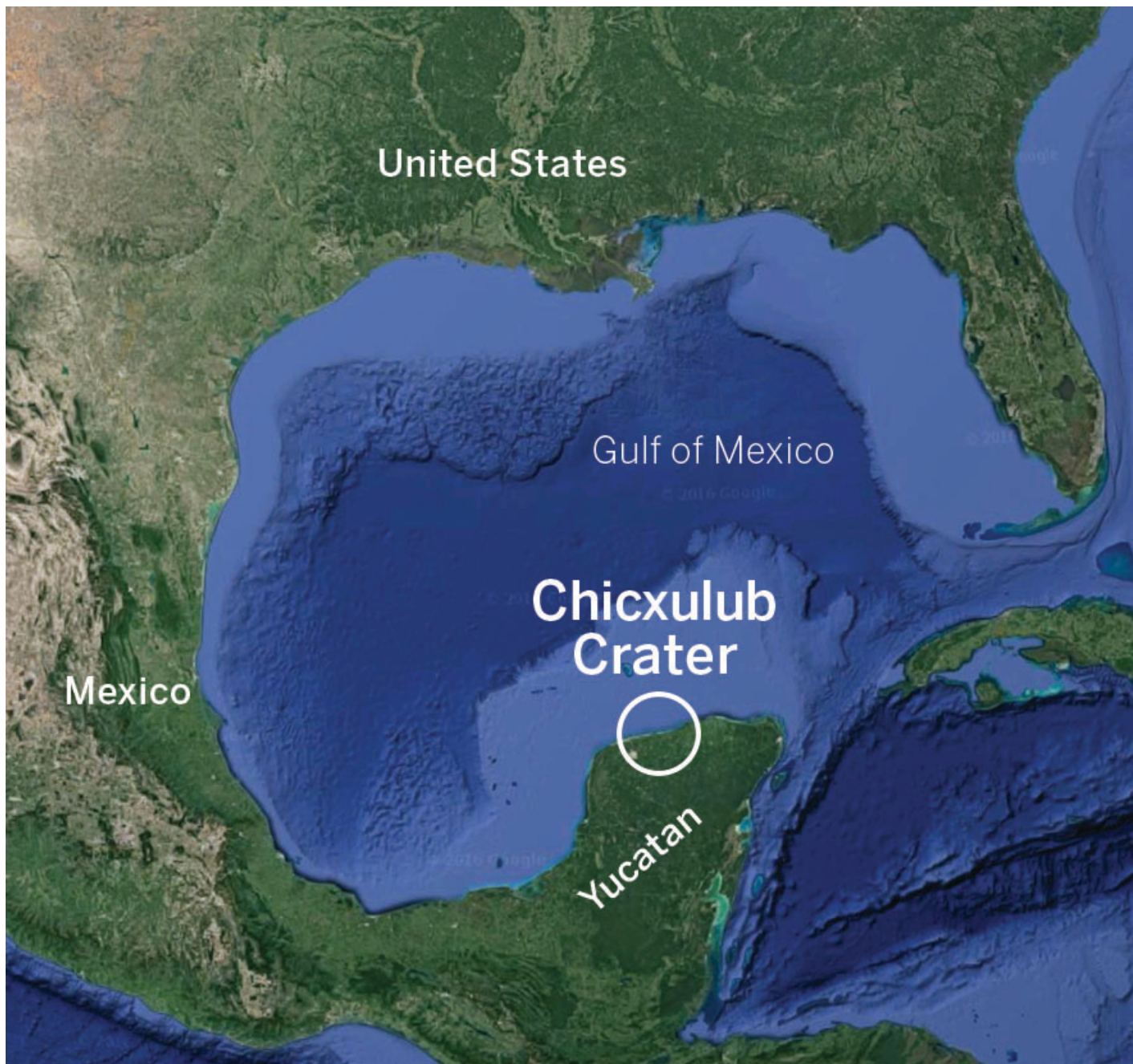


Faith and Science Working Together in History

Salvation History and the Big
History Project

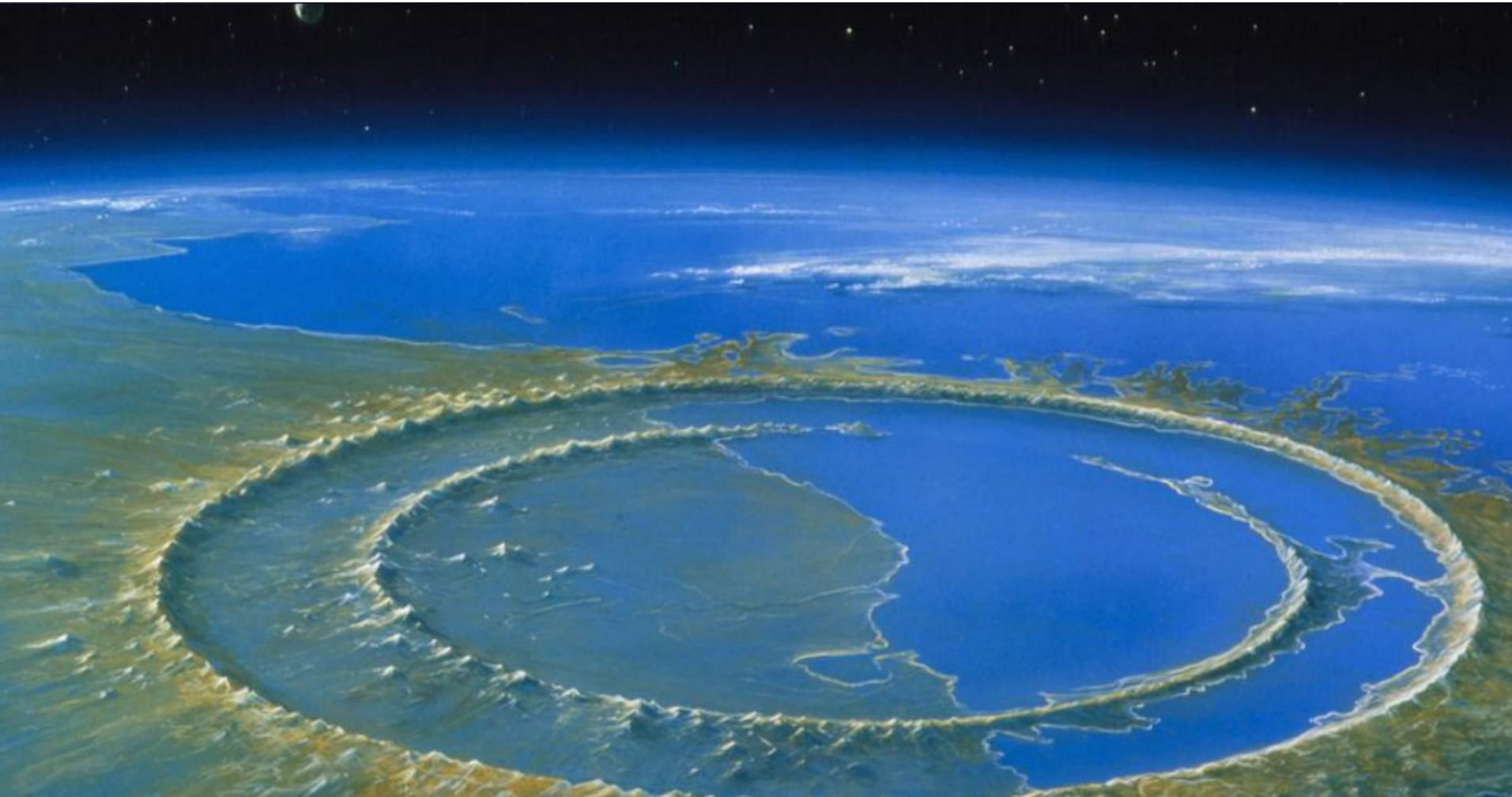
Meteor Crater





Chicxulub Crater 66mya

(artists depiction of the now buried crater)



What is
Big History?



Catholic Faith and
Big History



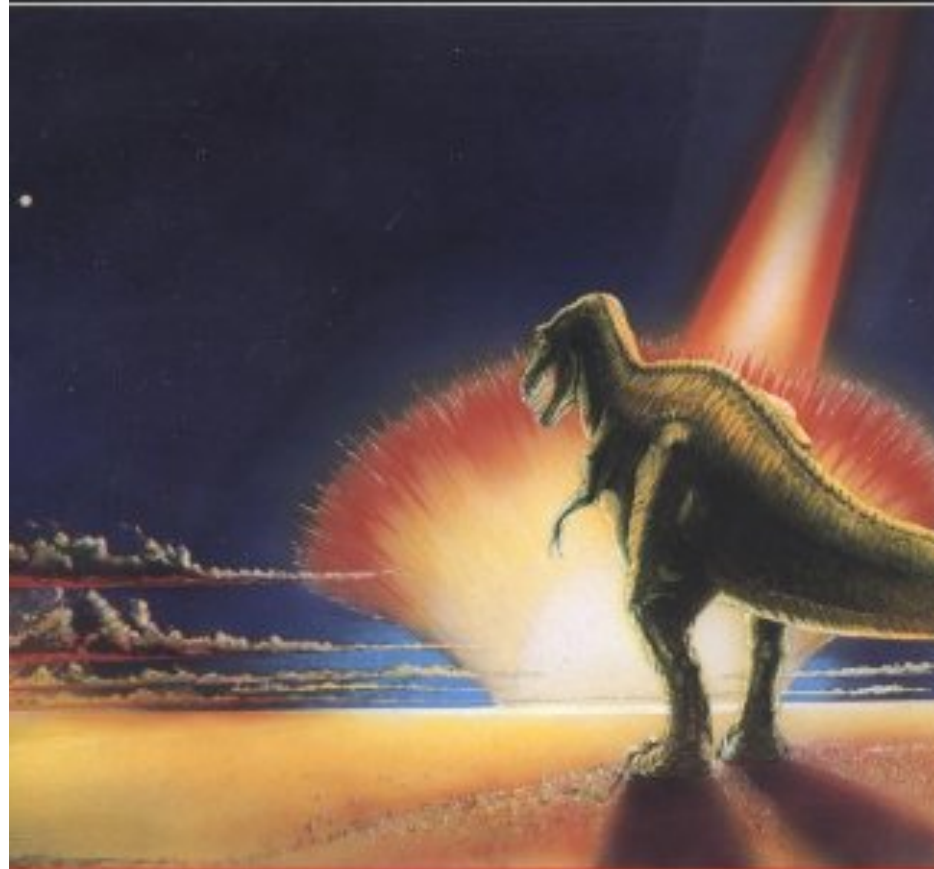
Challenge

“If you want to teach the history of humanity, you probably need to teach the history of everything.... To understand the history of humanity, you have to understand how such a strange species evolved, which means learning about the evolution of life on planet Earth, which means learning about the evolution of planet Earth, which means learning about the evolution of stars and planets, which means knowing about the evolution of the universe.” (David Christian, *Origin Story: A Big History of Everything* (New York: Little, Brown, and Co., 2018), p. viii.)

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***T.rex* AND THE CRATER OF DOOM**

Walter Alvarez



THE STORY THAT WAITED 65 MILLION YEARS TO BE TOLD—HOW A GIANT IMPACT
KILLED THE DINOSAURS, AND HOW THE CRATER WAS DISCOVERED.

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“[M]odern secular education lacks a confident origin story that links all domains of understanding. And that may help explain why the sense of disorientation, division, and directionless that Durkheim described is palpable everywhere in today’s world, in Delhi or Lima as much as in Lagos or London.... So most modern educators focus on parts of the story, and students learn about their world discipline by discipline.... [W]e are rarely encouraged to assemble that knowledge into a single, coherent story in the way that globes in old-fashioned classrooms linked thousands of local maps into a single map of the world. And that leaves us with a fragmented understanding of both reality and the human community to which we all belong.”

(Christian, *Origin Story: A Big History of Everything*, pp. 8-9.)

“[M]any simply lost faith and conviction, and along with them, they lost their bearings, their sense of place in the universe. That loss of faith helps explain the pervasive *anomie*, the feeling of aimlessness, meaninglessness, and sometimes even despair that shaped so much of literature, art, philosophy, and scholarship in the twentieth century.” (Christian, *Origin Story: A Big History of Everything*, p. ix.)

“One of the most significant aspects of our current situation ... is the ‘crisis of meaning.’ Perspectives on life and the world, often of a scientific temper, have so proliferated that we face an increasing fragmentation of knowledge. This makes the search for meaning difficult and often fruitless.... [M]any people ask whether it still makes sense to ask about meaning. The array of theories which vie to give an answer, and the different ways of viewing and of interpreting the world and human life, serve only to aggravate this radical doubt, which can easily lead to skepticism, indifference or to various forms of nihilism.” (John Paul II, *Fides et Ratio*, #81.)

“Within the creative hurricane of modernity, there is emerging a new, global origin story that is as full of meaning, awe, and mystery as any traditional origin story but is based on modern scientific scholarship across many disciplines.” (Christian, *Origin Story: A Big History of Everything*, p. ix.)

“Unlike many traditional origin stories, the modern origin story lacks a creator god.”

(Christian, *Origin Story: A Big History of Everything*, p. 9.)

| Event | Approx. Absolute date | Date Divided by 1 Billion |
|---|--|--|
| Threshold 1: Big bang: origin of our universe | 13.8 billion years ago | 13 years, 8 months ago |
| Threshold 2: The first stars begin to glow | 13.2 (?) billion years ago | 13 years, 2 months ago |
| Threshold 3: New elements forged in dying large stars | Continuously from Threshold 2 to the present | Continuously from Threshold 2 to the present |
| Threshold 4: Our Sun and Solar System form | 4.5 billion years ago | 4 years, 6 months ago |
| Threshold 5: Earliest life on Earth | 3.8 billion years ago | 3 years, 9 months ago |
| First large organisms on Earth | 600 million years ago | 7 months ago |
| Asteroid wipes out the dinosaurs | 65 million years ago | 24 days ago |
| Hominin lineage splits from the chimp lineage | 7 million years ago | 2.5 days ago |
| <i>Homo erectus</i> | 2.7 million years ago | 17 hours ago |
| Threshold 6: First Evidence of <i>Homo Sapiens</i> | 200,000 years ago | 100 minutes ago |

| Event | Approx. Absolute Date | Date Divided by 1 Billion |
|--|--|---|
| Threshold 7: End of the last ice age, Holocene begins, earliest signs of farming | 10,000 years ago | 5 minutes ago |
| First evidence of cities, states, agrarian civilizations | 5,000 years ago | 2.5 minutes ago |
| Roman and Han Empires flourish | 2,000 years ago | 1 minute ago |
| World zones begin to be linked together | 500 years ago | 15 seconds ago |
| Threshold 8: Fossil-fuels revolution begins | 200 years ago | 6 seconds ago |
| Great Acceleration; humans land on Moon | 50 years ago | 1.5 seconds ago |
| Threshold 9 (?): A sustainable world order? | 100 years in the future (?) | 3 seconds to go |
| The Sun Dies | 4.5 billion years in the future | 4 years, 6 months to go |
| The Universe fades to darkness; entropy wins | Gazillions and gazillions of years in the future | Billions and billions of years from now |

Four Regimes

- Cosmos
- Earth
- Life
- Humanity

Neil de Grasse Tyson, *Origins*

- Part I: The Origin of the Universe
- Part II: The Origin of Galaxies and Cosmic Structure
- Part III: The Origin of Stars
- Part IV: The Origin of Planets
- Part V: The Origin of Life
- Coda: The Search for Ourselves in the Cosmos

“Big History provides a framework for understanding literally all of history, ever, from the Big Bang to the present day.... Today, whenever I learn something new about biology or history or just about any other subject, I try to fit it into the framework I got from Big History.” (*Big History* [quoting Bill Gates] (New York: DK Publishing, 2016), p. 9.)

What is
Big History?



Catholic Faith and
Big History



Challenge

Catholic Faith and Big History

The two books:
Scripture and Nature

Applications

The Big Bang

Origin of
the Elements

The End of the Universe

Origin of Meaning

“For from the greatness and beauty of created things their original author, by analogy, is seen.” (*Wisdom* 13:5)

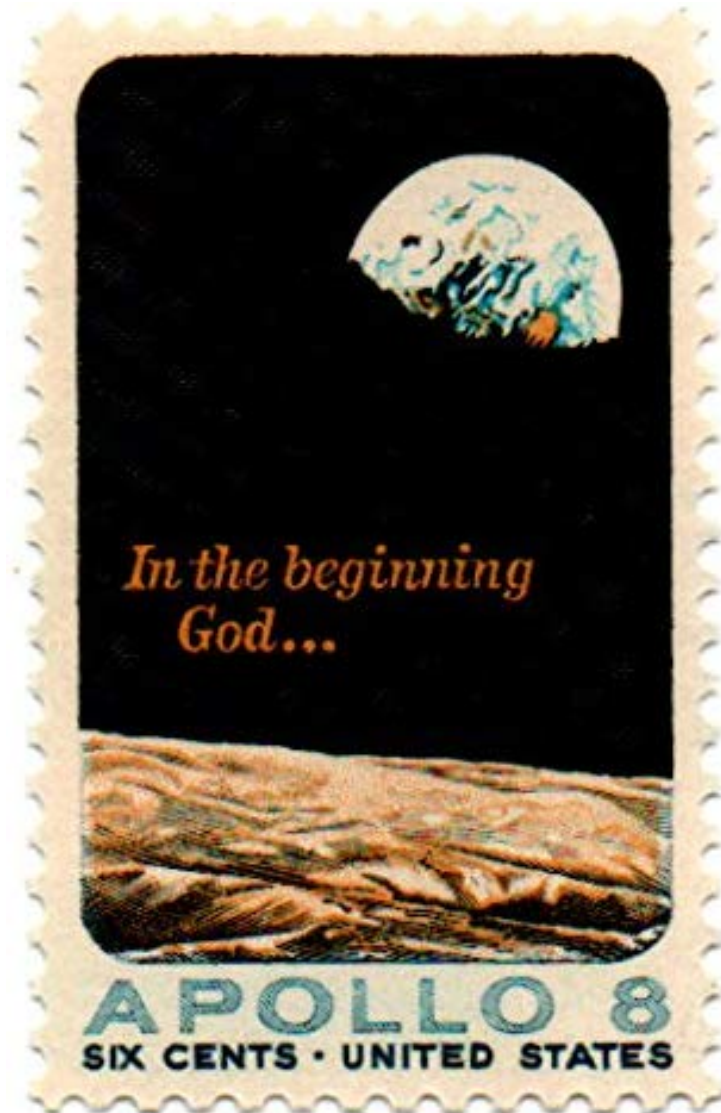
“Whatever can be known about God is clear to them; he himself made it so. Since the creation of the world, invisible realities, God’s eternal power and divinity, have become visible, recognized through the things he has made.” (*Rom 1:19-20 following Wisdom 13:1-5*)

“This is to recognize as a first stage of divine revelation the marvelous ‘book of nature,’ which, when read with the proper tools of human reason, can lead to knowledge of the Creator.” (St. John Paul II, *Fides et Ratio*, #19)

“[T]he Church holds and teaches that God, the first principle and last end of all things, can be known with certainty from the created world by the natural light of human reason. Without this capacity man would not be able to welcome God’s revelation.”

(Catechism of the Catholic Church #36)

Apollo 8 Christmas 1968



“I have dealt with great things that I do not understand; things too wonderful for me, which I cannot know.” (*Job* 42:3)

“[W]e must remember, first, that the sacred writers, or to speak more accurately, the Holy Ghost ‘Who spoke by them, did not intend to teach men these things (that is to say, the essential nature of the things of the visible universe), things in no way profitable unto salvation.’ Hence they did not seek to penetrate the secrets of nature, but rather described and dealt with things in more or less figurative language, or in terms which were commonly used at the time, and which in many instances are in daily use at this day, even by the most eminent men of science.” (Pope

Leo XIII, *Providentissimus Deus* [1893] #18.)

Faith and Science: “Though faith is above reason, there can never be any real discrepancy between faith and reason. Since the same God who reveals mysteries and infuses faith has bestowed the light of reason on the human mind, God cannot deny himself, nor can truth ever contradict truth.” “Consequently, methodical research in all branches of knowledge, provided it is carried out in a truly scientific manner and does not override moral laws, can never conflict with the faith, because the things of the world and the things of faith derive from the same God. The humble and persevering investigator of the secrets of nature is being led, as it were, by the hand of God in spite of himself, for it is God, the conservator of all things, who made them what they are.” (*Catechism of the Catholic Church*, #159)

Vatican Observatory Castel Gandolfo



Vatican Observatory Mt. Graham (Arizona)





Pope Paul VI giving his greetings to the Apollo XI astronauts prior to the Moon landing



Brother Guy J. Consolmagno, SJ (1952-)

Catholic Faith and Big History

The two books:
Scripture and Nature

Applications

The Big Bang

Origin of
the Elements

The End of the Universe

Origin of Meaning

“The universe formed in the Big Bang. We do not know if anything existed before it, and we only have a glimpse of what happened in the fraction of a second immediately afterward. But over the next 380,000 years, the universe expanded and cooled, and the fundamental forces and forms of matter that we know today emerged.” (*Big History* (New York: DK Publishing, 2016), p.16.)



Fr. Georges Lemaître (1894-1966)

EUROPA

16



BELGIQUE
BELGIË

G. Lemaître 1894-1966

1994 (8 a) A. VELGHE

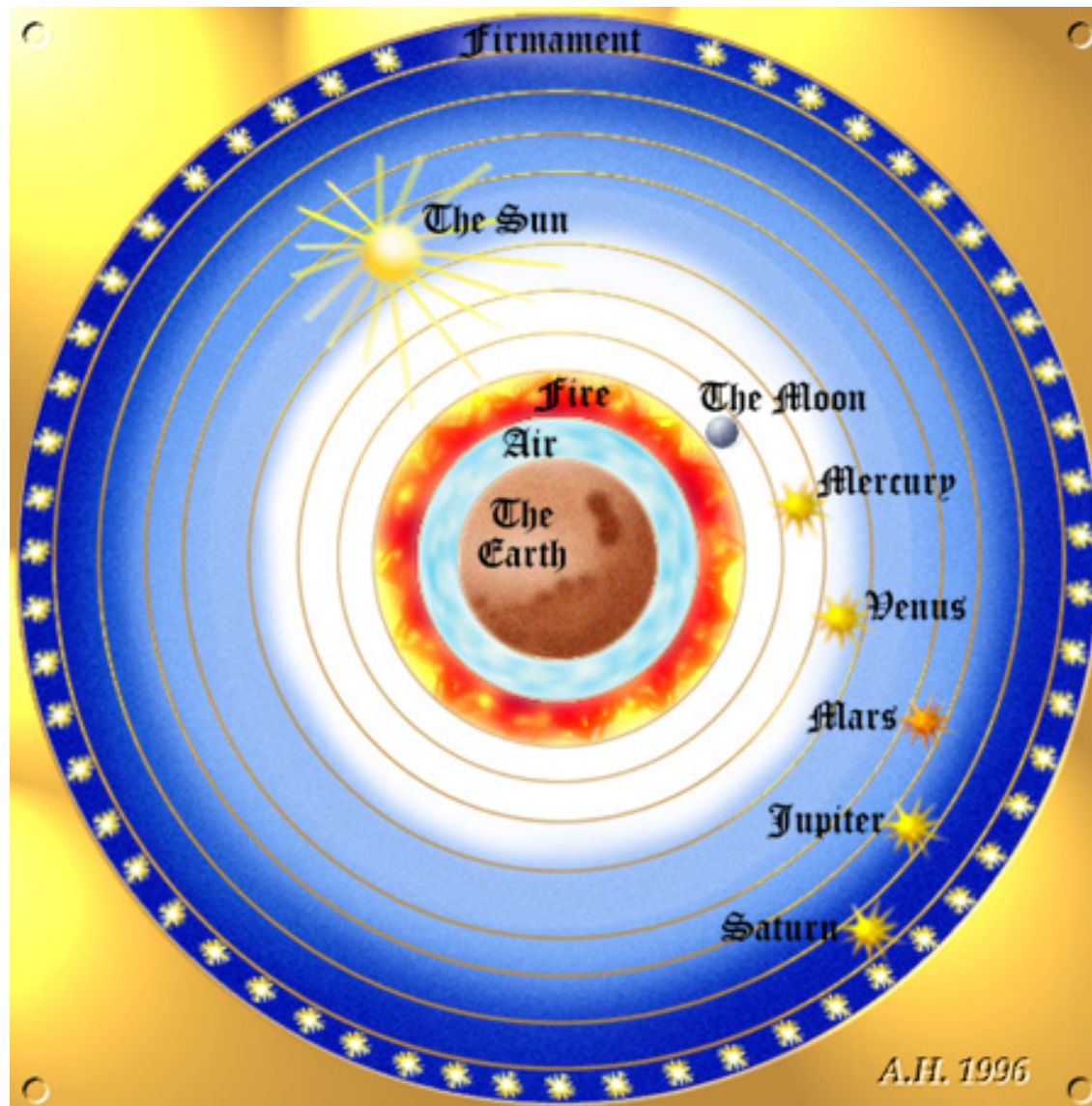


Big Bang Cosmology Quantities

- 10^{-43} second (0. followed by 42 zeroes and then a 1)
Technically called Planck time
- one-hundredth of a centimeter (about the size of the point of a needle) Size of universe at Planck time
- 10^{32} degrees Kelvin (1 followed by 32 zeroes)
Temperature of universe at Planck time
- 13.82 billion years (current age of universe)

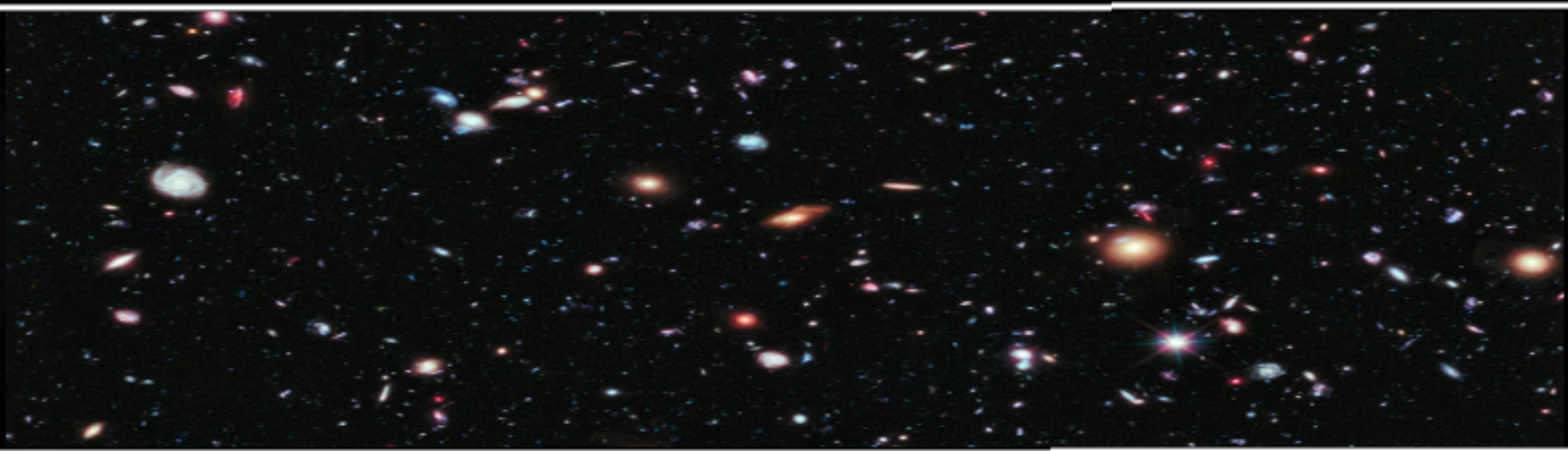
“We can trace things back to the earlier stages of the Big Bang, but we still don’t know what banged and why it banged. That’s a challenge for 21st Century science.” (*Big History* [quoting Martin Rees, British Cosmologist], p.38.)

Aristotelian Universe



Steady State Theory

Universe is in the same state into eternal past and eternal future and only the present moment exists.



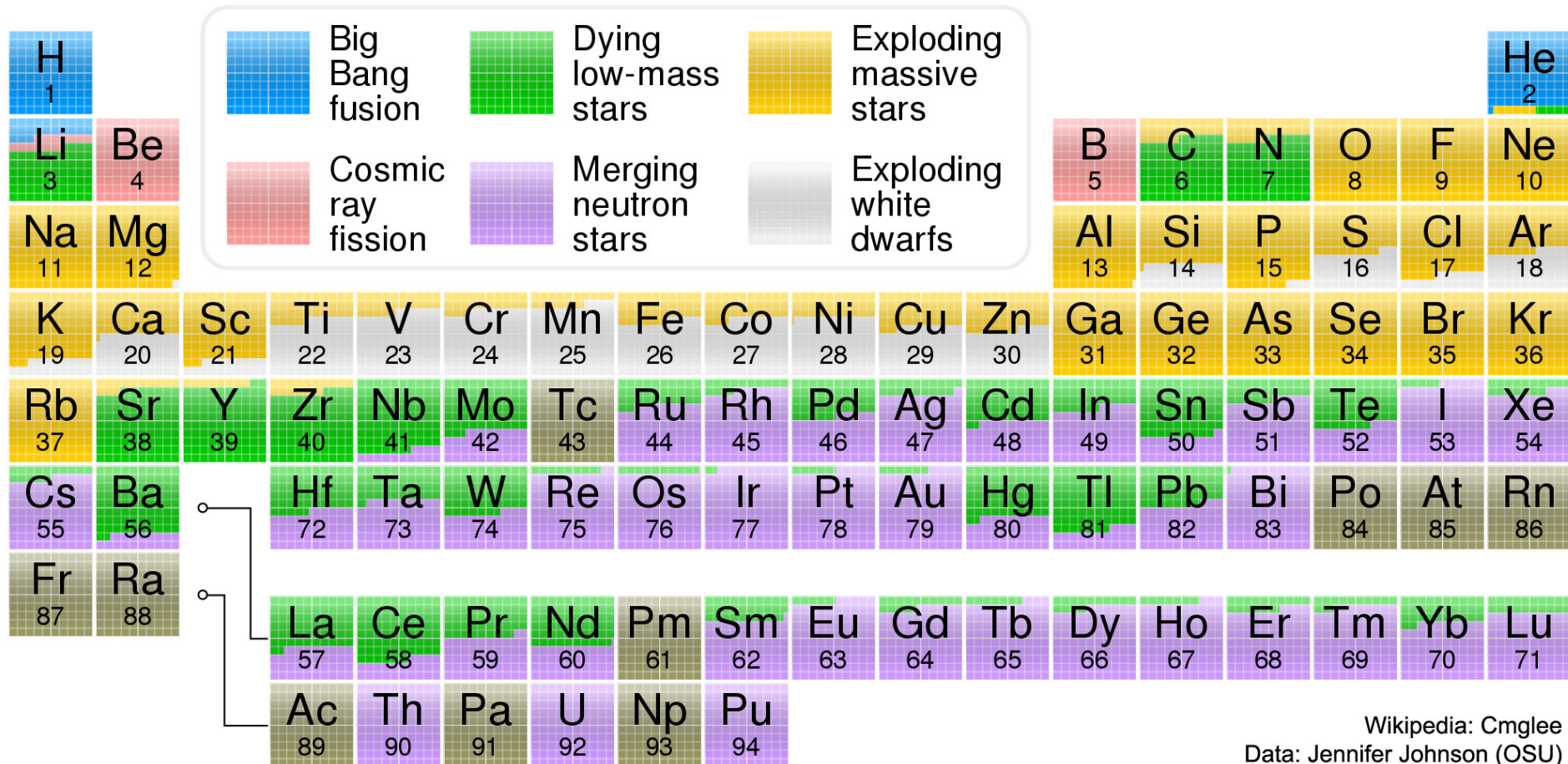
“He [the astronomer] tracks the galaxies as they move through the heavens, infers what paths they have travelled in times past, and so becomes in a manner of speaking a spectator of the cosmic events that happened on the very morning of creation.”

(Pope Pius XII, “Discourse to Astronomers” #18, [1952])



Pope Pius XII and Fr. Georges Lemaître

Nucleosynthesis



Wikipedia: Cmglee
Data: Jennifer Johnson (OSU)

“If there is a bad guy in the modern origin story, it is surely entropy, the apparently universal tendency for the structures to dissolve into randomness. Entropy is the loyal servant of the second law of thermodynamics. So, if we think of entropy as a character in our story, we should imagine it as dissolute, lurking, careless of others’ pain and suffering, not interested in looking you in the eye. Entropy is also very, very dangerous, and in the end it will get us all. Entropy stands at the finale of all origin stories. It will dissolve away all structures, all shapes, every star and every galaxy and every living cell. Joseph Campbell described entropy’s role poetically in a book on mythology: ‘The world, as we know it ... yields but one ending: death, disintegration, dismemberment, and the crucifixion of our heart with the passing of the forms that we have loved.’” (Christian, *Origin Story*, p. 26.)

“Lord, of old you established the earth, and the heavens are the work of your hands. They will perish, but you remain; all of them will grow old like a garment. You will roll them up like a cloak, like a garment they will be changed. But you are the same, and your years will have no end.” (*Hebrews 1:10-12* quoting

Psalms 102:26-28)

“Like the origin stories of Confucianism or early Buddhism, the modern story is about a universe that just is. Any sense of meaning comes not from the universe, but from us humans. ‘What’s the meaning of the universe?’ asked Joseph Campbell, a scholar of myth and religion. ‘What’s the meaning of a flea? It’s just there, that’s it, and your own meaning is that you’re there.’ (Christian, *Origin Story: A Big History of Everything*, p. 9.)

“Man is the summit of the Creator’s work....
God created everything for man, but man in
turn was created to serve and love God and
to offer all creation back to him.” (*Catechism of the
Catholic Church*, 343 and 358)

“For a long time, then, I reflected on this confusion in the astronomical traditions concerning the derivation of the motions of the universe’s spheres. I began to be annoyed that the movements of the world machine, *created for our sake* by the best and most systematic Artisan of all, were not understood with greater certainty by the philosophers....” (Nicholas Copernicus, *On the Revolutions*.

Trans. and Comm. Edward Rosen. (Baltimore and London: Johns Hopkins Univ. Press, 1992) “Preface” p. 40.) Italics mine.)

What is
Big History?



Catholic Faith and
Big History



Challenge

“If the cosmologies of the ancient Near Eastern world could be purified and assimilated into the first chapters of Genesis, might contemporary cosmology have something to offer to our reflections upon creation?” (John Paul II, “To the Reverend George V. Coyne, S.J., Director of the Vatican Observatory,” p.M11.)

“The hylomorphism of Aristotelian natural philosophy ... was adopted by medieval theologians to help them explore the nature of the sacraments and the hypostatic union.... 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.” (John Paul II, “To the Reverend George V. Coyne, S.J., Director of the Vatican Observatory,” p.M10-11.)

“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 ... [Might science] offer to theology a potentially important resource ... may not [contemporary developments in science] invigorate and inform those parts of the theological enterprise that bear on the relation of nature, humanity and **God?**” (John Paul II, “To the Reverend George V. Coyne, S.J., Director of the Vatican Observatory,” p.M12.)

“Pillars of Creation”

