, they conclude, is apparently a species of philosophy or theology that has no real bearing on biology. But that conclusion is mistaken: ID theory has important consequences for both Darwinism and biology. So while I do not consider it our task to seek to make ID theory a part of biological science, I consider it utterly crucial that we clarify the relationship between biology and ID theory.

It is important to stress that this relationship is not an either-or. A biologist may accept both ID theory and the natural science project. A biologist's conviction that ID theory is correct in no way compromises his or her commitment to the natural science project of explaining nature in terms of unintelligent causes. The biologist should say: "The biological system I am studying is intelligently designed, but when I am engaged in biological research I am only looking for unintelligent causes." Unless some such stance is adopted, the subject would not be advanced -- research would never get off the ground. For we are interested in doing more than establishing that a given biological system is intelligently designed. When studying a car engine, we are not content to conclude that the engine is intelligently designed: we also want to take it apart and find out how its internal mechanisms interact. By the same token, the whole aim of the natural science project is to take the biological system apart to discover how its internal mechanisms interact. As said, establishing that a biological system is intelligently designed is not internal to science in this strict sense. It relates rather to the pre-suppositions of biology. Moreover, we are faced with a problem of nomenclature when describing what we are engaged in when seeking to substantiate the claim that complex biological systems are intelligently designed, since there is currently no term for that project that attracts a consensus. I am led to call it phenomenology or analogical understanding. In my view, it is of paramount importance that we become better at identifying and acknowledging this mode of cognition, which is a mode of cognition in its own right.

The endeavour to explain the origin and evolution of life by means of the Darwinian mechanism remains meaningful even after ID theory has been accepted. Again, the biologist can say: "I know that life is designed, but my project focuses on how much we can explain by reference to unintelligent causes alone." This remains a cogent form of inquiry for two reasons. First of all, we cannot know in advance how far this mode of explanation will take us, and secondly, it enables us to

test ID theory -- to seek confirmation that it is not an illusion. Darwinian research is fully compatible with ID theory so long as a distinction is made between scientific project and regulative idea.

Am I advocating methodological naturalism? That depends on how the term is construed. The proponents of theistic evolution do indeed advocate methodological naturalism. They are not ontological naturalists since they also claim that God created the world, but they are methodological naturalists inasmuch as they believe that nature can be fully explained by reference to immanent causes alone. I do not subscribe to this kind of methodological naturalism because I do not believe that nature can be explained by reference to immanent causes alone. I would contend that natural science proceeds on the basis of a methodological reduction. The biologist recognizes, or should recognize, that life, the object of biological inquiry, is intelligently designed while abrogating this knowledge when he or she is engaged in empirical research meaning looking for immanent, mechanical causes. He or she should, however, not abrogate this knowledge as a regulative idea for his or her research. This reductionist strategy is perfectly legitimate. It represents a deliberate choice made in the interests of furthering research. The difference between the undogmatic biologist and the Darwinist is that the undogmatic biologist is aware of the reduction involved, whereas the Darwinist is not -- he or she has no inkling of its existence.

My conclusion, in sum, is that the design revolution does not represent a paradigm shift in natural science. It is a shift rather in our conception of the basic presuppositions and regulative ideas underpinning biology. Present-day orthodoxy is the Darwinian theory, which contends that precisely scientific materialism is the presupposition and the regulative idea underlying biology. The most commonly held perspective on the natural science project sees it not just as a research

project but also as the correct expression of a complete ontology. By contrast, ID theory claims that precisely design is the presupposition and regulative idea informing biology. The knee-jerk reaction against ID theory shows just how ingrained is the view that scientific materialism and naturalism are the proper presuppositions of biology. The recognition on the part of biologists that the object of biological research, life, is designed, and that the natural science project involves a methodological reduction, will amount to nothing less than a revolution, I am sure. Our conception of nature will be utterly transformed and I would expect to see huge ethical implications flowing from it.

Dembski calls ID theory "a new kind of science."⁸ If by that he means only that natural science qua project will be enriched and invigorated if the insight takes hold that ID theory is the regulative idea on which it is predicated, I agree with him. A new regulative idea may lead to new empirical findings. But if he means that the natural science project as such will be revolutionized by ID theory, then I disagree. For what I fundamentally miss in Dembski's account is a distinction between science, on the one hand, and the presuppositions and regulative ideas that underpin it, on the other.

Endnotes

1. William A. Dembski, *The Design Revolution* (InterVarsity Press) Downers Grove, Illinois 2004, p.19.
2. Larry Laudan, "The Demise of the Demarcation Problem", in: *But is it science? The Philosophical Question in the Creation/Evolution Controversy*, ed. Michael Ruse, New York 1988.
3. *The Design Revolution*, p.33.
4. See Jakob Wolf, "The Intelligent Design Theory and the Rehabilitation of Analogical Knowledge", in *ISCID Archive*, 2003.
5. Richard Dawkins, *The Blind Watchmaker*, New York, 1987.
6. *The Design Revolution*, p. 100-5.
7. *Op.cit.*, p.139.
8. *Op.cit.*, p. 269f

The Design Revolution William A. Dembski

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Reviewed by Thomas P. Sheahen

Bill Dembski has been getting a bum rap. He has been derided by the entire educational establishment because he dares to question the total authority of the neo-Darwinian hypothesis that random mutations and natural selection explain everything about evolution. As the leading proponent of *Intelligent Design Theory*, he is also the leading target for attacks from opponents.

So he's fighting back. In his latest book, *The Design Revolution*, he takes on those opponents and insists that his theory is a valid approach that deserves a place at the scientific table. Dembski is very careful to display the logic that underlies his reasoning. He defends Intelligent Design Theory on strictly scientific grounds, states what it can and cannot do, and carefully distinguishes

it from its negative public image.

Even before the title page, the first few pages are commentaries by serious members of the religion-and-science community who cannot be dismissed out of hand as crazies. For example: "William Dembski is asking, and forcing the rest of us to confront, a profoundly important question: Is nature a closed system of efficient and material causes?" These and similar words at the front are strong motivators to continue reading the book.

For those who want to give intelligent design theory a fair hearing, this book is an excellent place to start. (Incidentally, I have not read either of Dembski's two previous books, *The Design Inference* and *No Free Lunch*.) This whole area of inquiry deserves that fair hearing, especially given the fact that it's been tarred by "guilt by association" with creationism.

First, Dembski explains what Intelligent Design Theory is not, and thereby clears up a lot of common misconceptions. There are some famous smart-aleck remarks circulating such as "Intelligent Design is creationism dressed up in a cheap tuxedo" -- but those fall by the wayside as Dembski very carefully delimits what he really means by Intelligent Design. His chief argument is that ID has no religious commitments.

He then defines terms such as "design inference", "specified complexity", and "assertibility"; this allows the reader to consider his definitions rather than those attributable to his opponents. Dembski also provides some very readable explanations of the way the mathematics of probability enters in. He completely dismantles the notion of "multiple universes," with which most scientists are uncomfortable anyway; he points out that it is neither verifiable nor falsifiable, and hence violates a basic principle of scientific thought. Dembski's explanation of what's wrong with that idea is very clear and convincing.

Dembski takes pains to show that Intelligent Design Theory does not require any contradiction of natural laws. The major point of Part 3 is his expression of *The Conservation of Information*: "Neither chance, nor necessity nor their combination is able to generate specified complexity or, equivalently, complex specified information." Dembski nods briefly to thermodynamics, but then somehow excludes self-organization as a possible source of specified complexity. I would have liked to have read a deeper scientific discussion at this point.

In Part 4, Dembski argues that design theory deserves a place at the table in the world of biology, including biology education. After outlining four distinct cate-

gories of *naturalism*, Dembski is at his best as he carefully distinguishes between what design theory actually says and various inferences incorrectly attributed to it. His argument that Darwinian evolution is not perfect is sound; and he criticizes the neo-Darwinists who have tried to define their way to success by ruling any perception of design as "out of bounds." He presents a flow chart that illustrates quite clearly the endless recursive loop that befalls those who insist upon excluding the design hypothesis.

Regrettably, Dembski is also at his worst in chapter 28 when he sets aside all his previous careful reasoning and issues a polemic against his opponents. No wonder he's earned the descriptor "combative." This chapter detracts from the elevated level of debate in previous chapters.

Next, Dembski tackles the "theoretical challenges to Intelligent Design." He goes into details of the field of statistical analysis, contrasting Bayesian methods (conditional probabilities) with conventional methods of hypothesis-elimination. Dembski's point is that when specified complexity is used to infer design, there is no violation of statistical analysis principles. He also discusses the *displacement problem* and how it applies to Darwinism, and asserts that when a constraint is introduced into the environment, that's a form of design.

Dembski argues that Darwinism and Intelligent Design are "the only two games in town." There's much careful reasoning and patient explanation here, but several "Dembski-isms" as well. One of the unfair slurs against Intelligent Design has been to equate it to Creationism; in the closing lines of part 5, Dembski responds in kind by equating Darwinists to Segregationists. That is unnecessary; the case for ID should be trusted to stand or fall on the merits of reasoned arguments -- which is what most of this book is about.

Dembski then looks toward the future of Intelligent Design -- what it has accomplished and what it has yet to do: He applies the four characteristics that make a theory testable (refutability, confirmation, predictability and explanatory power) to both ID and Darwinism. He defends Michael Behe's work, which also has suffered from careless generalizations, casual dismissal and guilt-by-association.

The next few chapters explain why ID has had so little success in cracking the peer-reviewed journals. Dembski then concludes by clearly stating the needed directions of research and what is required for ID to become a respectable scientific discipline. Throughout this section, Dembski quite openly makes statements of the form "if X is true, then ID falls by the wayside." It's clear that

Dembski is not afraid of where future research might lead.

There can be no mistaking that Intelligent Design theory challenges standard evolutionary theory (Darwinian theory). Are there weaknesses, limits, inconsistencies -- "holes" in Darwinian theory? Most scientists would generally agree so, but have no idea of how to proceed -- patch the holes, or seek something radically different?

I'm reminded of the situation in physics just before 1900 when Classical Mechanics was king, but little nuisance effects were creeping in. The discovery that the nucleus is very tiny eliminated the "raisin pudding" model of the atom, and left us with electrons whirling around the nucleus in circles. But on the basis of Classical Mechanics, it was easy to calculate that every such electron would radiate away all its energy and fall into the nucleus in about 10^{-8} seconds. At that same time, the *ultraviolet catastrophe* had become evident, by which the energy of electromagnetic radiation should go to infinity in the far ultraviolet. So some new explanations

had to be found, but what? Scientists tried many different ideas. The Bohr model of the atom was still over a decade away, and Quantum Mechanics further in the future. People didn't stop using Classical Mechanics, but were respectful toward those who were exploring non-classical pathways.

Dembski and his colleagues are today's equivalent of those explorers, in the science of biology. A lot of their pathways will turn out to be dead ends. Indeed, perhaps someday there will arise a theory in which *both* Darwinism and Intelligent Design are true in limited spheres. In the meantime, individuals who pursue unconventional research goals still deserve to be treated as responsible scientists.

To achieve that condition, it is important to discard the glib innuendos and slurs of the past. By reading *The Design Revolution*, it becomes possible to thoughtfully consider and discuss whether Intelligent Design Theory can contribute to our understanding of biology.

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