Considering the heavens: Astronomer Guy Consolmagno

by Amy Frykholm in the June 10, 2015 issue

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Guy Consolmagno SJ is a researcher at the Vatican Observatory in Castel Gandolfo, Italy, and at the Vatican Observatory Research Group at the University of Arizona in Tucson. Until last year he was the Vatican's curator of meteorites; he is now president of the Vatican Observatory Foundation, which supports the work of the observatory. He has a Ph.D. in planetary science from the University of Arizona. He recently wrote, with Paul Mueller SJ, Would You Baptize an Extraterrestrial? . . . and Other Questions from the Astronomers' In-Box at the Vatican Observatory.

The evolutionary biologist Stephen Jay Gould called science and religion "nonoverlapping magisteria"—different fields of inquiry. Is that the best way to look at the relationship?

I don't think so. Gould tried to be sympathetic to religion, but it is clear that he didn't get it. The temptation is to hold science and religion in watertight boxes, but there is one place where they do in fact overlap: in the human being who is doing the science and practicing the religion. At the end of the day, you have to account for that.

Religion and science are not competing with each other, but that doesn't mean they don't interact. My religion gives me the motivation and courage to do the science. It gives me the framework in which I can reflect about what I learned doing the science. And science has given me another way to know God.

What fundamental assumptions about the nature of the universe does science, or cosmology, depend on?

There are three things you have to take on faith before you can be a scientist. First, you need a realism that says the physical world actually exists; it is not a projection of the imagination. You can't do science if you believe that all is illusion, and some religions do teach that.

The second belief you need is that the universe makes logical sense. It is not chaotic. There are laws that govern how things work.

The third thing you have to believe is that science is, in itself, good. If you believe that the physical world is evil and that the purpose of life is to get beyond the physical world, then science is difficult to do. Your culture will not support you.

Ten or 15 years ago I gave a talk in South Carolina. A young man came up to me and said, "I want to be a geologist, but how do I tell my mom?" The culture, family, and belief system that he came from was not going to produce many scientists, because they regarded geologists as those evil people who go against the Bible.

How has your cosmological work influenced your faith?

For me faith has always come first. When you grow up, you don't learn that everything that you were taught as a child was wrong; rather, you see that you didn't have a very complete picture. It was right, but not in the way you thought it

was. Any religious person has this experience over and over again.

This experience also happens in science all of the time. We used to talk about conservation of energy, and then Einstein came along and said, “Energy can become mass and mass can become energy, so there is something being conserved, but it isn’t what we thought it was.”

We need the humility to say that we don’t understand it all. I know my science is true, but I also know it is not completely true, so I have to keep improving it. I think my faith is completely true, but I know I don’t understand all of it—my understanding is in constant need of revision.

Can you talk about an experience that for you was simultaneously spiritual and scientific?

About ten years ago, I was studying the physical properties of meteorites, plotting my data, looking for correlations. Suddenly on the computer screen appeared this beautiful correlation between grain density and magnetic susceptibility. I was probably one of four people in the world who would care. But when I saw the pattern, I had this momentary jolt of joy that I recognized as being the same sort of joy I have gotten from prayer. I felt like God was saying, “You did good, kid. This is something I wanted to show you because it is so neat.”

My doing science is kind of like playing a board game with God. It is a great game, where God and I can interact with each other. We are not equals, but God is happy to see someone solve the puzzle a little bit.

Another example: I went to a Jesuit retreat house in Australia, a place called Sevenhill. The skies in the Southern Hemisphere are different than the ones I grew up with in Detroit, so I am fascinated by them. One night, I was looking at the Milky Way. Off to the left were the Magellanic Clouds which are not part of the Milky Way. They are like little orbiting satellite galaxies. Suddenly, my understanding shifted. I saw that the Milky Way was not a streak of light in the sky. It was the disc that I am inside of, with the Magellanic Clouds on the outside. I had known that intellectually, of course; but now I knew it even in my soul.

It was like when you are looking at one of those paintings where there are two faces, and suddenly the optical illusion flips and you see it in a new way, as a chalice. Suddenly I saw the galaxies in a different way. It was a moment of joy and insight,

that feeling of God saying, “Yep. You got it.” I had been taught for decades that we are inside the Milky Way, but to realize what it meant, to really get it: that was new for me.

Are you personally responsible for Pluto losing its status as a planet?

Not personally. I was on a commission for the International Astronomical Union, and I was the secretary of the division that finally made the decision. Originally, I was not in favor of it, but after serving on the committee that studied the issues, hearing the arguments, and then living with the decision, I think it was the right thing to do. Back when Pluto thought it was a planet, it was an ugly duckling of a planet. Now that it knows it is a dwarf planet, it is a beautiful swan of a dwarf planet.

Why does the Vatican have an observatory?

Every religion should have an observatory, don’t you think? The Vatican Observatory can trace its history back to the medieval university, where astronomy was one of the fields you had to learn before you could study theology or philosophy. There have been astronomers in church-supported schools for a long time.

The modern observatory started in 1891 under Pope Leo XIII. His goal was to show the world that the church supports science. That was an interesting moment for religion and science: only in the 19th century did anybody suggest that the church didn’t support science.

Everybody thinks that the church stopped supporting science with Galileo, but the church never stopped supporting science. There were church scientists who were arguing with Galileo and eventually agreeing with Galileo in the 16th, 17th, and 18th centuries. The myth that the church was antiscience is tied up in the politics of the 19th century.

Science in the 19th century was very triumphalistic. Steam engines and electricity were going to solve all our problems. But the church was triumphalistic as well, and the two were on a collision course. The 20th century made both a lot more humble.

What kinds of issues do you work on day to day at the Vatican observatory?

I am particularly interested in the smaller bodies in our solar system: how they formed, how they grew, and how they have changed over time. The way we get at

that is by measuring the meteorites that come from these smaller bodies. We have a big collection of these that have come from the asteroid belt over hundreds of years. There are about 1,000 samples in Rome, and I work on measuring their physical properties so that other people can plunk our hard numbers into their models.

This work is a service to the scientific community, work that we uniquely can do as Jesuits and at the Vatican Observatory for the practical reason that it takes 20 years to do it, and people can't get grants that last that long. And if you are seeking tenure, you are not going to do a project that can't produce a payoff for 20 years.

What are some recent developments in astronomy that you think ordinary people should know about?

The biggest and most exciting thing is the acceleration of the universe. Seventy-five percent of the universe is made of something we have no idea what it is and didn't even know existed 25 years ago. Not only does science not have all the right answers, we aren't even asking the right questions yet. That's what makes cosmology so much fun.

In our own solar system, we have been to Mars, and we know it as a place where people can have adventures—if they bring enough oxygen. But now we also know that there are other kinds of places to explore that we never thought of: the oceans beneath the crusts of icy moons or maybe even the ocean beneath the crust of the dwarf planet Ceres. This is another exciting place where life might exist, where we could exist.

When you hear the biblical stories of creation, what do you hear in them that perhaps nonscientists don't?

I hear the assumed cosmology of a time and place in which everybody knew that the world is flat with a dome over the top of it. But I also hear how God fits into this cosmos. What "everybody knows" changes over thousands of years, but the way that God fits never changes.

How could congregations be supportive of scientists in their midst?

The tone is set by the person in the pulpit. The keys are curiosity and humility. Religious leaders need to say: I don't know everything, and I wish I knew more. If ministers could give scientists and engineers in their midst a forum to talk about

how they live in both religion and science, that could be good for everyone. Don’t let the atheists have all the fun.

So would you baptize an extraterrestrial?

Only if she asks.