FOUNDATIONS

EDUCATING AT THE INTERSECTION BETWEEN SCIENCE & RELIGION

READER

Foundations New Orleans

2019

This seminar is made possible through the generous support of the John Templeton Foundation.

UNIVERSITY OF NOTRE DAME | McGRATH INSTITUTE FOR CHURCH LIFE

NOURISHING THE CATHOLIC IMAGINATION.
RENEWING THE CHURCH.

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McGRATH INSTITUTE FOR
CHURCH LIFE

Mission Statement

The McGrath Institute for Church Life partners with Catholic dioceses, parishes and schools to address pastoral challenges with theological depth and rigor. By connecting the Catholic intellectual life to the life of the Church, we form faithful Catholic leaders for service to the Church and the world.

Science & Religion Seminars

Nourishing the Catholic Imagination of Teachers at the Intersection of Science and Religion

The Science & Religion Seminars equip teachers with approaches that expand the dialogue between the disciplines and challenges the notion that science and religion are in conflict.

Training Catholic Educators to Engage the Dialogue Between Science and Religion:

A Grant from the John Templeton Foundation

Project Leader(s)
John Cavadini

Grantee(s)
University of Notre Dame du Lac

Description
The purpose of this grant is fivefold: (1) to continue and expand the Science & Religion Initiative that began with the exploratory grant and was continued and extended by a second grant; (2) to introduce teachers in Catholic high schools to the dialogue between theology and science; (3) to assist them in incorporating that material into their courses; (4) to provide continuing education opportunities and pedagogical resources to teachers and administrators; and (5) to assess, develop, and share the results. We will accomplish these goals through a combination of seminar programming, media development, and the publication of educational material. Catholic schools constitute the largest private educational system in America and a large potential audience (1200 high schools with 579,605 students). We believe education should inspire wonder and foster inquiry into the mysteries of the world and this should be institutionalized in the entire school systems. Unfortunately, the academic and the spiritual have too often been separated, even within Catholic schools. Our program aims to rectify that. We have developed this program within the context of the church's 2000-year intellectual and spiritual tradition. The church encompasses numerous cultures, languages, and philosophical traditions, attempting to integrate them into a whole. Development of its tradition occurs slowly and discerningly, growing organically out of the historical tradition even while incorporating scientific and philosophical insights. Our initiative will bring elements of the tradition into dialogue with scientific research.

Foundations New Orleans Leadership Team

Dr. Chris Baglow (Director) - Chris is the Director of the Science and Religion Initiative of the McGrath Institute for Church Life, where he creates and directs programming that assists Catholic leaders in bringing the Catholic faith and modern science into dialogue for the sake of the New Evangelization. He has led programs of academic integration at two Catholic high schools, including the STREAM™ Program at St. Mary's Dominican H.S. in New Orleans, LA. In 2011-2014 Baglow directed the Templeton-funded *Steno Learning Program in Faith and Science for Catholic Secondary Educators* (*SLP*), a week-long seminar experience for Catholic science and religion teachers. Baglow is the author of *Faith, Science and Reason: Theology on the Cutting Edge* (Midwest Theological Forum, 2009, 2nd ed. in progress).

Dr. Stephen Barr (Physics Lecturer, Co-Moderator) - Steve is a Professor of Particle Physics at the Bartol Research Institute and the Department of Physics and Astronomy at the University of Delaware. He has authored over 120 physics papers in journals such as *Physical Review* and *Physics Today*. He is a regular contributor on matters of science and religion to the journal *First Things*. He is the author of *Modern Physics and Ancient Faith* (University of Notre Dame Press, 2003) and *The Believing Scientist: Essays on Science and Religion* (Eerdmans, 2016). He is the founder and president of the Board of Directors of the Society of Catholic Scientists.

Dr. Tim Burgess (Physics Lab Instructor) - Tim is retired Chair of the Science Department at McGill-Toolen Catholic H.S. (Mobile, AL) and a veteran high school science teacher with 34 years of experience. As Science Chair, he pioneered the successful *Physics First* Program that introduces students to physics first, followed by chemistry, and then culminating with biology.

Matthew Foss (Lab Coordinator) - Matt is the Chair of the Science Department at St. Mary's Dominican H.S. (New Orleans, LA). He has a B.S, and M.S. in Physics and has taught science for 15 years at Dominican, as well as math and robotics. He also has had a leading role in the planning of the labs in the new *Gayle and Tom Benson Science and Technology Complex* as well as in STREAM™ faculty development and curricular implementation.

Dr. Cory Hayes (Co-Moderator) - Cory is a Senior Professor of Philosophy and Theology at St. Joseph Seminary College in Covington, LA and served as Associate Director of the STREAM™ Program at St. Mary's Dominican H.S. A veteran seminar leader and a co-moderator in the *Steno Learning Program*, Hayes is also a clear and exciting instructor with a keen grasp of philosophy and the role it plays in the science and religion dialogue in the Catholic intellectual tradition.

Maria Gianna Iannucci (Implementation Director) – Gianna has been an educator since 1991, and is a science teacher at Mercy High School in Connecticut. She has taught at the undergraduate college level at the University of New Hampshire, Quinnipiac University, and Albertus Magnus College, and has developed courses in neuroscience, medical botany, and astronomy taught in the Catholic liberal arts tradition. For two years she has worked with the Science & Religion Initiative as a presenter and director of implementation workshops.

Dr. Dan Kuebler (Biology Lab Instructor, Lecturer) – Dan is a Professor of Biology and the Chair of the Biology Department at Franciscan University in Steubenville, Ohio where he teaches courses on evolution, cell physiology and neurobiology, as well as maintaining an undergraduate research laboratory that investigates seizure disorders. Dan is the co-author of *The Evolution Controversy: A Survey of Competing Theories* (Baker Academic, 2007), a resource for cutting through the competing agendas to gain an unbiased understanding of the scientific issues involved in the debate surrounding evolution.

Dr. Stacy Trasancos (Chemistry Lab Instructor, Lecturer) - Stacy has a Ph.D. in Chemistry from Pennsylvania State University and a M.A. in Dogmatic Theology from Holy Apostles College and Seminary. She has served as a Senior Research Chemist for E. I. DuPont de Nemours & Co., Inc., and is the author of *Science Was Born of Christianity: The Teaching of Fr. Stanley L. Jaki* and *Particles of Faith: A Catholic Guide to Navigating Science* (Ave Maria Press, 2016).

Foundations New Orleans Seminar Schedule
June 23-28, 2019
(schedule subject to minor revisions if necessary)

Day 1, Sunday, June 23, 2019
3:00 – 5:00 p.m. Arrival/Check-In at Notre Dame Seminary (NDS)
5:30 – 6:15 p.m. Mass
6:15 – 7:30 p.m. Dinner
7:30 – 9:00 p.m. EVENING SESSION
Greetings and Orientation (NDS Pastoral Center)
Introduction to Seminar Team and Agenda (NDS Pastoral Center)
9:00 p.m. Social (NDS Student Center - Biblicum)

Day 2, Monday, June 24, 2019
7:00 – 7:30 a.m. Mass (NDS Chapel)
7:30 – 8:00 a.m. Breakfast (NDS Dining Room)
Part One: Engaging the Great Conversation: Science, Philosophy and Theology
8:15 – 9: 30 a.m. Lecture: "The Catholic Church and Modern Science: A Glorious History" (Stephen Barr) (NDS Classroom 1)
9:30 – 9:45 a.m. Break
9:45 – 11:00 a.m. Seminar I: C.S. Lewis, "Meditation in a Toolshed" (pp. 3-5, FNO *Reader*); Stacy Trasancos, "Science in the Light of Faith" (Part I in *Particles of Faith*, pp 9-62) (NDS Classroom 2)
11:00 – 11:15 a.m. Break
11:15 – 12:30 p.m. Seminar: St. John Paul II, "Our Knowledge of God and Nature: Physics, Philosophy and Theology" (pp. 7-14, *FNO Reader*); Dan Kuebler, "After Galileo: Modern Science Has Deep Parallels with Theology" (pp. 15-19, *FNO Reader*) (NDS Classroom 2)
12:30 – 1:30 p.m. Lunch
1:45 – 3:00 p.m. Presentation: "Introducing Faith/Science Dialogue and Instruction in Secondary Curricula" (Gianna Iannucci) (NDS Classroom 1)
3:00 – 3:15 p.m. Break
Part Two: Faith and Science in the Catholic Intellectual Tradition
3:15 – 5:00 p.m. Seminar II: Chris Baglow, "The Christian Doctrine of Creation: A Wisdom Wider than Science"; "Evil, Prayer and Miracles: Critical Questions for Science and Religion," (pp. 23-53, *FNO Reader*) (NDS Classroom 2)
5:00 – 6:00 p.m. Break
6:00 – 7:00 p.m. Dinner (NDS Dining Room)
7:00 – 8:15 p.m. Lecture: "Modern Science, the Catholic Church, and the Galileo Affair" (C Hayes). Required pre-reading: "Galileo Affair: Selections" (pp. 55-66, *FNO Reader*) (NDS Classroom 1)
8:30 p.m. Social (NDS Student Center - Biblicum)

Day 3, Tuesday, June 25, 2019
7:00 – 7:30 a.m. Mass (NDS Chapel)
7:30 – 8:00 a.m. Breakfast (NDS Dining Room)
8:15 a.m. DEPART NDS FOR DHS AS A GROUP

Part Three: Physics, Chemistry and the Catholic Faith
Morning Session at DHS Gayle and Tom Benson Science and Technology Complex from 8:30 a.m. – 12:30 p.m.
PHYSICS LAB: Our Understanding of Light, the Photoelectric (PE) Effect and the Birth of Modern Physics (Instructors: T. Burgess & M. Foss)
Explanation: *FNO* begins with an explanation of how models of light were developed through 2000 years of observations, experiments and imagined explanations. Eventually the explanation arrived at the wave-particle duality model for light. Once developed, this explanation became foundational to all of modern Physics. Understanding this "duality" is required to consistently and coherently explain the "photoelectric effect" (PE).
Materials: *FNO Physics Lab Packet,* Pencils, Pens, Paper
8:30 – 9:45 a.m. Lecture: Introduction to the wave-particle duality of light (discussing history and experiments leading up to this model). Includes a diffraction/refraction demo. (T. Burgess & M. Foss)
9:45 - 10:00 a.m. Break
10:00 – 11:30 a.m. Teams will gather electron ejection energy as a function of incident light frequency. The data will be collected across all teams and groups for analysis in the Concluding Session. Teams will also explore the capabilities of the simulation of the PE effect and the different values that can be measured and observed. Teams will gather data with stated expectations. Possible interacting values include light frequency (color), light intensity (brightness), electrical current (amperes), stopping voltage (Volts) required to stop the flow of electrons from the surface (and so therefore electron ejection energy).
11:30 - 11:45 a.m. Break
11:45 a.m. – 12:30 p.m. Teams review, analyze and discuss data collected in the lab and computer simulations. Teams will generate a graph or representation of the data and an explanation using the dual particle-wave model of light proposed by Albert Einstein in his Nobel Prize-winning 1905 paper on the PE effect.
12:30 – 1:30 p.m. Lunch (NDS Dining Room)
1:30 – 2:30 p.m. Physics Lab Presentations and Discussions: All teams will present data, analysis and explain results of simulation exploratory labs in terms of the wave-particle duality described by Einstein. Discussion regarding the consistency and coherence of the model will be generated. Clarifications will be offered. (NDS Pastoral Center)
2:30 - 3:00 p.m. Break
3:00 – 4:15 p.m. Seminar I: Stephen Barr, "Modern Physics, The Beginning and Creation," pp. 123-136 in *The Believing Scientist* (NDS Classroom 2)
4:15 - 4:30 p.m. Break
4:30 – 5:45 p.m. Seminar II: Stephen Barr, "Fearful Symmetries," pp. 159-167 in *The Believing Scientist* (NDS Classroom 2)
6:00 – 7:00 p.m. Dinner (NDS Dining Room)
FREE NIGHT IN NEW ORLEANS

Day 4, Wednesday, June 26, 2019

7:00 – 7:30 a.m. Mass (NDS Chapel)
7:30 – 8:30 a.m. Breakfast (NDS Dining Room)
Morning Session at DHS Gayle and Tom Benson Science and Technology Complex from 8:45 – 11:45 a.m.

CHEMISTRY LAB: Flame Test for Metals (Instructor: S. Trasancos)
Explanation: This is a hands-on experience with an analytical technique to gather data for elemental analysis. The goal is to begin a discussion about atomic spectroscopy and electromagnetic radiation, which will lead into a deeper discussion about emission spectra, absorption spectra, and fluorescence spectra. This will lead to a deeper discussion about how the instruments in analytical labs and in astronomical labs are used to determine the elemental composition of substances for industry and of cosmic bodies. It will introduce concepts that tie the atomic realm to the cosmic realm, yet include the academic and industrial realm as well. In tying all of this together, the discussion will then lead to an appreciation of beauty and symmetry in the laws of nature as evidenced in a) the order in the periodic table; b) how each element known is unique in its number of protons, with no missing spots on the table; and c) how this profound yet simple order is responsible for the symmetry and/or asymmetry in ionic and molecular bonds.
Materials: Pencils, Paper (*FNO Chemistry Lab information will be given via PowerPoint*)
8:45 – 9:15 a.m. Lab Preparation and Explanation
9:15 – 10:15 a.m. Lab Activity: Flame Testing (Metal Salts)
10:15 - 10:30 a.m. Break
10:30 – 11:00 a.m. Participants present and discuss findings from testing.
11:00 – 11:45 a.m. Lab Activity: Flame Testing (Unknowns)
11:45 a.m. – 12:00 p.m. Participants present and discuss findings from testing.
12:00 – 1:00 p.m. Lunch (NDS Dining Room)
1:00 – 3:00 p.m. Implementation Workshop (Gianna Iannucci)
3:00 – 4:15 p.m. Break
4:15 – 5:15 p.m. Seminar I: Joseph Ratzinger, 1st and 2nd Homily, pp. 1-39 in *In the Beginning* (NDS Classroom 2)
5:15 – 5:30 p.m. Break
5:30 – 6:30 p.m. Seminar II: Joseph Ratzinger, 3rd and 4th Homily, pp. 41-77 in *In the Beginning* (NDS Classroom 2)
6:30 – 7:30 p.m. Dinner
Part Four: Biology and the Catholic Faith
7:30 – 8:45 p.m. Lecture: "Evolutionary Theory: Terms and Concepts" (D. Kuebler) (NDS Pastoral Center) Required pre-reading: Stacy Trasancos, "Can a Christian Accept the Theory of Evolution?" (Chapter 9 in *Particles of Faith*, pp 127-154)
8:45 p.m. Social (NDS Student Center - Biblicum)

Day 5, Thursday, June 27, 2019

7:00 – 7:30 a.m. Mass (NDS Chapel)
7:30 – 8:30 a.m. Breakfast (NDS Dining Room)
Morning Session at DHS Gayle and Tom Benson Science and Technology Complex from 8:30 a.m.-12:00 p.m.
BIOLOGY LAB: Classification and Evolution (Instructor: D. Kuebler)
Explanation: This lab was developed by evolutionary biologists Joseph H. Camin and Robert P. Gendron. Participants model evolution by classifying imaginary animals called "caminalcules." In this lab exercise the students first classify 14 "living caminalcule" species into genera, families, etc. Then they construct a phylogenetic (evolutionary) tree of the Caminalcules using an additional 57 "fossil" species. This illustrates how modern classification schemes attempt to reflect evolutionary

history. In the process participants learn concepts such as convergent evolution and vestigial structures.
Equipment/Materials: *FNO Biology Lab Packet*, Pencils, Paper
8:30 – 9:15 a.m. Lab Preparation and Explanation
9:15 – 10:30 a.m. Lab Activity: Caminalcules: Classification and Phylogenetic Reconstruction
10:30 – 11:00 a.m. Participants present and discuss findings.
11:00 a.m. – 12:00 p.m. Lab Activity (cont.): Caminalcules: Classification and Phylogenetic Reconstruction
12:00 – 1:30 p.m. Lunch (NDS Dining Room)
1:30 – 3:30 p.m. Implementation Workshop (G. Iannucci) (NDS Classroom 1)
3:30 – 3:45 p.m. Break
Part Five: The Emergence of the Image: God, the Human Person, and the Sciences of Human Origins
3:45 – 5:00 p.m. Chris Baglow, "Paleoanthropology and Theology at the Origins of Humanity" (pp. 69-84 in *FNO Reader*) (NDS Classroom 2)
5:00 – 5:15 p.m. Break
5:15 – 6:30 p.m. Chris Baglow, "In His Image: The Human Person from the Divine Perspective" (pp. 85-96 in *FNO Reader*) (NDS Classroom 2)
6:30 p.m. Dinner (NDS Dining Room)
FREE NIGHT IN NEW ORLEANS

Day 6, Friday, June 28, 2019

6:00 - 7:30 a.m. Checkout (NDS Main Lobby)
7:00 – 7:30 a.m. Mass (NDS Chapel)
7:30 – 8:00 a.m. Breakfast (NDS Dining Room)
Part Six: Jesus Christ: The True Origin of Humanity
8:15 – 9:30 a.m. Seminar I: Chris Baglow, "Human Sin and Modern Science: The Tragic History of the Image of God" (pp. 99-114 in *FNO Reader*) (NDS Classroom 2)
9:30 – 9:45 a.m. Break
9:45 – 11:00 a.m. Seminar II: Chris Baglow, "From Evolution to Resurrection: Jesus Christ, the True Origin of Humanity" (pp. 115-125 in *FNO Reader*) (NDS Classroom 2)
11:00 a.m. – 12:00 p.m. Lunch (NDS Dining Room)
12:00 p.m. – 2:00 p.m. Implementation Workshop (Gianna Iannucci)
3:00 **Departure from Notre Dame Seminary**

THE SEMINAR WAY

By
Patrick Powers, Ph.D.

THE VIRTUES

Moral, Theoretical and Theological

- **Be patient**, as you are one of over forty great minds who believe they should speak.
- **Be deferential** with your colleagues who want to speak, as your turn will come.
- **Be courageous** to speak up every now and then, not worrying what you will say.
- **Be honest** about whether or not you have done the entire assigned reading.
- **Be cautious** about judging when an author or colleague is talking rot or not.
- **Remember** to start with "first impressions," not the meaning or truth of an author.
- **Remember** to read what an author said, not what you think he or she should say. .
- **Remember** to listen to what an author or speaker intends to say and mean.
- **Remember** to listen to: What did he say? What did he mean? So what; is it true?
- **Remember** to heed these counsels before seizing the pulpit to speak your mind.
- **Remember** to ask questions as much as to make statements.
- **Be faithful** to your colleagues by trusting that the dialogue will unfold fruitfully
- **Be charitable** as your colleagues may not have as much to say as you.
- **Be hopeful** that Providence will guide you about when it is good to speak or not.
- **Be humble** about assuming that God has assigned you to save a messy seminar,

THE RULES

- **Inner and Outer Circles**: Participants are divided into two groups, the Alphas and the Omegas. Each group will rotate in the discussion, with one being the Inner circle of dialogue participants and the other acting as auditors. Some sessions will be plenary.

- **The Moderators' Sign Language:**
  - Finger at you – you should speak.
  - Finger in the air – you have one minute.
  - Two fingers pinched – you have thirty seconds.
  - Two-handed T – take a break and come back later.
  - Hand across the throat – enough, stop now!
  - Thumb pointed back over shoulder – you're silenced!

"Blessed are the silent, for their way contributes to dialogue and is often the stuff of wisdom."

ENGAGING THE GREAT CONVERSATION:

THE COMPLEMENTARITY

OF

SCIENCE, PHILOSOPHY AND FAITH

(In this opening session of FNO, works that bring science and faith into conversation and a "relational unity" are considered.)

1. **C.S. Lewis, "Meditation in a Toolshed"**
2. **St. John Paul II, "Our Knowledge of God and Nature: Physics, Philosophy and Theology"**
3. **Dan Kuebler, "After Galileo: Modern Science Has Deep Parallels with Theology"**

Meditation in a Toolshed

by
C. S. Lewis[1]

I was standing today in the dark toolshed. The sun was shining outside, and through the crack at the top of the door there came a sunbeam. From where I stood that beam of light, with the specks of dust foating in it, was the most striking thing in the place. Everything else was almost pitch-black. I was seeing the beam, not seeing things by it.

Then I moved, so that the beam fell on my eyes. Instantly the whole previous picture vanished. I saw no toolshed, and (above all) no beam. Instead I saw, framed in the irregular cranny at the top of the door, green leaves moving on the branches of a tree outside and beyond that, 90 odd million miles away, the sun. Looking along the beam, and looking at the beam are very different experiences.

But this is only a very simple example of the difference between looking at and looking along. A young man meets a girl. The whole world looks different when he sees her. Her voice reminds him of something he has been trying to remember all his life, and ten minutes casual chat with her is more precious than all the favours that all other women in the world could grant. He is, as they say, "in love". Now comes a scientist and describes this young man's experience from the outside. For him it is all an affair of the young man's genes and a recognised biological stimulus. That is the difference between looking along the sexual impulse and looking at it.

When you have got into the habit of making this distinction you will fnd examples of it all day long. The mathematician sits thinking, and to him it seems that he is contemplating timeless and spaceless truths about quantity. But the cerebral physiologist, if he could look inside the mathematician's head, would fnd nothing timeless and spaceless there—only tiny movements in the grey matter. The savage dances in ecstasy at midnight before Nyonga and feels with every muscle that his dance is helping to bring the new green crops and the spring rain and the babies. The anthropologist, observing that savage, records that he is performing a fertility ritual of the type so-and- so. The girl cries over her broken doll and feels that she has lost a real friend; the psychologist says that her nascent maternal instinct has been temporarily lavished on a bit of shaped and coloured wax.

As soon as you have grasped this simple distinction, it raises a question. You get one experience of a thing when you look along it and another when you look at it. Which is the "true" or "valid" experience? Which tells you most about the thing? And you can hardly ask

[1] Originally published in The Coventry Evening Telegraph (July 17, 1945); reprinted in *God in the Dock* (Eerdmans, 1970; 212-15).

that question without noticing that for the last ffty years or so everyone has been taking the answer for granted. It has been assumed without discussion that if you want the true account of religion you must go, not to religious people, but to anthropologists; that if you want the true account of sexual love you must go, not to lovers, but to psychologists; that if you want to understand some "ideology" (such as medieval chivalry or the nineteenth-century idea of a "gentleman"), you must listen not to those who lived inside it, but to sociologists.

The people who look at things have had it all their own way; the people who look along things have simply been brow-beaten. It has even come to be taken for granted that the external account of a thing somehow refutes or "debunks" the account given from inside. "All these moral ideals which look so transcendental and beautiful from inside", says the wiseacre, "are really only a mass of biological instincts and inherited taboos." And no one plays the game the other way round by replying, "If you will only step inside, the things that look to you like instincts and taboos will suddenly reveal their real and transcendental nature."

That, in fact, is the whole basis of the specifcally "modern" type of thought. And is it not, you will ask, a very sensible basis? For, after all, we are often deceived by things from the inside. For example, the girl who looks so wonderful while we're in love, may really be a very plain, stupid, and disagreeable person. The savage's dance to Nyonga does not really cause the crops to grow. Having been so often deceived by looking along, are we not well advised to trust only to looking at? in fact to discount all these inside experiences?

Well, no. There are two fatal objections to discounting them all. And the frst is this. You discount them in order to think more accurately. But you can't think at all—and therefore, of course, can't think accurately—if you have nothing to think about. A physiologist, for example, can study pain and fnd out that it "is" (whatever is means) such and such neural events. But the word pain would have no meaning for him unless he had "been inside" by actually suffering. If he had never looked along pain he simply wouldn't know what he was looking at. The very subject for his inquiries from outside exists for him only because he has, at least once, been inside.

This case is not likely to occur, because every man has felt pain. But it is perfectly easy to go on all your life giving explanations of religion, love, morality, honour, and the like, without having been inside any of them. And if you do that, you are simply playing with counters. You go on explaining a thing without knowing what it is. That is why a great deal of contemporary thought is, strictly speaking, thought about nothing—all the apparatus of thought busily working in a vacuum.

The other objection is this: let us go back to the toolshed. I might have discounted what I saw when looking along the beam (i.e., the leaves moving and the sun) on the ground that it was "really only a strip of dusty light in a dark shed". That is, I might have set up as "true"

my "side vision" of the beam. But then that side vision is itself an instance of the activity we call seeing. And this new instance could also be looked at from outside. I could allow a scientist to tell me that what seemed to be a beam of light in a shed was "really only an agitation of my own optic nerves". And that would be just as good (or as bad) a bit of debunking as the previous one. The picture of the beam in the toolshed would now have to be discounted just as the previous picture of the trees and the sun had been discounted. And then, where are you?

In other words, you can step outside one experience only by stepping inside another. Therefore, if all inside experiences are misleading, we are always misled. The cerebral physiologist may say, if he chooses, that the mathematician's thought is "only" tiny physical movements of the grey matter. But then what about the cerebral physiologist's own thought at that very moment? A second physiologist, looking at it, could pronounce it also to be only tiny physical movements in the frst physiologist's skull. Where is the rot to end?

The answer is that we must never allow the rot to begin. We must, on pain of idiocy, deny from the very outset the idea that looking at is, by its own nature, intrinsically truer or better than looking along. One must look both along and at everything. In particular cases we shall fnd reason for regarding the one or the other vision as inferior. Thus the inside vision of rational thinking must be truer than the outside vision which sees only movements of the grey matter; for if the outside vision were the correct one all thought (including this thought itself) would be valueless, and this is self- contradictory. You cannot have a proof that no proofs matter. On the other hand, the inside vision of the savage's dance to Nyonga may be found deceptive because we fnd reason to believe that crops and babies are not really affected by it. In fact, we must take each case on its merits. But we must start with no prejudice for or against either kind of looking. We do not know in advance whether the lover or the psychologist is giving the more correct account of love, or whether both accounts are equally correct in different ways, or whether both are equally wrong. We just have to fnd out. But the period of brow- beating has got to end.

Our knowledge of God and nature: physics, philosophy and theology

Letter of Pope John Paul II, dated June 1, 1988, to the Director of the Vatican Observatory. The occasion of the letter was the recognition of a study week sponsored by the Holy See marking the three hundredth anniversary of the publication of Sir Isaac Newton's "Philosophiae Naturalis Principia Mathematica".

To the Reverend George V. Coyne, S. J.

Director of the Vatican Observatory

"Grace to you and peace from God our Father and the Lord Jesus Christ" (Eph 1:2).

As you prepare to publish the papers presented at the Study Week held at Castel Gandolfo on September 21-26, 1987, I take the occasion to express my gratitude to you and through you to all who contributed to that important initiative. I am confident that the publication of these papers will ensure that the fruits of that endeavor will be further enriched.

The three hundredth anniversary of the publication of Newton's *Philosophiae Naturalis Principia Mathematica* provided an appropriate occasion for the Holy See to sponsor a Study Week that investigated the multiple relationships between theology, philosophy and the natural sciences. The man so honored, Sir Isaac Newton, had himself devoted much of his life to these same issues, and his reflections upon them can be found throughout his major works, his unfinished manuscripts and his vast correspondence. The publication of your own papers from this Study Week, taking up again some of the same questions which this great genius explored, affords me the opportunity to thank you for the efforts you devoted to a subject of such paramount importance. The theme of your conference, "Our Knowledge of God and Nature: Physics, Philosophy and Theology", is assuredly a crucial one for the contemporary world. Because of its importance, I should like to address some issues which the interactions between natural science, philosophy, and theology present to the Church and to human society in general.

The Church and the Academy engage one another as two very different but major institutions within human civilization and world culture. We bear before God enormous responsibilities for the human condition because historically we have had and continue to have a major influence on the development of ideas and values and on the course of human action. We both have histories stretching back over thousands of years: the learned, academic community dating back to the origins of culture, to the city and the library and the school, and the Church with her historical roots in ancient Israel. We have come into contact often during these centuries, sometimes in mutual support, at other times in those needless

conflicts which have marred both our histories. In your conference we met again, and it was altogether fitting that as we approach the close of this millennium we initiated a series of reflections together upon the world as we touch it and as it shapes and challenges our actions.

A growing critical openness

So much of our world seems to be in fragments, in disjointed pieces. So much of human life is passed in isolation or in hostility. The division between rich nations and poor nations continues to grow; the contrast between northern and southern regions of our planet becomes ever more marked and intolerable. The antagonism between races and religions splits countries into warring camps; historical animosities show no signs of abating. Even within the academic community, the separation between truth and values persists, and the isolation of their several cultures—scientific, humanistic and religious—makes common discourse difficult if not at times impossible.

But at the same time we see in large sectors of the human community a growing critical openness towards people of different cultures and backgrounds, different competencies and viewpoints. More and more frequently, people are seeking intellectual coherence and collaboration, and are discovering values and experiences they have in common even within their diversities. This openness, this dynamic interchange, is a notable feature of the international scientific communities themselves, and is based on common interests, common goals and a common enterprise, along with a deep awareness that the insights and attainments of one are often important for the progress of the other. In a similar but more subtle way this has occurred and is continuing to occur among more diverse groups—among the communities that make up the Church, and even between the scientific community and the Church herself. This drive is essentially a movement towards the kind of unity which resists homogenization and relishes diversity. Such community is determined by a common meaning and a shared understanding that evokes a sense of mutual involvement. Two groups which may seem initially to have nothing in common can begin to enter into community with one another by discovering a common goal, and this in turn can lead to broader areas of shared understanding and concern.

As never before in her history, the Church has entered into the movement for the union of all Christians, fostering common study, prayer, and discussions that "all may be one" (Jn 17:20). She has attempted to rid herself of every vestige of anti-Semitism and to emphasize her origins in and her religious debt to Judaism. In reflection and prayer, she has reached out to the great world religions, recognizing the values we all hold in common and our universal and utter dependence upon God.

Within the Church herself, there is a growing sense of "world-church", so much in evidence at the last Ecumenical Council in which bishops native to every continent— no longer predominantly of European or even Western origin— assumed for the first time their

common responsibility for the entire Church. The documents from that Council and of the magisterium have reflected this new world-consciousness both in their content and in their attempt to address all people of good will. During this century we have witnessed a dynamic tendency to reconciliation and unity that has taken many forms within the Church.

Nor should such a development be surprising. The Christian community in moving so emphatically in this direction is realizing in greater intensity the activity of Christ within her: "For God was in Christ, reconciling the world to himself" (2 Cor 5:19). We ourselves are called to be a continuation of this reconciliation of human beings, one with another and all with God. Our very nature as Church entails this commitment to unity.

Turning to the relationship between religion and science, there has been a definite, though still fragile and provisional, movement towards a new and more nuanced interchange. We have begun to talk to one another on deeper levels than before, and wish greater openness towards one another's perspectives. We have begun to search together for a more thorough understanding of one another's disciplines, with their competencies and their limitations, and especially for areas of common ground. In doing so we have uncovered important questions which concern both of us, and which are vital to the larger human community we both serve. It is crucial that this common search based on critical openness and interchange should not only continue but also grow and deepen in its quality and scope.

For the impact each has, and will continue to have, on the course of civilization and on the world itself, cannot be overestimated, and there is so much that each can offer the other. There is, of course, the vision of the unity of all things and all peoples in Christ, who is active and present with us in our daily lives—in our struggles, our sufferings, our joys and in our searchings—and who is the focus of the Church's life and witness. This vision carries with it into the larger community a deep reverence for all that is, a hope and assurance that the fragile goodness, beauty and life we see in the universe is moving towards a completion and fulfillment which will not be overwhelmed by the forces of dissolution and death. This vision also provides a strong support for the values which are emerging both from our knowledge and appreciation of creation and of ourselves as the products, knowers and stewards of creation.

The scientific disciplines too, as is obvious, are endowing us with an understanding and appreciation of our universe as a whole and of the incredibly rich variety of intricately related processes and structures which constitute its animate and inanimate components. This knowledge has given us a more thorough understanding of ourselves and of our humble yet unique role within creation. Through technology it also has given us the capacity to travel, to communicate, to build, to cure, and to probe in ways which would have been almost unimaginable to our ancestors. Such knowledge and power, as we have discovered, can be used greatly to enhance and improve our lives or they can be exploited to diminish and destroy human life and the environment even on a global scale.

The unity we perceive in creation on the basis of our faith in Jesus Christ as Lord of the universe, and the correlative unity for which we strive in our human communities, seems to be reflected and even reinforced in what contemporary science is revealing to us. As we behold the incredible development of scientific research we detect an underlying movement towards the discovery of levels of law and process which unify created reality and which at the same time have given rise to the vast diversity of structures and organisms which constitute the physical and biological, and even the psychological and sociological, worlds.

Contemporary physics furnishes a striking example. The quest for the unification of all four fundamental physical forces—gravitation, electro-magnetism, the strong and weak nuclear interactions—has met with increasing success. This unification may well combine discoveries from the subatomic and the cosmological domains and shed light both on the origin of the universe and, eventually, on, the origin of the laws and constants which govern its evolution. Physicists possess a detailed though incomplete and provisional knowledge of elementary particles and of the fundamental forces through which they interact at low and intermediate energies. They now have an acceptable theory unifying the electro-magnetic and weak nuclear forces, along with much less adequate but still promising grand unified field theories which attempt to incorporate the strong nuclear interaction as well. Further in the line of this same development, there are already several detailed suggestions for the final stage, superunification, that is, the unification of all four fundamental forces, including gravity. Is it not important for us to note that in a world of such detailed specialization as contemporary physics there exists this drive towards convergence?

In the life sciences, too, something similar has happened. Molecular biologists have probed the structure of living material, its functions and its processes of replication. They have discovered that the same underlying constituents serve in the make-up of all living organisms on earth and constitute both the genes and the proteins which these genes code. This is another impressive manifestation of the unity of nature.

By encouraging openness between the Church and the scientific communities, we are not envisioning a disciplinary unity between theology and science like that which exists within a given scientific field or within theology proper. As dialogue and common searching continue, there will be growth towards mutual understanding and a gradual uncovering of common concerns which will provide the basis for further research and discussion. Exactly what form that will take must be left to the future. What is important, as we have already stressed, is that the dialogue should continue and grow in depth and scope. In the process we must overcome every regressive tendency to a unilateral reductionism, to fear, and to self-imposed isolation. What is critically important is that each discipline should continue to enrich, nourish and challenge the other to be more fully what it can be and to contribute to our vision of who we are and who we are becoming.

We might ask whether or not we are ready for this crucial endeavor. Is the community of world religions, including the Church, ready to enter into a more

thoroughgoing dialogue with the scientific community, a dialogue in which the integrity of both religion and science is supported and the advance of each is fostered? Is the scientific community now prepared to open itself to Christianity, and indeed to all the great world religions, working with us all to build a culture that is more humane and in that way more divine? Do we dare to risk the honesty and the courage that this task demands? We must ask ourselves whether both science and religion will contribute to the integration of human culture or to its fragmentation. It is a single choice and it confronts us all.

For a simple neutrality is no longer acceptable. If they are to grow and mature, peoples cannot continue to live in separate compartments, pursuing totally divergent interests from which they evaluate and judge their world. A divided community fosters a fragmented vision of the world; a community of interchange encourages its members to expand their partial perspectives and form a new unified vision.

Yet the unity that we seek, as we have already stressed, is not identity. The Church does not propose that science should become religion or religion science. On the contrary, unity always presupposes the diversity and the integrity of its elements. Each of these members should become not less itself but more itself in a dynamic interchange, for a unity in which one of the elements is reduced to the other is destructive, false in its promises of harmony, and ruinous of the integrity of its components. We are asked to become one. We are not asked to become each other.

Religion and science must preserve their autonomy

To be more specific, both religion and science must preserve their autonomy and their distinctiveness. Religion is not founded on science nor is science an extension of religion. Each should possess its own principles, its pattern of procedures, its diversities of interpretation and its own conclusions. Christianity possesses the source of its justification within itself and does not expect science to constitute its primary apologetic. Science must bear witness to its own worth. While each can and should support the other as distinct dimensions of a common human culture, neither ought to assume that it forms a necessary premise for the other. The unprecedented opportunity we have today is for a common interactive relationship in which each discipline retains its integrity and yet is radically open to the discoveries and insights of the other.

But why is critical openness and mutual interchange a value for both of us? Unity involves the drive of the human mind towards understanding and the desire of the human spirit for love. When human beings seek to understand the multiplicities that surround them, when they seek to make sense of experience, they do so by bringing many factors into a common vision. Understanding is achieved when many data are unified by a common structure. The one illuminates the many; it makes sense of the whole. Simple multiplicity is chaos; an insight, a single model, can give that chaos structure and draw it into intelligibility. We move towards unity as we move towards meaning in our lives. Unity is also the

consequence of love. If love is genuine, it moves not towards the assimilation of the other but towards union with the other. Human community begins in desire when that union has not been achieved, and it is completed in joy when those who have been apart are now united.

In the Church's earliest documents, the realization of community, in the radical sense of that word, was seen as the promise and goal of the Gospel: "That which we have seen and heard we proclaim also to you, so that you may have fellowship with us, and our fellowship is with the Father and with his Son Jesus Christ. And we are writing this that our joy may be complete" (1 Jn 1:3-3). Later the Church reached out to the sciences and to the arts, founding great universities and building monuments of surpassing beauty so that all things might be recapitulated in Christ (cf. Eph 1:10).

What, then, does the Church encourage in this relational unity between science and religion? First and foremost that they should come to understand one another. For too long a time they have been at arm's length. Theology has been defined as an effort of faith to achieve understanding, as *fides quaerens intellectum*. As such, it must be in vital interchange today with science just as it always has been with philosophy and other forms of learning. Theology will have to call on the findings of science to one degree or another as it pursues its primary concern for the human person, the reaches of freedom, the possibilities of Christian community, the nature of belief and the intelligibility of nature and history. The vitality and significance of theology for humanity will in a profound way be reflected in its ability to incorporate these findings.

Now this is a point of delicate importance, and it has to be carefully qualified. Theology is not to incorporate indifferently each new philosophical or scientific theory. As these findings become part of the intellectual culture of the time, however, theologians must understand them and test their value in bringing out from Christian belief some of the possibilities which have not yet been realized. The hylomorphism of Aristotelian natural philosophy, for example, was adopted by the medieval theologians to help them explore the nature of the sacraments and the hypostatic union. This did not mean that the Church adjudicated the truth or falsity of the Aristotelian insight, since that is not her concern. It did mean that this was one of the rich insights offered by Greek culture, that it needed to be understood and taken seriously and tested for its value in illuminating various areas of theology. Theologians might well ask, with respect to contemporary science, philosophy and the other areas of human knowing, if they have accomplished this extraordinarily difficult process as well as did these medieval masters.

No substitute for knowledge of the ultimate

If the cosmologies of the ancient Near Eastern world could be purified and assimilated into the first chapters of Genesis, might not contemporary cosmology have something to offer to our reflections upon creation? Does an evolutionary perspective bring

any light to bear upon theological anthropology, the meaning of the human person as the *imago Dei*, the problem of Christology—and even upon the development of doctrine itself? What, if any, are the eschatological implications of contemporary cosmology, especially in light of the vast future of our universe? Can theological method fruitfully appropriate insights from scientific methodology and the philosophy of science?

Questions of this kind can be suggested in abundance. Pursuing them further would require the sort of intense dialogue with contemporary science that has, on the whole, been lacking among those engaged in theological research and teaching. It would entail that some theologians, at least, should be sufficiently well versed in the sciences to make authentic and creative use of the resources that the best established theories may offer them. Such an expertise would prevent them from making uncritical and overhasty use for apologetic purposes of such recent theories as that of the "Big Bang" in cosmology. Yet it would equally keep them from discounting altogether the potential relevance of such theories to the deepening of understanding in traditional areas of theological inquiry.

In this process of mutual learning, those members of the Church who are themselves either active scientists or, in some special cases, both scientists and theologians, could serve as a key resource. They can also provide a much-needed ministry to others struggling to integrate the worlds of science and religion in their own intellectual and spiritual lives, as well as to those who face difficult moral decisions in matters of technological research and application. Such bridging ministries must be nurtured and encouraged. The Church long ago recognized the importance of such links by establishing the Pontifical Academy of Sciences, in which some of the world's leading scientists meet together regularly to discuss their researches and to convey to the larger community where the directions of discovery are tending. But much more is needed.

The matter is urgent. Contemporary developments in science challenge theology far more deeply than did the introduction of Aristotle into Western Europe in the thirteenth century. Yet these developments also offer to theology a potentially important resource. Just as Aristotelian philosophy, through the ministry of such great scholars as St. Thomas Aquinas, ultimately came to shape some of the most profound expressions of theological doctrine, so can we not hope that the sciences of today, along with all forms of human knowing, may invigorate and inform those parts of the theological enterprise that bear on the relation of nature, humanity and God?

Can science also benefit from this interchange? It would seem that it should. For science develops best when its concepts and conclusions are integrated into the broader human culture and its concerns for ultimate meaning and value. Scientists cannot, therefore, hold themselves entirely aloof from the sorts of issues dealt with by philosophers and theologians. By devoting to these issues something of the energy and care they give to their research in science, they can help others realize more fully the human potentialities of their discoveries. They can also come to appreciate for themselves that these discoveries cannot

be a genuine substitute for knowledge of the truly ultimate. Science can purify religion from error and superstition; religion can purify science from idolatry and false absolutes. Each can draw the other into a wider world, a world in which both can flourish.

For the truth of the matter is that the Church and the scientific community will inevitably interact; their options do not include isolation. Christians will inevitably assimilate the prevailing ideas about the world, and today these are deeply shaped by science. The only question is whether they will do this critically or unreflectively, with depth and nuance or with a shallowness that debases the Gospel and leaves us ashamed before history. Scientists, like all human beings, will make decisions upon what ultimately gives meaning and value to their lives and to their work. This they will do well or poorly, with the reflective depth that theological wisdom can help them attain, or with an unconsidered absolutizing of their results beyond their reasonable and proper limits.

Both the Church and the scientific community are faced with such inescapable alternatives. We shall make our choices much better if we live in a collaborative interaction in which we are called continually to be more. Only a dynamic relationship between theology and science can reveal those limits which support the integrity of either discipline, so that theology does not profess a pseudo-science and science does not become an unconscious theology. Our knowledge of each other can lead us to be more authentically ourselves. No one can read the history of the past century and not realize that crisis is upon us both. The uses of science have on more than one occasion proved massively destructive, and the reflections on religion have too often been sterile. We need each other to be what we must be, what we are called to be.

And so on this occasion of the Newton Tercentennial, the Church speaking through my ministry calls upon herself and the scientific community to intensify their constructive relations of interchange through unity. You are called to learn from one another, to renew the context in which science is done and to nourish the inculturation which vital theology demands. Each of you has everything to gain from such an interaction, and the human community which we both serve has a right to demand it from us.

Upon all who participated in the Study Week sponsored by the Holy See and upon all who will read and study the published papers thereof, I invoke wisdom and peace in our Lord Jesus Christ and cordially impart my Apostolic Blessing.

After Galileo:
Modern Science Has Deep Parallels with Theology[1]

by

Daniel Kuebler

Galileo is probably best known for his work *The Dialogue on the Two Chief World Systems*, the book that triggered his ill-fated encounter with the Inquisition. However, when it comes to Galileo's role in shaping our understanding of the modern scientific enterprise, it is his 1623 work *The Assayer* that has had a much larger impact. In one of the most quoted lines in the book, Galileo sums up his view of science, a view that has come to dominate our understanding of science ever since:

> Philosophy is written in this grand book the universe, which stands continually open to our gaze. But the book cannot be understood unless one first learns to comprehend the language and to read the alphabet in which it is composed. It is written in the language of mathematics, and its characters are triangles, circles, and other geometric figures, without which it is humanly impossible to understand a single word of it; without these, one wanders about in a dark labyrinth.

Galileo saw, clearer than most, the uncanny ability of mathematics to describe the world around us. In Galileo's mind, if one really wanted to understand the material world, one must measure it and describe it mathematically. Orbits could be reduced to mathematical figures and mathematical equations. Likewise, the trajectory of a cannonball or the acceleration of a falling object could be described mathematically with staggering precision.

The ability to measure and quantify, to reduce entities like electric currents to equations has without doubt deepened our understandings of the natural world. It has given us an appreciation for the workings of selective pressures in evolution, the relationship between energy and matter, and the interactions between some of the most fundamental forces in physics. In addition, it has fueled the development of everything from microwaves to rockets to iPhones.

Yet, as we bask in our significant scientific and technological successes, it is easy to lose our perspective. Too often we slip into the assumption that because we can describe an entity or behavior mathematically, that we therefore understand it. Take gravity for example. While we can measure it and define equations relating gravity to the mass of objects and their distance, we do not know what it is in any fundamental sense. While we know how it affects objects, at a certain level it remains a mystery. This is true of many other phenomena such as the wave/particle duality of light, the origin of the first cell, and quantum entanglement. While these can be modeled to some extent, and in some cases be described mathematically, wrapping the human mind around the reality of such concepts is another activity altogether.

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As Richard Feynman once said, "I think I can safely say that nobody understands quantum mechanics."

This distinction between factual knowledge and understanding lies at the heart of a popular misconception of what science is and what it can provide. Students often have the impression that what separates the sciences from the humanities is that the sciences are fact-based, that there are right and wrong answers while the humanities are speculative. Nothing could be further from the truth. While science explores the natural world and has been able to generate an impressive array of factual knowledge, all disciplines are fact laden. Just ask an undergrad struggling to recall the dates of Church councils in a theology class or the names of the Existentialists in a philosophy class. Facts are essential for any discipline and science is no exception. Yet, any science that does not go beyond facts is not fit to be called scientific.

Science is more than measuring the world in the manner Galileo described. At its core, it is an attempt to use those measurements, use those facts, to construct theoretical and conceptual frameworks that can broaden our understanding of the natural world. For example, in evolutionary biology there exists an enormous catalogue of fossils that have been meticulously quantified over the years. However, they only contribute to our understanding when scientists either 1) integrate them into an existing theoretical framework or 2) use them to construct a novel theoretical framework. Absent this, they are quite simply a disjointed pile of bones and shells.

The data we accumulate, the measurements we attain, do not do dictate our theories. Building theories requires human ingenuity and insight that goes well beyond the facts of science. The reality is that multiple theories or explanations can be given to the same set of facts. The scientific enterprise consists of sorting through these explanations. Taxonomy is an excellent example of this. As pointed out by the historian of science Sandra Mitchell, "nature underdetermines taxonomy (i.e., there is more than one classification consistent with the results of empirical investigation), which classification we adopt must be chosen for reasons other than empirical ones. Species can be divvied up by a criterion of reproductive isolation or by genealogy, for example." As a result, taxonomic disputes are a way of life in biology.

Likewise, when paleontologists classify fossils, the methods and weights they use to build their phylogenetic trees can influence the outcome of the process. The decisions about which method to use though is not dictated by the measurements. The fossils do not tell the researchers which one to apply, yet different methods give different trees. How then do we know which phylogenetic tree most accurately describes the evolutionary history? Getting more data, in this case more fossils, can help. However, the irony is that as we broaden our understanding with new knowledge, we find the world becoming more complex and inscrutable. New fossils often do not resolve two different trees but instead lead to additional phylogenetic possibilities that were not even thought of before. New data does not always resolve old problems, but it almost certainly will create new ones.

As a result, the questions we ask today, the scientific view of the world we hold today, is limited. It is only as good as our current understanding. This is the great lesson of the history of science. According to the philosopher of science Nicholas Rescher: "Most of the

questions with which present-day science grapples could not even have been raised in the state-of-the-art that prevailed a generation ago."

The history of cell biology over the last two-hundred years illustrates this well. In the mid nineteenth century, most biologists though that the cell was a simplistic sack of protoplasm, a homogenous viscous fluid that provided the basis for life. Techniques developed by scientists in the twentieth century, however, allowed us to peer into this protoplasm and shatter the simplistic notion of its homogeneity. The cell contained staggering amounts of nucleic acids, proteins, and lipids, all arranged in a highly organized manner to create the organelles and transport systems that sustained life. Yet, with this new knowledge of the "protoplasm," the number of unanswered questions expanded exponentially. How did the cell maintain its structure? How did it regulate its organelles? How did its disparate parts communicate? How did the cell control the thousands of metabolites it produced and consumed?

Spurred on by a strong belief in genetic reductionism, many researchers thought that the advances in genome sequencing that occurred at the end of the twentieth century would help unlock these mysteries. But the sequencing data only brought more questions. In retrospect it seems obvious that genes would be just one piece of the puzzle. As the editor of one scientific journal cautioned at the time, "Everyone seems to have forgotten that every gene needs environmental causes to express itself. Hence studying genes is only as important as studying their external counterparts." Genes are not autonomous. Rather they are largely controlled by complex global processes and pathways within the cell that are highly influenced by the environment.

This realization has spurred new questions regarding the epigenetic regulation and control of genes and new fields of study like systems biology that are asking questions that no mid-twentieth century cell biologists could have possibly formulated. In addition, systems biology has produced mounds of data regarding the complex interactions within the cell, data that will keep a generation of scientists busy deciphering, contextualizing, and theory building.

Despite all this data, despite all this progress, big questions remain. The biochemist Nicholas Wade sums up the current state of biology this way: "Some 350 years after the discovery of cells, we still don't know why life on earth is the way it is . . . The biggest questions in biology are yet to be solved." This situation is not unique to cell biology. Scientific discovery always opens up new frontiers, each question "answered," spawns countless more questions, more avenues for investigation, and in some cases entirely new disciplines.

Furthermore, most scientific questions are never completely resolved and the really big scientific questions remain open to debate. They remain "underdetermined by the data." Does the Copenhagen interpretation represent the correct understanding of quantum mechanics? Was the Cambrian explosion caused by an environmental trigger or was it fueled by a singularly rare transitional event amongst early metazoans? Which model best explains the rate at which the globe is actually warming? Yet, one could go even further as it is possible that the biggest questions have yet to be formulated. As Rescher points out: "Scientific inquiry is a creative process of theoretical and conceptual innovation; it is not a matter of pinpointing the most attractive alternative within the presently specifiable range,

but one of enhancing and enlarging the range of envisageable alternatives." New data, new advances can bring us new possibilities, new theories that are presently hidden from our view. We do not even know what we do not know. Physical reality is more complex that we can comprehend and our knowledge of its workings is more limited than we care to admit.

While this situation might seem daunting to a practicing scientist, it appears to speak to a fundamental truth about the nature of the physical world and our relationship to it. In the Catholic tradition, there are two great books by which the Creator reveals himself, the Book of Nature and the Book of Scripture. As we read the Book of Nature, we are meant to proclaim as the Psalmist does, "The heavens declare the glory of God." There is an aspect of wonder that is inherent to scientific discovery and exploration that parallels the wonder we experience before God. But what else does the Book of Nature speak to us about? What else does modern science reveal to us about the mystery of God? Another clear message is that the human mind is well-suited to probe the secrets of his created world, of investigating its structure. In some sense, God desired that we enter the mystery of his Creation through the study of science. The language of mathematics, a human construct, has allowed us to gain insights into, amongst other things, the relationships between the fundamental forces within the natural world. On a fundamental level, our mind is equipped with the tools needed for scientific discovery.

Yet, before any hubris sets in, the Book of Nature also reveals that at the heart of Creation lies a mystery. While we can always penetrate further into this mystery using our human reason, we can never seem to exhaust it. All our measurements, all our mathematics, has yet to tame this mystery. Rather, each discovery, like a log tossed onto a fire, only serves to further fan its flames.

In this sense, our reading of the Book of Nature parallels the work of the theologian as he or she attempts to penetrate the mystery of God. Theologians can approach the Mystery, yet they know they will never exhaust it. As the Catechism states: "Since our knowledge of God is limited, our language about him is equally so. We can name God only . . . in accordance with our limited human ways of knowing and thinking." In a similar fashion, modern science seems unable to fully exhaust its subject matter. Our mind is such that we can penetrate the order and rationality of Creation, but we seem to be unable to exhaust the mystery.

But should we expect anything less from science? As we read the Book of Nature, should we expect to come to an exhaustive understanding of his Creation? Or, much like one can plumb the depths of Sacred Scripture and continually find new meaning, wisdom, and insights, should the Book of Nature to be any different? Should we expect an end of science, a day when we have deciphered all there is to know about the physical world? Or are we as humans unable to fully penetrate the created world in much the same way that we will never be able to fully penetrate the mystery of God.

Certainly, there are historical and philosophical reasons for positing there will never be an end to science. As Rescher points out:

> If the future is anything like the past, if historical experience affords any sort of guidance in these matters, then we know that all of our scientific theses and theories

> at the present scientific frontier will ultimately require revision in some (presently altogether indiscernible) details. All the experience we can muster indicates that there is no justification for viewing our science as more than an inherently imperfect stage within an ongoing development.

Yet, might there be theological reasons to suspect this as well? If the mystery of the created world is meant to reveal the mystery of its Author, then those looking for certainty in science should go elsewhere. Science is not about certainty and facts, it is about continually building and reshaping theories, it is about encountering a mystery. In this way, modern science has deep parallels with theology.

Too often though this parallel is lost on those who would flatten science into to a series of facts and proofs. Science is much more human than that, it is all at once tentative, probing, mysterious and majestic. Debates about the scientific theory of evolution illustrate this key point. The scientific theory of evolution is not a fact, it is incomplete and will remain so despite future discoveries. It is a mystery that we cannot fully penetrate. So are all scientific theories. Yet this does not mean we should discard evolutionary theories or attempt to construct biological theories of Intelligent Design any more so than we should discard the reality of a Trinitarian God given that our earthly understanding of the Trinity will always remain incomplete. It seems we will never exhaust the riches of the Created world, just as we as creatures can never fully comprehend the nature of God. But this does not leave us without hope. Just as we have analogies to understand the nature of the Trinity, we build theories to help shape our understanding of the facts of science. Yet, it is important to realize that neither the analogies nor the theories are exhaustive. The Catechism makes this point as well:

> God transcends all creatures. We must therefore continually purify our language of everything in it that is limited, image-bound or imperfect, if we are not to confuse our image of God—"the inexpressible, the incomprehensible, the invisible, the ungraspable"—with our human representations. Our human words always fall short of the mystery of God.

Though we fall short, God still desires that we understand him and his Creation, the work of his hands. Human reason has equipped us to do so. Yet, even with the best of human tools and the most prepared of human minds, the scientific enterprise, our great effort to read the Book of Nature, remains incomplete. While portions of the truth become accessible to us, other aspects seem to remain beyond our grasp. The Book of Nature, while written in the language of mathematics, does not end in a neat and tidy batch of formulas, angles, weights, and measures but rather points beyond itself. It reveals a God that is not only wonder and beauty, but who is infinite and inexhaustible. Scientific discovery draws us into precisely that mystery, the inexhaustible mystery of the Created world, a world that reflects our infinite Creator.

FAITH AND SCIENCE

IN THE

CATHOLIC INTELLECTUAL TRADITION

Chris Baglow

1. **"The Christian Doctrine of Creation: A Wisdom Wider than Science"**
2. "**Evil, Prayer and Miracles: Critical Questions for Science and Religion"**

Galileo Galilei, et al.

1. **The Galileo Affair: Selections**

The Christian Doctrine of Creation: A Wisdom Wider Than Science

Dr. Christopher T. Baglow
McGrath Institute for Church Life
University of Notre Dame

"Though we speak much we cannot reach the end, and the sum of our words is:
'The LORD is the ALL.'
Where shall we find strength to praise him?
For he is greater than all his works."

-Sirach 43:27-28

With these words Ben Sira (2nd cent. BC), the Jewish author of the Old Testament Book of Sirach, set a standard for Christian theology. For Christians, God is the perfect, unlimited source of all truth, goodness and beauty, and as such he completely present to the universe as the cause of its existence and of all its beings, laws and physical causes. In the words of the Book of Sirach, God should be called "the ALL," because God is the cause of everything in a way more profound and more essential than physical, material causes.

And yet, the author of Sirach tells us, God is also "greater than all his works," wholly different from them, and so cannot be understood as being and acting the way creatures are and act. God's relationship to the universe is not like the relationships his creatures have with each other. He doesn't have a "role" to play in the universe, for He is the Creator of everything in it. He is infinitely greater than all things, even as he is more intimately close to them than they are to themselves.

Other passages in Sacred Scripture make it very clear that our limited human conceptions can never fully express this mystery of God's relationship to his creatures. As St. Paul says, "He alone has endless life and lives in inaccessible light. No one has ever seen him, nor can anyone see him" (1 Tim 6:16). The prophet Isaiah makes the same claim about God's mercy:

For my thoughts are not your thoughts,
neither are your ways my ways, says the LORD.
For as the heavens are higher than the earth,
so are my ways higher than your ways
and my thoughts than your thoughts. (Isaiah 55:8-9)

The humility involved in this Christian understanding of God is beautifully represented in a fictional dialogue written in 1444 by the philosopher and theologian, bishop and cardinal, Nicholas of Cusa (1401-1464). He called this work "On the Hidden God" (*De Deo Abscondito*). In it a pagan approaches a Christian whom he finds at prayer. When the pagan asks the Christian to identify the God he worships, he receives a startling answer:

The *Pagan* spoke: I see that you have most devoutly prostrated yourself and are shedding tears of love-not hypocritical tears but heart-felt ones. Who are you, I ask?

Christian: I am a Christian.
Pagan: What are you worshipping?
Christian: God.
Pagan: Who is [this] God whom you worship?
Christian: I don't know.
Pagan: How is it that you worship so seriously that of which you have no knowledge?
Christian: Because I am without knowledge [of Him], I worship Him.[1]

The response of the Christian is startling, but upon reflection, his logic is obvious—only a God who *cannot* be fully known by the human mind, who is inexpressible Truth, could be the true God and worthy of human adoration.

In this essay, we will see how this humble approach to God was replaced by new and faulty conceptions of God during the Scientific Revolution. These conceptions ultimately led to the warfare model of science and religion. Then we will consider how to return to the Christian conception with the help of the philosophy of St. Thomas Aquinas. In his thought will see that the Christian approach to God represents an important framework for science because of its respect for the integrity of creation, which is expressed in St. Thomas's distinction between primary causality of God and the secondary causality of creatures, commonly known as *the principle of double agency*. This is the most important philosophical principle for the harmony between science and faith, and shall be explained in depth.

We will also consider a conception of God that can help us better understand God's relationship to the universe in the true, Christian sense: the relationship of an author to a novel or a play. Finally, we will move from philosophy to theology, and begin to reflect upon the Christian doctrine of God as Creator, whose only motive for causing the universe is to communicate his goodness. As we will see, God's infinite love, not merely his perfect knowledge (omniscience) or power (omnipotence), is the foundation of all creation.

To begin, let's go back to the Scientific Revolution to see how a great scientific genius misunderstood God's relationship to the universe.

A. Scientific Atheism in Context: Newton's Laws and Newton's Flaws

1. Newton's Laws: The Man Who Embodied the Scientific Revolution

"Nature and Nature's laws lay hid in night: God said, 'Let Newton be!' and all was light." The great English poet Alexander Pope wrote this epitaph to be inscribed on the tomb of *Sir Isaac Newton* (1643-1727), and captured in two lines the immense importance of Newton to the history of modern science. In the words of particle physicist Stephen Barr,

> …one could almost say that Sir Isaac Newton *was* the Scientific Revolution… Newton was a towering peak. There was no rival to him in physics until the twentieth century. One may think of everything that went before Newton as having set the stage for his great breakthroughs, and everything that came after him—until the twentieth century—as having exploited those breakthroughs.[2]

No student today makes it through high school without encountering Newton's *universal laws of motion* and his *universal law of gravity*. What makes these so important can be

[1] Nicholas of Cusa, *De Deo Abscondito*, 1, 6, in Jasper Hopkins, ed. and trans., *A Miscellany on Nicholas of Cusa* (Minneapolis, MN, Arthur J. Banning Press, 1994), 300-311.
[2] Stephen M. Barr, *A Student's Guide to Natural Science* (Wilmington, DE: ISI Books, 2006), 33.

guessed from the word *universal* that is used to describe them. For the first time in history a human being had discovered laws that describe all earthly and celestial motion and that allow all physical cause and effect relationships to be understood with mathematical formulas. With Newton science broke through descriptions of individual phenomena in the material universe to a deep understanding that unified the way we think about the earth, the solar system and beyond.[3]

Unlike the apple in the famous event that first caused him to ponder the law of gravity, Newton's immense breakthrough did not fall out of the sky. His thought rested upon a shift in thinking that had already occurred in the century prior to his birth. Scientific pioneers whom Newton greatly admired, such as Galileo Galilei (1564-1642), Johannes Kepler (1571-1630) and Rene Descartes (1596-1650) had found it very effective to think of the universe in mechanical and mathematical terms in order to understand it. Newton recognized that their successes came not only from their genius but because they worked from this kind of approach, and so he set out to describe all natural phenomena the way one might describe a clock or an engine.[4] His enormous success set science firmly upon this path of mechanical thinking, a path it was to follow exclusively for more than a century and a half.

Thinking of the universe as a machine is a great example of *scientific modeling*, a process by which scientific thinkers use something they understand to model things they do not understand. In this case Newton and his predecessors chose for their model the mechanical clock, one of the greatest technological innovations of medieval European culture, a device that that could tick away accurately for years thanks to its hidden gears, cogs and wheels. It was a stroke of genius, and the mechanistic "clock" conception of the universe greatly benefited every area of the natural sciences. For example, much of what we know about anatomy comes from modeling living organisms as machines, an idea proposed by Rene Descartes.[5] In the words of Lawrence Principe, "In living organisms, the levers and pulleys were to be revealed by anatomy and the new microscope. Individual organs became mechanical devices; the heart, a pump, the kidneys, filters, and indeed the whole body, a mass of plumbing and rigging."[6]

But while extremely helpful, a scientific model is merely a model. The universe is not a machine, nor is a living organism, even though they both have qualities that can be modeled as such. No one model can capture everything about the universe, nor should a scientific model of the universe be simply turned into a theological model. But this is something that is easy to overlook, as even the great Isaac Newton unfortunately did.

2. Newton's Flaws and the Rise of Scientific Atheism

For all his greatness as a scientist, Newton was much less gifted as a theologian. A devoutly religious man who wanted to speak of God as insightfully as he spoke of the universe, Newton unwisely adopted the same approach in theology as he did in science. Just as he described the universe using the model of a clocklike machine, he described God as an all-powerful clockmaker, engineer or mechanic, one whose primary connection to all things was that of a craftsman who puts parts together in ingenious designs.[7] He believed that God

[3] Ibid., 34-42.
[4] Amos Funkenstein, *Theology and the Scientific Imagination: From the Middle Ages to the Seventeenth Century* (Princeton, NJ: Princeton University Press, 1986), 30.
[5] Rene Descartes, *Meditations on First Philosophy*, med. 6.
[6] Lawrence Principe, "God the Watchmaker" Lecture, *Science and Religion*.
[7] Funkenstein, 96.

did this through the instrument of space, and that He occasionally had to "rewind" the clock of the universe, giving the planets occasional adjustments to keep them in line in their orbits around the sun.[8] He insisted that the universe occupied infinite space and time, and if there were ever a time that space did not exist, then neither would God have existed.[9] This made the Creator of space dependent upon the existence of space, which is absurd.

Newton also involved God in the universe by reference to gravity. Gravity involves the immediate action of things upon each other without physical contact, which is not how machines worked in Newton's day. So Newton supposed that gravity was a force produced by God acting directly within the universe.[10] This gave God a constant role in the universe and seemed to be irrefutable evidence against atheism, evidence that would later be explained away when Einstein showed that gravity is not a force but is the effect of the curvature of space and time upon material objects.

Newton's theological ideas would become almost as influential as his scientific breakthroughs. As later scientists began to be able to explain things that Newton could not, they imagined that they had replaced God with natural explanations. Actually, they had just squeezed Newton's clockmaker God out of the gaps where Newton had placed him. So, for example, the great French scientist Pierre Simon Laplace (1749-1827), when asked by his emperor, Napoleon Bonaparte, about why he never mentioned the Creator in his five volume work on astronomy and celestial mechanics, responded: "Sire, I had no need of that hypothesis."

Another gap was closed in 1859 when a natural explanation for living things was given by Charles Darwin (1809-1882) and his evolutionary biology. Up to that time, many thought that the origins of living things required divine miraculous intervention, a clockmaker who not only put parts together but who mysteriously made his machines capable of sense and motion. It seemed to many that God's existence had been challenged, that God no longer had a "role" to fill. Eight years after Darwin first published his theory, the atheist poet Matthew Arnold would mourn the loss of faith in his poem "Dover Beach," comparing it to the ebbing away of seawater at low tide:

The Sea of Faith
Was once, too, at the full, and round earth's shore
Lay like the folds of a bright girdle furled.
But now I only hear
Its melancholy, long, withdrawing roar,
Retreating, to the breath
Of the night-wind, down the vast edges drear
And naked shingles of the world.[11]

And yet the only thing that had really been challenged by these new scientific discoveries was the role Newton and others had assigned to God *within* the universe.

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[8] Ibid., 95.
[9] Christopher Insole, "Kant's Transcendental Idealism and Newton's Divine Sensorium," *Journal of the History of Ideas* 72:3 (2011): 416-417, quoting Isaac Newton, "De Gravitatione et Aequipondio Fluidorum" (1684/85), 89-169, in *Unpublished Scientific Papers of Isaac Newton*, ed. Rupert Hall and Marie Boas Hall (Cambridge: Cambridge University Press, 1962).
[10] Funkenstein, 94.
[11] Matthew Arnold, "Dover Beach" (1867), https://www.poetryfoundation.org/poems/43588/dover-beach.

Newton's clockmaker God is very different than the understanding of God that is the heart of Christianity. As we saw above, traditional Christian thought saw God as entirely other and different than the universe, not filling any physical roles but causing all things to exist. But for Newton and many to follow, God was assumed to be an explanation for *how* the universe works. As we will further examine in the next section on the thought of St. Thomas Aquinas, this is bad theology. In the words of St. John Paul II: "The theological teaching of the Bible, like the doctrine of the Church… does not seek so much to teach us the *how* of things, as rather the *why* of things."[12]

Over the rest of the seventeenth and through the following two centuries, flawed new theologies began to emerge, all based upon the error of trying to make God fit the mechanistic model of the universe. Some such as Thomas Jefferson and other American founders adopted *deism*, putting God at the beginning of the universe to set up the machine and then restricting God's present action simply to legislating values and morality, and his future action to the punishment and reward of behavior in the afterlife. Other thinkers, such as the American poet and philosopher Henry David Thoreau (1817-1862) began to merge God and the universe, a belief system called *pantheism*, modeling the universe as God's body. But these half-baked theologies did not succeed in offering an enduring foundation for faith, and the descent of Western culture into widespread materialism, reductionism and atheism began.

What had happened can easily be summarized: *Newton and his followers had turned his model of the universe into a mentality, reducing all of reality, including God, to fit into the mold of his mechanical model.* This model fits the goals of science very well, and even today remains essential to science, but it was too small for theology. Despite his unlimited power, Newton's God is a tiny God, acting the way natural beings and forces act. A God who intervenes to rewind the clock of the universe, and makes things attract each other through direct divine power, is a God that is doing things that natural forces can do all on their own, not the God who is the Source of the universe and its laws.

Newton failed to recognize that the truth about God requires that we recognize the limitations of our theological models. Ironically, even the truth about the universe requires more than is offered by the mechanistic model, as would be discovered in the profound scientific achievements of the twentieth century. Let's examine a different way of modeling God's relationship to the universe than the mechanistic theology of Newton.

B. Expanded Wisdom: Connecting the Cosmos to the Creator

1. The Art of Analogy

How can we model God's relationship to the universe in a way that respects the integrity of the natural world and also does justice to what God has revealed to us about Himself? Since God is greater than the universe and everything in it, we can only do so by creating a limited comparison, in which there are similarities but also differences. Such a comparison is called an *analogy*. An analogy exists when a property that is shared by two or more subjects, such as beauty, strength or goodness, is used to show some similarity between them.[13] Every analogy involves both similarity and difference; what makes any analogy a good analogy is awareness not only of the similarity it reveals, but also the difference between the things compared. This is especially true of theological analogies; God is

[12] St. John Paul II, "Address to a Colloquium," September 5, 1986.

[13] W. Norris Clarke, *The One and the Many: A Contemporary Thomistic Metaphysics* (Notre Dame: University of Notre Dame Press, 2001), 46.

infinitely greater than any of his creatures, and so the dissimilarity between God and creatures will always be greater than the similarity.

Despite the infinite difference, the Christian Faith teaches that there are real similarities between God and creatures, and so Christian theology thrives on finding good *analogues*, things comparable to God, among creatures, using them to explore divine mysteries. We find numerous analogies in Sacred Scripture in which the characteristics of God's creatures are used to help reveal something about God. In the Book of Wisdom, beauty in nature is given as a quality that is *analogous*, similar to, divine beauty: "For from the greatness and the beauty of created things their original author, *by analogy*, is seen" (Wisdom 13:5). In other words, there are things in the world that delight us by their beauty and grandeur. *By analogy*, these things show us God who is the "author of beauty," although only imperfectly: "far more excellent is the LORD than these" (Wisdom 13:3).

Returning momentarily to Newton and the many who followed him, we can say that the real problem with their machine-maker/engineer model of God is that they did not limit their suggestion of similarity with the recognition of difference. They had what is called a *univocal* conception of God, in which they claimed to describe God *in the same way* one might describe an apple tree or a galaxy. In their univocal theology, God is not like an all-powerful engineer, he *actually is* an all-powerful engineer who puts things together and maintains them the way human engineers do. Had Newton used the engineer model of God as an analogy that would've been fine; many great theologians before him had done so. The incredible order we see in the universe is the product of the wisdom of God, and so it is helpful to think of God as the source of order in the way a sophisticated machine is the product of the genius of a great mechanic, inventor or engineer. The problem is not the model Newton used. The problem was his expansion of that model into an exhaustive description.

An analogical, Christian approach is humble before the mystery of God, suggesting insights but never total comprehension. A univocal approach tries to *resolve* the mystery of God into something fully understood by the human mind. The art of analogy is the only art by which we can begin to understand God as well as acknowledge that he is ineffable, inexpressible Truth.

In order to create a proper analogy between God and creatures, we must note the infinite difference between them. To grasp that difference, we must go all the way down, beyond nature, to the very concept of existence. To do so, we need the help of a wisdom wider than science, the wisdom of philosophy.

2. Philosophy and Existence: The Principle of Double Agency

According to classical Catholic theology, God is not only the "why" behind the universe but also the reason "that" it exists at all. God is "He who Is," and as such he causes all things that exist to exist. So in order to think about God, we must ask the question, "What is existence?" Thankfully, the branch of philosophy called *metaphysics*, the branch of philosophy that deals with the first principles of things, tackles this question as its primary object of study.

Existence is the first, most fundamental "property" of every being, which is why we call them "beings". Even something I imagine, such as a unicorn, has a kind of existence – the unicorn exists as something thought and imagined by human beings – it has *mental being*. My dog Sophie, by contrast, is not simply something I imagine –she has *real being*. The first and most basic thing about Sophie, the one thing she shares in common with the whole universe and everything in it, is obviously not her cuteness nor her dogginess. It is her *existence*, her *being* – if Sophie did not exist she would not be a part of the universe at all. All

things, even thoughts, are connected by existence and share in it as a common characteristic in different ways. Whatever else a thing is, it is only *what* it is *because* it is. *If you can say something true about being, about existence, then you have said something true about every existing thing in a single statement.*

Sophie has real being, but she *is not* Being. If Sophie were Being itself, everything that ever existed would have to share in, or participate in, Sophie! But there was a time not long ago when Sophie did not exist. Her being is something that she *has*, not something she *is*. And she did not give existence to herself – she exists "only if" she is given existence. Existence comes to all things from without – it is like a gift.

You may be asking, "What is "Being itself"? A dog is something that *has* being, but what *is* Being? From where do all beings get their existence? To be Being itself is to exist necessarily, and to be the uncaused Cause, the source of being for all things, because all things do not and cannot give themselves existence. It is "the infinite fullness of pure unlimited existence, and the one ultimate Source of all being."[14] It would be, in fact it is, God. *God is Being subsisting in itself.*

We are not far from theology here; this philosophical insight is also revealed in Sacred Scripture. When Moses asks God for his name, the LORD responds, "I AM THAT I AM" (Exodus 3:14). And when the Son of God became incarnate, he told those who were skeptical of his authority and origins, "Amen, Amen, I tell you, before Abraham came to be, I AM" (John 8:58).

Above and beyond any other consideration, the most basic relationship between God and the universe is that God is the Giver of existence to all things. God is not simply perfect. He makes all things, and all the perfections of those things, *real*. This means that God truly does cause all things, but not in the way Newton supposed. He causes them not by crafting them like a watchmaker but by thinking of them and so willing them to exist.

The great philosopher and theologian who most fully developed this insight to explain God's relationship to the universe was St. Thomas Aquinas (1224/25-1274). According to St. Thomas, God causes all things to be, and so God should be called the *Primary Cause*. But in causing all things to be, God causes them in such a way that they are able to be causes of each other in various ways. For example, parents are the real biological causes of their offspring's bodies, giving them a particular *kind* of existence as this or that kind of animal. But it is God who gives *being* to both the parents and their offspring. God causes all dogs to be real, but Sophie's dog parents really did cause Sophie to be the kind of dog she is. The universe is made up of *secondary causes*, the very kinds of causes studied by scientists. St. Thomas taught that God set things up this way so that creatures could share in his own goodness, by being causes like (but not exactly like!) God Himself: "the Primary Cause, by the preeminence of its goodness, gives other beings not only their existence, but also their existence as causes."[15]

This means that, for every cause and effect relationship in the universe, there are at least two causes, God the Primary Cause and whatever secondary cause or causes are involved. It also means that God and those secondary causes can really be called causes, but only in entirely different ways, such that they are *never* in competition with each other. This is called *the principle of double agency*. St. Thomas explains this in one of his greatest works, the *Summa contra Gentiles*:

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[14] Clarke, 87.

[15] St. Thomas Aquinas, *De veritate* 11.1.

> [An] effect is not attributed to a natural cause and to divine power in such a way that it is partly done by God, and partly by the natural agent; rather, it is wholly done by both… [for the] same God who transcends the created order is also intimately and immanently present within that order as upholding all causes in their causing.[16]

The key words in this quote are "wholly done by both" – God causes things in a way that no creature can cause them, and creatures cause things in their own genuine way that is *really and truly their own*. God is not the source of "how" answers about the universe; "how" questions can only be answered by his creatures. Likewise, no creature can answer the question of its very existence; that question can only be answered by God the Creator. God holds all creatures in being even as they cause each other.

We might be tempted to ask, "*How* does God cause creatures to exist and the universe to be real?" But this is dead-end thinking. "How" answers involve processes that occur in time and can be studied by science. But God is eternal and unchanging; time is something he creates; his reality is a perfect *NOW* with no past or future. In his perfect eternity God wills his creatures to be, and because he does so, they are. No process is involved in divine creation, as we will see in more detail later. As St. Thomas says, God is "the cause hidden from every human being."[17]

St. Thomas explains God's relationship to the natural world with an analogy which brings to mind Newton's clockmaker/mechanic model of God but with a crucial difference: "Hence it is clear that nature is nothing but a certain kind of art, i.e. the divine art, impressed upon things… It is as if the shipbuilder were able to give to timbers that by which they would move themselves to take the form of a ship."[18] Here God is not inserted as a "how" answer, as he is in Newton's theology; St. Thomas does not give God a role in "building" the universe. Instead, creatures (pictured here as wooden timbers) are caused to exist by God *with* the ability to bring about what God intends.

In another work St. Thomas uses the analogy of a great teacher to explain why it is fitting that God makes the world in such a way that its cause and effect relationships are real:

> …it is a greater perfection for a thing to be good in itself and also the cause of goodness in others, than only to be good in itself. Therefore God so governs things that He makes some of them to be causes of others…; as a teacher, who not only imparts knowledge to his pupils, but also gives them the capacity to teach others.[19]

From God's perspective, it wasn't enough for him to cause creatures to exist; he wanted to establish them in real causal relationships with each other. And so, unlike Newton, St. Thomas recognizes that God is not the cause of this or that, but of "the All," establishing the universe as a vast system of real causes and effects, all with their own integrity. The cosmos is not a thing that God must maintain by interference, nor by miraculously producing this or that natural phenomenon.

We can now see how the principle of double agency is so hospitable to science, unlike literal creationism. The principle of double agency preserves scientific and theological explanations from bleeding into, substituting for, or competing with, each other. Scientists

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[16] St. Thomas Aquinas, *Summa contra Gentiles* III.70.8.
[17] Ibid., III.101.1.
[18] St. Thomas Aquinas, *In Physicorum*, II.8.14, no. 268.
[19] St. Thomas Aquinas, *Summa Theologiae* I.103.6 resp.

rightly become upset when believers try to stick God into the processes of the universe as a "how" explanation. Consider the words of the evolutionary biologist and atheist Richard Lewontin:

> We take the side of science *in spite* of the patent absurdity of some of its constructs, *in spite* of its failure to fulfill many of its extravagant promises of health and life, *in spite* of the tolerance of the scientific community for unsubstantiated just-so stories, because we have a *prior commitment*, a commitment to materialism… Moreover, that materialism is absolute, for we cannot allow a Divine Foot in the door.[20]

In light of the principle of double agency, Lewontin's commitment to materialism to avoid the "Divine Foot in the door" is not necessary to protect the integrity of the natural world. In the Christian understanding, God is the cause of the existence, the reality, of all things, not an all-powerful, magical substitute for natural causes. He answers the ultimate questions: "Why does anything exist at all?" "Why is the universe orderly and yet open?," not questions like "How did mammals evolve?," or "How did the universe develop during the Big Bang?" Science takes care of those, and the more science can explain, the more it shows God's majesty as Creator.

For their part, many believers become upset when atheists such as the late Christopher Hitchens (1949-2011) reject the existence of God because they assume that science has squeezed God out of the gaps in our knowledge of how the universe works. "Thanks to the telescope and the microscope, religion no longer offers an explanation of anything important," declares Hitchens, as if that settles everything.[21] That is a problem for Newton's God, but not the God of Christianity. If we truly understand God in St. Thomas' way we would expect, like the Christian in Nicholas of Cusa's dialogue, not a God who explains this or that natural phenomenon, but who, beyond our greatest genius and wildest dreams, is the ultimate reason for the existence of all things, constantly upholding them in being, allowing and enabling them to cause each other in a beautiful, sometimes perplexing, always amazing, universe. Any being that could be detected with Hitchens' telescope or microscope would be too small to be Truth and Being Itself.

3. The Mind of the Maker: God as Playwright

As noted above, no one analogy can be fully sufficient for understanding the Creator. So let's add another analogy to our repertoire that highlights God as the ALL and greater than everything he has made, based on the principle of double agency. Here it is: As a playwright is the author of a play, so God is creator of the universe. The mystery of imagination involved in creating a play has much to add to our understanding of God the Creator.

A playwright creates a play not primarily through physical activity, but by conceiving of it in his/her mind. Whether or not the play is ever written, it exists in the mind of the playwright. By causing the play and everything within it to exist through creative genius, a playwright like Shakespeare makes a world that we also can mentally inhabit, characters we

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[20] Richard C. Lewontin, "Billions and Billions of Demons," *The New York Review of Books*, January 9, 1997, http://www.nybooks.com/articles/1997/01/09/billions-and-billions-of-demons/.

[21] Christopher Hitchens, *God is Not Great: How Religion Poisons Everything* (New York: Hatchette Book Group, 2009), 282.

can love or hate, cause and effect relationships that sometimes delight, sometimes shock or sadden. Therefore, the playwright is "the All" to his play; nothing of it would be were it not for the playwright. Every part of it is conceived by him; he is the origin of it in its entirety. In a similar, but much greater way, God is Creator of the universe by thinking it into existence in its entirety. In the words of St. John the Evangelist, "All things came to be through him, and without him nothing came to be" (John 1:3).

Yet from the perspective of its events and characters, a play also has a real independence from the playwright's mind, it can be thought about and studied and enjoyed by anyone who reads it or sees it performed, without even knowing who wrote it. The things that happen in the play have their own real causes within the play. It makes no sense to ask, "Did Juliet accept Romeo's offer of marriage because Shakespeare wrote the play that way, or because she freely chose Romeo to be her husband?" These are two very different questions, and they must be answered separately. Shakespeare did not accept Romeo's offer of marriage; Juliet did so herself. But Shakespeare did conceive of Romeo and Juliet as well as their love for each other.

In a similar way, the universe has a real existence distinct from God. It has real cause-and-effect relationships that can be understood in their own right. It makes no sense to say, "Did the Big Bang cause the universe, or did God cause the universe?" Both explain the universe in their own way; or, as St. Thomas might say, "the universe is wholly done by both." The event of the Big Bang is the beginning of the universe in time but God is the origin of the universe from eternity.

Just as a playwright is the "All" to his play, he is also greater than his play and everything in it. The internal time of the play has no application to the activity of the author. Shakespeare's wedding, for example, has no place in *Romeo and Juliet*. Even his creation of the play, his invention of the characters, his thinking out the plot, etc., are not part of the play; they make the play possible, they aren't scenes within it. Also, the playwright can write other plays, create different characters, etc.[22] In a similar way, God is not dependent upon the universe in any way; rather, it is entirely dependent on him. God's own inner life is the perfect fullness of existence, and creation is the sharing in his perfections out of the infinite abundance of his love.

As we said above, no analogy is properly understood if we note similarity without also noting difference. So let's note some very important differences between a playwright and his/her play, on the one hand, and God and the universe on the other. For one thing, it takes time for a playwright to produce a play. But God is eternal; time is a part of his universe, but he transcends time. To conceive of his play a playwright must use his/her brain, with neurons firing across synapses. The brain is the first "instrument" used to produce the play. But God has no physical parts; he is Perfect Truth, creating the universe simply by knowing and willing it. To communicate his play a playwright must take up a quill or type on a keyboard – both physical activities. But physical activity is something that is part of creation, not of the Creator, who is pure Spirit. God simply wills it, and the universe and all creatures exist.

Moving to theology, there are other differences that can be appreciated in the light of what God has revealed. First, while the saga of *Romeo and Juliet* is completely dependent on Shakespeare, as history and the universe are upon God, Shakespeare is not part of his play. Yet the Author of the universe has not created a story in which He is not involved. The climax of history is the moment when He enters the universe, when God becomes man in

[22] Barr, *Believing Scientist*, 124-126.

Jesus Christ. And the fulfillment of history will be when Jesus returns in glory. This brings out another important difference: unlike the story of *Romeo and Juliet*, the play of the universe is an unfinished one – for humanity, the last drama has yet to occur.

Another difference is that the characters in *Romeo and Juliet* do not have the ability to read their own story. They only think, feel, and act in imagination – when the story is not being written or read or at least thought about, they do not exist as anything but ink on a page. But the amazing characters in our story – real human beings – do have the ability to read their own story. We can both participate in the drama of the universe, but can also read that drama through reflection, understanding it through science, philosophy and theology. We are in the story but not entirely of the story – we can both live it and know it, although only imperfectly, because the "play" of the universe has not yet reached its conclusion.

Finally, God has revealed the reason why he is authoring the universe, the greatest secret of all—his desire to communicate his goodness to us and to unite us to himself in love. This is the widest wisdom—it is at the heart of the Christian doctrine of creation, to which we now turn.

C. The Widest Wisdom: The Christian Doctrine of Creation

The doctrine of creation refers to God, in absolute love, power and wisdom, bringing into being things distinct from himself. Creation is the beginning of God's revelation of himself, in which his reality is manifested to his creatures in their very coming to be and continuing in existence. It is the basis of all other Christian doctrines, and is referenced in the very first line of the Christian profession of faith, the Nicene Creed which is professed every Sunday in the Mass: "I believe in one God, the Father almighty, maker of heaven and earth, of all things visible and invisible."

The Christian belief in a Creator God has four distinctive elements. First, Christians believe that God creates the world *ex nihilo*, "from nothing." Second, Christians believe that God creates the world *cum tempore*, "with time." Third, Christians believe that God creates the world *cum libertate*, "freely." Finally, Christians believe that the world is created *ex Trinitate*, "by the Trinity," that is by all three divine Persons equally.

These elements of the Christian doctrine of creation have been solemnly professed and defined by the Catholic Church at three ecumenical councils: Lateran IV in 1215, Florence in 1442, and Vatican I in 1869-1870. *Ecumenical councils* are assemblies at which bishops from the whole world come together to authoritatively teach regarding matters of faith and morals – there have been only 21 in the two millennia of Church history. Catholics recognize the bishops gathered in councils by the pope as having "*the charism of infallibility*" from the Holy Spirit. Thanks to this grace, bishops assembled in ecumenical councils together exercise freedom from error in matters of faith and morals, and their teaching requires the unswerving "assent of faith" since God has definitively spoken through them.[23] Therefore, the four elements listed above are integral to the Christian Faith and are divinely revealed truths. Let's look at each element to theologically complete the philosophical understanding we have achieved so far.

1. Creation, Not Change: Creation ex nihilo

It is common for theologians to draw a distinction between science and faith by reference to the difference between "how" questions and "why" questions. The ultimate reason for this distinction is the Christian doctrine of creation *ex nihilo* – "from nothing."

[23] CCC no. 888-892.

God uses no preexisting material to create the universe, so no "how" explanations are possible to describe the act of creation. The divine act of creation causes matter, space, time and even the very laws which govern the universe to exist; without him, there would literally be "no thing" whatsoever. In the words of Lateran IV,

> We firmly believe and openly confess that there is only one true God… [who is] the one principle of the universe, Creator of all things invisible and visible, spiritual and corporeal, who from the beginning of time and by His omnipotent power *made from nothing* creatures both spiritual and corporeal, angelic, namely, and mundane, and then human, as it were, common, composed of spirit and body.[24]

Creation *ex nihilo* is not a change. Every change involves going from one real state to another, as when a sperm and ova unite and cease existing, contributing their genetic material to an entirely new state of being, an embryo. The Big Bang may have been a change from one state to another through an explosion. But in the divine act of creation, God causes something to exist out of nothing, and nothing is, by definition, not a state of being. In the words of philosopher William Carroll, "Whenever there is a change there must be something that changes… [by contrast Divine] creation… is the radical causing of the whole existence of whatever exists… any thing left entirely to itself, wholly separated from the cause of its existence, would be absolutely nothing."[25]

No one captured this mystery more beautifully than G.K. Chesterton:

> A child kicks his legs rhythmically through excess, not absence, of life. Because children have abounding vitality, because they are in spirit fierce and free, therefore they want things repeated and unchanged. They always say, "Do it again"; and the grownup person does it again until he is nearly dead. For grownup people are not strong enough to exult in monotony. *But perhaps God is strong enough to exult in monotony.* It is possible that God says every morning, "Do it again" to the sun; and every evening, "Do it again" to the moon. It may not be automatic necessity that makes all daisies alike; it may be that God makes every daisy separately, but has never got tired of making them. It may be that He has the eternal appetite of infancy; for we have sinned and grown old, and our Father is younger than we.[26]

Chesterton's poetic imagery is true—with perfect Divine youthfulness God creates every daisy, causes every sunrise, because God is holding all things in existence through his perfect, eternal act of creation *ex nihilo*. In the words of the Letter to the Hebrews, "By faith we understand that the worlds were prepared by the word of God, so that what is seen was made from things that are not visible" (Hebrews 11:3).

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[24] Paul Halsall, ed., "The Canons of the Fourth Lateran Council (1215 AD)," *Medieval Sourcebook: Twelfth Ecumenical Council: Lateran IV 1215*, can. 1, https://sourcebooks.fordham.edu/basis/lateran4.asp.
[25] William E. Carroll, "Creation, Evolution, and Thomas Aquinas," Catholic Education Resource Center, https://www.catholiceducation.org/en/science/faith-and-science/creation-evolution-and-thomas-aquinas.html.
[26] G.K. Chesterton, *Orthodoxy*, Moody Classics new ed. (Chicago: Moody Publishers, 2009), 92.

2. From Beginning to End: Creation cum tempore

Along with creation *ex nihilo*, the Church's doctrine of creation includes the assertion that the universe was created "with time." In the words of Lateran IV above, which were repeated by Vatican I, God creates "from the beginning of time." This phrase should be interpreted as identifying *every moment* as the result of the divine act of creation. Since God transcends time, then his creative act is itself timeless. The terms "with time" (*cum tempore*) has also been used by the Church and her theologians to emphasize that time only exists in relation to creatures, not God. It is a feature of the universe, and is itself created.[27]

Creation *cum tempore* means that every moment is the moment of creation, from the first moment of the universe's existence until now. All things are being brought into existence out of nothing by God *right now*. For God who transcends time, to create at the first moment of the universe is no different than what God is doing at this moment. Right now, as much as at any time in the past, God is saying "Let there be light," "Let the earth teem with living things," etc. God's act of creation is not a historical event that happens within time, but a metaphysical reality describing the universe's dependence on God's eternal act of creating, which transcends time.[28]

Sacred Scripture often refers to "the beginning" to indicate this element of creation (Genesis 1:1; Sirach 16:16; John 1:1). It also refers to God as existing and acting "before the foundation of the world" (John 17:24; Eph 1:4; 1 Peter 1:20). This phrase should be interpreted carefully, lest it lead us to assume that God is in time, rather than the Creator of it. God as "the beginning" is not pointing to something God did "back then," but to God as the timeless origin of all things. The Big Bang is not the moment of creation. Rather, the Big Bang, the present moment, every moment in between them and to come, are all equally the moments of creation.

To help us understand this, recall our playwright analogy. The opening lines of Shakespeare's *Romeo and Juliet* are: "Two households, both alike in dignity, In fair Verona, where we lay our scene, From ancient grudge break to new mutiny, Where civil blood makes civil hands unclean." That is the *beginning* of *Romeo and Juliet*; it references a point in time when the play begins in Shakespeare's fictional Verona. But Shakespeare is the *origin* of those lines and everything else in *Romeo and Juliet*. When Sacred Scripture speaks of God acting "in the beginning" or before it, it is pointing to God as origin of the universe and history, not to some moment in the past.

It is a doctrine of the Christian Faith that the universe has a temporal beginning, as indicated by the words "at the beginning of time" quoted above from Lateran IV. This is a topic we will consider in Chapter Seven. But creation *cum tempore* refers primarily to the fact that God transcends time, and all times rely on him as their origin. Even if the universe had no first moment, it would still be a temporal universe, and would still rely on God for its existence.

3. A Freely Created Universe: Creation cum libertate

In the First Creation Account we read that God said, "Let us make humankind in our image, according to our likeness…" (Gen 1:26). This very human image of God mulling over the prospect of making human beings points to divine freedom, that God freely created humans and the entire universe. In the words of Psalm 135:6-7. Whatever the LORD pleases he does, in heaven and on earth, in the seas and all deeps." In the words of Vatican I,

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[27] Haffner, 52.

[28] Austriaco, et al., *Thomistic Evolution*, 65-66.

> [The] one true God, by his goodness and almighty power, [brought things into being] not with the intention of increasing his happiness, nor indeed of obtaining happiness, but in order to manifest his perfection by the good things which he bestows on what he creates, [but] by *an absolutely free plan*…[29]

Let's reflect on what this implies. First of all, it means that God is free either to create the cosmos or not create it. It also means that God is not obligated to create the best possible universe. God is not forced to create one possible universe out of all possible universes because it is "best." This shows God's radical difference from us – as creatures with a capacity to develop towards perfection, there is always a tendency to choose the best, and choosing the best is always preferable and sometimes morally necessary. But God cannot and is not perfected through creating—he is already perfect Goodness. Also, the idea of "the best universe" is very deceptive. No matter what exists, a better universe could always be imagined, and any estimation of what the best universe would be is limited by our own finite, personal viewpoint.[30] We are part of the universe, and a part cannot know the whole well enough to make such a judgment.

The important distinction to make here is between the act of creation and the product of that act, which is the universe and all things, including human beings and angels. The act of creation is perfect because it is divine. But the object resulting from the act of creation, insofar as it is finite, is therefore imperfect. So the universe is imperfect, but it corresponds perfectly to what God freely wills to create.[31] Furthermore, God has pledged himself to bringing his creation to its fullest possible perfection. In the words of the *Catechism,*

> With infinite power God could always create something better. But with infinite wisdom and goodness God freely willed to create a world "in a state of journeying" towards its ultimate perfection. In God's plan this process of becoming involves the appearance of certain beings and the disappearance of others, the existence of the more perfect alongside the less perfect, both constructive and destructive forces of nature. With physical good there exists also physical evil as long as creation has not reached perfection.[32]

The perfect freedom by which God creates also means that the universe was created out of love. God who is Love (1 John 4:8) chose to make this universe, and did so without any coercion. The International Theological Commission, the pope's theological "think-tank," emphasizes the personal nature of this free choice of God, who makes it all for humanity: "[The doctrine of Creation] teach[es] us that the existing universe is the setting for a radically personal drama, in which the triune Creator calls out of nothingness those to whom He then calls out in love."[33] This brings us to the final, and most important, element of the Christian doctrine of creation.

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[29] Vatican I, Dogmatic Constitution *Dei Filius* on the Catholic Faith, chap. 1, no. 2-3, https://www.ewtn.com/library/councils/v1.htm#4.
[30] Paul Haffner, *Mystery of Creation* (Herefordshire, UK: Gracewing, 1995), 56-57.
[31] Ibid., 57.
[32] *CCC* no. 310.
[33] International Theological Commission, "Communion and Stewardship: Human Persons Created in the Image of God," July 23, 2004, no. 66,

4. Love is the Reason: Creation ex Trinitate

For the world to have its beginning in God the Creator means that it has its origin from the Trinity. Not simply from the Father – the Father, Son and Holy Spirit create together. In the words of the Council of Florence,

> Most firmly [this council] believes, professes and preaches that *the one true God, Father, Son and Holy Spirit, is the creator of all things that are*, visible and invisible, who, when he willed it, made from his own goodness all creatures, both spiritual and corporeal, good indeed because they are made by the supreme good, but changeable because they are made from nothing, and it asserts that *there is no nature of evil* because every nature, in so far as it is a nature, is good.[34]

In other words, creation is not simply an act of God the Father; the universe is also the work of the Son and the Spirit. The Son-*Logos* is the "Mind" or "Reason" to whom we attribute the orderliness of the universe. The Holy Spirit, the Gift-Love of God, is the source of its openness. To the Father, who eternally begets the Son and from whom the Spirit eternally proceeds, is attributed the very power by which the universe exists.

The Holy Trinity is a perfect communion of love, which means that the universe is the product of divine love and is good. St. Thomas Aquinas teaches that there are two kinds of love, the love that arises from justice and the love that springs from mercy. This distinction is very helpful in understanding what kind of love God manifests by creating the universe:

> When a person's love is caused by the goodness of the one he loves, then that person loves out of justice - it is just that he love such a person. When, however, love causes goodness in the beloved, then it is a love springing from mercy. The love with which God loves us produces goodness in us; hence mercy is… *the root of divine love*…[35]

Justice is the giving to another what is due to them. When I love and respect a great person such as a saint, I am not being merciful to them; I am being just. Similarly, when I give my children my time and attention, I am not being merciful to them, I am simply being just to them – I am giving them what is theirs by right. These things can be called love, but this is loving out of justice, because love is what is due. In these cases, those who receive love have a right to it.

But what about when I forgive an offense committed against me and am friendly to a person who has hurt me? When I refuse to retaliate with insult or injury and instead, offer a kind word? Or when I give to the poor, helping them to have a better life? That is a love that actually causes goodness where it is absent, "a love springing from mercy."

And it is this kind of love, a love springing from mercy, that most closely corresponds to the act of creation. Nothing can be good unless it exists, and nothing is owed to something that doesn't exist. As we have already seen, God creates the universe *ex nihilo*,

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http://www.vatican.va/roman_curia/congregations/cfaith/cti_documents/rc_con_cfaith_doc_20040723_communion-stewardship_en.html. (Hereafter referred to as C&S.)

[34] Ecumenical Council of Florence, *Bull of Union With the Copts* (1442), http://www.ewtn.com/library/COUNCILS/FLORENCE.HTM.

[35] St. Thomas Aquinas, *In Eph.* 2.2.

out of nothing. He causes good things to exist not out of any justice to them, but out of something like mercy. Therefore divine mercy, "the root of divine love," is the reason for the universe and everything in it. The great English mystic Julian of Norwich portrays this beautifully in a vision she was given in prayer:

> The Holy Spirit showed me a little thing, the size of a hazelnut, lying in the palm of my hand, and to my understanding it was as round as any ball. I looked upon it and thought, "What may this be?" And I was answered, "It is everything that exists." I marveled how it could endure, for I thought it would certainly fall into nothingness because of its littleness. And I was answered, ***"It lasts and always shall, because God loves it, and all things have being through the love of God."***[36]

Creation *ex Trinitate* is the heart of the Christian doctrine of creation. Nothing is unless it is created, and everything created exists because of God's inexhaustible, merciful love. Machinists sometimes create because they have some need, as do some playwrights. But God had no need to create, no hunger to fill by creating. Rather, the universe is the product of love overflowing, and merciful love is therefore the foundation and deepest meaning of all things, the same mercy with which the world was redeemed by Christ on the Cross.

The unity we discover in creation and redemption can nowhere be clearer than in the notion of mercy, which also reveals the foundation of Christian spirituality. In the words of Pope Benedict XVI, "…from the point of view of the Christian faith, man comes in the most profound sense to himself, not through what he does, but through what he accepts. He must wait for the gift of love, and love can only be received as a gift."[37] Our very existence is the first gift, the one that comes through creation, through which at every moment God causes us to be. And in overcoming our sinful separation from divine goodness through his death on the cross, Jesus offers us the fullness of existence. Jesus, the Son-*Logos* made flesh, does in history is the perfect reflection, and fulfillment, of what God does in eternity.

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[36] Julian of Norwich, *Revelations of Divine Love*, chap. 5.

[37] Joseph Ratzinger, trans. By J.R. Foster and Michael J. Miller, *Introduction to Christianity* (San Francisco: Ignatius Press, 2004), 267.

Evil, Prayer and Miracles:
Questions for God in the Light of Modern Science

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"Then Job answered the LORD and said: I know that you can do all things,
and that no purpose of yours can be hindered… I have spoken but did not understand;
things too marvelous for me, which I did not know…
By hearsay I had heard of you, but now my eye has seen you.
Therefore I disown what I have said, and repent in dust and ashes."

-Job 42:1-6

In theology and philosophy, just as in science, a good explanation not only sheds light, but also creates new questions. Brilliant insights deepen our understanding, but that deepening never resolves the mysteries at the heart of reality. In the words of physicist Peter Hodgson, "In [both science and faith] there is detailed knowledge that guides our lives, one in the natural world and the other in the supernatural world, and in each there is a mystery at its heart."[1]

One great scientist who knew this was *William Thomson* (1824-1907), known to history as *Lord Kelvin*. Kelvin was one of the great pioneers of electrical theory after whom the standard measurement of electric current, the *Kelvin (ampere) balance*, was named. As the story goes, he once made an anonymous tour of an electrical equipment factory. Kelvin listened patiently to a young factory apprentice as he explained elementary facts about amps and volts. Once he was done, Kelvin asked him, "Please tell me what electricity is." The young man fell into an awkward silence. "Don't let that worry you," Kelvin remarked, "no one knows what electricity is."[2] Very few in his day understood electricity better than Kelvin, and yet Kelvin also humbly recognized that his understanding was only a glimpse, not unlimited comprehension.

Theologians and philosophers are not exempt from this humility of Kelvin; in fact, it is an even greater necessity for those contemplating the mysteries of faith and the Absolute Mystery of God. Consider St. Thomas Aquinas, the greatest theologian of the Middle Ages and perhaps of all Church history, who at the end of his life had a remarkable spiritual experience while celebrating Mass on the Feast of St. Nicholas in 1273, the year before his death. He abruptly stopped writing afterwards, and when a fellow friar urged him to finish, he exclaimed, "Everything that I have written seems like straw compared to those things that I have seen and have been revealed to me."

Given the examples of Kelvin and St. Thomas, it should not be surprising that exploring the Christian doctrine of creation raises new, and sometimes more perplexing, questions. These questions are essential not only to the relationship between faith and reason, but also to everyday life and religious experience.

For example, Christians celebrate the whole universe as a work of divine love. And yet the universe, life, and especially human life, are fraught by imperfections. The *problem of*

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[1] Peter Hodgson, *Science and Belief in the Nuclear Age* (Naples, FL: Sapientia Press, 2005), 115.
[2] Ibid., 115.

evil seems to call into question that the universe is a product of divine love, and the misery and destruction we see all around lead many to reject the existence of God altogether. This is not a new problem, but modern science has made it even clearer by helping us understand the fragility of all life. For example, it is now thought that our very Sun is destined to fizzle out, along with the entire universe, which will expand until it is so spread out that it will whisper away. This leads us to our first critical question: how can we affirm the doctrine of God the Creator and yet fully admit the tragic presence of evil in creation?

The necessity of prayer is also a critical issue for understanding faith in the light of science. Christians believe that time is just a feature of the physical universe, not of God's reality. God is timeless and unchanging. But these lead us to other critical questions: If God is unchanging, why would anyone offer prayers to God in petition for their needs? Why does Jesus, the Son of God, teach us to pray daily for our needs ("Give us this day our daily bread")? If God respects the integrity of nature and is eternal and changeless, why would we assume that He would grant our needs in response to our prayers?

Finally, *the reality of miracles* confronts us with other critical questions for faith in the light of science. Miracles are hard to reconcile with the Catholic avoidance of supernaturalism and respect for the integrity of nature, with the Catholic recognition that God the Author of nature does not act by inserting a "Divine Foot" in the door of nature. And yet the Christian Faith does not simply profess belief in a Creator, but also that the same God who creates the universe also redeems it through becoming one of us. When God became man, incredible signs and wonders occurred. As Catholics profess in the Creed, Jesus "by the Holy Spirit was incarnate of the Virgin Mary," and "rose again on the third day in accordance with the Scriptures." In both cases, as well as in Jesus's many deeds of healing and power, things occurred that can't be explained simply by referring to natural causes. These marvels have been allegedly followed by countless others in the history of the Church. Isn't belief in the miracles of Jesus and the saints just one more "God of the Gaps" error?

The problem of evil, the necessity of prayer and the reality of miracles involve mysteries of faith, and so the critical questions they raise cannot be fully resolved simply by reasoning about them. We must adopt the humility of Kelvin and St. Thomas as we proceed. In the use of our powers of reason, two conditions of darkness can occur: mystery beyond us that shows reason's limits, and contradiction below us that disturbs and injures truth. The key to avoiding contradiction while embracing mystery is to know both the power and limits of human reason, to go only as far in exploring as reality permits.[3] We will know that we are successful when absurdities are resolved but mystery remains, and when we are invited into awe and wonder at the nature of reality and the Absolute Mystery of God.

In the liturgical calendar the Church observes two seasons, Advent and Lent, in which she confronts evil through prayer and prepares to celebrate miracles that are at the heart of the Christian Faith: the Incarnation of the Son of God and the Virgin Birth of Jesus celebrated at Christmas, and his Resurrection celebrated at Easter. These two seasons and the great feasts to which they lead will serve as helpful reference points to guide our reflections.

B. "The Cry of the Poor": Divine Providence and the Mystery of Evil

The problem of evil is immense; it touches all of creation. At the same time, the doctrine of creation *ex nihilo* implicates God in the existence of all things. And so all things, even our thoughts and own free actions, are locked in a paradox; both have God for their

[3] Charles Journet, *The Meaning of Evil*, trans. by Michael Barry (New York: P.J. Kenedy & Sons, 1963), 25-26.

source and also the capacity for evil. St. Paul, recognizing the imperfections of creation, speaks of the whole of creation groaning in pain (Romans 8:22). God, Creator and Source of existence for all things, made real the freedom of the Nazi concentration camp guards, for instance, just as made the freedom of Mother Theresa real as she gave herself to the poor of Calcutta. So we must face the question: How can we claim God as the source of all things when evil and suffering permeate all of creation? 1500 years ago, St. Augustine asked this more poignantly than anyone, reflecting upon the evil he found in himself. We now make his questions our own:

> Who made me? Was it not my God, who is not only good, but goodness itself? Whence came I then to will to do evil, and to be unwilling to do good, that there might be cause for my just punishment? Who was it that put this in me, and implanted in me the root of bitterness, seeing I was altogether made by my most sweet God?
> …
> Where is evil then, and when did it start, and how has it crept into the world? What is its root, and what is its seed?[4]

1. Defining Evil

Many philosophers before St. Augustine pondered the problem of evil, and made some progress in understanding, especially the pagan philosophers Plato (c.424-c.347 BC) and Plotinus (204-270). And yet it was St. Augustine himself who would be the first to offer to history a fuller perspective on evil, often referred to as the *privation theory of evil*. He saw that evil was not a being, and therefore not the product of divine creation. Rather, evil is a lack or absence, the *privation*, of a good that should be present. Not all privations are evil. A rock is not able to see, but we do not feel compassion for it as we do for a blind person or animal because it is not in the nature of a mineral to see. Every created nature is finite; even if a creature has all that is natural to it, it does not have the infinite range of perfections that only belong to God, the Source of all being and goodness.

Interestingly, it was precisely the realization of God as Creator of all things that allowed Augustine to conclude that evil "is not any *thing* found in nature."[5] Augustine's insight was formally proclaimed as a doctrine of the Christian Faith by the Council of Florence (1431-1449): "[this council] asserts that *there is no nature of evil* because every nature, in so far as it is a nature, is good." The evil that causes us to suffer and creation to groan is not a creature of God, not something willed into being by Him. It exists precisely when a creature or (in the case of human beings) a thought, word or action lacks something that it ought to possess. God is not its source, although he does permit it.

Augustine and the Catholic philosophical tradition recognize two kinds of evil. The first kind, *physical evil*, is evil that doesn't involve personal fault, although personal fault is sometimes the cause of it. Physical blindness is an example – blindness is the nonexistence, the privation, of sight in a creature whose nature it is to see. Most physical evils occur as a matter of course because of physical good. Cancer happens because mutations that drive evolution (which is good) also drive disease (which is evil). Underwater earthquakes and their tsunamis create human deaths and property destruction (evil) because geological processes (good) that form beautiful tropical islands (good) also deprive the earth's crust of stability,

[4] St. Augustine, *Confessions*, Book VII, ch. 3.5; ch. 5.7.
[5] St. Augustine, *City of God*, Book XI, ch. 22.

which causes evils for creatures whose lives depend upon that stability.[6] The same is true with all biological life. As Aristotle keenly observed, the generation of new life often requires *corruption*, which literally means "destruction". The conception of a new human being requires the corruption of the ovum and sperm, which cease to exist when they combine to form the zygote. And in order to sustain their lives, animals destroy other living things by consuming them; hence "The life of the spider [good] is the death [evil] of the fly."

Any time we observe an example of physical evil and try to identify it, we discover that it is impossible to "find" evil until we come to some negative, some absence. The purely positive properties of any thing cannot be called evil, even if those positive properties are the cause of evil. For example, a deadly *virus* consists of genetic material and a coating of protein. None of these positive components are evil; indeed, all living things are made up of genetic material and proteins. The evil of a deadly virus is not any part of it; rather, the *privation* of health and life it causes is the true evil. As proof of this, consider that the very viruses that may cause sickness can also be directly involved in great good. Scientists tell us that a retrovirus that was inserted into the DNA of our evolutionary ancestors millions of years ago became the genetic component for the mammalian placenta upon which all human infants depend in the womb. But no evil can also be good and be a positive cause of goodness—this would be a contradiction. The virus is not the evil; the absence of health and the negation of life it might cause is the true evil. Therefore the late Jesuit philosopher W. Norris Clarke called evil "a hole in being"[7]; it is the lack of what ought to be present, the non-existence of some good.

The second and more tragic kind of evil Augustine identified as *moral evil*, evil in which rational creatures knowingly and freely deprive their own thoughts, words and actions of what ought to be present within them. Once again, it is the "hole" within these that make them evil. Adultery is an example. Its evil does not consist in the sexual pleasure, or personal intimacy, involved, both of which are good as such. The evil of adultery is the non-existence of sexual fidelity when sexual fidelity ought to be present. This lack of loving fidelity to a spouse is what corrupts the good of sex from within. The evil of the crimes of the Nazis in the concentration camps involved the absence, in their thoughts, words and deeds, of the proper respect for the human life and dignity of the Jews they imprisoned, tortured and killed. The absence of compassion, kindness and justice is what made Auschwitz evil, not the gases used there for horrific purposes.

One reality closely associated with evil is often confused for it, but actually needs special consideration—the reality of pain. The feeling of *pain* is actually a positive presence, not a privation; it tells us that there is something wrong in our bodies (*physical pain*) or within our relationships, actions or attitudes (*emotional pain*). Without them we could not function, and so these important "messenger services" actually aid us rather than deprive us.[8] It would be hard for anyone to count how many times pain has saved one's life or well being, even though from the perspective of pleasure it is never preferable. Pain is a rightly ordered response to physical and moral evil. It is not evil itself.[9]

Finally, to call evil a privation is not to declare it to be non-existent nor powerless. It is a lack where something truly ought to be present, and so it is always a privation, a hole, in

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[6] Nicanor Austriaco, "Three Critical Questions for Science and Religion"" (lecture, Science and Religion Seminar, Institute for Church Life, University of Notre Dame, South Bend, IN, June 18, 2014).
[7] Clarke, 278-279.
[8] Ibid., 280.
[9] Ibid., 280.

something real. Because of this it is a powerfully destructive force simply by virtue of what it "takes away." Physical and moral evil are the source of all suffering for human beings, and those who suffer from them (and is there anyone who doesn't?) can rightly be called "poor" in some real way. Psalm 34:7 tells us that "[the] poor one cried out and the LORD heard, and from all his distress he saved him." Our question is, if the LORD is the poor one's Creator, why must he need to cry out in the first place?

2. The Mystery of God and the Reality of Evil

We can now turn to our critical question, "Why does God, the source of all things, create a universe in which physical evil is actually a part of its functioning, and in which moral evil permeates human life?" The classic argument, proposed centuries ago by the English philosopher *David Hume* (1711-1776) runs as follows:

> God by nature must be both omnipotent (all-powerful) and omnibenevolent (all-good). Now if God is omnipotent, he *could* prevent all evil. And if he is all-good, he *would* do so, since it is the characteristic of a good person to prevent evil wherever possible. But in fact he does not prevent all evil, even though he could, but allows a vast amount of it, both physical and moral, as is evident in the world around us. Therefore, it follows that God is either not omnipotent or omnibenevolent. In either case such a being could not be God; therefore, there is no God.[10]

It seems almost an insult to those who suffer in a world weighted down with evil to disagree with Hume, as if denying God's existence is a necessary part of showing compassion to the suffering. But denying the existence of ultimate Goodness is no compassion at all. It is not that Hume's argument is wrong, but it is missing an alternative. A good person is not always bound to prevent any and all evil; it may be that a good person allows a lesser evil to occur so that a greater good may be achieved through it, as a parent does when they allow their children to suffer failures in order to learn responsible judgment and valuable lessons. In a similar way, when we consider the universe, and human life, we realize that neither kind of goodness would be possible without the possibility of evil.

As for the universe, its integrity would simply be annihilated if God were to miraculously suspend its stable operation whenever necessary in order to prevent every physical evil. Given this stable operation, on which the evolution of the universe and of life depends, it is inevitable that living organisms will occasionally act spontaneously in ways that bring them in conflict with that stable operation and so cause them injury, with pain and suffering as a result. As noted above, most physical evils occur because of physical good – recall the geological processes example. The lion (good) could not be itself unless it killed and consumed the gazelle. Therefore much of the beauty and majesty of our universe would be missing were God simply to halt every physical evil.

The absence of physical evil in the universe would also mean a universe in which life would not freely develop, and in which everything would operate according to a single pattern. That would translate into a world in which there would be nothing surprising in nature and in which human beings could not choose to impose their own patterns on things. It would be a world without freedom. It would be a completely regimented world in which we could not have any meaningful activity of our own. In the words of W. Norris Clarke:

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[10] Adapted from Ibid., 283.

> But, the objector might ask, would it not be even better to make a world wherein no physical evil were possible? But would this really be better in the long run? We would never be challenged to learn from experience, since we would never get hurt no matter what we did, and, worst of all, virtues would disappear since not needed… We would remain like simple, spoiled children… in a word, quite unlike the human beings we know and admire today.[11]

When we come to the greatest tragedy, the moral evil of human beings, we are faced with the same dilemma. There would be no freedom in a world in which God prevented all moral evil. In such a universe it would also be the case that human beings acting morally, with goodness in mind, could accomplish no good spontaneously. God would not simply be the Absolute Source of all things, but would also be the Absolute Obstructionist, preventing us from collaborating with him in the fulfillment of his desire to perfect the world he created, and to make moral masterpieces of our own lives. But if he enables us to freely cooperate, he must also enable us to choose freely to reject goodness, and so moral evil must be allowed if moral goodness is to be possible.

We do not want a divine dictator who would destroy our freedom, we want a Heavenly Father who does not violate the universe and human freedom, a God who deals with us in love, not simply in power. Here we can define love as "willing the good of the other as other," for their own sake and not for the sake of one's self. Pope Benedict XVI captured this point beautifully in his first homily as pope by showing the unloving, totalitarian lie behind the false promise of a universe with no evil, a lie that has been foisted upon human beings by "ideologies of power" that only make things worse, ideologies such as Nazism:

> It is not power, but love that redeems us! This is God's sign: he himself is love. How often we wish that God would show himself stronger, that he would strike decisively, defeating evil and creating a better world. All ideologies of power justify themselves in exactly this way; they justify the destruction of whatever would stand in the way of progress and the liberation of humanity. We suffer on account of God's patience. And yet, we need his patience. God, who became a lamb, tells us that the world is saved by the Crucified One, not by those who crucified him. *The world is redeemed by the patience of God. It is destroyed by the impatience of man.*[12]

Perhaps the Christian solution to Hume's argument lies precisely in the fact that God's work of creation and redemption is not yet complete. God wills a perfect world, and he is actively working to bring the universe and history to its perfect completion. In the words of 2 Peter 3:13, "What we are waiting for is what the LORD promised: the new heavens and the new earth, the place where righteousness will be at home." From this perspective of faith, we can say to Hume: "Yes, God is all-good and all-powerful, and yes, evil is present in 'vast amounts.' Therefore, God *will* defeat all evil." Indeed he is already powerfully and mysteriously doing so by enabling his creatures to be themselves and mercifully forgiving them when they fail, working through holy men and women to

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[11] Clarke, 285-286.

[12] Benedict XVI, Inaugural Homily, April 24, 2005, http://w2.vatican.va/content/benedict-xvi/en/homilies/2005/documents/hf_ben-xvi_hom_20050424_inizio-pontificato.html.

transform the world through their free cooperation with him. God would not allow any evil unless he could and would bring some greater good from it.

But that free cooperation and the transformation of the universe does not come simply from good intentions shared among a few; it comes from the loving sacrifice that God took upon himself when he became a human being in order to accomplish our liberation from evil. The ultimate answer that God gives to our question is the life, death and resurrection of Christ, which we annually celebrate in the seasons of Advent and Christmas, Lent and Easter. First, in his life Christ overcame moral evil in himself by being the perfect example of the fullness of human goodness with no moral evil whatsoever. In the words of Sacred Scripture, Jesus, the High Priest who offered himself in sacrifice for our sins, is not "unable to sympathize with our weaknesses, but… in every respect has been tempted as we are, yet without sin" (Heb 4:15).

Second, in his sacrifice on the Cross Jesus overcame moral evil not only in himself but in all human beings, past, present and future, by becoming an inexhaustible source of forgiveness to those who have sinned and the one who reconciles all human beings to each other and to God.

Finally, through the miracle of his resurrection, Christ overcame all physical evil and took our human nature into an indestructible life, preparing for a New Creation, a new heavens and earth with no evil whatsoever. This is why St. Paul calls the risen Christ "the firstborn of many brothers and sisters" (Rom 8:29), because he offers us the way to join him, body and soul, in a universe perfectly fulfilled and transformed that is to come. This is why, after the consecration at Mass, when Christ is truly present in the Eucharist, body, blood, soul and divinity, we sing "Save us, Savior of the world, for by your cross and resurrection, you have set us free." By his cross, all moral evil is overcome; by his resurrection, all physical evil is put to an end.

Christians do not deny the existence of evil; in fact, they see it for what it is, a hole in God's good creation. Science is put to the task of finding solutions to various evils, and has greatly improved human life through medical therapies, agricultural innovations and technological advancements, all of which are rightly celebrated as progress and as God's will for his human creatures. But evil will always be present in the world until God's plan for it is fulfilled, and the way to overcome it is to walk daily with Christ crucified and risen through life, being willing to suffer patiently out of love, recognizing that one's suffering is precious to God not because he wishes us to suffer, but because such love is his own attitude to our universe, a love that overcomes all evil. Through loving God and loving like God, our suffering in the face of evil is transformed into *sacrifice*, which is not misery but a joy-filled hope that, in response to the cry of the poor, the LORD "will wipe every tear from their eyes, and there shall be no more death or mourning, wailing or pain…" (Rev 21:4) in the New Creation, where God "will be all in all" (1 Cor 15:28).

C. "Ask and It Will Be Given": Divine Eternity and the Necessity of Prayer

With the mystery of evil observed and clarified, we can now turn to the very "cry" of those afflicted by it; prayer, and specifically *petitionary prayer*, the kind of prayer in which we ask God for things we need. There are many other kinds of prayer: prayer of thanksgiving, prayer of praise and adoration, and prayer of repentance, to name a few. But our critical question has to do with our asking God for things we want and need, and God's ability to answer. Jesus said "Ask, and it will be given to you; seek and you shall find; knock, and the door shall be opened to you" (Matt 7:7). How can God who is eternal and unchanging

answer the requests he encourages and even commands us to offer? And if God is all knowing, why does he instruct us to give him information by offering our needs to him?

To appreciate the question, consider this riddle about Zeus, the pagan Greek god of the sky, which comes from a pagan source but is equally applicable to Christian prayer. The mother of two daughters first visits one, who asks her to pray to Zeus for rain so that her garden will grow. Then she visits the second, who begs her to pray for sunshine because she is planning a journey.[13] What does Zeus (or, in reality, the one true God) do with contradictory requests? Does he grant one and not the other based on the merits of those in need? Or does he do so arbitrarily?

These puzzling questions show how often we think in very human ways about prayer and the divine response to prayer. In our ordinary way of thinking, God answers prayers in the way a friend or neighbor might respond to a request for a favor, or a first responder to a call for help in an emergency. First, the responder becomes aware that there is a need. Then she does something in her power to help, fills our need or rescues us from our distress.[14] But this cannot be the way it is with God. God, who perfectly knows all things, does not have to become aware of things unknown to Him. And God, who is eternal and unchanging, does not "begin" doing things; to be eternal means to have no beginning, nor to change from inactivity to activity. We imagine God responding in this way not because that is how prayer works, but because as creatures within time we cannot imagine the mystery of divine eternity. Yet if we are to answer our critical question, we must begin to think beyond our ordinary thoughts, to adopt a wisdom wider and deeper than our normal notions.

Based upon St. Thomas Aquinas' principle of double agency, we can begin to move beyond contradiction into a deeper appreciation of the mystery of prayer and why it is essential to the Christian life. The principle of double agency developed by St. Thomas Aquinas teaches us that God is already the source of all of our actions, including our prayers. This means that although our prayers fully originate with us in one way, they also fully originate with God in another: prayer is "wholly done by both" God and the person praying, as St. Thomas would say. It is not that we pray first and then God responds, but that as soon as we pray the prayer itself is already God's action in us and for us. As one of the *prefaces*, the prayer said at Mass shortly before the Eucharistic prayer, describes our prayers of thanksgiving, "You have no need of our praise, yet our desire to thank you is itself your gift." With our prayers it as if the first responder is the very one who dials 911 *and* makes the rescue! In the words of C.S. Lewis, "'God did (or said) it' and 'I did (or said) it' can both be true… The deeper the level within ourselves from which our prayer, or any other act, wells up, the more it is His, but not at all the less ours. *Rather, most ours when most His.*"[15]

This helps us to understand the first, and most important, reason that God wants us to tell him our needs and desires even when he already knows them and when they seem to contradict those of others (as when one prays that a hurricane will avoid their area, while another prays for it to avoid theirs, when it cannot avoid both). God purifies our desires when we pray sincerely and with humble trust. The purpose of prayer is not to change God but to change us, to connect us more deeply and authentically to God, the source of our being. St. Thomas Aquinas imagines salvation and happiness as a great chain of light hanging

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[13] Joseph Ratzinger, *Dogma and Preaching: Applying Christian Doctrine to Daily Life*, Michael Miller and Michael J. O'Connor, trans., 1st unabridged edition (San Francisco: Ignatius Press, 2011), 109.

[14] Dodds, 244.

[15] C.S. Lewis, *Letters to Malcolm Chiefly on Prayer*, as quoted in Dodds, 245.

from heaven and stretching to earth, and prayer as the way a person climbs it – notice that it is the person praying that is changed, not God:

> If we take hold of this chain and move ourselves hand over hand toward the top, we will seem to pull the chain downwards, but really we will not bring it down… Rather, we ourselves will be raised into the greater splendor of that luminous chain,… Before all acts, but most especially before theological work, it is beneficial for us to begin with prayer, not as if we were to draw down divine power which is everywhere present and nowhere contained, but as drawing and uniting ourselves to him through recollection and supplication.[16]

If prayer does not change God and only changes us, then why do we thank God for "answered" prayers? Once again the principle of double agency, with its distinction between the primary causality of God and the secondary causality of creatures, can help us to transcend our ordinary way of thinking. For example, God causes all living creatures on our planet to exist through a process we call "evolution," through the secondary causality of random genetic mutation, natural selection, etc. God provides the food we eat and the air we breathe through the secondary causality of plant and animal growth and a stable, oxygen-rich atmosphere. We should think of petitionary prayer as yet another secondary cause that at times God uses to accomplish what he intends.

In other words, God allows our prayers to cause things that might otherwise not be accomplished. He does so through his eternal decree and unchanging will to bring the universe and his creatures to fulfillment, which we call *divine providence*. St. Thomas explains why this does not mean that God is changed by our prayers, because it his unchanging will that some things be caused by prayer:

> The cause of some things that are done by God is prayers and holy desires… [P]rayers are efficacious [effective; successful] before God, yet they do not destroy the [unchangeable] order of divine providence, because whatever request is granted already falls under the order of divine providence. To say we should not pray… because his providence is [unchangeable] is like saying that we should not walk in order to get somewhere, nor eat in order to be nourished, which is completely absurd.[17]

C.S. Lewis' point above, i.e. that the deeper the level within ourselves from which we pray, the better our prayer is, might help us understand why the Church teaches that the intercession of holy men and women on earth, and above all the saints in heaven, especially the Virgin Mary, is so powerfully effective. The deeper one is completely united to God, the more it is the case that one's prayers are in keeping with God's will; imperfectly on earth but perfectly in heaven. Among all human beings, the saints are "most His," and so uniting our prayers to theirs and seeking their intercession is something that God eternally desires of us. God has revealed that all of the faithful are united in Christ's mystical body, the Church, which transcends the boundaries between life and death, heaven and earth. The spiritual goods and happiness that the saints have, they wish to share with us; and God eternally wishes that the whole human family be united in what is called "the communion of saints."

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[16] St. Thomas Aquinas, *In de div. nom.* III, l. un., 239, 243-244, as quoted in Dodds, 246-247.
[17] St. Thomas Aquinas, *ScG* III.96.8.

Just as he wishes us to share our goods with the poor, the saints help us by taking up our cause as God empowers them to do so.

Finally, let's connect the mystery of prayer to the mystery of evil that prayer so often addresses. In the section on the problem of evil we noted that God would never allow evil unless he could bring a greater good from it. God has revealed that his plan for the universe is to perfect it, to offer the perfect fullness of life, everlasting happiness and the complete conquest of all physical and moral evil. As we read in the Book of Revelation, chapter 21:

1 Then I saw a new heaven and a new earth. The former heaven and the former earth had passed away, and the sea was no more.
2 I also saw the holy city, a new Jerusalem, coming down out of heaven from God, prepared as a bride adorned for her husband.
3 I heard a loud voice from the throne saying, "Behold, God's dwelling is with the human race. He will dwell with them and they will be his people and God himself will always be with them...
4 He will wipe every tear from their eyes, and there shall be no more death or mourning, wailing or pain, [for] the old order has passed away."
5 The one who sat on the throne said, "Behold, I make all things new." Then he said, "Write these words down, for they are trustworthy and true."

God's will for his creatures is the fullness of life in a new heaven and earth beyond any evil. And yet he refuses to go forward with his plan without our cooperation. In light of this, prayer is one essential way in which we begin to cooperate, to allow that transformation to occur within ourselves and within those whose lives we touch. Just as in the Eucharist, in which bread and wine are utterly transformed while in another way remaining completely themselves, prayer is the desire that the whole world become the reality hidden in the Eucharist: humanity risen and glorified, and the physical universe transformed according to God's will for it.

Our consideration of the tragedy of evil and the necessity of prayer now sets the stage for our final critical issue, the reality of miracles. Let's consider a miracle of healing from our own day to set the stage.

D. Miracles: Signs and Wonders at the Crossroads of Faith and Science

Under normal circumstances, the beginning of the year 2000 would've been a wonderful time in the life of Elizabeth Comparini Arcolino, a Brazilian mother of three children who had recently learned that she was expecting her fourth child. But during an emergency visit to the hospital in the 16th week of her pregnancy, Elizabeth's happiness was troubled by tragic news. Her baby's placenta had torn, resulting in a total loss of amniotic fluid, the watery substance that creates the unborn baby's necessary growth environment. She was told by the examining physician that the baby had absolutely no chance of survival, and was advised to have an abortion.

At that very moment Bishop Diogenes Matthes, her diocesan bishop, was at the hospital visiting a friend. He was summoned to Elizabeth's room, where he urged her to consult another physician. But there was a slight problem with his advice, at least for eyes without faith: the bishop recommended a physician who had died 38 years earlier.

What the bishop advised Elisabeth was that she join with him in praying for the intercession of *Gianna Beretta Molla*, an Italian wife, mother, and physician who had died to save the life of her own unborn child. In late 1961, Molla was newly pregnant when she

learned that she had a tumor in her uterus that was threatening her own life and the life of her baby. Rather than have an abortion, or even a morally acceptable hysterectomy, she chose the path riskiest to herself and safest for her baby – an operation to remove the tumor. Her heroic desire to save the baby was fulfilled, but only at the sacrifice of her own life – Molla died on April 28, 1962, at the age of 39 due to an infection she would have avoided had she not had the surgery.

One miracle had already been attributed to the intercession of Gianna Molla, and due to her remarkable love and witness as a Catholic mother, St. John Paul II had beatified her in 1994. This meant that she was one miracle short of the two miracles required for her canonization as a saint, giving Bishop Matthes his idea: "You don't kill life inside the mother," the bishop told Elisabeth. "This is the time for Blessed Gianna Beretta Molla to intercede for the life you are carrying." At home the bishop began praying to Molla, saying, "The time for your canonization has arrived. Intercede to the LORD for the grace of a miracle and save the life of this little baby."[18]

Elisabeth took the bishop's advice and began to ask Gianna for her intercession. She turned out to be the "specialist" Elisabeth needed. Despite the lack of amniotic fluid, and in an event without scientific explanation, Elisabeth delivered a healthy baby girl by Caesarean section on May 31, 2000. She and her husband named their child Gianna Marie after the woman of faith and of science on whose prayers they had relied.[19] After a careful investigation that included scientists and doctors, John Paul II accepted the miracle as authentic. Four years later, on May 16, 2004, the Arcolino family, including Gianna Marie, were in Rome along with thousands of other pilgrims for Molla's canonization. Gianna Beretta Molla, believer, scientist, and pro-life hero, is now St. Gianna Molla. She has joined the ranks of the extraordinary men and women throughout history who have been recognized by the Church as saints.

The story of the Arcolino family and their heavenly physician brings us to our final critical issue of this chapter—miracles—and to our question regarding the integrity of nature. If the Church acknowledges the possibility of miracles such as this, how can we say that the Christian faith upholds the integrity of nature? Does God insert himself into ordinary events and so violate the order he established in the universe? To answer our questions, we must first understand the definition of a miracle.

1. Miracles in the Light of Faith

The French theologian René Latourelle offers a definition of a *miracle* in the precise theological sense: "a religious wonder that expresses, in human beings and the universe, a special and utterly free intervention of God, who uses it to give human beings a sign of the presence of his message of salvation in the world."[20] Recalling the miracle surrounding the pregnancy of Elisabeth Arcolino, we can see that each of these elements was present:

1) A "Religious Wonder": The Arcolino baby's survival transcended the ordinary course of things in nature. But this escape from death was not a simple wonder; it was one related directly to the prayers made by Elisabeth, her bishop, and others. It came after humble, trusting, persevering prayer; it came from the mediation of Jesus Christ shared with his holy

[18] "A Pro-Life Icon to be Canonized: Gianna Molla Gave Her Life for Her Unborn Daughter," *Zenit: The World seen from Rome* (http://www.zenit.org/english/visualizza.phtml?sid=53575).
[19] Ibid.
[20] René Latourelle and Rino Fisichella, eds., *Dictionary of Fundamental Theology* (New York: Crossroad, 1994), 702.

and heroic servant, the pro-life, pro-baby hero St. Gianna. In this event we can clearly see a harmony between the wonder of the baby's miraculous cure and the calling on God, through St. Gianna, to which God "responded." This is the nature of all miracles; they are not simply wonders, but *religious wonders*, God's answere to the cry of those who place their trust in him.

2) A Sign of God's Message of Salvation: The Arcolino healing miracle was not simply a mysterious, inexplicable blessing for the baby and her family. It was also a picture that painted a thousand words, an action that taught many things at once. It made known that God's saving power is real. It showed God's love and care for all human beings, including the unborn, a very important message for our age in which many societies (including the United States) have legalized the destruction of unborn children for all nine months of pregnancy. Finally, it confirmed the heroic holiness and the presence in heaven of Gianna Molla so that the Church could recognize her for the assistance that she can offer to the Church's members on Earth. God, the greatest teacher, taught several lessons all at once in this marvelous event. The Arcolino pregnancy miracle was, quite fittingly, a miracle *pregnant* with meaning. It was not divine micromanagement of the universe, but a message to God's human creatures of his blessing and salvation.

3) A Special and Free Divine "Intervention": God continuously acts in the world to bring about the fulfillment of his plan through the secondary causality of creatures within the normal course of nature. All pregnancies are God working through natural causes to bring new human life into the world. But a miracle is somewhat different than this normal course of divine providence. A miracle is a singular (i.e. one-time) "intervention" of God for an express purpose. In such an intervention, God is not acting in violation of nature; he is enabling natural causes to have effects that transcend their ordinary capacity. It is not that God sets aside natural causes; rather, natural causes are empowered to do what they cannot ordinarily do. The Arcolino healing did not occur through the violation of nature; the injured placenta and amniotic sac was enabled by God to do what it ordinarily does but had become incapable of doing. In the words of the International Theological Commission, in miracles "particular actions of God bring about effects that transcend the capacity of created causes acting according to their natures" in a way that is "non-disruptive."[21] In a miracle, God doesn't overrule a natural cause, he rather enables it to do what it cannot ordinarily do under given circumstances.

The term "divine intervention" is the most common way of describing a miracle, but it only signifies what a miracle seems to be from our ordinary, limited perspective. We must treat this word with the same care that we applied to understanding prayer. From the perspective of God's plan of salvation, his plan to perfect the universe, perhaps it is helpful to think of miraculous signs and wonders not as "interventions" by God suspending natural causes and doing for them what they cannot do themselves, but as nature finally being able to do what God ultimately intends, thanks to God's special assistance. Miracles only make sense if we place them in the context of God's plan for the universe. Thanks to God's loving providence, and not simply by its own power, the universe is journeying to a fulfillment in which physical and moral evil will be no more. If this is the case, then miracles are streams of light breaking through the ordinary, temporary, imperfect "old order" (Rev 21:4) of things, the advent of a new set of laws for the universe through which the material universe will perfectly radiate the higher, spiritual realities of love and freedom.

[21] ITC, *Communion and Stewardship*, no. 70.

One person who saw miracles this way was the great Catholic novelist Flannery O'Connor (1925-1964). In response to a friend for whom miracles were an obstacle to accepting the Christian Faith because they seemed to violate natural laws, O'Connor took the reverse perspective:

> …for my part I think that when I know what the laws of the flesh and the physical really are, then I will know what God is. We know them as we see them, not as God sees them. For me it is the virgin birth, the Incarnation, the resurrection which are the true laws of the flesh and the physical. Death, decay, destruction are the suspension of these laws… The resurrection of Christ seems [to me] the high point of the law of nature.[22]

In a similar fashion, the Catholic convert and poet Richard Crashaw (1612-1649) interpreted the Miracle of Cana, where Jesus turned water into wine, as the water "blushing" in the presence of its LORD and Maker.[23] When the new order of things begins to break through, we discover *all* that nature can do when God is fully present to it and when it is conformed to God's will for it.

C.S. Lewis offers the analogy of God as an author. If an author writes a story in which characters are in a completely ordinary plot, and it ends up in a tragedy or a complicated mess, then it would ruin the story to include something wondrous and strange that comes out of the blue to rescue them. That is not what one expects in a "normal" plot. But if an author writes a novel in which the wondrous and strange is really at the heart of the plot, then it would be entirely different; the author *must* include the wondrous and strange in order to avoid ruining the story. God has revealed that the universe as we know it is not completely ordinary. It is being taken over by a new kind of reality that goes beyond it and transforms it, the order of grace and salvation, a new heavens and earth.[24] Miracles are the plot twists of God's great book—history and the universe—which bring them closer to their magnificent and surprising conclusion. With this in mind, as Flannery O'Connor saw clearly, it becomes obvious who the central character is – the man whose very existence was a miracle, who performed countless miracles of healing and power, and whose death was followed by the greatest miracle of all. If miracles are the heart of God's story, then Jesus of Nazareth is clearly its main protagonist, its central figure.

2. The Miracles of Jesus

The first miracle in the life of Christ is the *Incarnation*, the assumption of a fully human nature, body and soul, by the divine *Logos* in order to achieve our salvation and reunion with God.[25] Unlike any other human being, Christ is "conceived by the power of the Holy Spirit and born of the Virgin Mary," a human child without a human father. The Christian Faith teaches that Jesus Christ, who from eternity is truly God, became true man in his Incarnation.[26] In the words of St. Paul, "in the *fullness of time* God sent forth his Son, born of woman" (Gal. 4: 4). The phrase *"fullness of time"* reveals to us that what happened in the womb of Mary is the central turning-point of all of human history. C.S. Lewis shows us how

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[22] Flannery O'Connor, *The Habit of Being: Letters of Flannery O'Connor*, selected and edited by Sally Fitzgerald (New York: Farrar, Straus & Giroux,1979), 100.
[23] Haffner, *Mystery of Creation,* 104.
[24] Ibid., 98-99.
[25] CCC 461.
[26] CCC 461.

the Incarnation gives a new dimension to the things we see all around us in the natural world:

> In this descent [of God's Son]...everyone will recognize a familiar pattern: a thing written all over the world. It is the pattern of all vegetable life. It must belittle itself into something hard, small, and deathlike, it must fall into the ground: thence the new life re-ascends. It is the pattern of all animal generation too. There is descent from the full and perfect organisms into the spermatozoon and ovum, and in the dark womb a life at first inferior in kind to that of the species which is being produced: then the slow ascent to the perfect embryo, to the living, conscious baby, and finally to the adult…The pattern is there in nature because it was first there in God.[27]

The Incarnation reveals that all the "descent" around us points to the miracle in which God himself descends to us in order to re-ascend with us for our salvation.

In his earthly life, Jesus performed many miracles. Some of these miracles had natural effects which Lewis calls *nature miracles*, such as turning water into wine. In these miracles Jesus did "small and up-close" what God does "large and everywhere." God, through the secondary causes of plant biology and organic chemistry, "changes" water into wine gradually in vineyards throughout the world. At the wedding feast of Cana (Jn 2: 1-11), Jesus does the same in an instant.

We can say the same of Jesus' many healing miracles. Every time a person recovers from an illness, God heals her through secondary causes of antibiotics and other medicines. Jesus, in his miracles of healing, does quickly and flawlessly what the body does slowly and imperfectly; in him, "the power that always was behind all healings puts on a face and hands."[28] Through these and many other nature miracles, such as multiplying loaves and fishes, he reveals that he is the God who created and sustains the universe, not merely a king, but *the LORD*.

Other miracles performed by Jesus involved things that never happen in the normal course of nature, such as when he raised the dead, walked on water and was transfigured before Peter, James and John. C.S. Lewis calls these acts of power *miracles of the New Creation*. Such miracles show that in the New Creation as described in Revelation 21:1-5, matter will be made obedient to spirit in a way that we can scarcely begin to imagine. Jesus' raising of Lazarus or of the widow's son from death reveals that a glorious and irreversible resurrection of all the dead is coming, what is called the *resurrection of the body*.

Finally, after suffering the agony of betrayal, a physical torture, a separation from all whom he loved, a gruesome death and descent into hell, the third day after his execution found Jesus alive and among his disciples in a way that they could never have foreseen. He was clearly beyond the ordinary limits of human bodily life, not limited by space and time any longer. But he was still himself and fully human; he could still eat food, touch and be touched. Therefore, the *Catechism of the Catholic Church* declares,

> Christ's humanity can no longer be confined to Earth and belongs henceforth only to the Father's divine realm…in his risen body he passes from the state of death to another life beyond time and space. At Jesus' Resurrection his body is filled with

[27] Lewis, *Miracles*, 112.
[28] Ibid., 140.

> the power of the Holy Spirit: he shares the divine life in his glorious state, so that St. Paul can say that Christ is 'the man of heaven.'"[29]

In summary, we see that all the miracles of Jesus have a message to share with us. They are not merely for show. They are not there to violate nature or to cancel it out, but to signal its transformation in a new and glorious reality that God has prepared for those who love him. They are clues to the meaning of the universe.

3. The Integrity of Nature Revisited

We can now face our critical question directly: if miracles are real, what about the integrity of nature? A proper theological account of miracles shows the difference between the veneration of the miracles of Christ and the saints, on the one hand, and a disrespect for nature and natural causes on the other.

First, a miracle only makes sense in the context of faith, and faith is the domain of human persons. To posit miracles at the beginning of the universe or at the origins of life (as creationists do) makes no sense, for there were no human beings to receive the divine sign, the religious wonder, of a miracle at that time. Also, miracles do not replace the natural processes and patterns in nature by inserting God's direct action as an explanation for the ways things normally occur. As moments of salvation and divine signs that teach, miracles are singular events by definition; when they occur, they cause astonishment precisely because they are not the way things usually happen.

Finally, to acknowledge the reality of miracles is not to picture God as "tuning up" or nudging the universe to do what He failed to make it capable of in creation. In a miracle, God does not violate nature; he ennobles it, showing its greatest possibilities when it is fully united to him. Water blushes, dead bodies are filled with life, and a new indestructible kind of life is revealed. Miracles are a unique way God responds to the cry of His people in ways they could never anticipate, and they usher in a new reality that awaits them and the whole universe.

[29] Ibid., 646.

The Galileo Affair: Selections

Illustrated page from Martin Luther's Bible (1545) showing the earth at the center of the universe (geocentrism). Luther rejected geocentrism as contrary to Scripture: ***"[Nicolas Copernicus] wants to prove that the earth moves and goes around instead of the sky, the sun, the moon, just as if somebody… in a carriage or ship might hold that he was sitting still and at rest while the earth and the trees walked and moved."***

The following selections contain a group of texts contemporary with the events of the Galileo Affair (1613-1633) and one text from the twentieth century (1992). The first four consists of two letters, one from Galileo and the other from St. Robert Bellermine, and Galileo's condemnation by the Roman Inquisition and his abjuration (recantation) of heliocentrism. The last document represents the modern magisterium's assessment and apology for the Galileo affair.

a. Galileo Galilei, Letter to Benedetto Castelli (Concerning Castelli's conversation with the Grand Duchess Cristina) December 21, 1613

Galileo wrote this letter in response to a report by his former pupil, Benedetto Castelli, about a conversation that Castelli had at the Ducal palace of the Medici family regarding Copernicanism and what it implied for biblical interpretation. Galileo was eager to show (1) that since Copernicanism was the true account of celestial mechanics, (2) it could not (in principle) contradict any assertion of Scripture.

Very Reverend Father and My Most Respectable Sir:

Yesterday Mr. Niccolò Arrighetti came to visit me and told me about you. Thus I took infinite pleasure in hearing about what I did not doubt at all, namely about the great satisfaction you have been giving to the whole University…

After Mr. Arrighetti related the details you had mentioned, they gave me the occasion to go back to examine some general questions about the use of the Holy Scripture in disputes involving physical conclusions and some particular other ones about Joshua's passage, which was presented in opposition to the earth's motion and sun's stability by the Grand Duchess Dowager with some support by the Most Serene Archduchess.

In regard to the first general point of the Most Serene Ladyship, it seems to me very prudent of her to propose and of you to concede and to agree that the Holy Scripture can never lie or err, and that its declarations are absolutely and inviolably true. I should have added only that, through the Scripture cannot err, nevertheless some of its interpreters and expositors can sometimes err in various ways. One of these would be very serious and very frequent, namely to want to limit oneself always to the literal meaning of the words; for there would thus emerge not only various contradictions but also serious heresies and blasphemies, and it would be necessary to attribute to God feet, hands and eyes, as well as bodily and human feelings like anger, regret, hate and sometimes even forgetfulness of things past and ignorance of future ones. Thus in the Scripture one finds many propositions which look different from the truth if one goes by the literal meaning of the words, but which are expressed in this manner to accommodate the incapacity of common people; likewise, for the few who deserve to be separated from the masses, it is necessary that wise interpreters produce their true meaning and indicate the particular reasons why they have been expressed by means of such words.

Thus, given that in many places the Scripture is not only capable but necessarily in need of interpretations different from the apparent meaning of the words, it seems to me that in disputes about natural phenomena it should be reserved to the last place. For the Holy Scripture and nature both equally derive from the divine Word, the former as the dictation of the Holy Spirit, the latter as the most obedient executrix of God's commands; moreover, in order to adapt itself to the understanding of all people, it was appropriate for the Scripture to say many things which are different from absolute truth, in appearance and in regard to the meaning of the words; on the other hand, nature is inexorable and immutable, and she does not care at all whether or not her recondite reasons and modes of operations are revealed to human understanding, and so she never transgresses the terms of the laws imposed on her; therefore, whatever sensory experience places before our eyes or necessary demonstrations prove to us concerning natural effects should not in any way be called into question on account of scriptural passages whose words appear to have a different meaning, since not every statement of the Scripture is bound to obligations as severely as each effect of nature. Indeed, because of the aim of adapting itself to the capacity of unrefined and undisciplined peoples, the Scripture has not abstained from somewhat concealing its most basic dogmas, thus attributing to God himself properties contrary to and very far from his essence; so who will categorically maintain that, in speaking even incidentally of the earth of the sun or other creatures, it abandoned this aim and chose to restrict itself rigorously within the limited and narrow meanings of the words: This would have been especially problematic when saying about these creatures things which are very far from the primary function of the Holy Writ, indeed things which, if said and put forth in their naked and unadorned truth, would more likely harm its primary intention and make people more resistant to persuasion about the articles pertaining to salvation.

Given this, and moreover it being obvious that two truths can never contradict each other, the task of wise interpreters is to strive to find the true meanings of scriptural passages agreeing with those physical conclusions of which we are already certain and sure from clear sensory experience or from necessary demonstrations. Furthermore, as I already said, though the Scripture was inspired by the Holy Spirit, because of the mentioned reasons many passages admit of interpretations far removed from the literal meaning, and also we cannot assert with certainty that all interpreters speak by divine inspiration; hence I should think it would be prudent not to allow anyone to oblige scriptural passages to have to maintain the truth of any physical conclusions whose contrary could ever be proved to us by the senses and demonstrative and necessary reasons. Who wants to fix a limit for the human mind? Who wants to assert that everything which is knowable in the world is already known? Because of this, it would be most advisable not to add anything beyond necessity to the articles concerning salvation and the definition of the Faith, which are firm enough that there is no danger of any valid and effective doctrine ever rising against them. If this is so, what greater disorder would result from adding them upon request by persons of whom we do not know whether they speak with celestial inspiration, and of whom also we see clearly

that they are completely lacking in the intelligence needed to understand, let alone to criticize, the demonstrations by means of which the most exact sciences proceed in the confirmation of some of their conclusions?

I should believe that the authority of the Holy Writ has merely the aim of persuading men of those articles and propositions which are necessary for their salvation and surpass all human reason, and so could not become credible through some other science or any other means except the mouth of the Holy Spirit itself. However, I do not think it necessary to believe that the same God who has furnished us with senses, language, and intellect would want to bypass their use and give us by other means the information we can obtain with them. This applies especially to those sciences about which one can read only very small phrases and scattered conclusions in the Scripture, as is particularly the case for astronomy, of which it contains such a small portion that one does not even find in it the names of all the planets; but if the first sacred writers had been thinking of persuading the people about the arrangement and the movements of the heavenly bodies, they would not have treated of them so sparsely, which is to say almost nothing in comparison to the infinity of very lofty and admirable conclusions contained in such a science.

So you see, if I am not mistaken, how disorderly is the procedure of those who in disputes about natural phenomena that do not directly involve the Faith give first place to scriptural passages, which they quite often misunderstand anyway. However, if these people really believe they have grasped the true meaning of a particular scriptural passage, and if they consequently feel sure of possessing the absolute truth on the question they intend to dispute about, then let them sincerely tell me whether they think that someone in a scientific dispute who happens to be right has a great advantage over another who happens to be wrong. I know they will answer Yes, and that the one who supports the true side will be able to provide a thousand experiments and a thousand necessary demonstrations for his side, whereas the other person can have nothing but sophisms, paralogisms, and fallacies. But if they know they have such an advantage over their opponents as long as the discussion is limited to physical questions and only philosophical weapons are used, why is it that when they come to the meeting they immediately introduce an irresistible and terrible weapon, the mere sight of which terrifies even the most skillful and expert champion? If I must tell the truth, I believe it is they who are the most terrified, and that they are trying to find a way of not letting the opponent approach because they feel unable to resist his assaults. However, consider that, as I just said, whoever has truth on his side has a great, indeed the greatest, advantage over the opponent, and that it is impossible for two truths to contradict each other; it follows therefore that we must not fear any assaults launched against us by anyone, as long as we are allowed to speak and to be heard by competent persons who are not excessively upset by their own emotions and interests.

b. St. Robert Bellarmine, Letter to Paolo A. Foscarini (On Galileo's claim concerning the truth of heliocentrism) April, 12 1615

At the time of this letter, Bellarmine (1542-1621) was head of the Roman Inquisition (aka the Holy Office). He wrote to Foscarini, a Carmelite priest who was a heliocentrist, concerning his (and the more famous Galileo's) opinions concerning the earth's motion. Although Bellarmine was a convinced geocentrist, he allowed heliocentrism as a mathematical account of celestical mechanics. Bellarmine's caution (laced with tentative open-mindedness) is evident throughout the letter. Galileo knew of this letter and crafted his own Letter to the Grand Duchess Cristina (1615) as a guarded response to it.

My Reverend Father,

I have read with interest the letter in Italian and the essay in Latin which your Paternity sent to me; I thank you for one and for the other and confess that they are all full of intelligence and erudition. You ask for my opinion, and so I shall give it to you, but very briefly, since now you have little time for reading and I for writing.

First I say that it seems to me that your Paternity and Mr. Galileo are proceeding prudently by limiting yourselves to speaking suppositionally and not absolutely, as I have always believed that Copernicus spoke. For there is no danger in saying that, by assuming the Earth moves and the sun stands still, one saves all of the appearances better than by postulating eccentrics and epicycles; and that is sufficient for the mathematician. However, it is different to want to affirm that in reality the sun is at the center of the world and only turns on itself, without moving from east to west, and the earth is in the third heaven and revolves with great speed around the sun; this is a very dangerous thing, likely not only to irritate all scholastic philosophers and theologians, but also to harm the Holy Faith by rendering Holy Scripture false. For Your Paternity has well shown many ways of interpreting Holy Scripture, but has not applied them to particular cases; without a doubt you would have encountered very great difficulties if you had wanted to interpret all those passages you yourself cited.

Second, I say that, as you know, the Council [of Trent] prohibits interpreting Scripture against the common consensus of the Holy Fathers; and if Your Paternity wants to read not only the Holy Fathers, but also the modern commentaries on Genesis, the Psalms, Ecclesiastes, and Joshua, you will find all agreeing in the literal interpretation that the sun is in heaven and turns around the earth with great speed, and that the earth is very far from heaven and sits motionless at the center of the world. Consider now, with your sense of prudence, whether the church can tolerate giving Scripture a meaning contrary to the Holy Fathers and to all the Greek and Latin commentators. Nor can one answer that this is not a matter of faith, since it is not a matter of faith "as regards the topic", it is a matter of faith "as regards the speaker"; and so it would be heretical to say that Abraham did not have two

children and Jacob twelve, as well as to say that Christ was not born of a virgin, because both are said by the Holy Spirit through the mouth of the prophets and the apostles.

Third, I say that if there were a true demonstration that the sun is at the center of the world and the earth in the third heaven, and that the sun does not circle the earth but the earth circles the sun, then one would have to proceed with great care in explaining the Scriptures that appear contrary; and say rather that we do not understand them than that what is demonstrated is false. But I will not believe that there is such a demonstration, until it is shown me. Nor is it the same to demonstrate that by supposing the sun to be at the center and the earth in heaven one can save the appearances, and to demonstrate that in truth the sun is at the center and the earth in the heaven; for I believe the first demonstration may be available, but I have very great doubts about the second, and in case of doubt one must not abandon the Holy Scripture as interpreted by the Holy Fathers. I add that the one who wrote, "The sun also riseth, and the sun goeth down, and hasteth to his place where he arose," was Solomon, who not only spoke inspired by God, but was a man above all others wise and learned in the human sciences and in the knowledge of created things; he received all this wisdom from God; therefore it is not likely that he was affirming something that was contrary to truth already demonstrated or capable of being demonstrated. Now, suppose you say that Solomon speaks in accordance with appearances, since it seems to us that the sun moves (while the earth does so), just as to someone who moves away from the seashore on a ship it looks like the shore is moving, I shall answer that when someone moves away from the shore, although it appears to him that the shore is moving away from him, nevertheless he knows that it is an error and corrects it, seeing clearly that the ship moves and not the shore; but in regard to the sun and the earth, no wise man has any need to correct the error, since he clearly experiences that the earth stands still and that the eye is not in error when it judges that the it also is not in error when it judges that the stars move. And this is enough for now.

c. Excerpt from the Sentence of the Tribunal of the Supreme Inquisition against Galileo Galilei (June 22, 1633)

These next two documents, Galileo's sentence and his abjuration, both resulted from the same trial proceeding. In the former, Galileo was convicted of "vehement suspicion of heresy" rather than "formal heresy," which would have been the clearest and highest form of condemnation. Galileo's prison sentence was immediately commuted to confinement at the Episcopal palace of his friend, the archbishop of Sienna, and eventually to house arrest at his Tuscan villa. His oldest daughter, a cloistered nun, requested that she be allowed to take on her father's penance as his substitute; her request was granted.

Invoking then the Most Holy Name of Our Lord Jesus Christ, and of His most glorious Mother Mary, ever Virgin, for this Our definite sentence…We say, pronounce, sentence, and declare, that thou, the said Galileo, by the things deduced during this trial, and by thee confessed as above, hast rendered thyself vehemently suspected of heresy by this Holy

Office, that is, of having believed and held a doctrine which is false, and contrary to the Holy Scriptures, to wit: that the Sun is the centre of the universe, and that it does not move from east to west, and that the Earth moves and is not the centre of the universe: and that an opinion may be held and defended as probable after having been declared and defined as contrary to Holy Scripture; and in consequence thou hast incurred all the censures and penalties of the Sacred Canons, and other Decrees both general and particular, against such offenders imposed and promulgated. From the which We are content that thou shouldst be absolved, if, first of all, with a sincere heart and unfeigned faith, thou dost before Us abjure, curse, and detest the above-mentioned errors and heresies and any other error and heresy contrary to the Catholic and Apostolic Roman Church, after the manner that We shall require of thee. And to the end that this thy grave error and transgression remain not entirely unpunished, and that thou mayst be more cautious in the future, and an example to others to abstain from and avoid similar offences, We order that by a public edict the book of DIALOGUES OF GALILEO GALILEI be prohibited, and We condemn thee to the prison of this Holy Office during Our will and pleasure; and as a salutary penance We enjoin on thee that for the space of three years thou shalt recite once a week the Seven Penitential Psalms, reserving to Ourselves the faculty of moderating, changing, or taking from, all other or part of the above-mentioned pains and penalties. And thus We say, pronounce, declare, order, condemn, and reserve in this and in any other better way and form which by right We can and ought.

Galileo's Abjuration

I, Galileo Galilei, son of the late Vincenzio Galilei of Florence, aged 70 years, tried personally by this court, and kneeling before You, the most Eminent and Reverend Lord Cardinals, Inquisitors-General throughout the Christian Republic against heretical depravity, having before my eyes the Most Holy Gospels, and laying on them my own hands; I swear that I have always believed, I believe now, and with God's help I will in future believe all which the Holy Catholic and Apostolic Church doth hold, preach, and teach. But since I, after having been admonished by this Holy Office entirely to abandon the false opinion that the Sun was the centre of the universe and immoveable, and that the Earth was not the centre of the same and that it moved, and that I was neither to hold, defend, nor teach in any manner whatever, either orally or in writing, the said false doctrine; and after having received a notification that the said doctrine is contrary to Holy Writ, I did write and cause to be printed a book in which I treat of the said already condemned doctrine, and bring forward arguments of much efficacy in its favour, without arriving at any solution: I have been judged vehemently suspected of heresy, that is, of having held and believed that the Sun is the centre of the universe and immoveable, and that the Earth is not the centre of the same, and that it does move. Nevertheless, wishing to remove from the minds of your Eminences and all faithful Christians this vehement suspicion reasonably conceived against me, I abjure with sincere heart and unfeigned faith, I curse and detest the said errors and heresies, and generally all and every error and sect contrary to the Holy Catholic Church.

And I swear that for the future I will neither say nor assert in speaking or writing such things as may bring upon me similar suspicion; and if I know any heretic, or one suspected of heresy, I will denounce him to this Holy Office, or to the Inquisitor and Ordinary of the place in which I may be. I also swear and promise to adopt and observe entirely all the penances which have been or may be by this Holy Office imposed on me. And if I contravene any of these said promises, protests, or oaths, (which God forbid!) I submit myself to all the pains and penalties which by the Sacred Canons and other Decrees general and particular are against such offenders imposed and promulgated. So help me God and the Holy Gospels, which I touch with my own hands. I Galileo Galilei aforesaid have abjured, sworn, and promised, and hold myself bound as above; and in token of the truth, with my own hand have subscribed the present schedule of my abjuration, and have recited it word by word. In Rome, at the Convent della Minerva, this 22nd day of June, 1633. I, GALILEO GALILEI, have abjured as above, with my own hand.

d. St. John Paul II Excerpt from *Faith Can Never Conflict with Reason* (Address to the Pontifical Academy of the Sciences) October 31, 1992.

This last document represents what many have called John Paul II's "rehabilitation" of Galileo and an acknowledgement of the Church's errors and wrongdoing during the Galileo affair. This address was John Paul's response to a ten-year effort on the part of a Vatican commission's investigation into the Church's treatment of Galileo.

One might perhaps be surprised that at the end of the Academy's study week on the theme of the emergence of complexity in the various sciences, I am returning to the Galileo case. Has not this case long been shelved and have not the errors committed been recognized?

That is certainly true. However, the underlying problems of this case concern both the nature of science and the message of faith. It is therefore not to be excluded that one day we shall find ourselves in a similar situation, one which will require both sides to have an informed awareness of the field and of the limits of their own competencies. The approach provided by the theme of complexity could provide an illustration of this.

5. A twofold question is at the heart of the debate of which Galileo was the centre.

The first is of the epistemological order[30] and concerns biblical hermeneutics.[31] In this regard, two points must again be raised. In the first place, like most of his adversaries, Galileo made no distinction between the scientific approach to natural phenomena and a reflection on nature, of the philosophical order, which that approach generally calls for. That is why he rejected the suggestion made to him to present the Copernican system as a

[30] That is, concerning the ay we know things.
[31] Biblical interpretation

hypothesis, inasmuch as it had not been confirmed by irrefutable proof. Such therefore, was an exigency of the experimental method of which he was the inspired founder.

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

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

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

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

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

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

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

trap of a hesitant attitude and of hasty judgement, both of which can cause considerable harm.

8. Another crisis, similar to the one we are speaking of, can be mentioned here. In the last century and at the beginning of our own, advances in the historical sciences made it possible to acquire a new understanding of the Bible and of the biblical world. The rationalist context in which these data were most often presented seemed to make them dangerous to the Christian faith. Certain people, in their concern to defend the faith, thought it necessary to reject firmly-based historical conclusions. That was a hasty and unhappy decision. The work of a pioneer like Fr Lagrange[32] was able to make the necessary discernment on the basis of dependable criteria.

It is necessary to repeat here what I said above. It is a duty for theologians to keep themselves regularly informed of scientific advances in order to examine if such be necessary, whether or not there are reasons for taking them into account in their reflection or for introducing changes in their teaching.

9. If contemporary culture is marked by a tendency to scientism, the cultural horizon of Galileo's age was uniform and carried the imprint of a particular philosophical formation. This unitary character of culture, which in itself is positive and desirable even in our own day, was one of the reasons for Galileo's condemnation. The majority of theologians did not recognize the formal distinction between Sacred Scripture and its interpretation, and this led them unduly to transpose into the realm of the doctrine of the faith a question which in fact pertained to scientific investigation.

In fact, as Cardinal Poupard has recalled, Robert Bellarmine, who had seen what was truly at stake in the debate personally felt that, in the face of possible scientific proofs that the earth orbited round the sun, one should "interpret with great circumspection" every biblical passage which seems to affirm that the earth is immobile and "say that we do not understand, rather than affirm that what has been demonstrated is false". Before Bellarmine, this same wisdom and same respect for the divine Word guided St Augustine when he wrote: "If it happens that the authority of Sacred Scripture is set in opposition to clear and certain reasoning, this must mean that the person who interprets Scripture does not understand it correctly. It is not the meaning of Scripture which is opposed to the truth but the meaning which he has wanted to give to it. That which is opposed to Scripture is not what is in Scripture but what he has placed there himself, believing that this is what Scripture meant". A century ago, Pope Leo XIII echoed this advice in his Encyclical *Providentissimus Deus*: "Truth cannot contradict truth and we may be sure that some mistake has been made either in the interpretation of the sacred words, or in the polemical discussion itself".

[32] Marie-Joseph Lagrange (7 March 1855, Bourg-en-Bresse – 10 March 1938, Marseille) was a Dominican priest, biblical scholar and founder of the École Biblique in Jerusalem.

Cardinal Poupard has also reminded us that the sentence of 1633 was not irreformable, and that the debate which had not ceased to evolve thereafter, was closed in 1820 with the imprimatur given to the work of Canon Settele.[33]

10. From the beginning of the Age of Enlightenment down to our own day, the Galileo case has been a sort of "myth", in which the image fabricated out of the events was quite far removed from reality. In this perspective, the Galileo case was the symbol of the Church's supposed rejection of scientific progress, or of "dogmatic" obscurantism[34] opposed to the free search for truth. This myth has played a considerable cultural role. It has helped to anchor a number of scientists of good faith in the idea that there was an incompatibility between the spirit of science and its rules of research on the one hand and the Christian faith on the other. A tragic mutual incomprehension has been interpreted as the reflection of a fundamental opposition between science and faith. The clarifications furnished by recent historical studies enable us to state that this sad misunderstanding now belongs to the past.

11. From the Galileo affair we can learn a lesson which remains valid in relation to similar situations which occur today and which may occur in the future.

In Galileo's time, to depict the world as lacking an absolute physical reference point was, so to speak, inconceivable. And since the cosmos, as it was then known, was contained within the solar system alone, this reference point could only be situated in the earth or in the sun. Today, after Einstein and within the perspective of contemporary cosmology neither of these two reference points has the importance they once had. This observation, it goes without saying, is not directed against the validity of Galileo's position in the debate; it is only meant to show that often, beyond two partial and contrasting perceptions, there exists a wider perception which includes them and goes beyond both of them.

12. Another lesson which we can draw is that the different branches of knowledge call for different methods. Thanks to his intuition as a brilliant physicist and by relying on different arguments, Galileo, who practically invented the experimental method, understood why only the sun could function as the centre of the world, as it was then known, that is to say, as a planetary system. The error of the theologians of the time, when they maintained the centrality of the earth, was to think that our understanding of the physical world's structure was, in some way, imposed by the literal sense of Sacred Scripture. Let us recall the celebrated saying attributed to Baronius "Spiritui Sancto mentem fuisse nos docere quomodo ad coelum eatur, non quomodo coelum gradiatur". In fact, the Bible does not concern itself with the details of the physical world, the understanding of which is the competence of human experience and reasoning. There exist two realms of knowledge, one which has its source in Revelation and one which reason can discover by its own power. To

[33] Canon Settelle published his *Astronomia* in 1820 that presented heliocentrism as a proven scientific fact and received the *imprimatur* from the Church. This ended the Church's censure of heliocentrism,

[34] The practice of deliberately preventing the facts or full details of something from becoming known.

the latter belong especially the experimental sciences and philosophy. The distinction between the two realms of knowledge ought not to be understood as opposition. The two realms are not altogether foreign to each other, they have points of contact. The methodologies proper to each make it possible to bring out different aspects of reality.

The Emergence of the Image: God, the Human Person, and the Sciences of Human Origins

Chris Baglow

1. **"Paleoanthropology and Theology at the Origins of Humanity"**
2. **"In His Image: The Human Person from the Divine Perspective"**

Paleoanthropology and Theology at the Origins of Humanity

Dr. Christopher T. Baglow
McGrath Institute for Church Life
University of Notre Dame

"[B]iological evolution has transcended itself in the human 'revolution.' A new level or dimension has been reached. The light of the human spirit has begun to shine… [This] does not mean that a new force or energy has arrived from nowhere; it does mean that a new form of unity has come into existence…"
-Theodosius Dobzhansky, *The Biology of Ultimate Concern*

In December 2000, in a remote part of Africa north of the Ethiopian badlands, a team of scientists came face to face with an amazing glimpse into the past. While fossil hunting, they spotted a small skull peering down a slope. Years of painstaking excavation revealed other bones as well: a torso, a foot, a kneecap, and tiny finger bones. The skull even contained teeth, which further examination revealed to be baby teeth. Ultimately, scientists identified the bones to be those of a baby, probably a female of about three years of age at the time of her death, the cause of which is still unknown. But the date of that death is just as important – using sophisticated methods of dating, scientists estimate the age of the bones to be 3.3 million years old, making it the world's oldest fossil of its kind.[1]

This fossil, nicknamed the *Dikika Baby* after the place where it was found, is tremendously important for understanding the biological origin of our species. According to the majority of experts, the Dikika Baby is a member of *Australopithecus afarensis*, quite likely an evolutionary ancestor of all human beings. The Dikika Baby had a lower skeleton much like a human child's and an upper skeleton and skull with ape-like features, including shoulder blades that would be useful for climbing. These suggest a creature that could walk on two feet but also climb and spend time in trees.[2] The Dikika Baby is classified as a long-extinct *hominin*, a member of the biological family *Hominidae* that includes our species *Homo sapiens* and other extinct species of primates closely related to us.

In. any consideration of modern scientific discoveries and their theological significance, the Dikika Baby points to a key issue: how can we relate what we know from faith to what we know from science about human origins? For example, how can one say that man is made in the image of God, and also that he shares a common ancestor with chimpanzees and gorillas? Can the unique status of humanity withstand the discoveries of modern science? Could the Dikika Baby and the evolutionary origins of humanity be a stepping stone, rather than a stumbling block, on the path to a greater understanding of God and his divinely revealed truth? To answer such questions requires that we explore the amazing, yet still fragmentary, story of human evolution that has been pieced together by modern science. To do so requires that we consider the findings of three sciences: *paleoanthropology*, the study of fossil evidence of human evolutionary history; *paleoarchaeology*, the study of artifacts left behind by our evolutionary ancestors; and *evolutionary psychology*, the study of mental traits such as memory, perception, and language as they developed at various moments in the long process of hominin evolution.

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[1] Christopher P. Sloan, "Dikika Baby," *National Geographic* (11/2006), http://ngm.nationalgeographic.com/2006/11/dikika-baby/sloan-text.
[2] Ibid.

As we follow the fossil trail that leads to our own species, and consider the features of hominin life as they grew in sophistication, becoming more and more like our own, we will encounter a paradox regarding the nature of humanity. On the one hand, the origin of our species is a natural process, with the same mechanisms and processes involved in the evolution of any mammal. And yet evolutionary biology can only take us as far as its own method will allow, a method that strictly focuses on natural causes. At the advent of the specific kind of life we call human, we will see nature reach a terrain that requires perspectives that the science of biology cannot provide, the wider wisdom of philosophy and theology.

A. Out of Africa: Hominin Evolution

1. Defining "Human"

The whole science of human origins revolves around the meaning of the word "human." Confusion often arises from the different ways in which various disciplines define the term. In Catholic theology, as well as in the Western philosophical tradition, the term is used to refer to one species, *Homo sapiens*, and to those capacities that make our species different from all those alive today: the closely-related capacities of reason and free will. In the words of St. Thomas Aquinas, man is a *rational animal*, an animal that has the capacity for reason and therefore, a unique kind of freedom. The *Catechism of the Catholic Church,* following the Second Vatican Council, declares that our capacity for self-knowledge (reason, rationality) and self-possession (free will) makes our species to be "in the image of God."[3] We will explore the "human difference," which is at the heart of the philosophical/theological use of the term, below.

Of course, the theological and philosophical definition of "human" developed long before anyone was aware that our species was connected to the rest of the natural world via evolution. Based on the discovery of many fossils that share very similar characteristics to our own, paleoanthropologists use the term *human* (or the genus *homo* in Latin) to refer not only to members of our species, but to a wide range of close relatives of our species—now all extinct—that have dwelt on our planet.[4] They make this classification based upon bodily characteristics and toolmaking abilities. The list of *homo* species is incomplete and is growing; in the decade between 2003-2013 fossils of three previously unknown *Homo* species were discovered: *Homo floresiensis* in 2003, the Denisova hominins in 2008, and *Homo naledi* in 2013. It seems that there were once many relatives of our species populating the Earth, and some may have shared the same habitats with *Homo sapiens* as recently as 18,000 years ago (YA).

In this essay, in which we are considering philosophical/theological insights as well as scientific ones, we will use the term *hominin* to refer to closely related species to our own, and will reserve the word *human* for our own species.

2. Evolutionary Developments among Hominins

Paleoanthropology is a fascinating field, and has largely been driven by the attempt to show evolutionary relationships between our species and those that went before us. The popular term "missing link" points to the desire of many to discover our whole biological lineage in exact detail. But it is not possible to draw a straight line between any hominin species that came before us to our own. The fossil record is far too fragmentary to conclude

[3] CCC, no. 357.

[4] Ian Tattersall, *Masters of the Planet: The Search for Our Human Origins* (New York: Palgrave-MacMillan, 2012), 81-82.

that any one of the earlier hominin species are our direct ancestors, especially the further back in time they lived. So it is best to focus on general evolutionary developments that occurred throughout the 7 million year history of hominin evolution, identifying certain traits that we also possess today.

Our tour of hominin evolution begins by observing our living primate relatives, the chimpanzees, with whom we share a common ancestor that lived 7 million YA. Chimps have five-fingered hands, toolmaking abilities, and the same spectrum of color vision that we have.[5] They also have the ability to infer mental states in others, states such as desires and purposes.[6] They communicate using vocalizations, gestures, body postures and facial expressions that can be classified into greetings, expressions of displeasure or fear, delight or familiarity. They have even been taught how to use sign-language by researchers to indicate their desires for food and express emotions. They are highly social and engage in play. Since these are all traits and behaviors that we share with them, it is safe to assume that extinct hominins possessed them as well. But these exhibited other traits and behaviors that chimpanzees do not.

Upright Walking: A good way to visualize hominin evolution is to do so starting from the bottom up, from the legs upward to the skull, for it is the lower body where we see the oldest difference between hominins and other primates. All hominins have straight legs that are capable of upright walking on two feet, called *bipedalism*, as contrasted with the knuckle-walking behavior of modern apes, who go from place to place using their hands to bear their upper body weight. Early on, upright walking was not the only way of getting around for hominins; climbing remained vital to food gathering and protection from predators. In the Great Rift Valley of Africa, a vast valley created by massive subterranean forces about 20 million YA, the combination of scattered valleys and open spaces created a situation favorable to the development of bipedalism, although it may have also evolved elsewhere in other hominin lineages. There, 4 to 5 million YA, some of the earliest hominins originated, the *Australopithecines*, the species of the Dikika Baby, as well as the famous 3.2 million year old *Lucy* fossil. In 1976, in Laetoli, Tanzania, 3.6 million year old fossilized footprints were discovered that had made by a group of three australopiths who traveled across open land through volcanic ash between one wooded area to another. The footprints indicate that their feet and walking patterns were remarkably similar to our own. Such footprints are precious and rare glimpses into the past because they are "fossilized behaviors", "an arrow-straight double trail of prints some 80 feet long, more or less like anyone might leave walking along a wet beach."[7]

Over time, climate change created a situation in which the continent of Africa became hotter and drier. As wooded habitat shrunk, some of these small primates moved out into the open plains, teeming though they were with large predators, relying more on two feet than on their strong climbing abilities. Bipedalism became more important than climbing, freeing hands that, after much more evolution, ultimately could make and use

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[5] Matt J. Rossano, *Supernatural Selection: How Religion Evolved* (Oxford: Oxford University Press, 2010), 62-63.

[6] Matt Rossano and Benjamin Vandewalle. "Belief, Ritual and the Evolution of Religion" in James R. Liddle and Todd K. Schakelford, ed., *The Oxford Handbook of Evolutionary Psychology and Religion*, (Oxford Handbooks Online, 2016): 2, http://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780199397747.001.0001/oxfordhb-9780199397747-e-8.

[7] Tattersall, *Masters,* 33.

tools.[8] This brings us to two other closely related activities that emerged as early as 2.5 million YA and which became characteristic of future hominins.

Toolmaking/Omnivorous Diet: In the 1960's, in sediments dating back 2-2.5 million YA, ancient stone tools were discovered in close proximity to fossils that were dubbed *Homo habilis*. Members of *Homo habilis* had a much larger brain than the *Australopithicenes,* and also a significant level of *manual dexterity*, the ability to use their hands to make things and modify objects. The tools they made were crude, consisting of pebbles chipped down to their cores and the flakes that had come off of those pebbles. These remnants have a random appearance, "as if the maker was not holding any design in mind and was content to accept whatever shape of stone nature might produce."[9] Although molecular analysis of australopith teeth show that they were largely herbivorous, the tools made by *Homo habilis* indicate that they were *omnivorous*, regularly eating meat as well as plants. Meat made up a significant part of their diet; the sharp rock flakes they made have been shown to be very effective at butchering large animals, even elephants.[10]

Much more striking in terms of sophistication are the hand axes associated with another species, *Homo ergaster,* which originated around 1.9 million YA. These large, teardrop-shaped axes were carefully worked on both sides to produce a specific shape; the oldest such axe is 1.76 million years old and was found near Lake Turkana in northwest Kenya. This is also the region in which the *Turkana Boy* fossil was found, an almost complete, 1.6 million year old *Homo ergaster* skeleton of a male adolescent. Turkana Boy was radically different than Lucy and the Dikika Baby; at a height of 5 feet, 3 inches, with an upright, slender body shape and with a much larger brain (more than half the size of our own), he was clearly adapted to a new way of life on the open savannah.[11] From this point forward, increased brain size and brain complexity become defining features of hominin evolution, as does more and more sophisticated toolmaking.

Prosociality and Migration: The evidence of large game hunting says much more about *Homo ergaster* than just a change in diet and brain size; it also indicates an incredible amount of cooperation among their kind. All primates, especially the great apes such as chimpanzees and gorillas, are highly social animals, with intricate social networks and forms of communication and cooperation. But working together on a hunt for large game using hand axes is far beyond anything seen among apes. In the ruins of the medieval town Dmanisi, in the Republic of Georgia, archaeological digs unearthed artifacts and fossils of *Homo erectus*, a hominin species which originated around 1.89 million YA and only went extinct as recently as 40,000 YA. One skull, dated to approximately 1.8 million YA, belonged to an aged male whose tooth sockets had shriveled and who had been toothless (except for one tooth) for many years before he died. This is powerful evidence of a high degree of *prosociality*, a general concern for others that is found in some mammals. For him to have survived without teeth for so many years would've required care on the part of his relatives, in which soft foods were chosen, reserved and probably even prepared for him.[12] The capacity to care for others comes to be an even more pronounced and widespread feature in later hominins.

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[8]Tattersall, *Paleontology*, 149-177; see p. 176, Figure 9.3.
[9] Nicholas Wade, *Before the Dawn*: *Recovering the Lost History of Our Ancestors* (London: Penguin Books, 2007), 19.
[10] Tattersall, *Paleontology*, 170.
[11] Tattersall, *Masters,* 129-134.
[12] Ibid., 113-114, 122-124.

The fact that these fossils were discovered over 4,200 miles from Lake Turkana points to another development—the tendency of some hominins to migrate far and wide. By 1 million years ago, *Homo erectus* was on the island of Java and ultimately migrated as far east as China and as far west as Spain, not to mention all over the continent of Africa where they originated.[13] The various developments noted above—bigger, more complex brains, upright walking, tool-making, a varied diet, cohesive and cooperative lifestyle—made it possible for them to thrive in a wide range of environments, wet and dry, warm and cold. No other hominin species would rival this range of migration until our own.

Cooking/Shelter-building: As brain complexity increased, so did hominin sophistication. In Southern France, at a site called *Terra Amata*, the traces of the first artificial shelters, dating back 400,000 years, were discovered in 1966. The dwellings were oval-shaped and fashioned out of saplings and rings of stone. In one of them a shallow area filled with blackened stones and burnt bones, undoubtedly a primitive cooking hearth, was discovered. Hominins had been using fire for at least 300,000 years before this, but this site showed that by this time the domestic use of fire for cooking had developed.

The hominins of this region were also advancing in their toolmaking. Between 1994-1998 at Schöningen, Germany, eight remarkably well-fashioned wooden spears of about the same age were discovered, preserved in a peat bog. These were carefully whittled out of spruce and pine branches to put the weight at the sharpened front part of the spear so that they could be used as projectile hunting weapons to bring down large game.[14] Such spear making required a high level of intelligence and manual dexterity, and spear hunting for large game requires an incredible amount of group cooperation and coordination. Both sites have been associated with fossils of *Homo heidelbergensis*, which originated in Africa around 600,000 YA and spread into Europe and Asia. In the words of paleoanthropologist Ian Tattersall, "Altogether, they lived more complex lives than any hominins had ever done before them."[15]

The innovation of controlling fire and cooking food, which may have occurred as early as 1.6-1.8 million YA, the time of *Homo erectus*, had become an essential feature of hominin life by this point.[16] Cooked food is softer and much denser in calories than raw food, which larger-brained hominins need in order to support their brain development and activity; our own brains use about 25% of our daily available energy! Cooking also requires a great deal of cooperation among individuals and families—some must hunt and gather, others must cook, and food must be shared. Dwellings naturally follow as centers of these activities. Something recognizable as domestic and family life as we know it now was beginning to emerge, a situation in which social bonds became increasingly important.

The Neanderthals: The various adaptations above can be seen at a very advanced stage in our hominin "cousin" *Homo neanderthalensis*. When trying to understand our own species, both in what makes us unique and in what we share with all hominins, they are the very best "mirror" available to us.[17] In regard to the features we share with all later hominins, such as diet, toolmaking and cooking, Neanderthals are the closest to us in terms of sophistication, and had certain traits they may have shared only with us. In fact, DNA analysis has shown

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[13] Joseph Castro, "Homo Erectus: Facts About the 'Upright Man'," LiveScience, June 22, 2015, https://www.livescience.com/41048-facts-about-homo-erectus.html.
[14] Tattersall, *Paleoanthropology*, 178-180.
[15] Tattersall, *Masters*, 142.
[16] Richard Wrangham, *Catching Fire: How Cooking Made Us Human* (New York: Basic Books, 2009), 98-99.
[17] Tattersall, *Paleoanthropology*, 188.

that, with the exception of native Africans, all human beings alive today carry anywhere from 1.5-2.1% of genes inherited from the interbreeding of our ancestors with Neanderthals at some time between 60,000 and 40,000 YA.[18]

The first distinctively Neanderthal fossils are found in sediments dating to around 250,000-300,000 YA. They seem to have originated in Europe and inhabited Europe and western Asia until as recently as 35,000 YA. At *Cueva del Sidrón* (aka El Sidrón Cave), a 50,000 year-old Neanderthal site, the fossil remains of thirteen Neanderthals—three male adults, three female adults, three adolescent boys, two children and one infant—were discovered in 1994. This is about the size of groups found in *small-band hunter-gatherer (SBHG) societies* of our own species, universally until around 11,000 YA and even today among SBHG groups such as the *Khoe-San* in Africa.[19] DNA analysis revealed that the adult males were siblings, and that the females had each belonged to different families.[20]

Moreover, Neanderthals seem to have been the first hominins to intentionally bury their dead. In 1908 two priests who were also archaeologists, *Jean and Amédée Bouyssonie*, discovered a complete 50,000 year-old adult Neanderthal skeleton inside a cave located near *La Chapelle-aux-Saints* in central France. A pit had been carved out of a natural depression in the cave, and the body had been positioned to fit the pit and then covered. The priests immediately speculated that the skeleton had been buried, but at the time their hypothesis was ignored. However, in 2014 a more detailed analysis has confirmed their suspicion.[21] Another Neanderthal burial at *Shanidar Cave* in northern Iraq is of an aged male with a withered arm that was probably the result of a congenital birth defect.[22] Taken together, the sites offer evidence of compassion for the living and of mourning for the dead among this species.

Finally, there is evidence that Neanderthal created geometric structures and markings within some of the caves in which they dwelled. At *Bruniquel Cave* in southwestern France, a 176,000 year-old Neanderthal settlement was discovered containing circular arrangements of broken stalagmites that were used to contain fires—soot and burnt bone were found within the circles.[23] And in 2018, a ladder-like drawing was found on a cave wall on the coast of southeastern Spain and was tentatively dated to 65,000 YA, a time that is well before the estimates of the arrival of our own species in Europe.[24]

In summary, Neanderthals seem to match us in our own behaviors and abilities in incredible ways. Therefore it has become more and more common for paleoanthropologists to assume that they were like us in every way; or, as one recent study puts it, that they were "cognitively indistinguishable" from our own species.[25] But is this the case? As we conclude

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[18] Ian Tattersall, *The Strange Case of the Rickety Cossack: and Other Cautionary Tales from Human Evolution* (New York: St. Martin's Press, 2015), 197.
[19] Darcia Narvaez, *Neurobiology and the Development of Human Morality* (New York: Norton, 2014), 7.
[20] Tattersall, *Masters*, 172-175.
[21] William Rendu, et al., "Evidence supporting an intentional Neandertal burial at La Chapelle-aux-Saints," *PNAS* 111:1 (January 2014): 81-86.
[22] Tattersall, *Paleontology*, 185.
[23] Taylor Kubota, "Neanderthals Likely Built These 176,000-Year-Old Underground Ring Structures," *Live Science*, https://www.livescience.com/54906-neanderthals-built-bizarre-underground-ring-structures.html.
[24] Lorraine Boissoneault, "Were Neanderthals the Earliest Cave Artists? New Research in Spain Points to the Possibility," Smithsonian.com, February 22, 2018, https://www.smithsonianmag.com/science-nature/were-neanderthals-earliest-cave-artists-new-research-spain-points-possibility-180968236/.
[25] Andrew Masterson, ""Neanderthals and Early Modern Humans Were Cognitively Indistinguishable"," Cosmos, February 22, 2018, https://cosmosmagazine.com/archaeology/neanderthals-and-early-modern-humans-were-cognitively-indistinguishable.

our consideration of hominin evolution, consider the judgment of paleoanthropologist Ian Tattersall:

> … we find nothing in the technological record of the Neanderthals to suggest that they were symbolic thinkers. Skillful, yes; complex, certainly. But not in the way we are. As a species, *Homo neanderthalensis* seems to have fully participated in the hominin trend over time toward more challenging behaviors, and toward more subtle and intricate relationships with the environment. It certainly participated in the hominin trend toward bigger brains, and possibly taking this tendency to its most extreme expression. But behaviorally there was *no qualitative break with the past*; the Neanderthals were simply doing what their predecessors had done, if apparently better. In other words, they were like there ancestors, only more so. *We are not. We are symbolic.*[26]

Tattersall's claim is that *symbolic thought* is what sets us apart from Neanderthals and all other animals, which he defines as the ability to organize the world around us mentally by generating a vast array of mental, verbal and physical symbols. The word *symbol* comes from the Greek verb *symbállein*, which means "to put together." A symbol is a sign, sound or object that allows the sign, sound or object to represent something other than itself. While studies have shown that some animals can be taught to use rudimentary signs, they do not engage in symbolic behaviors in the thorough way that we use symbols to represent the world in our minds and communication. Human language, which we will further investigate in the next section, is the height of symbolism, in which sounds and written words are put together with real things to represent them.

This ability not only to use symbols, but to mentally generate them, in fact to engage in the kind of thinking that symbolism makes possible, is a hallmark of our species alone. It is at the heart of the difference between animal communication and human language, between skillful problem solving and reflection upon the intrinsic nature of things, between personal ornamentation and artistic expression, between intelligence and reason. In symbolic thought, we have reached the edge of the "human difference" that separates us from the other animals. As far as we can tell, the Neanderthals had all of the animal intelligence that we have, and more than most other hominins. They were capable of a high degree of empathy for those in their social groups. They may have even developed a preference for symmetry, and a way of signaling difference or relatedness via personal ornamentation. We do such things too, but we are not merely beings possessing more brainpower. We possess a wholly different kind of intelligence. They had *reasons for acting*, but we have the *power of reason*.

This difference between animal intelligence and human reason was well known to St. Thomas Aquinas, who ascribed to many animals a very high degree of cognitive ability, what we might call intelligence or brain power. Non-human animals, he observed, have the ability to learn from past experience. They are capable of judging situations correctly and can learn to solve problems; St. Thomas called this "natural judgment." But the power of reason allows our species alone to make judgments about our judgments, to hold real things in our minds mentally and to come to understand them not only for how they concern us and how we might use them, but for what they are. Animals can make natural judgments, St. Thomas

[26] Tattersall, *Masters*, 177.

acknowledges, but he also adds, "to pass judgments on one's own judgments belongs only to reason."[27]

3. Homo Sapiens: *Our African Beginnings*

When we arrive at our own species, we discover an interesting puzzle. There is no doubt among experts that we originated in Africa; the earliest plausibly human fossils are found there, and numerous DNA comparisons of modern humans all show a common African ancestry.[28] Fossils that bear our own skeletal characteristics have been discovered in North Africa and dated to as far back as 300,000 YA.[29] Yet up until 120,000-60,000 YA, these remains are found accompanied by artifacts that do not differ in any significant way from the Neanderthals. It seems that our modern human skeletal structure, including our large skull cases and brains, were around for a long time before reason "arrived." When it did, as recently as 60,000 YA, but perhaps as far back as 120,000 YA, the picture changed dramatically. In the words of Nicholas Wade:

> There is a new set of stone tools, more carefully crafted to attain specific shapes. There are complex tools made of bone, antler, and ivory. The bringers of the new culture… played bird-bone flutes. Their missile technology was much improved… They buried their dead with rituals. They could support denser populations. They developed trade networks through which they obtained distant materials.[30]

Sculptures and cave paintings followed. At some point prior to 50,0000 YA our species began to demonstrate "self-consciousness, self-determination, and therefore freedom," including an understanding of time and an orientation toward the future.[31]

How did this change occur? In their book *Why Only Us: Language and Evolution*, Robert Berwick and Noam Chomsky focus on the difference between animal communication and human language to answer this question. Animal communication involves linear order between sounds or signs; i.e. the sounds or gestures must follow each other in exact patterns. For example, when chimps are taught sign language, they never get beyond two-word combinations. By contrast, human language is structured hierarchically, which means that we can relate words in sentences according to rules that transcend the mere proximity of words to each other. Even more, we can combine words into new units of meaning, then relate them to other words, and so on, so that the possibilities of human language are infinite. The ability to do this, called *Merge* by Berwick and Chomsky, is simple enough neurologically that a slight rewiring of the brain through a few genetic mutations could have given our species the type of brains capable of Merge.[32] They also speculate that, when this change occurred, it acted not first as a tool for communication but for thought, for thinking first and only after for speaking. As it spread through the *Homo sapiens*

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[27] Alasdair MacIntyre, *Dependent Rational Animals: Why Human Beings Need the Virtues*, Paul Carus Lecture Series 20. (Chicago: Open Court, 1999), 53-55. Cf. St. Thomas Aquinas, *De Veritate* 24.2; *Summa Theologiae* I.84.1.
[28] Tattersall, *Masters*, 185.
[29] Ann Gibbons, "World's Oldest Homo Sapiens Fossils Found in Morocco," Science | AAAS, July 26, 2017, http://www.sciencemag.org/news/2017/06/world-s-oldest-homo-sapiens-fossils-found-morocco.
[30] Wade, 30.
[31] Fiorenzo Facchini, "Man, Origin and Nature," http://inters.org/origin-nature-of-man.
[32] Stephen M. Barr, "First Words | Stephen M. Barr," First Things, April 01, 2017, https://www.firstthings.com/article/2017/04/first-words.

population it triggered explosive progress in technology and art, a "Great Leap Forward" that ushered in the fully symbolic, human way of life that we live now.[33]

According to most experts, the fully developed form of the human being bearing all the characteristics described above emerged in one population of *Homo sapiens* in Africa before we began to spread out of Africa and across the globe, around 120,000-70,000 YA. Genetic studies have revealed that the original ancestral population from whom all today's human beings are descended seems to have numbered only a few thousand, maybe even a few hundred, individuals.[34] In fact, geneticists have even discovered that all human beings alive today carry genetic material from one male and one female member of the original ancestral population. While these two individuals are often referred to as "mitochondrial Eve" and "chromosomal Adam," this does not mean that these two mated and were the first parents of our species, nor that they ever lived at the same time, nor does this indicate that they were the only members of the ancestral population. But it does reinforce how remarkably small that population was.[35] The proliferation and migration of *Homo sapiens* was explosive – by 60,000 YA they were in Europe and Asia; by 50,000 YA, they had reached Australia. The foundations of human history and modern human societies were in place, although recorded history would not begin until around 3000-3500 BC (5000-5500 YA).

B. The Human Difference

In our tour of hominin evolution, we have identified symbolic thought and language as key indicators of what we are calling the human difference, that which sets us apart from all other hominins. Over and above those qualities already explained, two additional human qualities that are unique to us help us better appreciate the rationality of our species: self-reflection and an appreciation of the beautiful.[36]

What separates you and I from the other hominins? We have seen many ways in which they were very much like us. But were they like us in the most essential ways? The evidence is too scanty to make a solid judgment either way. But based on the evidence we do have, at present it seems unlikely that the other hominins, including the Neanderthals, were rational animals as we are. A closer look at these two qualities reveals the difference between human and hominin.

1. Self-Reflection

All animals with nervous systems have some kind of self-perception that can be generally called self-awareness; the very ability to feel external objects involves recognition by an organism of the difference between the organism and things outside itself. Higher animals, such as dolphins and chimpanzees, exhibit high degrees of self-perception that allows them to relate themselves to their environment, to other animals and especially to other members of their species. There is no doubt that, in their highly organized form of life, Neanderthals exhibited this kind of self-awareness. And yet human self-awareness extends to the ability to see one's self almost as another self, to reflect on one's self and to correct and deepen one's self-understanding. This is more than self-awareness; it is *self-reflection*.

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[33] Nicanor Austriaco, review of *Why Only Us: Language and Evolution*, by Robert Berwick and Noam Chomsky, *Thomist* 81 (October 2017): 619.
[34] Ian Tattersall, *The World from Beginnings to 4000 BCE* (Oxford: Oxford University Press, 2008), 89.
[35] Dennis R. Venema and Scot McKnight, *Adam and the Genome: Reading Scripture After Genetic Science* (Grand Rapids, MI: BrazosPress, 2017), 62-65.
[36] Paulinus Fosthoefl, *Religious Faith Meets Modern Science* (New York: Alba House, 1994), 92-95.

Consider a humorous but helpful indicator of this difference given by Walker Percy (1916-1990), the Louisiana novelist and Catholic philosopher. Considering the many scientists who have devoted themselves to proving that human intelligence is simply an advanced form of animal intelligence, he observed that human beings are constantly trying to prove that they are no different from the rest of the animals, and by doing so prove their uniqueness; no other species tries to prove that it is not unique![37] Ironically, human efforts to disprove human uniqueness testify most eloquently to it, for only humans are capable of proving or disproving anything. "Only man knows that he knows" – only a human can think about herself, her origins, her destiny, her behavior, her death, the possibility of life after death.

From what is known currently about the other hominins, there is no evidence that they were capable of self-reflection. One important indicator is the difference between Neanderthal burial and the burial practices of early humans. For example, neither the grave at La Chapelle-aux-Saints nor any other Neanderthal burial site currently known shows undisputed evidence of rituals that indicate belief in life after death.[38] But in the 34,000 year old graves found at Sunghir in modern Russia, the ancient humans who lived there buried their dead with specially crafted grave goods: one adult male with thousands of ivory beads, which were carefully arranged around the body, and two children, buried side-by-side, with weapons and other symbolic objects.[39] In the latter case, we see self-reflection mirrored in the way other humans are adorned, in which their importance to their relatives is reflected in a symbolic way. Also, the cave art left behind by humans as far back as 40,000 YA include hand-stencils, which we recognize today as a way of indicating a sense of self, the artistic equivalent of a personal "signature."

2. Appreciation for Beauty

Among the hominins, Neanderthals might stand alone as having a preference for symmetry (as we saw in the case of the stalagmite circles in Bruniquel Cave), and even may have ornamented themselves, although the latter claim is heavily disputed. They were gifted at toolmaking, even attaching stone points to wood, and showed a preference for the best materials as they crafted them. But their tools show a strict practicality, which one paleoanthropologist has gone so far as to call "practical monotony." Even crows make practical tools, sharpening sticks with their beaks to get at food, and have even been observed inserting such sticks into objects that are too big to fit into their beaks but which they want to carry.[40] But the tools left behind by our human ancestors are not just usable; they are symmetrical, bearing equal measure on all sides, and not just on the side used for cutting. They are quite often decorated with designs. In other words, they were crafted to be visually pleasing – to be beautiful. And in this way there can be no doubt that they are human tools – tools that reveal an appreciation for beauty in their design.

What is beauty? It has been described as the coming together of three characteristics in a being or beings. The first characteristic is *unity* – in order to be beautiful, a thing must have a wholeness, a completeness. The ancients referred to this as *integrity*. Second, to be

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[37] Walker Percy, *Lost in the Cosmos: The Last Self-Help Book* (New York: Farrar, Straus and Giroux, 1983), 254.
[38] Paul Mellars, "Neanderthal symbolism and ornament manufacture: The bursting of a bubble?" *PNAS* 107:47 (2010): 20147–20148.
[39] Lea Surugue, "Why This Paleolithic Burial Site Is So Strange (and so Important)," SAPIENS, March 05, 2018, https://www.sapiens.org/archaeology/paleolithic-burial-sunghir/.
[40] "Crows Are First Animals Spotted Using Tools to Carry Objects," New Scientist, July 28, 2016, https://www.newscientist.com/article/2099246-crows-are-first-animals-spotted-using-tools-to-carry-objects/.

beautiful, a thing must have *harmony*, a "fitting together" of everything integral to it. In physical beings, this is called proportion or symmetry. The ancients referred to this quality as *consonance*. Finally, to be beautiful, a thing must have *splendor*. This splendor, which comes from harmony and integrity, is what evokes feelings of delight, wonder, awe, and respect from those who perceive it.[41]

The greatest evidence of the human appreciation for beauty is the breathtaking cave art of 40,000-30,000 YA, to which nothing Neanderthal ever produced can compare. In places as distant as Southern France and Indonesia, common artistic conventions had developed among our ancestors: hand-stenciling, the depiction of animals and human beings, and even the use of abstract shapes. In *Chauvet Cave* in France, 32,000 year-old paintings of animals, including extinct species such as cave bears and cave lions, woolly rhinoceroses and woolly mammoths, cover the cave walls. Some of the animals were depicted with many legs so as to give the impression of movement by firelight. The place was obviously special, perhaps even sacred, to these ancient artists and their companions, because they did not live in the caves. The caves were places set apart.[42] Other artifacts from the period include the Vogelherd Horse, crafted out of the ivory of a wooly mammoth (35,000 YA), a flute made of a vulture bone (40,000 YA) and a female figurine, the Venus of Hohle Fels, also crafted out mammoth ivory to be worn as an amulet. The *human aesthetic capacity* revealed in these examples, the human desire for and appreciation of beauty, are a key part of the human difference.

In summary, the gap between spiritual human rationality and the animal intelligence of Neanderthals seems to have been more than a matter of brain size or advanced brain structure. Like the Neanderthals, humans are also animals – we depend on our bodies and especially our brains in order to think. But we can transform purely instinctive patterns and brain activity, which we share with animals, into something much more. We can also fail to do so and not rise above the level of behavior that we share with the animals.[43] Indeed, we can choose to become far more depraved than any other animal could ever become.

Now that we have a better idea of human evolution and the human difference from the scientific perspective, we can begin to reflect theologically upon human evolution and origins. We begin with the picture offered us in the Second Creation Account, which is found in Genesis 2, which in one verse captures the deepest mystery of human origins and of every human life.

C. The Divine Perspective: The Book of Genesis and the Human Soul

The Second Creation Account narrates the creation of human beings in one verse, Genesis 2:7, "The LORD God fashioned the human being (Hebrew: *ādām*) out of the clay of the ground (Hebrew: *ādāmah*), and breathed into his nostrils the breath of life, and so he became a living being." The connection between the word for "ground" (*ādāmah*) and the word for "human being" (*ādām*) shows that humans are naturally made of physical elements. It is a humbling image, and one that is "wide" enough to include the discovery of a long natural evolution from earlier living creatures in which matter, the stuff of the ground, ultimately is fashioned into humanity, the image of God. Based on this theological truth, which harmonizes so beautifully with the truth about human origins, no one of us can say,

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[41] Clarke, 298-302.

[42] For a thorough examination of Chauvet Cave and its significance, see *Cave of Forgotten Dreams*, dir. Werner Herzog (Barcelona: Cameo, 2010), film.

[43] Ibid., 95.

"I, or my race, is somehow better than all others." In the words of Pope Benedict XVI, "Despite every distinction that culture and history have brought about, it is still true that we are, in the last resort, the same… earth, formed from dust, and destined to return to it…. The Bible says a decisive 'No' to all racism and to every human division."[44]

Just as the First Creation Account was responding to and correcting the violent, dehumanizing worldview of the Babylonian myth *Enûma Eliš*, Genesis 2 responds to yet another Ancient Near Eastern myth, the *Atrahasis* (named after its main character), which was first written down sometime around 1700 B.C. In this myth humanity is created by Enki, the god of wisdom, to be slaves of the gods. Clay and the blood of a slain god are mixed together, and all the gods spit upon the mixture. After ten months seven male and seven female human beings are produced, beginning the human race.

Genesis 2:7 shares obvious commonalities with this pagan myth. For example, divine activity is depicted in both in a very anthropomorphic way. *Anthropomorphic* in this context refers to the description of divine creation as if it were a human activity – in Genesis 2:7 God "forms" as if he had fingers, and "breathes" as if he had lungs. Another commonality is that, just as in the *Atrahasis,* humans are made out of clay. But unlike the *Atrahasis*, God breathes into the human being his own "breath." Recognizing the symbolic nature of the account, it is clear that this second element is precisely what sets humans apart from the other animals, who also have the breath of life (see Genesis 6:17), but not as breathed directly from God. The picture of human origins given in the Second Creation Account, then, is of an animal that has a life more like God's than the rest of the animals, an animal who is not simply one of God's creatures but who becomes a "living being" precisely because of a special relationship to him. The Hebrew word for "being" in Genesis 2:7 is *nephesh*, a word that can be translated as "soul" or "life principle." Thanks to God's mysterious action, a living human being exists.

The issue of the origin of the human soul is the one issue about which the Catholic Church has qualified her openness to what science has revealed about our evolutionary origins. To quote St. John Paul II, "The doctrine of faith affirms that man's spiritual soul is created directly by God…the human soul, on which man's humanity definitively depends, cannot emerge from matter, since the soul is of a spiritual nature." So from the theological perspective, the "human difference" is located in the fact that the soul is spiritual and directly created by God; it is not merely the result of a biological process. In fact, this is the case for every human being; whenever a new human being is conceived, it must involve the direct creation of the soul of that human being. This is directly related to the special powers of the human soul, rationality and free will.

How does God "directly create" a human soul? In our ordinary way of thinking, it is easy to imagine that whenever a human body is "made," God makes a soul for this body, "attaching" the two. Many mistakenly think of themselves as *two* things, a living body and a mysterious ghost that is the real self. But this is to misunderstand the nature of the soul, which is not a separate thing that God makes but, along with the matter from which our body is made, is one of two principles that make a human being a living being. In the words of the Fifth Lateran Council, an ecumenical council of the Church, the human soul is the "substantial form" of the human body. No part of us is simply soul, no part of us is merely body. In fact, a body without a soul is not a body at all; as the soul is the very life principle of a living body, a body without a soul is only a corpse.

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[44] Ratzinger, *In the Beginning*, 43-44.

So at the beginning of our species, and indeed at the beginning of every human life, we have a paradox. From one perspective, human beings are the natural product of primate evolution, the product of a meandering process that involved trends we see in other hominins: bigger brains, more sophisticated tools and social organization, etc. From the other perspective, each human being is a rational being, the product of God's loving initiative that engages each of us in a special relationship with our Creator. The International Theological Commission (ITC) expresses the mystery of the *direct* (also called *special*) *creation* of the human soul in a way that sheds light on this paradox: God can "bring about effects that transcend the capacity of created causes acting according to their natures", in which God directly causes the soul in a "non-disruptive" way.[45] So human souls do come from parents, through the fertilization of the female ovum by the male sperm; human parents are the created causes acting according to their sexual natures. What makes human reproduction different is that, rather than disrupting this process, God causes it to produce a life principle that transcends the purely material "souls" of non-rational animals.

Therefore, the direct creation of the human soul is not to be understood as a miracle; miracles are singular, one-time events, and the direct creation of the human soul happens whenever human sexual reproduction is successful in the normal course of nature. Yet it is more like a miracle than other natural events because, as in the case of miracles, natural causes are empowered to produce something beyond their capacity. In the words of Joseph Ratzinger/Pope Benedict XVI,

> If creation means dependence of being, then special creation is nothing other than special dependence of being. The statement that man is created in a more specific, more direct way by God than other things in nature, when expressed somewhat less metaphorically, means simply this: that man is willed by God in a specific way, not merely as a being that "is there", but as a being that knows him; not only as a construct that he thought up, but as an existence that can think about him in return. We call the fact that man is specifically willed and known by God his special creation.
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> …The clay became man at that moment in which a being for the first time was capable of forming, however dimly, the thought "God"… For it is not the use of weapons or fire, not new methods of cruelty or of useful activity that constitute man, but rather his ability to be immediately in relation to God… The theory of evolution does not invalidate faith, nor does it corroborate it. But it does challenge faith to understand itself more profoundly and thus to help man to understand himself and to become increasingly what he is: the being who is supposed to say "thou" to God in eternity. [46]

In summary: the human soul, the very life-principle that makes a human body to be a living body of a specific kind, is not a thing God makes separately. Rather, due to the free unfolding of a universe that He sustains in being precisely for this purpose, a body of the human kind is, of its essence, a body that must have a spiritual soul to be the kind of creature that it is, a body that, in the words of the 17th century Catholic philosopher John of St. Thomas, "calls out to God out of justice for a soul." The spiritual soul is the principle

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[45] ITC, no. 70.

[46] Joseph Ratzinger, *Dogma and Preaching: Applying Christian Doctrine to Daily Life*, 2nd ed. (San Francisco: Ignatius Press, 2017), 141-142.

that, with the body, makes a human being the kind of being it is. Evolution, according to the God-given laws of the universe and due to the activity of creatures over millions of years, has yielded a situation where in our universe there is now a material creature for whom to be spiritual is its natural state, whose origins implicate God and require His direct involvement.

This wonderful mystery reveals a truth that science could never discover but which faith and reason together can discern – that *Homo sapiens* is the ultimate reason that the universe exists, the point of God's creative activity. From all eternity God did not merely will to share his goodness with creatures, but he willed there to be a creature that could receive the gift of the created universe, and ultimately the gift of His own divine life. In the words of St. John Paul II,

> Creation is a gift because man appears in it, who, as an 'image of God,' is able to understand the very meaning of the gift in God's call from nothing to existence… Man appears in creation as the one who received the world as a gift, and vice versa, one can also say that the world has received man as a gift.[47]

The created universe could not be a gift unless there was a creature who, being capable of understanding, could wonder at its beauty, respond to it with delight, and begin to comprehend its patterns and laws. The human difference, and the paradox of special creation, lies precisely in this uniquely human capacity, which places us in an intimate relationship with the Trinity, who calls us into being out of nothingness and then calls out to us in love.[48]

D. From the Dikika Baby to the Christ Child: The Theological Implications of Human Evolution

The great Christian author C.S. Lewis offers a beautiful summary of the picture faith and science combine to give us of the dawn of humanity. We will quote it here in full:

> For long centuries, God perfected the animal form which was to become the vehicle of humanity and the image of Himself. He gave it hands whose thumb could be applied to each of the fingers, and jaws and teeth and throat capable of articulation, and a brain sufficiently complex to execute all of the material motions whereby rational thought is incarnated. The creature may have existed in this state for ages before it became man: it may even have been clever enough to make things which a modern archaeologist would accept as proof of its humanity. But it was only an animal because all its physical and psychical processes were directed to purely material and natural ends. Then, in the fullness of time, God caused to descend upon this organism, both on its psychology and physiology, a new kind of consciousness which could say "I" and "me," which could look upon itself as an object, which knew God, which could make judgments of truth, beauty and goodness, and which was so far above time that it could perceive time flowing past….[49]

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[47] St. John Paul II, General Audience, January 2, 1980, https://www.ewtn.com/library/papaldoc/jp2tb13.htm.
[48] ITC, no. 66.
[49] C.S. Lewis, *The Problem of Pain* (New York: Simon and Schuster, 1996), 68-71.

Lewis' beautiful prose captures a truly Christian vision of human origins, in which God acts through secondary causes to bring his image into existence. Are there other important benefits offered by seeing the divine act of creating humanity through the lens of paleoanthropology? Here are two that come to mind:

1) The Loving Patience of God

God's preparation of the human body took millions of years; in fact, it took billions of years of cosmic history just for the first life-form to evolve. It involved the slow process of primate and hominin evolution, a process with fits and starts, with detours and many side-roads. But the delay came not on the part of God but on the part of creation itself, which took time to be realize its potential to produce a being capable of being the image of God. Matter had to "mature," starting all the way back at the Big Bang, to the point where its organization had been realized just so. At that moment, when evolution had produced a brain capable of the processes of language and symbolization, we now no longer speak of hominins but of humans in the fullest sense, rational animals in whom the life-pattern of hominins is taken up as the foundation of a new and greater way of being and acting.

This reveals the loving patience of God, who sustains creation while it freely develops. As the product of the Son-*Logos*, the Mind through whom the universe is made, there are trajectories toward life and ultimately toward rational life that are built into the very structure of matter. As the product of the Holy Spirit, the Gift-Love of God, creatures are allowed to freely develop. The human person is both the summit and surprise of evolution, not only of the evolution of life but of the entire universe.

2) The Unity of Creation

The prospect that we evolved from earlier living creatures infuriates some Christians who fear that it is an attack on human uniqueness and dignity, that to be biological relatives of chimpanzees means that we are nothing more than naked apes. But it actually reveals a marvelous truth – that all of creation is intimately related. From non-living matter evolved the simplest living organisms, from the simplest life eventually came animals, from the animals came man, in whom the animal is united to spirit so as to bring together the two vast realms of reality. And finally, in the fullness of time, "the Word became Flesh and made His dwelling among us" (Jn 1: 14). The coming of God in the flesh in Jesus completes the process God created and guided to unite all things to each other and to himself. In the Incarnation of the Son-*Logos,* God unites to himself a human nature and, therefore, the whole universe! Now we await the final moment – "When, finally, all has been subjected to the Son, he will then subject himself to the One who made all things subject to him, so that God may be all in all" (1 Cor 15: 28).

E. Conclusion

As we end our tour of hominin evolution and our investigation of the human difference we must humbly recognize that our current understanding of human prehistory is fragmentary. The sciences of human origins deal with a radically incomplete fossil and artifact record, and important discoveries may be just around the corner. Perhaps we will one day discover that at some point, Neanderthals also began to exhibit the human difference. It is not out of the question, for science or for faith, that we will one day discover remains that would reveal that they, or perhaps some previously undiscovered hominin species, also crossed the threshold from hominin to human. If so, we could happily add them as yet another example of the human difference. The same would be true of any bodily

creatures in our universe that, like us, are also rational animals. If "E.T." is out there, then nothing within our Christian Faith would prohibit us from recognizing him as a "brother," not biologically but spiritually, in his capacity for truth and freedom. Br. Guy Consolmagno S.J., the Director of the Vatican Observatory, was once asked, "Would you baptize an extraterrestrial?" His response was, "Only if she asked me to!" The special dependence upon God, and the intimacy with God it makes possible, need not be exclusive to *Homo sapiens*.

In His Image:
The Human Person from the Divine Perspective

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"Indeed, to the question as to what distinguishes the human being from an animal… the answer has to be that they are the beings that God made capable of thinking and praying. They are most profoundly themselves when they discover their relation to their Creator… the image of God means that human beings are beings of word and of love…"

-Pope Benedict XVI, *In the Beginning*

The Christian Faith includes the divinely revealed truth that, at least as far as we can know, only one creature currently on our planet is capable of saying "let it be," *Amen*, to God in the same way that God says, "let there be," *Amen*, to creatures. All creatures participate in God's act of creation as secondary causes, but only one kind of visible creature that we know of can offer itself intelligently, freely, and lovingly to this great co-creating partnership. That creature is the human person. *The Great Amen is ourselves.*

The *Catechism of the Catholic Church* proclaims this unique and central role of humanity in God's plan of creation and redemption. It begins by quoting the first creation account: "God created man in his own image, in the image of God he created him, male and female he created them" (Gen 1: 27). Man is this image because "of all visible creatures only man is 'able to know and love his creator.' He is 'the only creature on earth that God has willed for its own sake,' and he alone is called to share, by knowledge and love, in God's own life."[1] In this chapter, we will focus primarily on what God has revealed about the deepest meaning of being human, of being the embodied image of God.

A. Reason and Freedom: the Foundations of the Divine Image

1. The ABC's of Imaging God

The great theme of the Christian Faith regarding the human person is that all human beings are created in the image of God (Latin: *imago Dei*). In Sacred Scripture, "image of God" is the central definition of being human, which reveals that "the mystery of man cannot be grasped apart from the mystery of God."[2] The key Old Testament text is Genesis 1:26-28:

26 Then God said, "Let us make the human (*ʾāḏām*) in our image (*tzelem enu*), after our likeness; and let them have dominion over the fish of the sea, and over the birds of the air, and over the cattle, and over all the earth, and over every creeping thing that creeps upon the earth."

27 So God created man in his own image, in the image of God (*tzelem Elohim*) he created him; male and female he created them.

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[1] CCC no. 356.

[2] ITC, *Communion and Stewardship*, no. 7.

28 And God blessed them, and God said to them, "Be fruitful and multiply, and fill the earth and subdue it; and have dominion over the fish of the sea and over the birds of the air and over every living thing that moves upon the earth."

We should begin by noting the difference between how God creates the other creatures and how he makes man. God is depicted as deliberating before he creates humanity ("let us make *ādām* …"), symbolizing the special status of human beings among all creatures. In the words of St. Gregory of Nyssa (334-395):

> What a marvel! … only to the making of man does the Maker of all draw near with careful thought, so as to prepare beforehand for him material for his formation, and to liken his form to an archetypal beauty, and, setting before him a mark for which he is to come into being, to make for him a nature appropriate and allied to the operations, and suitable for the object in hand.[3]

God almost seems to be reflecting on his own nature as he prepares to make his image. The Hebrew term *tzelem* reflects the ancient Near Eastern idea that the king is the image of God on earth; notice that immediately after God creates them he gives them dominion over the earth (see v. 28). But here it is not just the king that is the image of God; every human being shares in a kind of royal dignity. Notice also that what God is making is not a bodies nor souls but whole human beings, body and soul, male and female. The whole human person is seen as created in the image of God. Therefore the *imago Dei* is not restricted to one or another aspect of human nature such as upright stature, sexuality or even intellect.[4]

Besides its royal connotations, what does it mean for something to be an image? St. Thomas Aquinas developed an excellent way of understanding the uniqueness of an image: by contrasting *images* with *vestiges*. Some things that are made are simply vestiges (traces) of their maker, as when a paleoarchaeologist finds stone tools made by early humans. Some information about the maker can be gathered through such vestiges, such as that the maker had opposable thumbs, or that he or she was an intelligent creature. Vestiges of the Trinity can be found in all creatures.[5] But an image expresses the thing it images directly, such as in a self-portrait. As St. Thomas Aquinas says, "An image represents a thing in a better-defined manner according to all its parts and the arrangement of its parts."[6] In other words, an image is a precise representation of something. An image, unlike a vestige, is an image because of its likeness to what it resembles.

2. God is Truth and Love

So in what does our imaging of God consist? Since God is pure Spirit, the foundations of our imaging of God are clearly not "located" in some bodily organ, but in our unique capacities as human creatures. The Bible and the Christian Faith tell us that God is Truth. We have already seen that God is the unlimited, infinite source of all perfections in creation, including the orderliness and knowability of all things. This is what Jesus means

[3] St. Gregory of Nyssa, *De hominis opificio*, III.2.
[4] ITC, no. 8-9.
[5] Aidan Nichols, *Discovering Aquinas* (Grand Rapids: Eerdmans, 2002), 75.
[6] St. Thomas Aquinas, *In I Sent.* 3.3.1.

when he says "I am the Light of the world" (John 8:12): he is God himself, the Son-*Logos*, the perfect source of the truth of all things.

The Bible also tells us that God is Love – "He who does not love does not know God; for God is Love" (1 Jn 4: 8). *Love* in the fullest meaning of the term refers to giving one's self for the good of another. As the *Catechism* explains, "God's very being is love. By sending his only Son and the Spirit of Love in the fullness of time, God has revealed his innermost secret: God himself is an eternal exchange of love, Father, Son and Holy Spirit."[7]

If "God's very being is Truth and Love,"[8] then being God's image must somehow involve these two attributes too. Humans cannot be the image of God who is Truth and Love unless we have a unique capacity for truth and love. *Reason*, which is the ability to know truth, and *free will*, which is the ability to love and to determine one's self and one's actions, are the twin foundations of man's imaging of God.

In summary: God is Truth and Love, and the human person is God's image because she can know truth and can love freely. Understanding these two human attributes reveals the image of God within every one of us.

3. Rationality: The First Foundation of Imaging God

Of all visible creatures, only man is able to know truth and to pursue truth, a capacity called *reason*. What does this capacity entail? Christoph Cardinal Schönborn offers us one key aspect of human reason – man has a *capacity for objectivity*. The capacity for objectivity is man's "ability to go beyond his immediate interests and needs and to perceive himself and others as the beings they are in their own right." He continues:

> I do not just feel, I can also examine my feelings, approach them "objectively," interpret them. I am not completely immersed in my world, I can look at it, can change it, compare it with other things, and can stand over against it with a critical spirit. I can think about it as well as myself.[9]

This objectivity is also the power to transcend mere appearances and get at how things are in themselves.

The philosopher Dennis Bonnette gives us one way of seeing the uniqueness of reason by contrasting it with the way lower animals know things. He invites us to imagine a dog, an uneducated aborigine, and an educated person all observing a train pulling into a station every day for many days. All three see the train, and recognize the train even if different cars, engines, or cabooses are used from day to day. The common visual image would make the train recognizable to all three.

But there the similarities cease. The dog, which does not possess reason, would perceive the similarities between each experience and would act according to its instincts (running, hiding, growling, etc.). The uneducated aborigine would not know the engine's nature, but would be searching for some account of the inner workings of the train. He might make mistakes about the nature of the train, expecting some kind of magic to make it move or even imagining that it is an animal instead of a machine. But the educated person would understand something of the essence of the train – "the inner workings of [causes]

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[7] CCC no. 221.

[8] Ibid., no. 231.

[9] Christoph Schönborn, "What is Man that Thou art Mindful of Him? Is Man Really the Crown of Creation?", http://stephanscom.at/edw/katechesen/articles/2006/07/17/a11155.

producing steam whose expansion drives pistons to move wheels." In time, with some explanation, the aborigine would come to the educated person's understanding of the train, whereas the dog would not. The difference between the dog and the two men is that the dog's perception is only *sensory* (i.e. on the level of the senses), while the aborigine's perception, like the civilized person's, is both sensory and rational.[10]

Human rationality, therefore, involves the ability to transcend the senses and to understand the meaning of *abstract concepts*. Abstract concepts are those that philosophers call *universals* – ideas that do not refer to this or that object but to all possible objects of a certain kind. Some examples of abstract concepts are "justice," "visibility," and "beauty." For instance, consider one such abstract concept – *circularity*. It applies to all circles and circular objects "of any size, position, and orientation." In fact, circularity is not a physical object, although it can be correctly attributed to all physical objects which are circular. Its universality has an "unlimited reach" to all possible circular things: it is infinite in scope.[11]

Another element of human reason is that it involves the ability to judge the truth and falsehood of propositions (i.e. statements proposed to be true). For instance, we can think about "2 + 2 = 4" and come to the conclusion that it is a correct or true mathematical equation. A computer can also distinguish between true and false propositions, but only when a human with understanding builds it and programs it to carry out such steps in an automatic way. Unlike a computer, we can reason correctly about true or false propositions even when we have not been programmed to do so, that is, even when we have never been given a precise set of instructions telling us exactly what to do.[12]

Even more fascinating is that human beings not only can judge truth and falsehood, but they are also capable of certitude that some truths are necessarily true. For instance, take the mathematical equation "$1 \neq 0$." Once we understand the concepts involved, namely "1," "0," and "inequality," and the idea "$1 \neq 0$" is grasped, we also can see with certainty the impossibility that "$1 = 0$." In the words of physicist Stephen Barr, humans can know with certainty that necessary truths like $1 \neq 0$ are "true here and now, true a billion years ago and true a billion years hence, true in galaxies too remote to be seen with a telescope, even true in any other possible universe." To be human, therefore, is to know truth in itself and even to recognize the utter necessity of some truths. Indeed, we can even know that some truths remain true in an infinite number of cases, such as "$a \times b = b \times a$, for all numbers a and b."[13]

4. The Rational Soul and Existence Beyond Death

The amazing human capacity to know truth is clearly essential to human uniqueness and dignity. But it also reveals that the soul is *immaterial* (not made of matter) and therefore *immortal* (existing even after the cessation of biological life).

How can such a claim be justified? If the human ability to know truth is such that it can get beyond how things appear to the bodily senses and know them as they really are, and can know things (like circularity and beauty) in the abstract, independent of their concrete existence in the physical world, and can know that some truths are true in all cases, even in infinite cases, then the human ability to know truth transcends the capacity of any merely physical thing, including the brain. The human faculty of reason reveals that the soul is not

[10] Bonnette, 101.
[11] Barr, *Modern Physics,* 191.
[12] Ibid., 197-198.
[13] Ibid., 199-204.

intrinsically dependent upon matter. Although it may rely upon the senses and upon matter in various ways, human reason *in itself* is something intrinsically spiritual. It is a power of the human spiritual soul.

If this is the case, then the soul cannot be physically destroyed. To destroy something is to divide it into separate parts, to break it up. But only something that is material can be divided or decomposed.[14] Philosophical analysis, therefore, indicates what God also reveals– namely that the soul "does not perish when it separates from the body at death."[15]

The immateriality and immortality of the soul is yet another paradox at the heart of being human. The human soul is the form of the human body, not a separate thing God makes. Along with the physical stuff of which our bodies are made, it is one of two principles that make a human being a living being. The same could be said of all living things, which are all constituted by matter and a life principle. And yet unlike the souls of any other animals, the human soul can and does endure beyond the death of the body, it does not cease to be when the body ceases to be a living body.

As human technology advances, a common trend both in philosophy and in entertainment is to compare artificial intelligence and human intelligence. Computers have become more and more powerful over time, and have been made capable of vastly more efficient and complex activities. A question that has been around for as long as computers, but is taken with increasing seriousness, is whether computers will ultimately be capable of thought at the human level. The reverse question also arises: is the human mind nothing more than a "wet computer" or "a machine made out of meat"? According to the materialist/reductionist mindset, the human mind is nothing more than the brain, which, with its sophisticated neural circuitry, certainly has a great deal in common with computers.

But as we can see above, reason is not a higher level of intelligence; it is a power that transcends intelligence or brainpower. A computer is trapped in its own rules. A human being, by contrast, can think about the rules themselves. She can understand why they have the structure they do and what their limitations are. For example, she can use mathematical insights to discover new rules that are consistent with old ones, but go beyond them. She can discover new ways of proving things. A human being can think about any and all propositions, and can even reason about the process of reasoning. And so human beings can do something that the most advanced computer cannot.

A computer can use numbers. But a child can grasp the concept of *number*, a concept that embraces the entire series of numbers, which is infinite. The human mind does not simply compute, it *comprehends*, which literally means "holds together," a vast, even infinite multiplicity of things in a single, simple insight.[16] In this way we see another way in which the capacity of reason is at the foundation of our imaging of God. God is a simple and indivisible unity, an infinite act of understanding that grasps all of reality in a single thought. God is the Infinite Mind; man, by reflection, is the finite mind,[17] a reality which no computer, no machine however sophisticated, can begin to match.

Now let us investigate the second power that is foundational to human beings as the image of God and that stems from human reason: free will.

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[14] F.C. Copleston, *Aquinas* (Baltimore: Penguin, 1955), 161.
[15] CCC no. 366.
[16] Barr, *Modern Physics,* 221-224.
[17] Ibid., 225.

5. Free Will – Imaging God Who is Love

Man's capacity for knowing truth, as we have seen, means that humans can know things in themselves, in their essences. But because of this ability, human beings are also capable of knowing things in relationship to *goodness*. Goodness refers to that which contributes to the perfection of a being. For example, in a plant or animal health is "a good," and in a rational being wisdom and friendship are "goods." We can also say that food is good for an animal because it contributes to its having the good of health; and a book may be good for a human being because it contributes to his or her having the good of knowledge or enjoyment. The goodness of some goal we seek or some action we perform refers to its ability to meet some need we have or to actualize some potential that we possess. For instance, we can comprehend that shopping online can meet a need we have for a new pair of shoes or a new jacket. We can also comprehend that we might also spend that time enjoying a comedy, actualizing our capacity for laughter. In both cases we use our ability to know things as they are in themselves and in their relation to goodness, to consider actions we may perform, and then perform them or avoid performing them based on rational deliberation.[18]

This ability to act or not to act on the basis of reason is called *freedom*, "the power, rooted in reason and will, to act or not to act, to do this or that, and so to perform deliberate actions on one's own responsibility."[19] Based on reason, human beings are capable of consciously choosing or avoiding this or that action. Unlike the other animals, which are moved by appetites and instincts, humans are capable of directing their appetites and instincts through reason. Animals are moved by appetites and instincts, but humans can move themselves. This freedom includes "the possibility of choosing between good and evil, and thus of growing in perfection or of failing and sinning."[20] It is by our wills that we enact freedom, and our free wills are in turn grounded in our reason, our ability to know the truth. This is what St. Thomas Aquinas meant when he referred to the uniquely human ability to make judgments about our own judgments. Only a creature that can make such judgments freely is a truly moral being.

Consequently, human beings are capable of love. There are many dimensions or levels to love. The first is one we share with the animals—the inclination to act due to being attracted by a good. In human beings this attraction "causes a desire for the absent good and the hope of attaining it; [it] finds completion in the pleasure and joy of the good possessed."[21] Thus, our natural love of self leads us to pursue goods that fulfill us and give us joy. We also share the tendency among many animals toward prosociality or prosocial behavior, as we saw in the case of *Homo erectus* and the Neanderthals. Such instinctive tendencies toward our own good and also the good of others are part of the animal tendencies we inherit through evolution. They provide reasons for acting that are naturally good.

The Christian idea of love is often mischaracterized as an abusive hatred of self, or at least indifference toward one's self, as if our natural tendencies to care for ourselves are intrinsically evil. But as St. Thomas Aquinas observed, quite the opposite is the case. *Self-love*, in the sense of desiring physical goods like food and drink, physical well-being, knowledge of the truth and moral goodness, is the natural source of all other free acts for human beings.

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[18] F.C. Copleston, *Aquinas* (Baltimore: Penguin, 1955), 179-180.
[19] CCC no. 1731.
[20] Ibid. no.1732.
[21] Ibid. no. 1765.

This becomes the basis for knowing the good for others, and learning how to best provide it for them. In this way, self-love is not the opposite of the love of others; it actually makes that love possible.[22]

But such tendencies, good and necessary as they are, do not entirely capture the human ability to love. In the fully human sense, *love* is the free choice to will the true good of another.[23] Through knowing themselves and also being able to see reality objectively, humans are capable of knowing the true good of another person and of freely choosing to act for the sake of that good. In this way human beings can love in the way that God loves, not just for the good someone brings me, but for the sake of their own good. We see, then, that fully human love is not a mere "feeling" or emotion; it is an act of the will. To love someone is to will what is good for that person — and in the case of proper self-love it is willing what is genuinely good for oneself, i.e. what helps to perfect oneself.

As mentioned above, animals are capable of something like love; they are attracted to goodness as well. *But this attraction is one that possesses the animal and is not possessed by it.* Humans on the other hand, are capable, by reason and will, of *self-possession*. Therefore, they are capable of making themselves into a gift for others, including God.

Of course, we do not find it easy to choose the good for ourselves and others; in fact, we find ourselves often inclined toward moral evil. We experience great conflict within ourselves, and human history is full tragedy because of this problem of moral evil. The dark riddle at the heart of human existence revolves around the divorce between our desires and our reason, between our best tendencies toward knowing the truth and loving what is good, and our common struggle to overcome evil tendencies and habits within ourselves.

B. The Divine Image in Three Dimensions – Holism, Sexuality, and Personhood

We have gone a long way toward understanding why human beings, out of all the visible creatures on the planet, can alone be called the image of God. Now that we have seen the foundations of this unique status, we must turn to consider the specific ways in which reason and freedom are realized.

To be a human being is to be able to know and love, but human knowledge and human love are expressed in very particular ways. What makes human love different from angelic love and divine love is that human love is twofold: 1) humans love in their unique status as a union of body and soul; and 2) human love is expressed in the equality and diversity of masculinity and femininity.

But because of their spiritual status, human beings love as *persons*, and this is something that they do share in common with angels and with God. All of these dimensions add more detail to our understanding of the human being as the image of God.

1. "Body and Soul but Truly One"[24]

It is clearly true that something of man is immaterial; that is why humans can exercise the faculties of reason and free will, as we saw above. But as we also saw in Genesis 2:7, the Lord God made man from dust. In other words, the human person is a being that is both bodily and spiritual simultaneously.[25] To be human is to be a hybrid, a creature that has

[22] David M. Gallagher, "Thomas Aquinas on Self-Love as the Basis for Love of Others," *Acta Philosophica* 8:1 (1999): 25-30. Cf.
[23] CCC, no. 1765.
[24] Cf. Ibid., no. 362-368.
[25] Ibid., no. 362.

one foot in the world of non-rational animals and another in the world of angels, although he is neither. In other words, a human being is not two things, but one, a single substance made up of two distinct principles. Those principles are a material body and an immaterial soul. The union of body and soul is not like the union of two parts.[26]

This means that bodiliness is essential to being human. The Christian Faith rejects all forms of *dualism* (i.e. theories that assert that body and soul are separate substances, different things). This is what is meant by the Church teaching that the intellectual (rational) soul is the form of the human body, a teaching first declared at the *Council of Vienne* in 1311-1312 (and later at Lateran Council V in 1513).[27]

The body is so essential to being human that even our spiritual powers of reason and freedom are dependent on our bodiliness. Catholic thought has long recognized that the body is necessary for all acts of reason and will in this life;[28] the discoveries of neuroscience about brain activity involved in human thought are in no conflict with Christian theology. But the Christian Faith also declares what is attested to by our own experience and philosophical reflection, that the brain is not sufficient by itself for acts of reason and will. Because of the close dependence of body and spirit, man is the image of God as a body-soul composite.[29] Our imaging of God is not reducible to body or soul; it is the whole human being in her integrity that is the image of God.

As we have already seen, the fact that human beings are a union of matter and spirit means that the biological production of human beings through sexual intercourse, *procreation*, involves God in a very special way. A bodily process cannot of itself produce a spiritual soul, nor can a perishable body produce an immortal reality. The Church therefore teaches that every human soul is created immediately by God. This does not mean that the body is produced by the parents, and the soul by God, separately. Rather, God causes human procreation to produce an effect that transcends its biological capacity.[30] When the material that makes up the human body is organized sufficiently for human life, so that a living human being is produced, then that human being has a soul.[31] This is true even when human life is created in ways contradictory to God's plan and to human dignity; even a human created through cloning would have an immortal soul.

Why did God create humanity as a hybrid of body and spirit? Perhaps it is because of his love for unity. God, as we know, is three divine persons who are so intimately united that the real distinction between Father, Son and Holy Spirit coincides with the perfect unity of the divine nature. God's creation then should also be a unity in some way. But in order for there to be such a unity, a creature that possesses both body and spirit was necessary to unite the physical universe with the realm of spirit. Humanity is the link between the world of atoms and the world of angels.

So man, the image of God, is a unity of body and soul that brings about the unity which God intended for the entire realms of matter and spirit. But he also intended another unity within humanity itself: the unity of man and woman.

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[26] Ibid., 365.
[27] Haffner, *Mystery of Creation*, 78.
[28] Barr, *Modern Physics*, 173.
[29] ITC, no. 31.
[30] CCC no. 366.
[31] Haffner, *Mystery of Creation*, 74.

2. Man and Woman – "A Unity in Two"

In the words of the *Catechism of the Catholic Church*, "God created man and woman *together* and willed each *for* the other."[32] Therefore, the difference between man and woman and the relationship that difference makes possible are essential elements in their imaging of God.[33]

We have already noted that, due to the union of body and soul, bodiliness has a part to play in man's acts of reason and will. Therefore, all human actions, including spiritual acts, are also conditioned by maleness and femaleness, masculinity and femininity: "Each [sex] possesses a way of being in the world, to see, to think, to feel, to engage in mutual exchange with other persons who are also defined by their sexual identity."[34] It is important to note here that the Church does not distinguish between sex and gender; sexual identity is not a matter of human choice but is given to us from the moment of conception.

In their imaging of God, man and woman are *equal*, *different*, and *complementary*. First, the Christian Faith teaches that man and woman are equally created in God's image. Both have reason and freedom, and neither sex possesses a greater dignity than the other. Second, it also affirms that man and woman are different – each exercises reason and freedom in a way "proper and [unique] to their sexual identity."[35]

But the third characteristic is just as crucial: "man and woman were made 'for each other'"; that is, they are reciprocal (mutually supportive) and complementary (mutually enriching and completing). In marriage, they become "one flesh" and have the potential of uniting "their bodies and spirits in an attitude of total openness and self giving." When they do so, "they form a new image of God," who is a perfect communion of persons. The image of God that is found in each and every human person is fulfilled in a special way in this union of man and woman.[36]

3. Personhood and Communion

The spiritual powers of reason and free will, made manifest and expressed visibly in the human body united to the human soul and gloriously revealed in marital love, point to the fact that the human being, out of all the visible creatures on this planet, is a *personal being*, a subject (one who possesses himself or herself) and not simply an object. With human beings the visible world takes a major leap – human beings are visible creatures that are *persons*. A *person* is a being capable of knowledge and love; a human person is a person who, due to knowledge and love, exists bodily in the world as a relational and social being, the embodied image of God.[37] Because a human person can know and freely determine himself or herself, he or she has a level of uniqueness that is much more radical than simply being an individual member of a species. An individual is a unique *what*, but a *person* is also a *who*, with a unique *personality*.

Because of this self-possession, which reveals a deep interior life, the human person is capable of having the closest contacts with the whole world, especially with other persons. That contact begins on the natural bodily level, through the senses, but also blossoms into an interpersonal contact, a contact that is interior as well as exterior.[38] Because of reason and

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[32] CCC no. 371.
[33] ITC, *Communion and Stewardship,* no. 33.
[34] Ibid., no. 33.
[35] Ibid., *Communion and Stewardship,* no. 36.
[36] Ibid., no. 38.
[37] Ibid., 40.
[38] Karol Wojtyla, *Love and Responsibility* (San Francisco: Ignatius Press, 1993), 23.

will, human persons are capable of *communion* – a commitment of self to other persons in which mutual self-giving forms a spiritual unity. Personhood is the basis of the human ability to form communities, such as families, friendships, local, state, and national societies, teams, and the Church, which is the Body of Christ.[39]

Because a human being is a person, she is the subject of special rights. No good, even if it seems to be that of society as a whole, is sufficient grounds for the violation of a human person. Pope John Paul II said that when it comes to persons, one rule applies. Positively expressed, that rule is the obligation to love: "Thou shalt love!" Negatively, that rule is expressed as a prohibition: "Thou shalt not use!"[40] The message is clear: *a person is not an object to be exploited but a subject to be loved*. Only by loving others, and never using them in an exploitative fashion, can we respect the absolute integrity and dignity of human beings.

The highest form of communion that human persons can have is their relationship with God, expressed and realized especially in receiving the Sacrament of the Eucharist, which we appropriately call Holy Communion, because in it Christ gives himself to us – body, blood, soul, and divinity – and we give ourselves to him in return.

In the Trinity, there is a perfect communion of persons who share a single divine life. In human communities, even though humans have been wounded by sin, the human race reveals the image of God once again. Personhood and community are essential dimensions of the image of God that is humanity.

C. The Natural Virtues: The Art of Being Human

The fact that humans have reason and freedom means that our lives have ceased to simply be the outcome of our biological instincts and tendencies and have become something that can be, and are, deeply shaped by our free choices. In this regard we can recall the First Creation Account, where God creates human beings, but never pronounces that they are good, only that his entire creation has become very good now that his image dwells within it. With the emergence of the image of God, the world has become a stage for love and for moral goodness, but also a stage open to the whole range of moral evils.

Therefore every human being, knowingly or not, receives her being from God as not only a gift but a task, a crucial project. The moral, virtuous life is not so much about what we ought to do; instead, it is about who we ought to be.[41] The real task of human life is to strengthen our natural tendencies toward goodness and to correct, purify and master those tendencies we have toward evil. When we are successful, we develop *virtues*, habits of goodness that are the greatest realization of what a human life can be. The art of being human consists precisely in the cultivation of these possibilities, all of which build upon important elements of our nature as a union of body and soul.

The first natural virtue, *prudence*, is based upon and perfects our capacity for knowing the truth. The prudent person is one who sees things as they really are, and understand how to best choose what is right and good in the light of the whole truth about God, the world, themselves and others. Christian tradition has sometimes depicted the virtue of prudence as a human being with two faces. One face is of an old, wise man that looks backward at the past. The other is a beautiful, young woman that faces the present and the future with eyes that reveal that she is engaged in careful thought. Prudence is the opposite of *moralism*, which is an approach to moral decisions that is focused on moral rules without understanding why

[39] ITC, 42-43.
[40] Ibid., 40-43
[41] Josef Pieper, *The Christian Idea of Man* (South Bend: St. Augustine's Press, 2011), 4.

they exist. Moralism makes moral decision-making rigid, uncreative, and unspontaneous. Prudence makes us authentically and creatively good, able to light the way for others because we understand the rules, why rules are necessary, and also the limitation of rules. All of the other natural virtues depend upon prudence; she has often been called the mother of the others.

The second natural virtue is *justice*, the habit of giving to others what is due to them. Justice directs us in our relationships with others, and in justice we really conceive of other people as entirely distinct from ourselves, worthy of their own lives and happiness, and act accordingly. The third is *courage*, which is the habit of choosing what is right regardless of the consequences, the willingness to even endure suffering rather than betray what is right. One sub-virtue of courage is patience, because when we are patient we endure the delay of the good we desire rather than act selfishly. The fourth is *temperance* or moderation, by which we master our animal instincts, our natural desires for physical goods, and pursue those goods in ways that truly serve our growth and happiness.

It is by these virtues that the divine image that is the human person is brought to its natural fulfillment. Together they produce human beings that are more able to receive divine grace, by which we are invited to participate in the life of God. *Grace* is "the free and undeserved help that God gives us to respond to his call to become children of God, adoptive sons, partakers of the divine nature and of eternal life."[42] Through this special help, we become capable of new virtues—faith, hope and charity—which fulfill the art of being fully human. Living in God's grace means to participate in the life of God, imperfectly in this life but perfectly in the life to come. Divine creation makes humans the image of God; through grace we become more like God, radiating his truth, goodness and love to each other. We will revisit this in Chapter Twelve.

D. Conclusion – The Human Person, Stewardship, and Science

As the image of God, human beings share the world with other creatures but are distinguished from them by reason and freedom. Therefore we have a special relationship with the rest of visible creation; only human beings are capable of enjoying the privilege of sharing God's own governance of the universe. In fact, this vocation is given by God himself. In the first creation account we read that God blessed the man and woman, saying "Be fertile and multiply; fill the Earth and subdue it" (Gen 1: 28). Man does not replace God but does act as his steward of the universe and its goods. *Stewardship* is a participation in the ownership of something of which primary ownership belongs to another.[43]

In stewardship over creation, humans are called to rule over it much as someone might act as master of someone else's household, such as the servants in the story Jesus tells of the man who gives his servants money to invest and then to return to him with interest (Lk 19: 12-27). Man is master of creation, but not in a way in which he can abuse the world. In fact, his dominion over the world involves a responsibility and service that he owes to God;[44] our care for the earth and its creatures is an act of justice by which we give to God the Creator what he is due. Careful stewardship of the earth is an act of justice, both to God who creates it and by extension to the creatures who share the planet with us.

This important truth was affirmed by Pope Francis in *Laudato Si,* his 2015 encyclical letter subtitled "On Care for Our Common Home." Pointing to pollution, climate change,

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[42] CCC, no. 1996.
[43] ITC, no. 57.
[44] Ibid., no. 58-59.

the scarcity of clean water and the loss of biodiversity, which are the direct effects of human over-consumption, the pope observed that, in the biblical creation accounts, to be human means to be grounded not only in relationships with God and others but also with the Earth itself.[45] Noting St. Francis of Assisi's joyous recognition of the earth as "our sister," he declared:

> This sister now cries out to us because of the harm we have inflicted on her by our irresponsible use and abuse of the goods with which God has endowed her. We have come to see ourselves as her lords and masters, entitled to plunder her at will. The violence present in our hearts, wounded by sin, is also reflected in the symptoms of sickness evident in the soil, in the water, in the air and in all forms of life. This is why the earth herself, burdened and laid waste, is among the most abandoned and maltreated of our poor; she "groans in travail" (Rom 8:22). We have forgotten that we ourselves are dust of the earth (cf. Gen 2:7); our very bodies are made up of her elements, we breathe her air and we receive life and refreshment from her waters.[46]

Rather than acting as stewards of the rest of creation, human beings have too often ravaged it out of greed and indifference. Pope Benedict XVI referred to our current environmental crisis as evidence that humans have lost their way, like sheep lost in the desert:

> And there are so many kinds of desert. There is the desert of poverty, the desert of hunger and thirst, the desert of abandonment, of loneliness, of destroyed love. There is the desert of God's darkness, the emptiness of souls no longer aware of their dignity or the goal of human life. The external deserts in the world are growing, because the internal deserts have become so vast. Therefore the earth's treasures no longer serve to build God's garden for all to live in, but they have been made to serve the powers of exploitation and destruction. The Church as a whole and all her Pastors, like Christ, must set out to lead people out of the desert, towards the place of life, towards friendship with the Son of God, towards the One who gives us life, and life in abundance.[47]

The human capacity for truth and goodness, as we see in our growing environmental crisis and in so many dark places within human life and history, has been deeply wounded, and the destruction of our common home is an outward sign of this interior darkness. Our consideration of the image of God, therefore, leads us to consider the sad reality of sin, in which the image of God in us is broken and disfigured.

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[45] Francis, *Laudato Si*, no. 66.
[46] Ibid., no. 2
[47] Benedict XVI, Inaugural Homily.

Jesus Christ: The True Origin of Humanity

Chris Baglow

1. **"Human Sin and Modern Science: The Tragic History of the Image of God"**
2. **"In His Image: The Human Person from the Divine Perspective"**

The Tragic History of the Image of God

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"If only there were evil people somewhere insidiously committing evil deeds, and it were necessary only to separate them from the rest of us and destroy them. But the line dividing good and evil cuts through the heart of every human being. And who is willing to destroy a piece of his own heart?"
- Alexander Solzhenitsyn, *Gulag Archipelago* (1973)

With these sobering words a former Russian political prisoner and Nobel prize-winning author reflects upon two tragic facts – that every human being is capable of evil, and that very often our outrage at the crimes of others hides from us our own capacity for crimes against goodness. For all its potential, human life is shadowed by acts of ignorance and violence, pettiness and hatred, greed and lust. Even when we choose what is good, we often fail at realizing our best intentions, at making good choices and living virtuous lives. St. Paul captured this tragic paradox perfectly as he lamented his own life experience in his Letter to the Romans, chapter 7: "What I do, I do not understand. For I do not do what I want, but I do what I hate… The will to be good is ready, but doing the good is not. For I do not do the good I want, but I do the evil I do not want." The greatness of the image of God is not the entire picture of what it means to be human from the perspective of faith. In the words of the theologian David Bentley Hart, "The Christian view of the human person is wise precisely because it is so very extreme: it sees humanity, at once, as an image of the divine, fashioned for infinite love and imperishable glory, and as an almost inexhaustible wellspring of vindictiveness, cupidity and brutality."[1]

In this essay we will investigate the ways in which science, philosophy and faith can together deepen our understanding of this tragic element of human nature and history, the pervasiveness of sin and moral evil. Using the examples of blind ideology and racism, we will explore how so many of the worst human tendencies have been illuminated by modern cognitive science, which shows that the animal nature we inherit from hominin evolution is at the root of our tendencies to both moral evil and moral goodness. With St. Thomas Aquinas as our guide, we will explore how the Christian tradition has recognized this and what it tells us about God's original plan for humanity, which was postponed but not terminated by sin. Finally, we will consider the Church's teaching on original sin and the entrance of moral evil into human life at the dawn of human history. Sinfulness is often wrongly considered to be what Christianity is all about, as if our salvation is actually about blame or condemnation. On the contrary, the center of the Gospel is God's love for humanity made flesh in Jesus Christ; the topic of sin merely shows us our need for redemption to fully receive that love.

To begin, let's explore two examples that highlight the dilemma of being human.

A. Blind Belief and Racism

In human history, great ideas have often mutated into poisonous and even murderous ideologies, in which a partial explanation is taken as the *only* explanation for just

[1] David Bentley Hart, *Atheist Delusions: The Christian Revolution and Its Fashionable Enemies* (New Haven. CT: Yale University Press, 2010), 17-18.

about everything. In the early 20th century, as Darwin's brilliant discovery of natural selection began to be more fully appreciated, it just as quickly began to be badly applied to human life and society. In this misinterpretation of Darwin's theory, called *social Darwinism*, it became the responsibility of governments to play the role of the environment, to "aid" natural selection by controlling breeding (called *eugenics*) and even sterilizing those considered physically or mentally deficient. In *Buck v. Bell*, a 1927 U.S. Supreme Court ruling, the door was opened nationally for compulsory sterilization of the unfit, including the mentally handicapped, "for the protection and health of the state" – an attempt to improve the human race by eliminating "defectives" from the gene pool. In the *1924 Immigration Act*, the US Congress passed a law that restricted immigration to favored races and nationalities in order to maintain the racial heritage of the nation, and completely excluded immigrants from Asia.[2] Across the Atlantic, in Nazi Germany, social Darwinism was behind one of the most horrific events in history—the unspeakable evil of the Holocaust.

Social Darwinism fueled movements of white supremacy and gave them a pseudo-scientific justification. It legitimized various expressions of *racism*, which has been condemned by the Church as "a violation of human dignity and a sin against justice."[3] In the words of Vatican II, "Every form of social or cultural discrimination in fundamental personal rights on the grounds of sex, race, color, social conditions, language, or religion must be curbed and eradicated as incompatible with God's design."[4] In the name of the pseudo-science of social Darwinism, the racist lies of white superiority and even of a "master race" flourished, and found expression in violence and discrimination.

The great irony behind Social Darwinism and the racism it fueled is that both have been entirely undermined by modern genetics. It turns out that all human beings at the genetic level are 99.9% the same, and that the differences between races and ethnicities are vanishingly tiny. A study conducted in the early part of the last decade tested the DNA of 1,056 people from 52 populations in five major geographic regions of the world: Africa, Eurasia (Europe, the Middle East, Central and South Asia), East Asia, Oceania and the Americas. Of the tiny .1% difference, 94% is among individuals of the same populations, and only 6% between individuals from different populations.[5] By comparison, a single population of chimpanzees in West Africa is said to have more diversity in its DNA than the entire human population has today![6] Skin color, which has been and remains a source of social division and an ocean of misery, violence and misunderstanding throughout history, turns out to be a micro-adaptation to various climates that has actually been independently acquired numerous times by human populations living in various regions of the world.

So racism has no foundation, scientific or otherwise. And yet its dark legacy continues. It is only one example of the numerous ways in which fear, discrimination and even murderous violence against those considered different and inferior has cast shadows over virtually every human society. In the Middle Ages, murderous attacks on European Jews were spontaneously undertaken by mobs of Christians, who saw the call to liberate the Holy Land as requiring that non-Christians in their own societies be slaughtered, despite condemnations by Church leaders. In 1992, ethnic cleansing in Bosnia-Herzegovina after the fall of the Soviet Union brought the murder of over 25,000 Muslims civilians. In 1994, an

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[2] Conor Cunningham, *Darwin's Pious Idea*, 187.
[3] CCC "Glossary"; cf. CCC no. 1935
[4] *Gaudium et spes*, no. 29.2.
[5] Mark Schwartz, "People from Distant Lands Have Strikingly Similar Genetic Traits, Study Reveals," Stanford Report, January 8, 2003, https://news.stanford.edu/news/2003/january8/genetics-18.html.
[6] Tattersall, *Masters,* 194.

estimated 1,000,000 members of the Tutsi tribe were slaughtered by members of the Hutu tribe, led by the Hutu majority government of the African nation of Rwanda, over a period of 100 days. Innocent blood spilt over differences of skin color, culture and religion runs like a river through human history.

So from where do such evils come? Placing the poisonous ideology of social Darwinism and violence against those different from us side-by-side highlights an important fact about our human nature – that certain instinctive inclinations we have seem to make us tend toward both. In regard to blind ideology, it seems that the repetition of false claims, even claims that are known to be untrue, have the effect of making them seem more truthful to those who encounter them.[7] The human brain favors statements that have already been processed, which can create a situation in which groups large and small become blinded by falsehoods. Such "thinking shortcuts," also known as *cognitive biases*, tend to limit our openness to new ways of thinking, even when our standard ways of thinking are absurd or dangerous.[8] And yet this very tendency is one that also makes us capable of trusting all kinds of genuine sources of knowledge, upon whom we rely for 99% of the information that we have and the truths that we know. What can lead in some cases to the spread of ideologies like social Darwinism is also essential to knowing the truth and living in society.

Moving to the evil of racial and ethnic discrimination, other research shows that we have a natural tendency "to make distinctions between 'us' and 'them.'" As social animals that live in groups, we have an innate tendency to favor members of the "ingroup," and to be less inclined toward trusting members of "outgroups." Similar behaviors have been detected in other primates, which indicates that the roots of *outgroup bias* go far back in our evolutionary history. And yet the same tendency is also at the root of our ability to bond into groups and to offer mutual support to each other within groups.[9]

Do trust and ideology, group bonding and racism, and good and evil go hand-in-hand? How do we explain the "dividing line" between them that runs through our hearts? The paleoanthropologist Ian Tattersall suggests that this "dividing line" is probably due to our rapid and very recent emergence as a species, and the stunning cognitive revolution it involved. We arrived in an evolutionary blink of an eye – if the history of the universe was put in the time scale of one year, *Homo sapiens* appeared 3 minutes before the fireworks on New Year's Eve, at 11:57 pm. Through the past several million years the hominin brain grew in size and complexity, and hominins produced more and more amazing tools as well as becoming more socially organized and cohesive. But with the advent of symbolic thought and of language, our thinking processes shifted into a radically new mode, "unpredicted by anything that had gone before." We did not evolve this capacity gradually, and unlike all prior evolutionary adaptations, this one placed us in an entirely new situation:

> This messy process explains our apparently contradictory cognitive condition. It explains why we have such brilliant rational abilities yet so often behave irrationally. It shows us why we so frequently use the unprecedented communicative potential of language to obfuscate and tell lies. It explains why we sometimes cannot justify our actions even to ourselves… and why we reason so powerfully, yet make so many

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[7] Lisa K. Fazio, et al., "Knowledge Does Not Protect Against Illusory Truth," *Journal of Experimental Psychology* 144:5 (2015):

[8] Emanuel Maidenberg, "Why We Believe What We're Told," *Psychology Today*, June 27, 2017, https://www.psychologytoday.com/us/blog/belief-and-the-brain/201706/why-we-believe-what-we-re-told.

[9] Elizabeth Culotta, "Roots of Racism," Science, May 18, 2012, http://science.sciencemag.org/content/336/6083/825.full.

> dreadful decisions. All this, and much more, occurs because the rational and the irrational constantly jostle in our heads, combining to make us the simultaneously creative yet reflexive creatures that we are…[10]

Because the human brain is the product of evolution, it has been compared to a building that was built with one story first, but to which new levels were added with little or no modification to the earlier levels. In the 1960's the neuroscientist Paul MacLean identified three levels: the hindbrain, which is the oldest "floor" and controls our basic biological functions like breathing and coordination; the limbic system, which is the next level and governs "emotions, instincts, sexual behavior, and feelings of well-being"; and the forebrain, the most recent "floor," which handles language, choices and thinking. In the words of cell biologist Kenneth Miller, this is an oversimplification but is basically accurate: "the circuitry of the brain is in fact a poorly integrated mixture of the truly ancient, the very old, and the relatively new all working side-by-side."[11]

In summary, despite being one of the great wonders that evolution produced, our biological and neurological composition has its shortcomings. This fact explains a great deal about why humans act irrationally and contrary to goodness – why racism and other forms of bias seem to crop up throughout society and history, why male human beings find it so hard to treat women as equals and not as objects, and why wars and the killing of the innocent are constants in human history. There is nothing from the scientific perspective that should make us surprised by this. Yet what makes sense from the "how" perspective of human evolutionary science falls short of the "why" perspective of theology, which looks at human life from the perspective of human happiness and God's intentions for the human family. We yearn for better than what evolution could give us, and thanks to the Christian Faith we know that what evolution produced was not the finished product.

B. Physical Evil and Preternatural Gifts: Animal Imperfection and Human Nature

1. St. Thomas Aquinas and Our Animal Nature

As has been noted elsewhere, evil is a privation of some good, the absence of a good that ought to be present. Most physical evils occur as a matter of course because of physical good. "The life of the spider is the death of the fly"; physical evil is so deeply intertwined with physical good that they are impossible to separate. And we know that, even though we are rational, we are also animals whose brains are physical organs that are necessary for our exercise of reason in this life. So our brains share the same ambiguity as the rest of physical reality. We have instincts and inclinations that can be interpreted as evil from one angle, but never from *every* angle. In fact, it is possible for human beings to come to understand their instincts and inclinations and to consciously choose between them; to treat those different than us as if they were beloved blood relatives, to confront with logic and truth the false ideologies that threaten to sway our minds toward darkness, and to discipline urges that are contrary to goodness. To quote Miller once more: "Evolutionary history may dictate the pleasures, anxieties and prejudices of our minds, but we, distinct from other creatures, have discovered that history"[12]—and because we can transcend it, we are not utterly determined by it.

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[10] Ian Tattersall, *The Strange Case*, 219.

[11] Kenneth R. Miller, *The Human Instinct: How We Evolved to Have Reason, Consciousness and Free Will* (New York: Simon & Schuster, 2018), 130-131.

[12] Ibid., 145.

The insight that our physical bodies, including our brains, bear the same ambiguities as all of physical reality is not new. While writing his greatest theological work, the *Summa Theologiae*, St. Thomas Aquinas puzzled over this strange paradox. On the one hand, he observed, we have been made for perpetual, everlasting happiness, something we are capable of thanks to being created in the divine image, endowed with reason and freedom. In thinking of human fulfillment and happiness, St. Thomas had in mind the great mysteries of our salvation – the eternal joy of communion with God. But when he considered our nature from the perspective of our biological makeup, he observed that the human body is not perfectly adapted to our spiritual capacities. Nature, he speculated, gave the best it was capable of, producing a body with features that are useful for rational animals (like sense and touch). But much like a blacksmith might choose iron to make a knife for one set of reasons (iron is hard, for example, and can be made very sharp), he might also regret that same material for other reasons, such as the tendency of iron to rust easily. "For we may note a twofold condition in any matter, one which the agent chooses, and another which is not chosen by the agent, and is a natural condition of matter."[13]

And so it is with human beings, creatures made in the image of God and also the products of evolution. We have the proper kind of biological makeup for a rational animal, but because of the very limitations of the material world, that makeup cannot in itself provide us with everything needed to be the perfect embodied image of God. God is eternal and the source of perfect life, but our bodies are corruptible; we are naturally subject to sickness, aging and ultimately, death. Also, our reason and freedom are constantly interacting with our animal instincts and inclinations, and those are not always easy to harmonize with knowing the truth and loving freely. Thanks to the gift of reason, we are capable of understanding what intellectual, moral and physical excellence entails, but so often cannot be our "best selves."

It is utterly incorrect, however, to conclude that what we received from evolution has made us intrinsically evil. It has made us only what any biological process can produce; a creature that pursues survival, physical health, sensual pleasure and other goods. These are sufficient for an animal existence, and even the bad tendencies we discover in ourselves arise only in relation to the goods that we strive for by nature. But as St. Thomas also knew, God made us capable of knowing the difference, of being able to "make judgments about our judgments." In addition, the Christian perspective on God's intention for humanity offered St. Thomas an insight that science and philosophy could not provide, as we will see below..

In summary, we receive ambiguous inclinations from our animal nature. The very things that lead us toward bonding and generosity can also lead us to mistrust, suspicion and even hatred. Some scientists suggest that such evil is simply part of human nature. They ask how "sin and death" can be the result of the Fall when clearly we find lust, aggression, killing, and death among animals for hundreds of millions of years before humans came along. But as St. Thomas' insights reveal, these drives are not in themselves sinful. As long as they are properly directed by reason there is no sin – the same drives which are involved in lust and aggression are also involved in true sexual love and in daring acts of heroism, respectively. And yet these ambiguous inclinations also reveal that our evolutionary heritage *alone* is not sufficient for us to be the virtuous, loving and sinless human beings God creates us to be. As the Catholic tradition tells us, God had more work to do.

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[13] St. Thomas Aquinas, *Summa Theologiae* I-II.85.6.

2. Original Integrity and the Preternatural Gifts

In keeping with Sacred Tradition, and with the divine purpose of moral perfection and perfect happiness for which God created human beings in mind, St. Thomas concluded that God not only created us in a special dependence upon him, but also endowed our first parents with special gifts that go beyond what they could receive from the material world and our animal nature. Through a supernatural force given to the soul, and as long as humans did not separate themselves from God through sin, the body would be preserved from all corruption and from death,[14] our bodily desires and emotions would be wholly subject to reason,[15] and human beings fully alive, living in untainted goodness and happiness, in unbroken communion with God, would have been the result. These special endowments, called *preternatural gifts*, were graces given to perfect our natural state, making it correspond to God's ultimate intentions for us. Reason and freedom made humans capable of communion with God, but not yet capable of living out that communion. These gifts were added to human nature so that God's loving desire for our unending happiness would be realized.

Along with the gift of immortality (to overcome our natural biological end, which is death) and infused knowledge (to overcome our natural lack of knowledge), St. Thomas speaks of the gift of *original integrity* as that by which God assisted our first parents to overcome their tendency toward a conflict between knowing, choosing and desiring, what Ian Tattersall calls our "apparently contradictory cognitive condition." Assumed here by St. Thomas is that our animal nature is not well-integrated, or at least not integrated well-enough – as animals, we are not able to easily integrate our reason and freedom with our desires; as composite beings, we tend toward physical dis-integration, not integration. Taken together, the preternatural gifts with which God endowed our first parents empowered them to readily realize the best possibilities provided to them by the "human difference."

When trying to conceive of what preternatural existence would've been like, with original integrity and freedom from suffering and death, our imaginations can tend to run away with us. Some think of the first humans living in an earthly paradise in which our planet, or at least some region of it, was radically different than it is, a place where nothing ever died and in which no physical evils were present. But it is more helpful to think of "paradise" as the privileged way in which sinless humans would have existed in this world *as it is*, or at least as it was at the origin of fully human beings. Others assume that freedom from death would mean a perpetual lifetime for humans on earth. But many important theologians, including St. Augustine, thought that eventually our first parents and their sinless descendants would have entered into a glorified state comparable to the risen Christ, or to the Blessed Virgin Mary after she was assumed body and soul into heaven. Article 398 of the *Catechism of the Catholic Church* teaches that from the beginning "man was destined to be fully 'divinized' by God in glory." Still others assume that freedom from suffering would mean freedom from any pain whatsoever, and a situation in which humans would not need to strive or mature in wisdom and virtue. But this also has never been the teaching of the Catholic Church.[16]

We do not know how long the first humans remained in a preternatural, sinless state. St. Maximus the Confessor, a champion of the full humanity of Christ against those who denied that he had a fully human will, was of the opinion that this state was lost at the very

[14] Ibid., I.97.1.

[15] Ibid., I.95.2.

[16] Nicholas Lombardo, "Original Sin, Evolution and Death" (lecture, Academy of Catholic Theology Annual Conference, Washington Retreat Center, Washington D.C., May 20, 2014).

instant of the creation of human beings: "…at the instant he was created, the first man, by use of his senses, squandered this spiritual capacity—the natural desire of the mind for God—on sensible things."[17] However long it may have lasted, the period of human sinlessness, of original integrity and original holiness, was an imperceptible glimmer that happened tens of thousands of years ago. Original integrity and holiness may very well have been lost as quickly as they were received. Such a moment would quickly perish from human memory, especially considering that human life became inundated by sinful tendencies, separation from God, suffering, and death.

3. The Broken Image

Regardless of how long our ancestors possessed the preternatural gifts, humans no longer have them now. What we are left with, according to St. Thomas, is a fourfold wound: the wound of ignorance, in which human reason is hindered in its path toward truth; the wound of malice, an inclination toward moral evil in which the human will is obstructed along its path toward goodness; the wound of weakness, in which the *irascible appetite*, our ability to strive for goodness, is deprived of its tendency toward persevering in the face of difficulty; and the wound of concupiscence, in which our *concupiscible appetite*, our capacity to approach our sensible desires with our true good always in mind, is wounded in its tendency to rejoice in true sensible goods vs. merely apparent ones.[18] St. Thomas notes that we are not entirely deprived of reason, goodwill, strength, etc., but that we are deeply wounded in these capacities.

St. Thomas calls this loss of preternatural gifts a "wounding of *nature*." When we define human nature only by virtue of our physical and biological heritage, then it makes no sense to call the loss of gifts that go beyond that heritage a "wounding." If man is defined simply as a particular primate species, then what Thomas calls wounds are no wounds at all; the good or bad to which our instincts incline us are, from the biological perspective, simply an expression of our nature.

But St. Thomas is not thinking of human nature only as a matter of our biological heritage. He is thinking of human nature in regard to what God ultimately intends us to be, what the 2nd century bishop St. Irenaeus of Lyons meant when he said that man is properly composed of "body, soul and the Holy Spirit."[19] Just as the human kind of body cries to God out of justice for a rational soul, so a living man or woman, body and soul, cries out for the ability to be everything he/she is capable of, and thanks to understanding and freedom we are capable of so much more than what our biological heritage offers us. When the Holy Spirit dwells in us, we are made capable of communion with God and of divine life. Since God created us with the intention of giving us this perfect mode of being, then Thomas' idea of the fourfold wound makes sense.

In other words man, the rational animal, isn't all he can be, nor is he all that he is meant to be. But without dependence on God what we are now is, in fact, all we can ever be. The one who breathed into our nostrils the breath of life wished to complete our formation, to give us the ability to be fully integrated rational animals well-situated to receive the fullness of his sanctifying grace in communion with Himself and with one another. The doctrine of the preternatural gifts tells us that even this rational animal is not yet what God

[17] St. Maximus the Confessor, *Ad Thalassium* 61, in *On the Cosmic Mystery of Jesus Christ*, trans. by Paul M. Blowers and Robert Louis Wilken (Crestwood, NY: St. Vladimir's Seminary Press, 2003), 131.
[18] St. Thomas Aquinas, ST I-II.85.3 resp.
[19] St. Irenaeus of Lyons, *Against Heresies*, V.6.1.

fully intended when he said "Let us make man in our image." The next part of Genesis 1:26, "after our likeness," is just as crucial. Evolution and divine creation gave us the ability to be the image of God, but not yet the ability to be like God fully. God had gifts for us beyond what biological evolution and even the powers of reason and free will could provide.

St. Thomas Aquinas directly confirms this when he asserts that, after the Fall, the first humans simply reverted to their biological heritage: "…when man turned his back on God, he fell under the influence of his sensual [bodily] impulses…[after the Fall] he is likened to beasts that are led by the impulse of sensuality…a deviation from the law of reason."[20] Here St. Thomas, who knows nothing of evolution, genetics, paleoanthropology or evolutionary psychology, sees that what we are by nature is "the rational and the irrational constantly" jostling, to paraphrase Tattersall. Reflecting upon this quote from St. Thomas, the theologian Henri Rondet helps us see how the evil tendencies we find in ourselves are both natural from the scientific perspective, yet unnatural from the divine perspective:

> Man has been left to his nature; but it is precisely this that is the paradox and stumbling block. Death, suffering, ignorance, the revolt of the senses – all this is in fact natural, since man is made of flesh and spirit. *But what is natural to an animal organism becomes unnatural for a soul made in the image of God.*[21]

So the wound caused by original sin, our fallen state, is best understood as a supernatural spark that was snuffed by sin, a higher way of life that was lost– thanks to sin, man was left unfinished. God had more gifts to give, and he didn't get to bestow them – he was stopped, and like the wise and loving father in the Parable of the Prodigal Son (Luke 15:11-32), he respected the freedom of his children and permitted them to go away. With this in mind, we can now approach the doctrines of the Fall and original sin.

C. The Tragedy of Original Sin

Original integrity was lost precisely when the disobedience of sin entered the world, an event which is called *the Fall*:

> Man, tempted by the devil, let his trust in his Creator die in his heart and, abusing his freedom, disobeyed God's command. This is what man's first sin consisted of. All subsequent sin would be disobedience toward God and lack of trust in his goodness. In that sin man *preferred* himself to God and by that very act scorned him. He chose himself over and against God, against the requirements of his creaturely status and therefore against his own good.[22]

This sin, freely committed by our first parents, resulted in the loss of the preternatural gifts and of sanctifying grace: of original holiness and original justice, of interior harmony, the loss of the harmony between man and woman, and between humanity and the rest of creation. Death, the natural ending of biological life, made its entrance into *human* history.[23] But, worst of all, our friendship with God was broken. As a consequence,

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[20] St. Thomas, ST I-II.91.6 resp.
[21] Henri Rondet, *Original Sin: The Patristic and Theological Background* (New York: Alba House, 1972), 166-167.
[22] CCC, no. 396.
[23] Ibid., no. 400.

human history became "inundated by sin."[24] The state of separation from God caused by the Fall, called *original sin*, is passed down to all generations. In the words of the *Catechism*, "Original sin is a sin 'contracted' and 'not committed'" – a state and not an act. Human nature has been wounded by original sin, but not totally corrupted; the image of God has been disfigured and stained but still remains.[25]

Once again, with original sin we come upon a doctrine that is easily misunderstood. Some have speculated that the transmission of original sin to all human beings involves some biological defect, as if the human genome was altered by the moral evil committed by our first parents. Original sin is misunderstood as something that is passed on like an infectious disease or a birth defect. But St. Thomas Aquinas rejects this idea. He asserts that we should think of all human beings as if they were one man, "Adam," like the members of a single bodily organism.[26] The first sin changed what it means to be human for all of us, although we are not guilty of the actual sin that caused our downfall as a human family.

Pope Benedict XVI approached the mystery of original sin from the perspective of human personhood and relationships. As has been noted elsewhere, the fact that we are created "in the image of God" means that we are beings that are capable of communion, of bonding in close relationships and whose lives make no sense without being in genuine relationships with each other. Sin is the disturbance of relationships; whenever I sin, I make myself the center of the universe, rejecting God and others. Therefore, the first sin damaged the network of relationships at the very beginning of human history. The world of human community we all enter at the beginning of our existence "is marked by relational damage":

> At the very moment that a person enters human existence, which is a good, he or she is confronted by a sin-damaged world. Each of us enters into a situation in which relationality has been hurt. Consequently each person is, from the very start, damaged in relationships and does not engage in them as he or she ought. Sin pursues the human being, and he or she capitulates to it.[27]

Decades later, Benedict would complete this insight with a beautiful contrast: between the nature of human sinfulness as slavery vs. the sinless freedom of the Blessed Virgin Mary, who was preserved from all stain of sin from the moment of her conception. We all carry the "drop of poison" of thinking that, standing all alone, raising ourselves to God's level, we will fulfill ourselves, finding real happiness. "We call this drop of poison 'original sin.'" In sinning every human being "sets his sights on power, with which he desires to take his own life autonomously in hand. And in doing so, he trusts in deceit rather than in truth and thereby sinks with his life into emptiness, into death."

But God's love and the love of others are gifts; trying to sinfully stand on our own is to enslave ourselves, for the freedom we have must be lived "with one another, and for one another" in order for it to be realized. The Blessed Virgin Mary, on the other hand, shows us what freedom truly means:

> …the person who abandons himself totally in God's hands does not become God's puppet, a boring "yes man"; he does not lose his freedom. Only the person who

[24] Ibid., no. 401.
[25] Ibid., no. 404-405.
[26] St. Thomas, ST I-II.81.1, resp.
[27] Joseph Ratzinger, *In the Beginning*, 73.

> entrusts himself totally to God finds true freedom, the great, creative immensity of the freedom of good.
>
> The person who turns to God does not become smaller but greater, for through God and with God he becomes great, he becomes divine, he becomes truly himself. The person who puts himself in God's hands does not distance himself from others, withdrawing into his private salvation; on the contrary, it is only then that his heart truly awakens and he becomes a sensitive, hence, benevolent and open person.
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> The closer a person is to God, the closer he is to people. We see this in Mary. The fact that she is totally with God is the reason why she is so close to human beings.[28]

The Virgin Mary is our sign of hope that the cycle of sin can be broken and our humanity made complete. But she is the object of our hope only as one who points to her Son, who is the perfect answer to the dilemma of our sinfulness and the tendencies toward it we have by nature. In his life, death and resurrection, Jesus moved the dividing line between good and evil out of the human heart, leaving only the good. We will focus on this shortly, but first, we must tackle a dilemma which modern science seems to create for the idea of a sin committed by our "first parents." The story of Adam and Eve and their disobedience is one that is often assumed by believers to be an historical account. Who are Adam and Eve, and what role do they play in the tragic history of humanity? Did they really exist?

1. The Theology of Human Origins

The biblical story that completes the Second Creation Account, Genesis 3, tells of a man and a woman, the first humans and parents of all human beings to come, being tempted by a serpent to eat fruit from a tree which God had forbidden them to eat after creating them. Their disobedience changes their perspective of themselves and each other; they realize their nakedness, and hide their bodies from each other with leaves. They also try to elude God when he walks through the garden, hiding themselves "among the trees." God punishes them for their rebellion; it results in their being expelled from the garden. Henceforth they both will be subject to death, the man to fruitless and wearying toil, the woman to agony in childbirth.

Modern literary analysis identifies this story as a symbolic narrative, more about the meaning of life than the beginning of human history. As St. John Paul II once noted, Genesis 2-3 uses "mythical language" to express a "deeper content."[29] But St. Augustine believed this account to be actual history.[30] Following him, much of the western Christian tradition assumed the same: human history began with only one man and one woman, who sinned.[31]

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[28] Benedict XVI, Homily on the Feast of the Immaculate Conception, December 8, 2005, http://w2.vatican.va/content/benedict-xvi/en/homilies/2005/documents/hf_ben-xvi_hom_20051208_anniv-vat-council.html.

[29] John Paul II, General Audience of November 7, 1979: 2. The pope offers further explanation in the footnotes to this audience, especially footnotes 2-4.

[30] Ernan McMullin, "Darwin and the Other Christian Tradition," *Zygon* 46:2 (June 2011): 296.

[31] David Bentley Hart, *The Story of Christianity: A History of 2,000 Years of the Christian Faith* (New York: Quercus, 2009), 99, 163.

Monogenism is the theological idea that "the whole human race is descended from Adam and Eve."[32] For centuries monogenism was assumed to accurately describe the beginning of human history. It now seems quite unlikely, perhaps genetically impossible, that monogenism is an accurate account. Evolution works through changes within populations, not through the sudden appearance of two individuals. Also, the genetic diversity that we encounter today among modern humans, despite our very close genetic unity, seems to require thousands of human beings at the beginning of human history, a doctrine theologians refer to as *polygenism*.

So where does that leave Adam and Eve? In 1950 Venerable Pope Pius XII, responding to the evolutionary science of his day, warned the faithful against embracing polygenism in his encyclical *Humani Generis*. He was very careful in his wording. He said that it "is not apparent" how polygenism can be squared with the doctrine of Original Sin.[33] He could have said "it cannot be reconciled" with Catholic teaching. But he did not. He was clearly being cautious and leaving the door open for possible scientific discoveries that might generate some theory of polygenism that could be harmonized with what we know by faith: that original sin is passed on to all human beings due to a real human sin committed at the dawn of human history.

Since that time, the paradigm of human origins has shifted significantly. The prevailing hypothesis in 1950 was the *Multi-Regional Model*. According to this model, the various ethnic groups had all evolved independently of each other: "native Africans evolved from archaic non-humans in Africa, native Europeans evolved from archaic non-humans in Europe, native Asians evolved from archaic non-humans in Asia," etc. Each race had its own distinct origin.[34] To Pius XII, who had opened his pontificate in 1939 with an encyclical denouncing "the forgetfulness of that law of human solidarity and charity which is dictated and imposed by our common origin and by the equality of rational nature in all men,"[35] the Multi-Regional Model would've seemed a step backwards towards the diabolical ideas that had fueled the murderous Nazi regime. For if there is no unity to the human family, it can also be argued that some people only *seem* human or have an inferior form of humanity, and are not equal in dignity and rights.

The magisterium of the Church has not given any specific guidance on the monogenism/polygenism issue since the rapid advances in understanding human origins of the last 30 years. But it is noteworthy that Pius XII's warning about embracing polygenism has not been repeated by any pope since the 1980's. In 2004, the International Theological Commission left the issue open – in *Communion and Stewardship*, the ITC recognized that the scientific evidence points to a population, not to two individuals, and refers to the emergence of the first humans as involving either "individuals" or "populations."[36] Here we see the principle of "faith and reason together"; the Church allows science to inform its understanding of what God has revealed, and so remains open to new scientific discoveries.

Thanks to modern genetics we now know that the Multi-Regional Model is incorrect, having been replaced by the *Out of Africa Model*. As discussed in Chapter Nine, there is firm evidence that anatomically modern humans evolved in Africa around 300,000 YA and migrated out of Africa around 60,000 YA. Studies indicate that there were about 10,000

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[32] Haffner, *Mystery of Creation*, 71.
[33] Pius XII, *Humani Generis*, no. 37.
[34] Austriaco, et al. *Thomistic Evolution*, 230.
[35] Pius XII, *Summi Pontificatus*, no. 35-36.
[36] International Theological Commission, *Communion and Stewardship*, no. 63, 70.

breeding individuals at the time of our anatomical origins, although the number of behaviorally modern humans, truly rational animals, may have been quite smaller and certainly emerged much later. Blombos Cave in South Africa has yielded the oldest artifacts that give evidence of symbolic thought, datable to around 75,000 YA. But such artifacts have only been found there and at another nearby site with artifacts datable to about the same time.[37] So the current evidence seems to indicate that the human difference may have come about within a few groups at a specific time and place, over 200,000 years after our modern anatomical features evolved.

It is interesting to reconsider polygenism in light of the Out of Africa Model. It does not seem to be a wild leap, in light of the most recent discoveries, to consider Adam and Eve as symbolic of a community, the first community to make the breakthrough to rationality and freedom, to fully human language and symbolic thought. Perhaps the genetic and neurological changes that made us capable of being rational animals remained latent for some time, spreading through the population before these uniquely human powers were actualized. Perhaps the first of our kind to make the breakthrough from potential to actual symbolic thought, language and reason also turned quickly away from the goodness being offered by God, in the way envisioned by St. Maximus the Confessor, and then drew the others into a way of being human marked by "relational damage," into a community characterized by sin.

Of course this all remains at the level of speculation, but speculation is essential to all human thought. Much like scientists, theologians oftentimes find themselves having to go back to the data and challenge their assumptions. This is not a threat to faith, in which we entrust ourselves to God despite the limits of our understanding. In fact, it refines and purifies faith to find itself faced with new questions, and it is through such faithful theological reflection that our understanding of divine truth moves forward.[38] The Blessed Virgin Mary, who asked the angel Gabriel, "How can this be, since I have no relations with a man?" regarding his announcement that she would "conceive… and bear a son" (Luke 1: 28-35), is the model for all theological speculation. Questions are not bad; faith is not blind.

In the end, however, sin entered the world, and however many first parents were involved, there can be no doubt that it affected humanity in a universal way. Br. Guy Consolmagno, recognizing the new frontier that evolutionary science has opened for theological reflection, points to the reality of original sin as it touches the universal experience of humanity:

> …there can be no doubt that the source of human evil, the urge that people have to choose to do things they know are wrong, has been a part of our human experience since before the beginning of recorded history. Original sin is a fact. But explaining it in light of what we now know of human origins is going to be a lot trickier than the theologians would have guessed a hundred years ago.
>
> And that's OK. More power to them.
>
> Meanwhile… I don't need to know the instant or the process when human beings first became capable of making free choices. It's enough for me, today, to know that I do have the power (and responsibility) to make free choices myself and that for whatever historical reasons, I can't depend on my own power to make the

[37] Austriaco, et al., *Thomistic Evolution*, 232-235.
[38] *Dei Verbum*, no. 8.

> right choice every time. In a practical sense that's what the doctrine of original sin is all about. And that's true, regardless of how it came to be.[39]

More important than how sin entered the world, and how many humans were involved, is how its destructive power is overcome. As noted above, Jesus Christ has pushed the line dividing between good and evil out of the human heart. And it is to his Heart that we now turn.

D. The Sacred Heart of Jesus

In the constitution on the Church in the modern world, the Second Vatican Council identified Christ as the new Adam, the one who "fully reveals man to himself and makes his supreme calling clear." Continuing this line of thought, it points to Christ as the perfect human being:

> He Who is "the image of the invisible God" (Col. 1:15), is Himself the perfect man. To the sons of Adam He restores the divine likeness which had been disfigured from the first sin onward… For by His incarnation the Son of God has united Himself in some fashion with *every human being*. He worked with human hands, He thought with a human mind, acted by human choice and *loved with a human heart*. Born of the Virgin Mary, He has truly been made one of us, like us in all things except sin.[40]

In this short summary of the mystery of the Incarnation, we see the solution to the dark riddle of human existence when it is only considered from the biological and philosophical perspectives. Christ answers the ambiguity of our moral fragility and inclinations toward evil with perfect love, living out an ordinary human existence in an extraordinary way. He did not take up human nature as it existed before sin damaged human life, endowed with preternatural gifts. Instead, he assumed our *fallen* human nature in order to redeem it, purifying it through the abundance of his love and his perfect obedience to the will of the Father.

The key phrase in this important text from Vatican II is its assertion that Jesus "loved with a human heart." In biblical symbolism, the heart represents the center of thinking, willing and acting. With this in mind, the Church celebrates the Feast of the Sacred Heart of Jesus as a reminder of the pure love with which Jesus loved all human beings and united himself to us totally. The Son-*Logos*, the Mind through whom the universe was made, has now become the Savior through whom it has been redeemed. The love by which God creates the universe is a love springing from mercy, which causes goodness where goodness is absent. In the revelation of Jesus Christ, the Word made flesh, even the "holes in being" created by sin and moral evil are met with mercy and loving power that draws good out of evil.

The author of the Letter to the Hebrews captures this beautifully. Christ, he tells us, has become our "merciful and faithful high priest" precisely by loving us in the midst of his own human suffering and temptations: "Because he himself was tested through what he suffered, he is able to help those who are being tested" (2:17-18). Recognizing that Jesus faced the same struggles we face, he also tells us that this was necessary for our sake: "For

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[39] Guy Consolmagno, *God's Mechanics: How Scientists and Engineers Make Sense of Religion* (Sa Francisco: Jossey-Bass, 2008), 219.

[40] *Gaudium et spes*, no. 22.

we do not have a high priest who is unable to sympathize with our weaknesses, but one who has similarly been tested in every way, *yet without sin*. So let us confidently approach the throne of grace to receive mercy and to find grace for timely help" (4:15-16). Jesus reversed the disobedience of sin by persevering through suffering and temptations in obedience to his Father, and so became "the source of eternal salvation for all who obey him" (5:9).

St. Paul expresses this mystery of our salvation in a single verse of his Second Letter to the Corinthians (8:9): "He who was rich became poor for our sake so that we might become rich through his poverty." This "marvelous exchange" was celebrated by the Fathers of the Church: the perfect divine Son grappling with and mastering our imperfect nature, making himself subject to its weakness but yet never being overcome by it, so that he could bring us into a new kind of life. Echoing the Letter to the Hebrews, the 4th century bishop and theologian St. Gregory of Nazianzus depicts this mystery as God coming to know by direct experience the suffering caused by temptation, weakness and ignorance:

> …in the form of a slave, he the Word descends to his fellow slaves… and takes upon himself an alien form, bearing me and all mine in himself, so that in himself he may consume the bad, as fire consumes the wax, or as the sun the mists of the earth, and that I may partake of his [divine] nature by the blending. Thus he honors obedience by his action and experiences it by his passion… He probes our obedience and, through his inventive love, he measures everything by his own sufferings. Thus he can learn from his experience what we experience, how much is demanded from us and how much we are excused. He weighs our weakness according to what he suffered.[41]

The process of salvation, by which we slowly begin to re-gather the riches lost through sin, begins when we enter into the mystical Body of Christ, the Church, through *the sacrament of baptism*. In Baptism, the tragic unity in "the sin of Adam" is replaced by a unity in Christ the New Adam, who has broken the chains of sin and death. As the Catechism states, "Baptism not only purifies from all sins, but also makes the [baptized] 'a new creature,' an adopted son of God, who has become a 'partaker of the divine nature,' member of Christ and co-heir with him, and a temple of the Holy Spirit."[42] The reception of this sacrament does not annihilate or replace our biological human nature – we remain the same human being after being baptized as before. And yet through this and the other sacraments, through a life of prayer and of communion with fellow Christians, through sacrifice, care for others and the practice of virtue, the translation of our humanity into the new way of life is not only possible, but has the guarantee of a divine promise. As we pray in the Preface of the Mass that opens the Eucharistic Prayer, "In love You created us, in justice You condemned us, but in mercy You redeemed us, through Jesus Christ our Lord."

E. Slave of the Slaves: From Outgroup Bias to Universal Love

The love and holiness described above is not something seen only in Christ and Mary. It is a theme that runs throughout the lives of all holy men and women, the great communion of saints whom the Church holds up for us as examples and as our powerful intercessors. We began by honestly examining the human inclination toward outgroup bias

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[41] St. Gregory of Nazianzus, *Theological Orations* IV.6, as quoted in Roch Kereszty, *Jesus Christ: Fundamentals of Christology*, rev. and updated edition (New York: Alba House, 2002), 205.
[42] CCC, no. 365.

which, when unchecked, turns into nightmarish forms of violence against "outsiders." Let us now look at what happens when the light of Christ shines upon the human heart.

One of the most horrific embodiments of violence in human history is racial slavery; the capture, bondage and forced labor of Africans is a dark phase in the history of the colonization of the Americas. For two and a half centuries, until 1852, the slave trade was active, and it is estimated that about 125,000 Africans entered the port city of Cartagena, Columbia, in chains between 1595 and 1640. Each ship would carry 400-500 slaves, and it was not uncommon for a third of those to die on the two-month voyage. It would have been a hopeless situation were it not for heroic Christians like *St. Peter Claver*.

Claver was born to a wealthy family in Catalonia, Spain, the son of the mayor of his town. During his university studies he encountered the Society of Jesus and joined them, and shortly thereafter encountered a lay brother who helped him realize a call from the Lord to go to the New World. In 1611, he arrived in Cartagena and was ordained a priest in 1616. There he became an assistant to Fr. Alonso de Sandoval, who first began the outreach to African slaves. Then he began his own work, becoming a "slave to the slaves." Over 35 years, he never missed the arrival of a ship. He would board each slave-bearing vessel, bathe the slaves in perfumed water, and give them clean water to drink. He would carry gifts of food and would care for the sick. Over the years he would travel widely to visit those whom he had once cared for on the ships, and continue his ministry to them. In response, over 300,000 slaves would be baptized by his hands.

The lengths to which Peter Claver would go to care for the slaves showed a depth of love that was truly supernatural, far surpassing any kind of natural empathy or compassion:

> Claver would wipe the sweat from the faces of the slaves with his own handkerchief. Moreover, he would often clothe the sick and diseased in his own cloak. As some of his interpreters witnessed, the cloak had to be washed up to seven times a day from the stink and filth which it had accumulated. It was routine for Claver to console his fellow man by joyfully undertaking practices which were considered extremely repugnant to most. As one eye-witness notes, "Most admirable was that he not only cleansed these plague-ridden ulcers with the two handkerchiefs he kept for that, but did not hesitate to press his lips to them." He plainly saw Christ "in the least of these brethren."[43]

It may be a natural inclination for human beings to fear and distrust those who are different; when hardened into evil choices and habits, whole cultures have been corrupted. What we see in St. Peter Claver is the "new" natural—the recognition of all human beings as brothers, made possible by the grace of God given to us in Christ. As the words of St. Paul reveal, that "new natural" involves replacing bias with belonging: "There is neither Jew nor Greek, there is neither slave nor free person, there is not male and female; for you are all one in Christ Jesus" (Gal. 3:28).

This is not unique to St. Peter Claver nor St. Paul; it is at the heart of the new reality of human life that radiates from the Sacred Heart of Jesus Christ. From the beginning of Christianity we see a new standard dawning in the world, the conviction that ethnicity, culture, and color do not make anyone inferior nor worthy of maltreatment, slavery or death, and that love must extend beyond the boundaries created by "family and tribe." In the

[43] Joseph F. X. Sladky, "St. Peter Claver: Slave of the Slaves Forever," Crisis Magazine, September 08, 2014, https://www.crisismagazine.com/2014/st-peter-claver-slave-slaves-forever.

words of sociologist Rodney Stark in his study of the rise of Christianity from its origins as a tiny movement in Palestine, "what Christianity gave to its converts was nothing less than their humanity. In this sense virtue *was* its own reward."[44]

The work of God in fashioning his image, postponed by sin, has been definitively accomplished by Christ, who invites all human beings to freely join him in this new way of being human. This fantastic mystery has remade the universe and the human race. In fact, it has revealed where the true origin of humanity is to be discovered: not in the relics of prehistory, not in the advent of language and symbolism, but in the man who showed us what it means to be truly human: Jesus, the "new Adam."

[44] Rodney Stark, *The Rise of Christianity: How the Obscure, Marginal Jesus Movement Became the Dominant Religious Force in the Western World in a Few Centuries* (New York: HarperOne, 1996), 215.

From Evolution to Resurrection:
Jesus Christ, the True Origin of Humanity

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In reality it is only in the mystery of the Word made flesh that the mystery of man truly becomes clear. For Adam, the first man, was a type of him who was to come, Christ the Lord. Christ the new Adam, in the very revelation of the mystery of the Father and of his love, fully reveals man to himself and brings to light his most high calling.

- Vatican II, *Gaudium et spes*

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A. Becoming Human: An Image in Stone

The Cathedral of Chartres in France is generally considered to be one of the most beautiful buildings in the world. It is doubtless the greatest architectural accomplishment of the Catholic culture of the Middle Ages. It was built to be a complete account of the history of salvation, and includes creation as one of its artistic themes. One example is found on the exterior, among the exquisitely carved images found on the north porch of the cathedral. There we find an image depicting the formation of Adam, based on a verse from the Second Creation Account, Genesis 2:7: "The Lord God formed the human being from the clay of the ground, and breathed into his nostrils the breath of life, and so man became a living being." The medieval artist must have appreciated the irony that he was sculpting God as a sculptor, and crafting an image of God forming his image. It would not be surprising if an educated modern viewer looked at the work and thought back to a beginning completely unknown to the medieval artist, when in a "Great Leap Forward" hominin life became rational. But the master of stone had a different and much more important idea in mind as he chipped and chiseled.

In the sculpture a sleeping human being, Adam, clings to the divine sculptor's knee, his head reclined almost on his lap. His lower body is only partially formed out of the clay lump that rests to the lower right side of the image. The divine sculptor is moving his hands gently and skillfully under and above Adam's head, with each hand actively sculpting him. But when we look to the face of the divine sculptor, with its careful attention to the human being he is forming, we find a surprise; the face is not that of an elderly man by which medieval art often represented God the Father, "the Ancient of Days" (Daniel 7:9-10). The face is the face of Christ—he is the divine sculptor who is forming Adam.

As has been noted elsewhere, the divine Son is the one through whom God made the universe, the *Logos* which gives to all things their orderliness and intelligibility. But this sculpture adds another dimension when we consider human life – we are the image of God by being formed by Christ, the *Logos*-made-flesh, into the image of his perfect humanity. In the words of the International Theological Commission,

> The origins of man are to be found in Christ: for he is created "through him and in him" (Col 1:16), "the Word [who is] the life…and the light of every man who is coming into the world" (John 1:3-4, 9). While it is true that man is created *ex nihilo*, it

> can also be said that he is created from the fullness (*ex plenitudine*) of Christ himself who is at once the creator, the mediator and the end of man.[1]

In this essay, we will consider the reality of being human from the perspective of Christ as the Last Adam and the true human being, the one who brings the creation of humanity to its completion. We will see that the first "Adam," the first human being or beings, was simply a preparation for the real goal of the creation of humanity, in which Christ fulfills what began long ago. If we define ourselves by the first Adam, we fail to discover and realize the fullness of our humanity.

From this perspective we will also consider Christ's resurrection as the central point of human history, as a new kind of evolution in which biology ceases to be the foundation of rationality and freedom, but in which human beings are brought into unending life that is freed from its limitations. Finally, we will conclude with the way in which we begin to enter that life by receiving Christ, crucified and risen, in the Eucharist, which Vatican II called "the source and summit of the Christian life."[2]

B. Jesus Christ, the New and Final Adam

1. Completing the Creation: The Baptism and Death of Jesus

When scholars consider the biblical cvreation accounts, they often marvel over an interesting detail of the First Creation Account, the omission of a declaration of goodness when God creates human beings. In other cases, God beholds what he has made, affirms its goodness, and then that "day" of creation ends - "evening came, and morning followed." The First Creation Account leaves no doubt that humans are the summit of God's creation; only when human beings are in the world does God behold everything he has made and declares it "very good." But human goodness is never declared at the end of the sixth day, nor does God "behold" (in Hebrew, *yar)* what he has made when he makes human beings. This could indicate that the Lord is not finished with the formation of his image; he is awaiting the human response. In other words, God's "human project" is incomplete at the end of Genesis 1. Even the words "and it was so," which follow the other acts of creation, are mysteriously absent.[3] Equally curious is the omission of any declaration of an end to the seventh day, the final day of creation – there is no "evening came, and morning followed – the seventh day" at the conclusion.

When we come to the New Testament, however, these seeming omissions are finally resolved. The undeclared goodness of humanity is finally proclaimed near the beginning of the Gospel of Matthew, when Jesus submits himself to the baptism of John the Baptist "in order to fulfill all righteousness" (3:15). As soon as he receives baptism, the voice of God is heard:

> 16 After Jesus was baptized, he came up from the water and behold, the heavens were opened, and he saw the Spirit of God descending like a dove [and] coming upon him.
> 17 And a voice came from the heavens, saying, "This is my beloved Son, with whom I am well pleased."

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[1] *Communion and Stewardship*, no. 53.

[2] *Lumen Gentium*, no. 11.

[3] John Behr, *Becoming Human: Meditations on Christian Anthropology in Word and Image* (Crestwood, NY: St. Vladimir's Seminary Press, 2013), 34.

In this event (which is also recounted in the Gospels of Mark and Luke) in which Jesus humbly submits himself publicly to the Father's will, God's declaration of pleasure indicates that in Jesus the goodness he intended for humanity has been achieved—a human being has arrived who pleases Him in every way, who is perfectly good. The disobedience with which human history began, which postponed the completion of humanity, has now been overcome.

In the Gospel of John we finally discover the divine "behold" in reference to human beings. After Pontius Pilate has Jesus scourged, he has him brought before the crowd and declares "*Idou ho anthrōpos*!", which translated into English means, "Behold the human being!" (19:5). The missing "behold!" which we expect to come in Genesis at the creation of human beings appears where we least expect it, on the lips of Jesus' cynical, unbelieving judge. In God's providential plan, these words are as much the words of God the Father as they are the words of the Roman governor. Through Jesus' unjust judge God gives us the "Behold!" signaling that in Christ's loving sacrifice, in his obedience to God and in his love for us, we finally see what God intended for us to be: only in his perfect act of love is the making of humanity completed. In the words of theologian John Behr, "Christ, over whom death had no claim so that he genuinely went voluntarily to his death, conquering death by his death, is the **first true human being** in history. He *is* the image of the invisible God (Col 1:15)."

As Jesus breathes his dying breath, he says, "It is finished" (Jn 19:30).[4] Jesus' words offer the missing "end" to the seventh "day" of the First Creation Account. With the completion of his sacrifice God's greatest project, the human person, is also complete. Christ "gives over the Spirit," the Gift-Love of God, to the rest of humanity, so that we can find the completion of our own humanity in union with him.

2. The Last Adam

At the heart of the New Testament message, then, is the recognition that Jesus Christ is the new and final *ādām*, or human being. While St. Matthew and St. John present this to us symbolically, St. Paul is more direct in his First Letter to the Corinthians (15:45-49):

45 So, too, it is written, "The first man, Adam, became a living being," the last Adam a life-giving spirit.
46 But the spiritual was not first; rather the natural and then the spiritual.
47 The first man was from the earth, earthly; the second man, from heaven.
48 As was the earthly one, so also are the earthly, and as is the heavenly one, so also are the heavenly.
49 Just as we have borne the image of the earthly one, we shall also bear the image of the heavenly one.

Here we have St. Paul extending the concept of humanity beyond that which we are given in Genesis—as the opening quote from Vatican II tells us, quoting St. Paul's Letter to the Romans (5:14), the first Adam is a *type* of the last Adam: "Adam, the first man, was a type of him who was to come." In theology, a type is something or someone that prefigures a new and greater reality called its *antitype*. For example, the Crossing of the Red Sea (type) points

[4] Behr, 35.

to Baptism (antitype) in which humans are freed from the slavery of sin, a much greater liberation than the deliverance of the Israelites from slavery in Egypt. In a type-antitype relationship (aka a *typological relationship*), the antitype is everything that the type was, but in a new and greater way.

To declare, Jesus to be the Last Adam, and to identify Adam as a type of Christ, means that Christ is everything we human beings are, but also the fulfillment of being human. This places the beginning of human history, and in some way all human beings, in a new light. In Genesis 2:7, we hear of the formation of the human being as a living being, but the human formed there is not the last Adam to be formed; a new and greater Adam, for whom the first Adam is only a sketch, was still to come.

St. Paul's designation of Christ as the last Adam is rooted in the language of his Jewish background. For the ancient Hebrew mind, temporal order is a way of indicating permanent, everlasting principles. To refer to someone or something as "last" is to identity them as the fulfillment and completion. When St. Paul calls Christ the last Adam, he doesn't mean to say that he is the last human being to be born, as if no other human beings would ever be born after him. He means that Christ is the exemplary human being, the one who takes humanity to its fulfillment. He means that Christ is the one who finishes what God began when he formed man from the clay of the ground and gave him the breath of life, what we now see as the process of human evolution. He is the last Adam because once He is present in the world, God has no more "human-making" to do; his masterpiece is complete. By saying that Christ is the last Adam, the last Human, he is saying that Christ is the true human, what God was aiming at when he created us in the first place. Therefore we have to say that theologically speaking it is not in the mists of prehistory, in Blombos Cave or some as-yet undiscovered place, but only in the manger in Bethlehem, and even more so on Calvary, that humanity really has his origin. Becoming human began far in the past, but only reached its completion in Christ.

What is it about Christ that makes him the Last Adam, the true man? According to Pope Benedict XVI, it is his radical dependence upon God and openness to us. Jesus knows being fully human means being entirely for God and for others. He knows that the human creature only realizes his fullest potential by moving beyond herself, by finding herself insufficient when she is by herself and only for herself. As Jesus tells us in Luke 9:24: "For whoever wants to save his life will lose it, but whoever loses his life for my sake will save it." Only through others, through being with and for others, does *Homo sapiens* come to be fully human—the other above all being God. In Christ the image of God becomes pure openness to God, which is what man was made to be.

In his 1967 masterpiece *Introduction to Christianity*, Pope Benedict made this point in cosmic and evolutionary terms. Referring to the moment in which we became rational animals as a first step, he points to the Incarnation, when God became man, as the completion of *hominization*, of "becoming human":

> The Rubicon of becoming man… was first crossed by the step from animal to *logos*, from mere life to mind. Man came into existence out of the "clay" at the moment when a creature was no longer merely "there" but, over and above just being there and filling his needs, was aware of the whole. But this step, to which *logos*, understanding, mind, first came into this world, is only completed when the *Logos* itself, the whole creative meaning, and man merge into each other. Man's full hominization presupposes God's becoming man; only by this event is the Rubicon dividing animal from [human] finally crossed forever… For… that man is most man,

> indeed the true man, who is most unlimited, who not only has contact with the infinite… but is one with him: Jesus Christ. In him hominization has truly reached its goal.[5]

The fact that Jesus Christ is the Last Adam, the true man, means that his existence concerns all that are called "adam," all human beings. He is not some unrealizable ideal that stands above us showing us how incomplete and broken we are so that we can despair. To call him the Last Adam is to say that it is in Him that all humanity is to be gathered into completion. This is the meaning of the opening of His Body on the Cross – for John's Gospel, this moment is the climax of the whole Passion narrative: "But when they came to Jesus and saw that he was already dead, they did not break his legs, but one soldier thrust a lance into his side, and immediately blood and water flowed out" (Jn. 19: 33-34). The opening of his side is symbolic of his interior openness to include us within his life. Now from him, a new humanity can be formed. He let the walls of his existence be broken down, and rather than this ending his existence, his unbounded life now flows forth and carries all human beings who believe in Him back into it. The redeemed human beings who are saved by the blood and water that flow out of the Last Adam we call the Body of Christ, the Church.

3. Becoming Fully Human

It is not surprising then, to discover that the earliest Christians considered their union with Christ, and their imitation of him, to be an essential part of the process of becoming human. In the first decade of the second century of the Christian era, around 110 AD, a bishop from the Holy Land, St. Ignatius of Antioch, made his way to Rome under escort of Roman soldiers as a prisoner on his way to martyrdom. Along the way he wrote letters to the various Christian communities in the places along his route: Smyrna, Philadelphia, Ephesus, and others. He also wrote ahead to the Church in Rome, and made an urgent appeal to the Christians there not to attempt to avert his execution:

> I am God's wheat and shall be ground by the teeth of wild animals. I am writing to all the churches to let it be known that I will gladly die for God if only you do not stand in my way. I plead with you: show me no untimely kindness. Let me be food for the wild beasts, for they are my way to God…

And then he closed with this request:

> The time for my birth is close at hand. Forgive me, my brothers. Do not stand in the way of my birth to real life; do not wish me stillborn. My desire is to belong to God… *Only on my arrival there can I be fully a human being.*[6]

Full humanity, Ignatius realized, comes from living and loving as Christ did on the Cross. The human being who shows us the real meaning of life and the path to unending happiness is not the one who appears at the beginning of the Bible but the One who appears at the end.

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[5] Joseph Ratzinger, *Introduction to Christianity,* 235.
[6] St. Ignatius of Antioch, "Letter to the Romans."

It is easy to misunderstand this important Christian truth, especially because it comes in the context of Jesus' painful death. What makes Christ the fulfillment of our humanity, the true Adam, is not the grisliness of his death but the perfection of his love. This love is what makes his sacrifice to God perfect and complete. As St. Augustine once observed, a true sacrifice is an "act done for the purpose of clinging to God in a holy fellowship… directed to that final Good which makes possible our true happiness."[7] St. Ignatius of Antioch saw in his own martyrdom a chance to perfect his love and so perfect his humanity. But it is the Christian life, which always involves clinging to God and loving one's neighbor, that the process of becoming "fully a human being" is possible for all of us. The Christian life is the adventure in which the image of God is completed in all who believe.

To become fully human, then, to repent of sin and believe in the Gospel, the Good News of Jesus Christ, means finally to open ourselves to the man who was fully God. Ultimately, every human being draws near to him whenever they forget themselves and love, and the Church teaches us to hope that there are and have been non-Christians who have come very close to him without even knowing him explicitly, as "God wills all men to be saved and come to knowledge of the truth." (1 Tim. 2:4).[8] The Christian life is the explicit consciousness of the real meaning of being human—like Christ, to be fully and entirely with and for others. Christian formation, which is also called discipleship, is not simply a lifestyle choice, but from the divine perspective is nothing less than the completion of what hominin evolution began. And it is a completion that leads to a life that never ends.

C. The Resurrection as the Final Stage of Human Evolution

Jesus did not only die; we believe that he rose to an entirely new and indestructible kind of life, a life that was beyond the biological kind that we have and that he had by virtue of our conception—a life sustained by oxygen, nutrients, etc. His resurrection was a real historical event that exploded the dimensions of history and transcended history. As we draw our consideration of the human person and science to a close, the resurrection brings us a new horizon in which matter, space and time are enveloped by divine love.

1. The Event of the Resurrection

Without the resurrection of Jesus, Christianity is absurd and its promises are false. St. Paul openly declared this when he said, "If Christ has not been raised, then our preaching is in vain and your faith is in vain" (1 Cor. 15:14). Death, the natural biological end of all life, is the only guarantee. The problem of physical evil and moral evil overshadow any hope we might have for everlasting happiness. What God has revealed in the Resurrection of Christ is that his eternal decision to create the world is simply one glimmer of the immense love He has for humanity. So it is all-important that we understand what the word *resurrection* means. As Benedict XVI explains,

> Jesus' Resurrection was about breaking out into an entirely new form of life, into a life that is no longer subject to the law of dying and becoming, but lies beyond it—a life that opens up a new dimension of human existence. Therefore the Resurrection of Jesus is not an isolated event, that we could set aside a something limited to the past, but it constitutes an "evolutionary leap"… in Jesus's resurrection

[7] St. Augustine, *De civitate Dei* 10.6, as quoted in Kereszty, 212.
[8] Cf. Vatican II, *Lumen Gentium* no. 14-16.

> a new possibility of human existence is obtained that affects everyone and that opens up a future, a new kind of future, for mankind.
>
> St. Paul was absolutely right to link the resurrection of Christians and the Resurrection of Jesus inseparably together: "If the dead are not raised, then Christ has not been raised… but in fact Christ has been raised from the dead, the first fruits of those who have fallen asleep" (1 Cor 15: 16, 20). Christ's Resurrection is either a universal event, or it is nothing, Paul tells us. And only if we understand it as a universal event, as the opening up of a new dimension of human existence, are we on the way toward any kind of correct understanding of the New Testament Resurrection testimony.[9]

So resurrection is not something that simply concerns Jesus, but all of us. It is not simply the return to a normal human life by a resuscitated corpse, but a "leap" to a whole new kind of life, which Jesus makes first but which is also promised to all humanity. This is what is meant when in the Creed we profess faith in the "resurrection of the body." The mystery of the resurrection is not just about the resurrection of Jesus' body, but of all human beings, an event that will occur at the completion of human history. As the *Catechism* states, "Who will rise? All the dead will rise, 'those who have done good, to the resurrection of life, and those who have done evil, to the resurrection of judgment.'"[10]

What makes the accounts of Jesus' Resurrection so unlike mythical stories is that there is no fanfare. It is revealed to only a handful of witnesses, to whom Jesus personally appeared. And in his appearances, the risen Lord acts normally; he speaks to his disciples, cooks for them, asks for a piece of fish so that he can eat it and show that his body is real; he is not a ghost (cf. Luke 24:37-39). "His presence is entirely physical, yet he is not bound by physical laws": despite his bodily presence his disciples often do not recognize him; he suddenly appears and then just as suddenly is removed from their sight. Within this strange combination of the familiar and unfamiliar, the message is clear: the man is the same Jesus with the same body, but also that he has transitioned to a new way of existing.[11]

2. The Miracle of the Resurrection and Science

Considering the Resurrection of Christ with modern science as a backdrop helps us look upon the mystery of the Resurrection with fresh eyes. From the perspective of physics, the Resurrection is the elevation of matter to a new way of existing beyond what is possible in the normal state of the universe. From the perspective of biology, the man Jesus, body and soul, now belongs totally to the sphere of the divine and eternal. Now in God there is a place for bodiliness, which means that human beings now have a "place" in God's life.

And this means also that our universe is also subject to renewal and redemption. As we have learned from modern science, humanity and the world are not easily separable quantities, with the world existing as just a container that just happens to hold all kinds of living creatures that could just as well have been placed in a different box. The cosmos and its evolution form the pre-history of the human spirit, of the human mind; the animals all participate, in lesser degrees, in intelligence that becomes self-reflection, reason and free will in humans. In the first humans, mind and personhood emerged from the material world

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[9] Benedict XVI, *Jesus of Nazareth: Holy Week: From the Entrance into Jerusalem to the Resurrection* (San Francisco: Ignatius Press, 2011), 244.

[10] CCC, no. 998. Cf. Jn 5:29; Dan 12:2.

[11] Benedict XVI, *Holy Week*, 265-266.

thanks to hominin evolution (which gave us our brains) but above all thanks to the special dependence of man upon God for his being and spiritual faculties. In the Resurrection, the Last Adam, Jesus Christ the true man, "doubles back" and draws up into Himself what came before him.

It is in light of the Resurrection that we best see the difference between the "how" explanations of science and the "why" explanations of faith. St. Paul himself saw the folly of trying to ask how the dead will be brought to new life in the Resurrection. In Chapter 15 of his First Letter to the Corinthians he used what he knew of natural bodies as an analogy that shows, dimly but beautifully, the fittingness of the resurrection of the dead:

35 But someone may say, "How are the dead raised? With what kind of body will they come back?"
36 You fool! What you sow is not brought to life unless it dies.
37 And what you sow is not the body that is to be but a bare kernel of wheat, perhaps, or of some other kind;
38 but God gives it a body as he chooses, and to each of the seeds its own body.
39 Not all flesh is the same, but there is one kind for human beings, another kind of flesh for animals, another kind of flesh for birds, and another for fish.
40 There are both heavenly bodies and earthly bodies, but the brightness of the heavenly is one kind and that of the earthly another.
41 The brightness of the sun is one kind, the brightness of the moon another, and the brightness of the stars another. For star differs from star in brightness.
42 So also is the resurrection of the dead. It is sown corruptible; it is raised incorruptible.
43 It is sown dishonorable; it is raised glorious. It is sown weak; it is raised powerful.
44 It is sown a natural body; it is raised a spiritual body. If there is a natural body, there is also a spiritual one.

Does St. Paul's analogy, and our faith in the resurrection of Jesus, contradict reason and a proper respect for the integrity of nature? As we saw in Chapter Six, that would be the case only if we turned bodily resurrection into a function of nature, or saw it as the violation of nature by divine power. But the resurrection is about the ultimate destiny of God's creation, the "new heavens and the new earth" which God intends. If science is done with the unprovable assumption that the material world is all that exists, then not only will the skeptic find the Resurrection to be absurd, but will ultimately be unable to make sense of the objectivity and wonder that makes human beings uniquely capable of investigating the world scientifically and coming to understand it as it truly is. If science is based on reductionism, then not only will life after death seem absurd, but so will life *before* death; because the living things we see are only collections of parts, acting as the sum of those parts.[12]

Benedict XVI asked the question, "Does the Resurrection contradict science?" Applying principles that we have already encountered, he combines a thorough respect for faith and reason together and the integrity of nature, while also bidding us to the possibility of something beyond our experience:

[12] Conor Cunningham, "Why Study Life Before Death with Conor Cunningham," YouTube, September 26, 2016, https://www.youtube.com/watch?v=McZMBqw8bb8.

> …Naturally, there can be no contradiction of clear scientific data. The Resurrection accounts certainly speak of something outside the world of our experience. They speak of something new, something unprecedented—a new dimension of reality that is revealed. What already exists is not called into question. Rather we are told that there is a further dimension, beyond what was previously known. Does that contradict science? Can they're really only ever be what there has always been? Can there not be something unexpected, something unimaginable, something new? If there really is a God, is he not able to create a new dimension of human existence, a new dimension of reality altogether? Is not creation actually waiting for this last and highest evolutionary leap, for the union of the finite with the infinite, for the union of man and God, for the conquest of death?[13]

With this in mind, the Resurrection doesn't require that we deny what we see in history and the universe, but that we see them against the backdrop of God's love. As we learn from the English mystic Julian of Norwich, all things have existence from the love of God; he is to all things the Source of being. And so the Source of the universe and all its creatures has the power to beckon us beyond the limits of biological life.

3. The Last Shall Be First: From Bios *to* Zoē

As we have seen, the key to understanding the Resurrection is the reality of love. In the Resurrection, we see that the final stage of human evolution reverses the paradigm of existence. In the first phase of human existence, biological life is necessary in order to love. In his sacrificial death, Jesus, as we have seen, valued love more highly than the biological life that made it possible. His Resurrection tells us that, although in this existence one must first have biological life in order to love, the power of love is greater than the power of the merely biological. In the resurrection, biology is encompassed by and incorporated into the power of love. And so love makes it possible for us to transcend the limits of biological existence.

After his resurrection, Christ did not go back to his previous earthly life as did Lazarus whom he raised from the dead (Jn 11:1-44). He rose to a definitive new life no longer governed by the chemical and biological laws that govern our lives now. In this new reality Love is the foundation of life and therefore in Love life becomes indestructible. He who loved us to the end has founded our immortality on that love. This is why Scripture says that Christ is our life – "When Christ your life appears, then you too will appear with him in glory" (Col 3:4). If he has risen, then we have too, for in his risen humanity he loves us now and always; if he is not risen, then we have not either, for then the situation is still that death has the last word, nothing else. Our own love, left to itself, cannot overcome death; taken in itself our own love would have to remain a feeble unanswered cry for immortality. But when his love envelops our love, then our own immortality has a foundation that can not be shaken or removed.

Therefore a new kind of life has dawned in the world through Christ, the New Adam. In the Resurrection of Christ, the realm of biological evolution has been left behind and in Christ humanity has leapt, so to speak, to a quite different plane, on which love is no longer subject to biology but now supports it. The last reality to emerge has become the first. The final stage of evolution, therefore, is no longer a biological stage; with the Resurrection the dominion of biology will be ended; and since biology always involves death, the

[13] Benedict XVI, *Jesus of Nazareth*, 246-247.

dominion of death will be broken as well. Christ has opened up the realm that the Bible calls *zoē*, that is, definitive life unqualified or restricted by biology, life that has left behind the rule of death. The last stage of evolution needed by the world to reach its goal has been achieved within the realm of biology by Jesus, who brings humanity past the purely biological realm.

Of course, our Faith tells us that the mode of our immortality will depend on our mode of living. If we place life above love then we begin hell right now on earth. The Resurrection of Christ reveals the tragic dimension of sin even more deeply. St. Augustine's definition of sin is to be *curvatus in se*, "caved in on oneself"—the exact opposite of Christ's openness to God and neighbor. Bishop Robert Barron shows us the absurdity of sin: "The powers of the human soul, which are meant to orient us to nature and other human beings and the cosmos and finally the infinite mystery of God, are focused on the tiny and infinitely uninteresting ego [self]. Like a black hole, the sinful soul draws all the light and energy around it into itself."[14]

From this we can learn a great deal from the tapeworm. The tapeworm has evolved from a much more complex organism to the form it has now. In its evolution it adopted a "less is more" approach to parasitism, losing its nervous system, its digestive system, leaving nothing but the ability to latch onto its prey and reproduce. Similarly, humans in hell would be those who cling to the lower form of existence rather than opening up to the adventure of a new kind of living, losing their capacity for anything beyond themselves. As Jesus teaches, "…whoever wishes to save his life will lose it, but whoever loses his life for my sake will find it" (Matt 16:25).

In other words, the prospect of eternal damnation is not one that comes from Christ, but rather from us. As Benedict recognized, "Christ inflicts [damnation] on no one. In himself he is sheer salvation. Anyone who is with him has entered the space of deliverance and salvation. [Hell] is not imposed by him, but comes to be wherever a person distances himself from Christ. It comes about whenever someone remains enclosed within himself."[15] The Christian life is the highest risk, but ultimately offers the highest kind of fitness—if we live for love in Jesus Christ then we open ourselves to a life that never ends.

D. The Eucharist: The Source of Our New Life

Jesus, the Last Adam, the true human being, has given us himself in the humblest of forms, the form of bread and wine, the form of food. In the holy sacrifice of the Mass, Christ crucified and risen feeds us in a way unlike any other. Whatever else we eat must die and be assimilated to ourselves through digestion before it can nourish us. Christ, who died and now lives eternally, fully God and fully man, is not assimilated to us when we receive the Eucharist. Instead, we are assimilated into Him, into His Body. And so through the grace of receiving him into ourselves, we receive the grace to enter into the eternal happiness of heaven, the communion of saints where God will wipe away the tears from every eye.

The Miracle of Jesus Christ "really, truly and substantially" present, in the Eucharist can helps us see science, the study of the universe, as the study of a stage that exists to focus our attention on the actors and on the Author whose loving hand and creative mind unfolds their story. Nature is given to us to foreshadow the coming of a greater reality that awaits us. Therefore, of all the acts of faith that God offers to us, one of them is most fitting to the

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[14] Robert Barron, *The Strangest Way: Walking the Christian Path* (Maryknoll, NY: Orbis Books, 2002), 75.
[15] Joseph Ratzinger, *Eschatology: Death and Eternal Life*, 2nd edition (Washington, D.C.: Catholic University of America Press, 1988), 205.

believer who also wishes to be a scientist. That act of faith is Eucharistic Adoration. In the Adoration of the Eucharist, we do in prayer what all scientists, knowingly or unknowingly, are doing in their research – gazing upon a reality whose appearance veils a reality much deeper and more amazing than appears at first glance. In the consecrated Host, the believer sees God the Creator, the Son-*Logos,* in the humblest of forms. In the microscope and the telescope, in the laboratory and in the field, the believing scientist sees physical realities that belong to God and will be transformed by him. In both cases, one must see beyond the surface to see the truth; in both cases, awe and wonder beckon us, and paradoxes await us.

As we end, let us heed the words and receive the blessing St. John Paul II once gave to the young scientists of the world:

> To you young scientists belongs the future of the dialogue between faith and science: I urge you to carry it forward with sincerity and humility. Strive for excellence in your scientific endeavors, and keep your minds and hearts ever open to the different channels which lead us to a better understanding of ourselves and the universe in which we live. May God, whose infinite love and wisdom fashioned the heavens and established the moon and stars, ever guide you into his grace and peace.[16]
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> Amen!

[16] John Paul II, "Address to Participants in the Fifth Summer School in Astrophysics," Vatican Observatory, July 7, 1995.