



Institute For Theological Encounter With Science and Technology

Volume 48 - # 4

Fall 2017 Bulletin

Verdant Pastures

Our director, Tom Sheahan, wrote this opening essay while vacationing in New Zealand recently. We wonder if the natural beauty of that small Pacific island somehow or other motivated this insightful reflection.

As scientists, we are awestruck by the mathematical symmetry and beauty of the fundamental equations that God thought up to govern the universe He created. Is it all contained in M-theory, the currently preferred version of string theory? Maybe. Or maybe it's in some more beautiful and fundamental mathematics that we haven't discovered yet.

Either way, the downstream consequences for the world of our experience are even more awesome! In Genesis 1 it says "let the earth bring forth..." When you're covering a billion years in one sentence, you have to skip a lot of details. But we know that plant life got here first. The plants used up nearly all of the once-plentiful supply of CO₂ they started with and "polluted" the atmosphere with their waste product, oxygen. Then along came animal life, which used that oxygen as fuel, and thereafter prospered.

The plants were able to make a comeback by grabbing the animals' waste product, CO₂. Ever since, the two opposite life forms have lived together symbiotically. Is that wisdom hidden somewhere in the basic equations of nature? Amazing!

Today we (and other animals) breathe in air containing 21% oxygen and very little CO₂. We exhale about 8% CO₂. The plants "can't get enough of it." Plant growth is limited by having only 400 part per million CO₂ in air. The waste product of one life form is food for the other. THAT is the perfect example of wisdom in creation.

We look out over those verdant Pastures and watch white fluffy animals turning grass into clothing (with a goodly boost from human ingenuity along the way). Dairy products come about in a similar way.

God thought it all up with incredible foresight, and then made us the managers. In an often clumsy and stumbling way, we've managed to keep it going. Looking ahead, our success in sustaining a healthy balance will depend on our ability to imitate God's wisdom, not thinking we can do it all ourselves.

Once in a while, we should remember to thank God for providing those verdant Pastures we usually take for granted.

Thomas P. Sheahan
Director, ITEST

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Announcements

Good News! Our “Evening with The Shroud of Turin” sponsored jointly with ITEST and The Office of Sacred Worship, was a great success. We had a close to capacity audience who were very pleased with the excellent quality of our speakers’ presentations. Thanks to St. Joseph Radio in St. Charles, Missouri, we have copies of both audio and video of the evening’s proceedings. CDs are \$5.00 and DVDs are \$10.00. If you are interested in purchasing either recording, please contact Sister Marianne at mariannepost@archstl.org and she will send those recordings to you. We are now able to accept VISA, MasterCard, Amex, and Discover. Please see Announcements in the last issue of the bulletin for details on the speakers. *Volume 48 Number 3.*

News of Opioids and their traumatic effects bombard us almost daily. From the smallest towns to the largest cities, it is truly a serious problem especially for all ages in the population. Be sure to read Tom Sheahen’s review of *Dreamland: The True Tale of America’s Opiate Epidemic*, by Sam Quinones. (*See page 3 of this issue.*)

Just a reminder: Membership renewal notices have been sent and we thank those who have responded generously by adding the “widow’s mite” to the \$80.00 dues. Some have also taken advantage of donating monthly or quarterly to ITEST and we urge you to consider that opportunity. On the reverse side of the renewal card you will see how you can pay your dues or donate to ITEST more easily by choosing an automatic payment monthly or quarterly. Just fill in your choice and we will take care of the processing.

Congratulations to Ralph Olliges, PhD, of Webster University in St Louis for his promotion to Full Professor. Olliges has been a Board Member of ITEST since 2010 and has co-authored articles for the Bulletin reviewing Father Robert Spitzer’s Magis Center Productions with Dr. Tom Sheahen.

He received his doctorate in philosophy from St. Louis University in 1988 with an emphasis on computer education. His dissertation “The Effects of Geometry for Teachers on Attitudes Toward Math and Anxiety Over Math,” reveals his understanding of the problem of math anxiety and how to deal with math anxiety often found in students at all levels of education.

At Webster University, Olliges chairs the Department of Multidisciplinary Studies, School of Education. He coordinates the M.E.T. Educational Technology degree, the Online Teaching and Learning Certificate, the Mobile Technology in Education Certificate, and the Educational Specialist in Technology Leadership degree. His professional memberships include National Science Teachers Association (NSTA), International Association for Special Education (IASE) and National Council of Teachers of Mathematics (NCTM), among others. His professional conference publications span a wide range of topics dealing with technology, from “Thinking Outside the Box: Cats in Hats Experience Technology” to “Teaching with Your Mouth Shut: Using QR codes with Life Cycles in the Classroom.”

In Memoriam - ITEST Members

We ask your prayers for the following ITEST members who died and entered Eternal Life recently: **Robert Jefferson** and **Lawrence Follis**

We also ask your prayers for ITEST members who are ill.

May they feel the restoring hand of the Lord.



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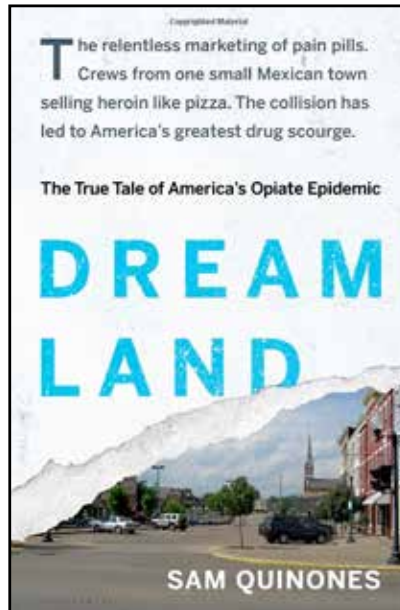
ITEST Bulletin - S. Marianne Postiglione, RSM, Editor
ISSN 1073-5976 • Copyright © 2017

Dreamland: The True Tale of America's Opiate Epidemic

by Sam Quinones

Reviewed by Thomas P. Sheahen

Many of us are puzzled, confused and stunned by the rapid expansion of addiction to pain-killing medicines that has swept across America in the 21st century. In a recent year, over 16,000 people died from overdoses of prescription pain-killing drugs – more than from all illegal drugs combined. We always thought that drug addiction was limited to big-city ghettos and Hollywood celebrities; heroin was virtually unknown across the heartland of America. And yet, the reality today is that many small and mid-sized towns in America contain substantial populations who came to their addiction through entirely legal pain-killing medicines. How could that have happened?



Sam Quinones answers that question with this gripping presentation of the intertwined pathways of prescription drugs and Mexican heroin. The subheading “true tale” indicates that the narrative is accurate, even if names and other details were changed. To assemble the information underlying this book, during 2009-2014 Quinones conducted many interviews across different segments of the population, including prisoners.

A cascade of short chapters skips from a Mexican mountain village to medical conferences to certain American cities, each bringing together one more piece of the puzzle. “Dreamland” is a fascinating page-turner, where at the end of each chapter the reader is anxious to find out what happened next.

On the medical side, we learn that in 1980, a one-paragraph letter in the *New England Journal of Medicine* reported that under close supervision, patients in hospitals found pain relief from *oxycodone*, without becoming addicted. Meanwhile, doctors had been searching for a non-addictive pain-killer for a very long time, and desperately *wanted to believe* the R&D reports about such a drug. Subsequently, many doctors were easily convinced of the inflated claims by an unscrupulous pharmaceutical company.

At roughly the same time, a Mexican farming village

became the source of *Black Tar heroin*; their remarkably simple retail operation, involving pellets of heroin inside small balloons, made heroin easy to obtain. If caught by the police, the couriers seemed to be in possession of very little heroin, hardly worth bothering with in circumstances where a big bust of the kingpins was the goal of the police. The story of those young Mexican entrepreneurs comprises a fair fraction of “Dreamland”; the story of law enforcement trying to understand and contain their spread is presented in parallel.

It is the confluence of those two advancing trends that brought about today's epidemic. People who couldn't

imagine themselves as addicts became hooked on opioids (notably OxyContin) and were desperate for ever-greater amounts. Opioids became the “gateway” drug into using heroin.

All this is brought out with exceptional clarity in the pages of “Dreamland.” The title derives from a grand swimming pool in Portsmouth Ohio at mid-20th century. Recurring throughout the book are chapters displaying the progressive disintegration of Portsmouth as opiates became ever more commonplace. While the example of Portsmouth presents an egregious prototype, we learn that the same progression from prescription drugs to heroin was going on in countless other American towns.

Oxycodone is one of many opioids; *hydrocodone* is another. By coating *oxycodone* with a time-delaying shell, *Purdue Pharma* invented a continuous-release version of it, and gave it the brand name *OxyContin*. Then *Purdue* began a very aggressive marketing campaign, bringing doctors to conferences at fancy resorts to tell them how great OxyContin was. Extrapolating from very scant medical studies in the 1980s, they claimed that because of the slow time-release feature, OxyContin prevented the “high” associated with addictive drugs.

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Since all doctors were wishing and hoping for a non-addictive pain reliever, it was fairly easy to make their case. When *Purdue Pharma* applied for approval to the US Food & Drug Administration (FDA), the assertion of only a 1% addiction rate was very persuasive. They didn't mention that the favorable initial data was for patients in a hospital under supervision.

Believing *Purdue's* claims, the FDA licensed Oxycontin in late 1995, and soon many doctors were routinely prescribing it for pain relief. "Dreamland" describes how it took a decade of adverse experience for the medical community to realize how addictive are the opioid medicines.

Once OxyContin was approved, countless millions of the pills were prescribed in the years that followed. Patients were given OxyContin for knee replacements, high school sports injuries, and other routine conditions. All sorts of abuses followed. *Pill Mills* were opened, where patients perfunctorily told a doctor they had pain, and in 3 minutes left with a prescription for Oxycontin – minus a several-hundred-dollar fee for the doctor visit, of course. Some of those doctors eventually went to jail. Senior citizens who had OxyContin they didn't need could sell the pills for a dollar per milligram (a huge profit) to desperate addicts. In the deteriorating town of Portsmouth Ohio, OxyContin pills became a form of local currency, where a 30-milligram pill was equivalent to a \$30 bill.

As thoroughly explained in "Dreamland," many people who got addicted to OxyContin switched to using Mexican *black-tar heroin*, which was plentiful and comparatively cheap. You could get it as easily as having a pizza delivered. The epidemic spread to suburbia and heartland America, far beyond the big urban centers where heroin had long been taken for granted.

There is plenty of blame to go around. *Purdue Pharma* succeeded in ballooning up unsubstantiated claims because too few people understand the way numbers and test results can be manipulated. For the deceitful way that *Purdue Pharma* had promoted OxyContin, they reached a plea-bargaining agreement to avoid jail time and paid a \$634 million fine, circa 2013.

The porous nature of the US-Mexican border was taken for granted, barely even mentioned. The Mexican farmers and heroin couriers in American cities were operating under the radar of both law enforcement and the big-city drug cartels.

But most of all, it was the doctors who wanted to believe in a non-addictive pain killer that blinded them to the dangers of opioids. Not just the marginal sleazy doctors, but fully reputable doctors believed that opioids were safe. "Dreamland" recounts one incident where a young woman confronted a prominent doctor at a conference, saying "You killed my brother." Some years later, he recalled "My instructors told me that when you take opioids for pain you can't become addicted because pain absorbs the euphoria. That was at Harvard Medical School. It was all rubbish, we all know now. Why do we listen to those messages? Because we wanted them to be true."

Russell Portenoy, the doctor whose skimpy study of 38 patients in the 1980s became the scientific basis for believing that opioids were safe, was interviewed decades later by the *Wall Street Journal* and said "Did I teach about pain management, specifically about opioid therapy, in a way that reflects misinformation? Well, against the standards of 2012, I guess I did," Portenoy said. "We didn't know then what we know now."

Anyone who read the original medical-journal paper might easily have seen its inadequacy; regrettably, too many people didn't check up, because they wanted to believe the result.

It's sobering to realize how history repeats itself. A century ago, the synthetic pain killer heroin was sold over-the-counter; a Sherlock Holmes novel featured it. About 25 years elapsed until heroin was taken off the market. "Dreamland" describes events of recent decades, which led to an epidemic that is still with us today.

On one level, Sam Quinones chronicles the events of this debacle. More important, on another level his strategy of having consecutive chapters take place in one or another location weaves together the total story into one coherent picture. That is what makes this book such a great read. The reader arrives at the final pages with an understanding of how it all fit together to bring about America's worst drug epidemic.

While "Dreamland" is well documented and has an excellent index, Quinones avoids the pitfall of writing a scientific tome that few will read. Everyone who reads it will realize "this could happen right next door." That shocking reality conveys urgency, and is what makes this book a page-turner, a "must read."

The Reason Series

(This is an essay by a young woman who is a Sophomore at Cor Jesu Academy in St Louis. Her teacher, Linda Martin, has been teaching the Reason Series produced by Father Robert Spitzer's Magis Center, for a the past few years and has found it to be an excellent vehicle to convey the complementarity of faith and science to her high school students. The essay below shows this student's firm grasp of the principles underlying the Reason Series. (A Five unit DVD set available on the Magis Center web site) www.magiscenter.com

Despite the claims of evolutionary biologist and notorious atheist Richard Dawkins, Fr. Robert Spitzer explains that "Science cannot disprove God." I agree with this statement because the facts show that it is impossible to prove that God does not exist. For instance, using the scientific method to disprove God's existence would not work because the scientific method is restricted to what can be measured and what is in our universe. God cannot be measured and exists outside of the universe; therefore disproving God by using science is senseless. In fact, disproving anything's existence with the scientific method is tricky because one would have to rule out every single possibility, presence, and place where it might be found and all at once. On the contrary, science can be used to prove that God exists. For example, science shows that the universe has a beginning because it is expanding; this evidence suggests there would have to be a creator because the universe cannot come from nothing. Even so, if the universe did come from nothing (which it cannot) the conditions for a flourishing, orderly, teeming-with-life universe is so unlikely that it is more logical to think that a transcendent creator, God, created the universe. This is one way that shows that science and faith can coexist together instead of having to choose just one. I found this very interesting because before I thought that science and faith were rivals and that some people believed in science and some people believed in God. After seeing this segment I am more familiar with science and religion going hand in hand.

Similarly, there is evidence for a creator in our universe because of what we know from the Big Bang Theory and the BVG Theorem. Proposed by Fr. Georges Lemaitre, a Belgian priest and physicist, the Big Bang theory suggests that time and space began as a point which expanded and created galaxies that moved away from each other. This theory has become one of the main theories for creation and there is scientific evidence that it happened. I believe the Big Bang

theory supports evidence for a creator because it shows the universe has a beginning, thus requiring it to have a creator to begin its existence. I do not believe that something could be created out of nothing; it would require a creator. In addition, further proof of an expanding universe was suggested by the BVG Theorem, named after the physicists Borde, Vilenkin, and Guth. It proved that if the average rate of expansion is greater than zero then the universe requires a beginning. I particularly liked this segment because I have heard of the Big Bang theory, but never thought of the big bang theory as being evidence for God until now. It is interesting because it gives scientific evidence for God that makes it nearly impossible for atheists to contradict.

Moreover, the Big Bang theory helps answer the question "Is the Universe Random and Meaningless?" Simply stated, the chance that the universe was at an anthropic condition that allowed life to emerge and develop at the same time that the Big Bang occurred is virtually impossible. The odds are 10 to the power of 10 to the power of 123---the same odds that a monkey randomly tapping keys on a typewriter would produce all of William Shakespeare's works. This extreme randomness is so improbable that I believe that there is creator that planned the existence of the universe. There are so many things that had to go right such as the correct elements to support life and the emergence of stars that it is unlikely that it happened by chance. In the science world, two theories have emerged that try to explain this: a transcendent creator, or a multiverse speculation. Neither have physical evidence but problems with the multiverse hypotheses suggest that the transcendent intellect theory is a reasonable explanation for the anthropic coincidences in the universe. After watching this segment, I was awed by how much had to be right in order for life to begin. As a result, I believe strongly that the universe is so perfect and ordered that it

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could not be chance and had to be planned by a creator.

The segment, “Does the Bible Conflict with Science?” helped illuminate some seemingly conflicting beliefs between biblical accounts and scientific theories. In summary, Biblical creation accounts were never intended to be scientific, they are intended to be theological. God inspired the writers of the Bible to write a creation story that presented theological truths in a way the author and audience could understand. I believe that much of the Bible is not necessarily historically or scientifically true, but it is religiously true. For instance, in the story of Noah’s Ark, it probably did not rain for 40 days; instead, this represents the power of God. In addition, this segment helped me better understand one of the problems I have had with understanding the Bible. If many of the Biblical stories are simply religiously true, how could I be sure that the story of Jesus was based in fact? This segment gave good account of the historical evidence of Jesus and complimented it with truths of Jesus as Emmanuel.

Finally, the segment “Does the Bible Conflict with Evolution?” further expands on the theological basis of the Bible. In summary, evolution and the biblical story of

man’s creation can be reconciled as long as evolution is viewed with the understanding that humans are distinct from other animals, they are made in the image of God, and they have a soul that survives bodily death. The segment shows scientific evidence of the human soul through studies of near-death experiences in which people have experienced consciousness after bodily death. I thought this was a convincing argument for people having souls that even made sense with scientific evolution.

In conclusion, I feel that faith and reason are compatible. In fact, in many cases, reason and logical proof are what makes faith more believable. For instance, the extreme improbability (reason) that the universe could have been created by random makes proof of a transcendent creator (faith) likely. At the beginning of this course, I assumed that religion and science were

incompatible. In my mind, I thought that science would contradict or disprove religious beliefs. Before watching this series I was at a two on a scale of one to seven of believing in God. Before I only believed in God because that is what my parents taught me and not I can see for myself that God is real. I was surprised that many religious beliefs could be backed with scientific evidence.



Letters To The Editor

Greetings, Sister Marianne!

Thomas Sheahen’s remarks on the horrors of crucifixion – “an incredibly horrible death-by-torture,” as he puts it – made me think of the book simply titled “The Crucifixion” by Fleming Rutledge. I had occasion to read it rather recently and found her graphic description of the agonies of a person being crucified the most thorough and, at the same time, the most ghastly and grizzly imaging that I have ever read, seen, or heard. She does not present it in a melodramatic way, though. She is not trying to shock for shock’s sake. She presents it in one of the most realistic fashions that I can imagine words are able to convey, however. Her purpose is to establish the foundation (her description of these agonies is found in the opening chapters) upon which to build the whole picture of the redemption that God has brought to the world through his Son by the Son’s endurance of the worst that humans can perpetrate on him.

I don’t know if you are acquainted with the book – or just may be an interesting by-word brought back to my mind as I read Sheahen’s opening remarks in the latest “newsletter.” (As noted above, I just finished the book recently, so the whole redemptive history as she presents it so thoroughly and well continues to lie deeply imbedded on my mind.) But I wanted you / him to know about this descriptive analysis of what most recently impressed him / you concerning the horrors of crucifixion if there might be any interest on either or both of your parts.

Hugh Beck

From Retired Lutheran Pastor,
Long-time ITEST member.

The Faith/Science Relationship

Now You Know Media is the Catholic “The Great Courses,” or (as that media giant was first known) “The Teaching Company.” Due to the accessibility of media resources today, these companies are providing the public with learning anywhere and anytime, from their cars on commute to the privacy of their own home computers or CD players. It is no surprise that Michael Bloom would see an opportunity for educating and updating the Catholic laity and clergy through this important new means. In the exercise of that mission, *Now You Know Media* has provided us with access to one of the great faith/science figures of our day, Dr. Guy Consolmagno, SJ, Director of the Vatican Observatory.

“Galileo: Science, Faith, and the Catholic Church”

Carla Mae Streeter, OP, ThD, STL and Thomas P. Sheahen, PhD

Sheahen: The Galileo fiasco has hung over the Catholic Church like an albatross for four centuries. The popular (and superficial) understanding is entirely negative, and often serves as a convenient excuse for people to disdain the Church. The truth is far more complicated. Brother Guy Consolmagno, SJ points out that there are over 400 books on the subject, and he doesn’t need to write another one. However, since these audio CDs are suitable listening during a long drive on a freeway, listeners can steadily become much better informed, and rise above the stereotypical images that abound in the public perception.

Streeter: Aha...the devil’s in the details...and so it is with the Galileo affair. Tom has put his finger on what muddies the waters in this and all important faith/science issues: *superficial understanding*. Theologically we need to approach this issue with the openness of faith: What might I learn from what really happened here? What is the full truth? Whose word is credible? This is not only wise theologically, it is the way to go intelligently.

In a single word, the name “Galileo” expresses the perception that the Catholic Church opposes science;

1. The Galileo Problem

Sheahen: In a single word, the name “Galileo” expresses the perception that the Catholic Church opposes science; and conversely, that to be a scientist must imply opposition to the Church. This presumption is so widespread that it’s shared by many Catholic parents and educators, who fear that science will steal away their children’s religious

beliefs. This is very harmful to what should be a genuine alliance between faith and science.

Consolmagno’s starting point is to pose a series of questions, which he will revisit in lecture # 12. He then outlines what he will cover in subsequent lectures. The series is a presentation of his own journey into studying Galileo. Galileo’s life was long and complicated, and there is *not* one answer. Every author has a different viewpoint. By being an astronomer, Consolmagno can bridge the gap between professional historians and the public. He can understand the science; see the contradictions within Galileo; and relate to the Vatican’s ways of thinking. But he cautions that, like everyone else who has written about Galileo, there will be mistakes in this work, too.

Streeter: Tom is pointing out how important it is for the inquirer to get his/her facts straight, but even more important, *the inquirer needs to monitor his/her own intelligent inquiry*. What does this mean? It means the most basic method is to know how your own intelligence works, and to respect its pattern. In other words: 1.) Check your facts. 2.) Ask every intelligent question. 3.) Reach reasonable judgments of truth. 4.) Evaluate, and move to responsible decisions regarding the significance of this truth for the entire community.

2. The Discarded Image

Sheahen: The title here is taken from C.S. Lewis’ book *The Discarded Image*. For thousands of years, people looked at the world as the province of mysterious forces controlled by capricious gods. As late as the time of Galileo, even the Pope had a personal astrologer! As

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universities were established by the Christian Church, and the study of nature grew into science, the notion of a rational world gained credence, and the old image was discarded. But the process took centuries.

Streeter: Theologically, this shift was from an allegiance to myth passed down by the stories handed down under the authority of elders, to the credibility offered by empirical science or the wisdom of the revealed Word of God handed down by respected Church authorities. The shift rested on credibility, whether to the empirically verifiable data of sense, or the time-honored and respected interpretation of the Word of God within the community called Church. Each rested on a type of “witness.”

3. Galileo’s Life

Sheahen: Beginning with Galileo’s parentage, Consolmagno describes Galileo’s upbringing, originality, inventiveness, and his rise through consecutive professorships to fame. Because of financial obligations within his family, Galileo was constantly scrambling for money. Drawing upon similarities observed in his own contemporaries, Consolmagno perceives that Galileo was a person always struggling for recognition; his membership in the “Society of the Lynxes” was extremely important to Galileo as a symbol of acceptance.

Streeter: So who will be credible to Galileo? Clearly he will want to be true to his own empirical research. At the same time another witness is calling out to him.

*Will what his telescope is revealing
clash with or deepen the Church’s
witness to truth?*

Will what his telescope is revealing clash with or deepen the Church’s witness to truth? The Church will ask him to remain in the tension...to hold his discoveries in the realm of *theory* until he can verify. Will his ego be open enough to push for verification from both witnesses, or will he push his own empirical agenda prematurely? After all, he needs to make a living....yes?

4. Galileo’s Times

Sheahen: Lecture # 4 is about everything else that was going on in the time when Galileo lived. Beginning with the invention of the printing press (1440), followed by the discovery of the New World, the Protestant Reformation, Copernicus’ new theory, and more, Consolmagno weaves

together a coherent picture of how those external events influenced Galileo’s background, his teachings, indeed his entire life. There was a new Holy Roman Emperor here, a new Archduke there, etc.; the ascendancy of the Ottoman Empire had repercussions for the city-state of Venice. Shakespeare’s plays were contemporaneous

*The early 17th century was a time of
enormous change...*

with Galileo’s invention of the telescope. The early 17th century was a time of enormous change for the entire world.

Streeter: The plot thickens theologically. The struggle for Galileo deepens between the witness of his own empirical research and the tension of the patience the Church is asking of him. He knows what his data is telling him; he knows how the Church interprets scripture non-literally, and he knows he needs to survive economically. What will he publish and when? Will he publish his findings as *theory* as the Church asks or as *fact*, when he cannot as yet empirically verify his findings? A judgment of truth needs to be reached, and then a decision based on that judgment or its disregard. Theology may point one way, and economically his ego may be pulling in another.

5. Protestants and Catholics, Jesuits and Dominicans

Sheahen: The Protestant Reformation in the 16th century revised the way people thought, and the turmoil persisted into the 17th century and beyond. A lot of what has been labeled “religious” struggles were actually political struggles between adversarial countries. The Catholic *Council of Trent* clarified many Catholic positions that had been loosely understood for centuries. The *Order of Preachers* (The Dominicans) had prominently founded many major universities centuries earlier; the new *Society of Jesus* (The Jesuits) came into being only in mid-16th century. They held competing views of what the Church should be. Amid the rivalry between those groups, Galileo found himself allied with the Jesuits for some years, but fell out of favor with them eventually. The Dominicans (who controlled the Roman Inquisition) were never particularly warm to Galileo.

Streeter: We are beginning to get a picture of a man who may not always get along with others in the intellectual

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community. Was this because Galileo was a poor scientist? I doubt it. More likely it was because he was opinionated, and had a strong ego. Even the Pope at this time defended him and prevented his condemnation. He knew the value of this scientific genius. But could Galileo afford to think beyond his own acceptance and scientific skill? Could he manage to attend to both witnesses calling out to him?

6. Galileo Triumphant

Sheahen: After refining his telescope in 1610, Galileo's fame continued to grow as more and more people looked through it and saw celestial phenomena such as the moons of Jupiter and the phases of Venus. Earlier, Galileo had tutored the teen-age Cosimo de Medici, and when Cosimo became Grand Duke of Tuscany, he hired Galileo away from a prestigious university in Padua. Of course this annoyed the university who had just given him a big raise, but Consolmagno pointed out that professors do this all the time, so Galileo was merely an early practitioner of that game.

Because he was saying that the Earth moved around the sun, Galileo's critics thought this violated Scripture, and charged him with heresy. In 1615, Galileo wrote a long letter to the Duchess Christina, explaining the compatibility between Scripture and Copernicus' Heliocentric theory. That letter might be the very first example of a Theological Encounter with Science & Technology. It satisfied prestigious churchmen that Galileo was faithful, and Galileo wound up holding a letter from Cardinal Robert Bellarmine certifying that he was *not* a heretic.

Streeter: The Heliocentric theory coming to the fore at this time was not new with Galileo. The Jesuits were also working on it. As he continued to refine his telescope,

As he continued to refine his telescope, Galileo was upping his empirical witness value.

Galileo was upping his empirical witness value. In the light of this scientific visibility, will he be able to maintain his popularity by continuing also to refer to his work as *Heliocentric theory* as the Church was asking? Galileo knew the facts...empirically, and biblically. Could he hold the tension until both witnesses were satisfied?

7. Galileo on Trial

Sheahen: Galileo had "trials" in both 1616 and 1633. His

opponents brought charges of heresy against him, but in 1616 he was given a pass by the Roman Inquisition, at the very same time that Copernicus-related books were put on the *Index of Forbidden Books*. Pope Paul V sent Galileo to meet with Cardinal Bellarmine, to reach a compromise. Galileo had no absolute proof of his position (physics is never perfectly proven), and therefore Bellarmine instructed Galileo not to teach the Copernican system as fact, but only as a computational aid. Galileo agreed. In 1623, Galileo's personal friend Matteo Barbarini was elected Pope Urban VIII, which enhanced Galileo's safety from his critics.

Galileo was probably the most prestigious scientist in the world -- at the top of his profession -- when he wrote *Dialogs on the Great World Systems*, an exposition of the Copernican heliocentric model. To call that "over-reach" is a huge understatement. Beyond being exactly what he promised Bellarmine not to do, Galileo wrote it as a 3-way conversation, in which *Salviati* was the interlocutor, while *Sagredo* answered the naïve questions posed by *Simplicio*. In 1633, Pope Urban VIII recognized his own questions coming from *Simplicio*, and was appalled. Clearly, Galileo held him in contempt. This betrayal by such a close friend infuriated the Pope, who thereafter supported a new investigation and trial of Galileo. The Pope was so angry that he wouldn't even acknowledge Galileo's medical condition (69 years old) or extend other courtesies to him.

The Inquisition ruled against Galileo, and forced him to recant. Consolmagno recites Galileo's statement rejecting the Copernican errors, without ever specifying what those errors were. Galileo spent his remaining years under "house arrest" in Tuscany. He wrote a very good early physics book that was published in 1638 in Holland (far from the censors in Rome). He died in 1642.

Streeter: So what is the real truth of the Galileo affair? It comes down to a stubborn scientific genius teaching as fact what had not yet been substantially verified scientifically. Galileo's ego won out. He broke the tension,

But the real truth of the matter is that he was not condemned for his science.

and history will forever remember it. But the real truth of

Continues on page 10

the matter is that he was not condemned for his science. The Church was on its way to fully support his findings. He was condemned because he published as *fact a theory* that was not yet reconciled with religious faith. He pushed for acceptance in the scientific community, while brushing aside those in the Church who were his friends and supporters. This is important. To continue to hold that Galileo was condemned because the Church is opposed to science is blatantly false and irresponsible.

8. Galileo and the 30 Years War

Sheahen: The importance of the 30 Years War to the Galileo trial has often been overlooked. In 1616 Cardinal Bellarmine forbade Galileo to teach *heliocentrism*. Thereafter, nothing much changed. But in 1618 the 30 Years War began. (Another popular misconception is that the war was Protestants vs. Catholics, but Consolmagno explains that it was mostly “Spain against all comers.”) By 1632, Gustavus Adolphus of Sweden was penetrating deep into Europe, and posed a potential threat to the city-states on the Italian peninsula. In that milieu, the Protestants were criticizing the Catholics for not adhering sufficiently to Scripture. The Church felt required to react to that. The Pope’s position was extremely awkward. To prove the Church’s fidelity to literal Scripture, the timing was just right to make an example of Galileo. It didn’t help that Galileo’s new book *Dialogues* had assigned the Pope’s own words to the character *Simplicio*, which invited ridicule of the Pope.

Consolmagno feels that the entire trial of Galileo might never have taken place were it not for the pressures of the 30 Years War. Due to the millennia-long practice in Christianity of blending Scripture with tradition, a literal reading of Genesis was *not* part of Catholicism. Escalating from Galileo’s assertions about science into a religious-heresy question would *not* have happened in different times.

Streeter: This point made by Tom clearly demonstrates the importance of theological context for doctrinal development. The Church as a community also must abide by the pattern of human consciousness. It too must check the data available to it at the time, ask all the pertinent questions, arrive carefully at a tentative judgment of fact or truth, and then defend that truth lived out responsibly in the events of the day. The Church is human. Its knowledge develops in the context of faith. The guidance of the Holy Spirit in this temporal human process is called infallibility,

which simply means that the Church is continually being directed to the fullness of truth throughout time. As that fullness unfolds, the Church’s doctrine develops in its expression. This explains why what the Church says in one time period can shift to a fuller expression at a later time. This is an example of the scriptural statement, “The householder brings out of his treasure house both old things and new.”

9. Galileo and the Change in Science

Sheahen: Consolmagno makes the point that the most important change brought about by Galileo was not about *heliocentrism*, but a change in the way people thought about *knowing* something. The medieval way of thinking was that knowledge was perfect long ago, and all learning was an effort to recover what was known in the past. Books were revered because they gave access to that past “Golden Age.” Even the Renaissance was geared toward recovering the past. Every writer based his work on some previous writer. The word “probable” meant “you can find it in a book.” That’s totally different from our modern definition of probability.

Galileo challenged all that. With his telescope, he announced *new* knowledge that had never been written down anywhere before. You had to use an *instrument* to gain this knowledge, and people in his times wondered if such knowledge was the same as direct sensory-perception knowledge. To the people of Galileo’s time, the universe was thought to be a living, changing entity; things just happened. The “machine” picture came many years later. Before Galileo, there was no such thing as a “law of nature.” The idea of a *repeatable experiment* was a new concept.

Today we know that all our data is “theory-laden” -- we initiate our experiments with some notion of what we’re looking for. In modern science, if your new paradigm explains observable things in nature better than mine, I’ll yield to your model and we’ll move forward together. That was emphatically not the case in the world Galileo

*The adherents of Aristotle wanted to reason
to the truth, but Galileo wanted to
change that standard of proof.*

inherited. The adherents of Aristotle wanted to *reason* to the truth, but Galileo wanted to change that standard of

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proof. That was the really important revolution in human thinking that Galileo wrought.

Streeter: It would take the twentieth century, and the birth of the psychological sciences, for us to thematize a cognitional theory to underpin our understanding of epistemology. Doing so became philosophically what we call *critical realism*. Until the process of knowing was charted by Bernard Lonergan, SJ, we operated in what philosophically is called *dogmatic realism*. This meant “knowing” is what I tell you it is. We began with an epistemology without offering an empirically observable cognitional theory to ground it. The key is that now, due to psychological data, we can chart the actual empirical pattern of the agent intellect. Once we could demonstrate and affirm what true knowing is, metaphysics became the *content* for that knowing. We know *being*... all sorts of being. This process goes on whether that content is the sense data of science or the truths that come to us by revelation. One process, two data bases. One truth, two sources: faith and science.

10. After Galileo

Sheahen: Much of lecture # 10 is devoted to explaining the experimental difficulties that astronomers had in the latter 17th century, as they tried to demonstrate the motion of the earth, to verify the Copernican system. To discern the motion of the Earth against the background of stars, you needed to measure the *parallax* (the small change in angle) to distant stars. Unfortunately, nobody imagined how far away those stars were, and nobody’s telescope could detect the tiny angular change. Consequently, the system of Tycho Brahe [Earth doesn’t move; Sun goes around Earth and other planets go around the Sun] was preferred, in accord with Genesis. The Copernican system was taught as simply a computational method.

It was only when Isaac Newton developed *Classical Mechanics*, with the force of Gravity introduced by hypothesis, that Kepler’s elliptical orbits were explained. That was about 1720, and Earth’s motion around the Sun was finally understood; Copernicus and Galileo were vindicated. In the centuries that followed, many branches of science developed further, and astronomy was pursued (indeed pioneered) by Catholic priests, especially the Jesuits who built numerous observatories.

Streeter: Truth eventually does win out. Our errors usually stem from the same impatience so clear in Galileo. Holding the tension, and the simple admission

that “we still have so much to learn...” would go a long way. Nothing beats what Tom refers to in his final remarks above: The student of science who does not acknowledge the immense contribution of clergy and other people of faith to the development of modern science is simply denying the facts of history.

11. Galileo Today

Sheahen: Consolmagno begins this lecture by asking “How did Galileo become the symbol of the clash between science and religion?” In fact, that is just a myth; the Catholic Church is not opposed to science at all, but is an active participant in ongoing science. In the late 19th century, Andrew Dixon White wrote a book promoting the notion of warfare between science and religion; he did so out of prejudice against foreign immigrants to America, whom he was sure would be against progressive ideas. Subsequent to Darwin, the notion of improving the human race through selective breeding (Eugenics) arose, and the Church vigorously opposed that. There you have it: proof that the Church was against scientific advances!

Earlier, philosophers of the Enlightenment period used the Galileo fiasco to attack religion in general. But all that time, Catholic priests had been pursuing science (especially astronomy). Several of those priests (Cassini, Secchi, etc.) now have space probes named after them. At one time, the Jesuits ran a quarter of the observatories in Europe.

One of the very best astronomers was Angelo Secchi, who introduced spectroscopy to determine the chemical elements in stars. His fame was such that the Vatican was taken seriously as a nation contributing to astronomy, even when the unification of Italy under Garibaldi squeezed what had been the Papal States into the confines of the Vatican. Pope Leo XIII chartered the *Vatican Observatory* in 1891. In the 20th century, the entire sky was mapped, and the *Vatican Observatory* was part of the team, with women religious doing endless calculations. Guy Consolmagno is now its Director.

Meanwhile, other Catholic scientists like Gregor Mendel (founder of Genetics) demonstrated further that the Church embraces and encourages science. The *Big Bang Theory* of the origin of the universe was proposed in 1927 by the Belgian priest Georges Lemaitre. The record of the Catholic Church in science is excellent.

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Consolmagno concludes with 3 major points about the Galileo affair:

- A) All you “know” about Galileo was mistaken. But Pope Urban VIII *did* use his religious authority to suppress Galileo, which was very wrong.
- B) When Galileo and Bellarmine contested in 1616, Galileo had better theology, but simply didn’t have the *proof* he needed to support the Copernican system.
- C) The *Galileo myth* was an invention of the late 19th century.

Unfortunately, today the enduring contemporary public perception about Galileo is that religion opposes science. Consolmagno states that people bring up the Galileo affair to him because “it’s the only thing they know.” It’s a very difficult myth to overcome.

Streeter: In our own day we are dealing with “fake news.” This means the publication of lies or partial truths that sway perceptions and opinions. How does one deal with myths and fake news? There is only one way that I know of, and it is imperative for both scientists and people of faith: check your source. I propose that we live our lives 99% in faith. It may not be religious faith, but it is believing our doctors, lawyers, police, teachers, priests, and politicians. We simply have not done the lab work, read the reports, or checked into the data. We have to take them at their word. When we realize we have been duped we are furious, because we really are helpless. If they lie, we become the victims. The same applies to religious content. What is our source? Is it credible? Does it have staying power to make it credible?

12. The Galileo Mysteries

Sheahen: In this final lecture, Consolmagno raises the “Why?” questions. Why are there no other similar examples? Why did anyone have a problem with Galileo at all? Why did it take 75 years for people to get concerned about Copernicus? Why did things go one way instead of another? Why did his trial in 1633 happen at that moment in history? Why did his elite status come crashing down so suddenly? Did his book really insult the Pope? Consolmagno shows that the many questions are more interesting than the answers – many of which will never be clear. He searches for the issues *behind* the questions. In 1992 Pope John Paul II termed the Galileo affair “a

tragic conflict of world views.” Today we all have a totally different world-view. Our perceptions are nothing like those of 17th-century people, but it is really essential to try to view all this through the lens of their mentality. They feared Galileo was trying to impose the Copernican system as *Truth*. Today we recognize that scientific truth is never complete, but continually advances.

Today we recognize that scientific truth is never complete, but continually advances.

Galileo’s children, students and colleagues loved him. Consolmagno wonders “Would I have liked him?” He would not have bought Galileo’s theories, because the evidence wasn’t good enough to displace the prevailing paradigm that came from Aristotle. Brother Guy also reminds us of issues like Galileo’s health, which wasn’t good after 1600. Galileo’s politics, his self-image, all played a part in this drama. Galileo distrusted authority, and yet he stayed faithful to the Church, obeying very unjust rulings.

Finally, Consolmagno asks the listener to examine these take-away questions: What do *we* think? What are *our* myths? How do we learn about the truth?

Streeter: And there you have it. The scene in our day is similar. The characters are different. No one is exempt from the hard work of discernment. Knowing how our intelligence reaches truth is vital for our examination of any thinker or writer. Most basic to responsible self-monitoring is the discernment of the *questions* we make sure we ask, and more, the discernment of the questions we are deliberately covering up so that we do not come to the knowledge that might change our point of view. Ours is the same tension between our own rational work and the revelation we have been given through the community we call Church. Truth is one. It is our job to honor both its sources.

Do we recommend these Consolmagno lectures from Now You Know Media? Yes, if you want to enjoy some fine intellectual fare while you are driving or exercising. Yes, if you are among those who simply want to know the real story. Yes, if you want to be able to debunk the myth that the Church was anti-Galileo because it is “opposed to science.” Yes, if you want to join the ranks of those who simply will not put up with “fake news.”

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**University of Toronto
2017 Engineering Alumni Network
Awards Ceremony ~ November 2, 2017
Engineering Alumni
Hall Of Distinction Award**



**2017 Award Recipient
Rocco Leonard Martino
BSc Mathematics & Finance '51;
MAsc Physics '52;
UTIAS PhD Aerospace Engineering '56**

The Hall of Distinction is an assembly of extraordinary alumni, selected for membership by their peers for their lifelong accomplishments. These are graduates whose performances have ultimately defined what is most exemplary in our graduates and in our profession. The careers of the members stand as examples and add a sense of reality to the aspirations of successive generations of University of Toronto Engineering students. Located in the Sandford Fleming Building, the Hall of Distinction is a familiar daily presence in the lives of students and is often visited by alumni and their families.

Dr. Rocco L. Martino is the inventor of the CyberFone – the world's first smart phone – and the driving force behind the software systems permitting secure real-time video, voice and data linkages. Martino graduated with a "First" in Honors Mathematics and Finance from University College at the University of Toronto, and went on to earn a master's degree in Physics and a doctorate in Aerospace Engineering from the Institute of Aerospace Studies. His discovery of the heating factors during the re-entry of space vehicles led to the development of heat shields that made space travel possible today. He is the Founder and Chairman of the Board of Martino Systems, Inc. and was the Founder, Chairman and CEO of XRT, Inc., a global leader in providing complete treasury, cash and banking relationship management solutions for many of the world's largest corporations and government entities.

Prior to founding XRT, Inc., Dr. Martino directed the Aerospace Division of Adalia, Ltd, a firm headed by Sir Robert Watson Watt, the inventor of Radar; directed all activities in Canada for UNIVAC, and worked with Admiral Grace Hopper on automatic programming systems; formed a partnership to create Mauchly Associates with John Mauchly, the co-inventor of computers, and spearheaded the Critical Path Method created by this company; and finally headed the Special Projects Group of Booz Allen and Hamilton.

Rocco Leonard Martino is also the author of five novels, twenty-six nonfiction books, as well as scores of papers and numerous corporate monographs on computers, communications, networks and planning.

He served as Professor of Engineering and Chair of the Systems Engineering Department of the University of Waterloo and as Professor of Mathematics at New York University.

Dr. Martino served on the boards of Saint Joseph's University in Philadelphia, the World Affairs Council, the Foreign Policy Research Institute (of which he is currently a Senior Fellow), the Gregorian University Foundation, the Vatican Observatory Foundation, the Order of Malta, and numerous other boards. He currently serves on the Advisory Board of the University of Toronto's Institute of Aerospace Studies.

He has been honored by the Monte Jade Society, the National Italian American Foundation of Washington, and the CYO Hall of Fame in Philadelphia among others. He holds honorary doctorates from Gonzaga University (Spokane, WA), Neumann University (Aston, PA) and Chestnut Hill College (Philadelphia, PA), and was knighted by Pope St. John Paul II as a Knight of Saint Gregory.

Dr. Martino's lifelong accomplishments have earned him a global reputation as a scientist, inventor, financial expert, technology guru and an author.

The Problem with Catholic Young-Earth Creationism

By Thomas P. Sheahen

On July 24, 2017, I heard a talk entitled “Are the first 11 chapters of Genesis true or did we descend from apes?” by Hugh Owen, Director of the *Kolbe Center for the Study of Creation*. His presentation, which lasted about 1 1/3 hours, was very strident young-earth creationism, with a special “Catholic” cachet about it. He was strongly opposed to “science,” essentially insisting that good Catholics were obliged by previous papal pronouncements to adhere to the literal Adam-and-Eve narrative. If he had made the distinction and attacked “scientism,” I would have been less unhappy.

The troublesome word in Owen’s title is “or.” Yes, “or,” -- the shortest word in the title. Owen could not imagine any possibility of seeing *both* truth in the Bible *and* truth in the science of evolution. To him, they were mutually exclusive.

As I have written in the past, both atheists and creationists make the same mistake: they imagine *time* is absolute and immutable. To say that God exists *within time* is a huge mistake, because it makes God *subordinate* to time; it places a false god (i.e., time) ahead of God. Little wonder that atheists disbelieve in such an inferior god. Recall that Bertrand Russell, about a century ago, sneered “if your God is so powerful, why did it take him *so long* to make the world we see?” The creationists have accepted that false premise -- they agree that God exists within time -- and to counter the atheist claim, they assert that God created everything about 6,000 years ago.

Creationists may have heard the word “transcendent” regarding God, but they don’t grasp the meaning of it. The concept that God is *present to all time* is beyond their comprehension. *Omnipresent* may mean “God is everywhere,” but “God is everywhen” elicits only a blank stare.

Hugh Owen festooned his presentation with quotes from diverse post-Darwin popes, such as Leo XIII and St. Pius X, which he extracted from their less-known encyclicals. That was the main difference between Owen’s talk and that of any standard fundamentalist-Protestant 6-day creationist. Owen’s interpretation of those quotes is that they are absolutely binding on all Catholics; you’re *anathema* if you don’t agree. He excoriated Catholic schools for teaching evolution in biology classes. The

biology books he didn’t like included one by Kenneth Miller (whom he disdains as a “theistic evolutionist”) and another by Peter Raven, curator of the St. Louis Botanical Gardens.

In the 19th century, Charles Darwin accepted the geology of a scientist named Lyell, which has since been surpassed. It is standard among creationists to assert that because Lyell was wrong in this or that way, therefore everything that Darwin said is wrong. The Grand Canyon was created by God to look just that way. I think of that belief as “God the Travel Agent.” Now, all of us who believe in the omnipotence of God agree that you cannot *prove* that God *didn’t* create the world just as we see it today; but then, God might have created everything just 10 minutes ago, including both you and me and all our memories. I’m reminded of Galileo’s statement that God, who gave us the ability to think and reason, wouldn’t expect us to forego the use of such abilities.

In the years after Darwin, the philosophy known as “Scientism” arose, wherein the only real knowledge is that gained from science, and all else is invalid. That became a cornerstone of the atheists’ argument that God either doesn’t exist or is irrelevant. “Logical Positivism” became a dominant philosophy, but that all came tumbling down with the 20th century discoveries of quantum mechanics, Godel’s theorem, and the replacement of Newton’s classical mechanics by relativity. This is all well-known to Catholic scholars today. Unfortunately, Hugh Owen is still fighting against the scientism of the 19th century -- and in doing so, he disdains all of 20th-century science.

Owen brought up the topic of “Mitochondrial DNA,” in which it now appears that one individual female stands in the path of our ancestry. Most scientists who have studied this topic place that “Mitochondrial Eve” between 1 and 6 million years ago. Hugh Owen states it was just 6,000 years ago.

Because he talked for so long, there wasn’t time for me to ask Owen the question I had framed: How soon will you be able to have the sainthood of John Paul II revoked, so that he can be condemned as *anathema* for having said “The Theory of Evolution is more than ‘just a theory’”?

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Additional good questions would be: Why do you *want to* ignore the images obtained by the Hubble Space Telescope? Who benefits by rejecting science?

Owen inveighed against the bad teachers in Catholic schools, who have led their students astray. His solution to the high percentage of defections from the Catholic faith is to insist that parents must reject all of modern science in order to protect their children's faith ... in a literal interpretation of Genesis, Adam & Eve, young earth creationism, etc. I was terribly saddened by Hugh Owen's entire message, which springs from the belief that science is the enemy of religion.

I think of the many fine books that bring faith and science together: books by Ian Barbour, John Polkinghorne, and especially the exceptionally clear presentations in several books by Catholic theologian John F. Haught. I admire the brilliant scholarship that goes into books like "New Proofs for the Existence of God" by Fr. Robert Spitzer, SJ, as well as Spitzer's excellent videos intended for high school students. I cherish the personal testimony of polymer chemist Dr. Stacy Trasanco in "Particles of Faith." There is an enormous amount of fine educational resources out there, waiting for each Catholic high school teacher to choose what works best.

What is it that enables the virulent anti-science attitude of Hugh Owen to find attentive Catholic audiences? Perhaps it is the *ease* of taking the "Us vs. Them" stand that demands an either/or commitment. Conversely, it requires serious thought and study to comprehend that questions can be answered on different levels, that "both/and" gives the more comprehensive explanation.

Contributing to this tragedy is the fact that most Catholic parents, and many Catholic priests, are very weak in science. That leads to seriously lowered expectations. If a student attributes a line from Shakespeare to some rock star, the attentive parent will correct that; but if a student doesn't know the difference between energy and momentum, or oxygen and nitrogen, the parent will often say "yeah, I was never good in science either." If you don't know any science in the first place, it's hard to see how faith and science complement each other.

As a young student progresses, hanging on to literal belief in Genesis inevitably causes a train wreck. For too long we have ignored that danger, and just dismissively giggled at the Catholic young-earth creationists. Once in college, the path toward atheism doesn't start with Marx & Freud & Dawkins, but begins by setting up an opposition between faith and science. Once a belief in scientism is established, atheism follows naturally. That pathway was fully demonstrated in the late 19th century.

Today, there is available a much more refined understanding of theology, as well as an understanding of the limitations of science. A person who advances in science enough to discern the limitations of science (and look over the horizon) will not succumb to believing in scientism.

Failing to distinguish between "scientism" and science is an easy mistake to make. Then "science" becomes a convenient scapegoat for all that is wrong in the dismal educational and moral outcomes we sometimes find among our adult children. To counter this default condition, every Catholic scientist needs to speak out clearly and frequently, insisting that science is *not* the enemy of religious faith.

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### Thoughts from Rabbi Jonathan Sacks

"The Great Partnership: Science, Religion and the Search for Meaning."

"Science takes things apart to see how they work. Religion puts things together to see what they mean." (p. 77)

"Faith is about seeing the miraculous in the everyday, not about waiting every day for the miraculous." (p. 81)

"Faith is not spurious knowledge of things we might be able to demonstrate through scientific means." (p. 96)

## Theology Musings

By Father Robert A. Brungs, SJ, July, 2005

*(In this issue, S. Carla Mae Streeter and Tom Sheahan “converse” about Brother Guy Consolmagno’s CD series on “Galileo: Science, Faith, and the Catholic Church.” Although written 12 years ago, these unpublished reflections of Father Brungs provide a “prequel” to that conversation, but unifies all the contributions to this issue. That was Father Brungs’ gift; he brought faith and science together.)*

One thing is certainly clear in the faith/science endeavor. We are living in an age that demands as much of us as it once did of the Church Fathers. They were in their time as the theologians of this age must be in their time. Briefly, the Church Fathers were mainly Bishops who had to educate their flocks both to the learning of their day – the early church – and to the developing sense of belonging to what is considered now an international Church. Augustine, Irenaeus, Gregory of Nyssa, Gregory Nazianzen, Basil the Great and many others dealt both with an emerging culture and with an emerging Church. That is our task now – to treat the growing awareness of the creation along with the unfolding knowledge of our place in and union with God. Our education in both areas must be life-long, acute and forward looking.

Scientific knowledge has been expanding at an ever faster rate. “There are probably more scientists alive in the world now than there were in all history—or almost, it is often said. I don’t really know a way to estimate how many scientists there were in the past or even who was considered to be a scientist. But I suppose making the statement above is fairly accurate. It is certainly true that there is an acceleration in our appreciation of the complexity of knowledge about the cosmos. From the immensity of space to the intimacy of the DNA molecule all we see is the extreme intricacy of things. We come more and more to declare the interrelatedness of all creation. If only we could grow equally swiftly in the interrelatedness of faith and science. In the minds of very many they are very separate – even incompatible—although in the real world I believe they are intimately connected.

I find it impossible to believe that things in the cosmos “just happened” willy-nilly. Things are simply too complex to have occurred by chance. It seems incredible to me that anyone could maintain that, while all things

are interrelated, they occurred completely at random. It might be that a single change may have occurred in a way that is now beyond our knowledge. We certainly can’t say why everything is the way it is. But explaining why the eye is the way it is and works the way it works is orders of magnitude less than explaining the fact that everything is part of a whole. There is only one reality in the world. Humankind is related to animals and to plants. It does not exist apart from them. The Earth is related to the Sun and the Moon and each of the stars. The earth has an effect however small, on each star and planet in the universe and they on it. Our weather on earth is related to heat from the sun and other heavenly bodies as well as on each living thing and on the earth’s terrain—or should we say *terrains*? Do we even consider this interrelatedness in our science? Hardly! It is simply too complex to write the requisite equations. Yet this interrelatedness exists whether we can cope with it or not.

According to the most accepted physical theory, the cosmos ought to be interrelated in its particulars because it is interrelated in its beginnings. According to the Big Bang theory everything began at the same time from the same “singularity.” That is the first and last time in the history of the universe that there was this “singularity.” It was the first and last time that cause and effect seemed to exist only “on one side of the equation” – our side. What was “before” we simply do not know, nor will we ever know. In the sense of that one singularity everything else in the universe is “in common.” What happens to one piece, no matter how tiny, happens to all pieces. Everything that happens to you, to me, to anyone, happens to all. Somehow our science had better begin to think at least somewhat in these terms. Otherwise, in the end, science simply will be inadequate to explain any part of creation, much less the whole.