

Wired 10.12: The Pope's Astrophysicist

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The Pope's Astrophysicist

MEET THE VATICAN PRIEST WHO SCANS THE HEAVENS FOR THE ORIGINS OF THE UNIVERSE.
(HEY, GALILEO — WANT A JOB?)

By Margaret Wertheim

We have come to meet the Pope. It's tourist season, and the Sistine Chapel is punishingly full. Visitors from around the world crowd together, ogling Michelangelo's ceiling. At the back of the chapel, our little group of scientists and theologians has gathered, a small knot trying to cohere against the jostling throng. Our audience with John Paul is the culmination of a weeklong conference on science and religion convened by the Vatican Observatory. Host and guide Father George Coyne glances nervously at his watch, then shepherds us through a hidden door and into a private chamber beyond — backstage at the Vatican.

For nearly a quarter century, Coyne has been the director and senior scientist at the Vatican Observatory, the Roman Catholic Church's beachhead on the shores of astronomical research. The Church's interest in the stars dates back to well before Galileo's time. Five hundred years ago, papal astronomers in charge of fixing Easter's date noticed that the Julian calendar was getting out of sync with the stars, and in 1582 they replaced it with the Gregorian. In 1891, long after the Church had accepted the heliocentric universe, Pope Leo XIII officially founded the Observatory so that "everyone might see clearly that the Church and her Pastors are not opposed to true and solid science."

Today, the Vatican Observatory Research Group boasts 13 professional astronomers and cosmologists, all of them Jesuits. The group specializes in fields like galaxy formation and, to quote from their latest annual report, "the dynamics of inflationary universes with positive spatial curvature."

En route to His Holiness, we're led through endless miles of corridors, every yard the work of Italian master craftsmen. Around one corner, an entire wall erupts with rococo excess as, in front of us, Christ rises into the heavens, his feet hovering yards above the ground. "They really knew what miracles were back then," quips the English cosmologist Paul Davies. We walk on, marveling at the might of the Catholic Church congealed into aesthetic overload. Cardinals swoosh by swathed in deep-red satin. Bishops shimmer in rose-colored silk. Swiss Guards stand watch in multicolored velvet pantaloons.

Ruled by ritual and formality, the Vatican is the last living Renaissance court, and Coyne a courtier who haunts its inner sanctum. Ironically, though, it's science that got him here. As a Jesuit novitiate from Baltimore, his life consisted mostly of prayer and study. He pursued astronomy and theology with equal vigor, earning a PhD from Georgetown in 1962 and a priest's collar in 1965. In 1978, he became the director of the Vatican Observatory. Today, he also serves informally as science adviser to the Pope.

Our party is ushered into a room to await His Holiness. He enters accompanied by a burst of song - young priests chanting hosannas. Our conference has been

wrestling with evolution, both biological and cosmological. And so has he, John Paul tells us. "The Church's Magisterium is directly concerned with the question of evolution, for it involves the conception of man." Though "Revelations teaches us that man was created in the image and likeness of God," says the Pope, "new knowledge has led us to realize that the theory of evolution is no longer a mere hypothesis." It's good to hear, but hardly breaking news. The Catholic Church has long accepted an evolutionary worldview, complete with descent from apes and a big bang beginning. John Paul in particular has championed science and lent his personal support to "Scientific Perspectives on Divine Action," a decade-long program of which our conference is a part. As the Pope finishes speaking, Coyne approaches the dais. Their lives have followed similar paths: Both were rigorously schooled in theology and philosophy, both speak multiple languages, and both hail from humble backgrounds. But what a difference a throne makes — without hesitation, Father Coyne drops to his knees to kiss his superior's ring. As a Jesuit, he is bound by absolute obedience to the Pontiff. Symbolic, ritualized, and utterly expected by a priest, it's an act of self-abnegation that seems shockingly out of place in a scientist. In this gesture lurks a fundamental tension: How can Coyne live both in the hierarchical world of the Catholic Church and the egalitarian world of science, where there is no higher authority?

The Vatican Observatory Research Group conducts its fieldwork light-years away from Roman opulence, at the University of Arizona. From the campus in downtown Tucson, it's an easy drive to Kitt Peak, site of the world's largest collection of optical telescopes. Father Coyne picks me up in the VORG 4x4 early in the day, before it gets too hot to travel comfortably. Hurling across the Sonoran Desert, I nurse an herbal tea. Coyne's been up since 5 am, biking 12 miles and then running 3 more, as he does each day. He's 69 years old.

At 6,875 feet, Kitt Peak is the highest point in the Quinlan range. Twenty-two optical and two radio telescopes cluster atop the mountain, including the university's 90-inch reflector, the Bok. The VORG has a special interest in the evolution of galaxies, and with the Bok they are studying the formation rate of nearby stars.

The question of origin is also of central interest to the Vatican — and has been since the beginning of the Church. For the medievals in particular, the celestial heavens were a metaphor for the theological heaven. During the 16th and 17th centuries, the study of the stars was regarded almost as a branch of theology — "this divine rather than human science," Copernicus called it. Johannes Kepler, the founder of modern astrophysics, famously declared: "For a long time I wanted to become a theologian. Now, behold how through my efforts God is being celebrated in astronomy." Half a century later, Isaac Newton himself attributed the force of gravity to God.

Coyne, too, sees the material world as a manifestation of divine will. "The human person participates in the mystery of God, and so does the universe," he says. But he has no time for creationists and other biblical literalists and is exasperated by those who want to put limits on scientific inquiry. "I have friends who pray that science will never discover or explain certain things. I don't understand that," he declares. "Nothing we learn about the universe threatens our faith. It only enriches it."

But what if we discover other intelligent beings? When NASA scientists announced they had evidence of life on Mars, commentators indulged in an orgy of speculation about the downfall of Christianity should E.T. ever pay us a call.

Coyne is amused when I raise the subject. He points out that Catholic theologians considered this question as long ago as the 13th century and

unanimously concluded that life in "other worlds" would cause no theological crisis. Since God was a god of plenitude, the great medieval thinkers believed, if other worlds existed they ought to be inhabited.

"In the theological tradition established by Saint Paul," Coyne tells me, "the whole of nature is groaning toward the Christ. That is usually interpreted in an anthropocentric way, but it does not have to be." The question for the medievals was not whether Christianity would collapse, Coyne says, but whether each world would need "its own instantiation of the Christ." Would an intelligent starfish race need a starfish Jesus, or would the human son of Mary be the Savior for all beings? Theologians are still divided, but like Thomas Aquinas, who first pondered the question of alien life, Coyne feels confident that his faith is secure from extraterrestrial attack.

Over the years, Coyne's studies have dovetailed with our growing desire for off-world contact. In the early 1960s, he was working on the surface chemistry of the moon, a subject of special interest to NASA, which was trying to locate a landing site for the Apollo missions. Later, his research shifted to the formation of stars and the evolution of protoplanetary discs, now a major topic in astrobiology. Planets, it's assumed, are the first requirement for any form of life.

Today, the Vatican Observatory is surveying all the galaxies in the neighborhood of the Milky Way. This is the distinctly unglamorous end of astronomy, which is increasingly obsessed with getting back to the big bang. The farther out in space one looks, the further back in time one sees; and the Beginning is where big reputations are made. By concentrating on nearby galaxies, the Vatican group is expanding what we know about the contemporary universe, which is as far from that apogee as it's possible to get. The VORG's research is unlikely to win any Nobels, but it's important work for astronomy as a discipline.

More than anything, it is this aspect of the VORG that sets it apart. In an age of Everest-sized egos, modesty is in short supply. Yet it is a natural outgrowth of what Ignatius of Loyola stressed as a central aspect of Jesuit life:

"ministry," or service to the community. In the 16th century, the original Jesuits tended the poor and the sick; for Coyne and his colleagues, astronomy is their form of community service.

As an astronomer, Coyne has focused on small problems, but as a theologian he has always pursued life's big questions: Why are we here? Where did we come from? Is there a higher purpose? For Coyne and others, the issue is whether science can answer these questions.

In *A Brief History of Time*, Stephen Hawking famously argues that his theories make God redundant. Specifically, he says that his "no-boundary cosmology" removes the need for a Creator. If there is no definitive origin to the universe, then there is no need for an originating power.

In the early 1980s, the Vatican invited Hawking to a conference where he, too, had an audience with the Pope. The synthesizer had yet to be installed, and Hawking was still speaking through his own disintegrating vocal cords.

Apparently John Paul had trouble understanding and knelt down beside Hawking's wheelchair to hear him better, prompting one scientist to deadpan that "things certainly have changed since Galileo."

Father Coyne was also at the conference. Like most, he is impressed by Hawking's mental agility and does not quibble with his physics. Nonetheless, he finds Hawking's grasp of theology sorely lacking. It is "just silly," Coyne says, "to suggest that this kind of cosmological theory does away with God." Later, Coyne admonished Hawking: "Stephen, God is not a boundary condition."

Coyne rejects much of the current discussion about science and religion. Echoing

Immanuel Kant, he insists that belief in God is independent of anything scientists discover. More than two centuries ago, Kant argued that science could never disprove the existence of God. But neither, he said, could it prove Him. That hasn't stopped many people from trying, and today there is a new fashion for the so-called anthropic principle.

Anthropic arguments are based on the notion that the universe has been specially tailored for the emergence of life. On both the cosmological and subatomic scales, from the force of gravity to electromagnetic bonds, the universe is shaped by powers that seem finely tuned for life to evolve. Evidence of an intelligent consciousness that built the very laws of nature?

Coyne dismisses this idea as well. "To imagine a Creator twiddling with the constants of nature is a bit like thinking of God as making a big pot of soup," he declares with a rare flash of sarcasm. A bit more onion, a bit less salt, and presto, the perfect gazpacho. "It's a return to the old vision of a watchmaker God, only it's even more fundamentalist. Because what happens if it turns out there is a perfectly logical explanation for these values of the gravitational constant and so on? Then there'd be even less room for God." In other words, if God is grounded in data, then He is immediately subject to revision every time we get new data — and data tends to improve over time. Coyne sums up his objection to this God of the gaps with an elegant economy: "God is not information," he says. "God is love."

What's missing in "this privileging of the cognitive over the empathetic," as Coyne puts it, is the concept of faith. The crux of the problem is that belief in God requires a leap outside anything science can describe or prove. Coyne insists that this leap does not happen on its own and does not sustain itself. For him at least, it must be continually rekindled: "I thank God constantly that He chose me. But it is not a rock of ages. It's something I have to renew every day."

What Coyne calls "the gift of faith" troubled his old friend Carl Sagan, who once asked him, "George, how come God chose you and not me?" If God is so generous, Sagan wondered, then why has He not extended this gift to us all? Coyne's answer: He has. "God chooses everyone sooner or later," he told Sagan, "but not everyone realizes it." Then, with the solicitude that only a true believer could show toward an avowed atheist, Coyne finished his thought. "I hope, Carl," he said, "that when God chooses you, you will recognize it."

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