

Ann Druyan Talks About Science, Religion, Wonder, Awe . . . and Carl Sagan

It is a great tragedy that science, this wonderful process for finding out what is true, has ceded the spiritual uplift of its central revelations: the vastness of the universe, the immensity of time, the relatedness of all life, and life's preciousness on our tiny planet.

ANN DRUYAN

I've been thinking about the distorted view of science that prevails in our culture. I've been wondering about this, because our civilization is completely dependent on science and high technology, yet most of us are alienated from science. We are estranged from its methods, its values, and its language. Who is the scientist in our culture? He is Dr. Faustus, Dr. Frankenstein, Dr. Strangelove. He's the maker of the Faustian bargain that is bound to end badly. Where does that come from? We've had a long period of unprecedented success in scientific discovery. We can do things that

even our recent ancestors would consider magic, and yet our self-esteem as a species seems low. We hate and fear science. We fear science and we fear the scientist. A common theme of popular movies is some crazed scientist somewhere setting about ruining what is most precious to all of us.

I think the roots of this antagonism to science run very deep. They're ancient. We see them in Genesis, this first story, this founding myth of ours, in which the first humans are doomed and cursed eternally for asking a question, for partaking of the fruit of the Tree of Knowledge.

**It's puzzling that Eden is synonymous
with paradise when, if you think about it at all,
it's more like a maximum-security prison with
twenty-four hour surveillance.**

It's puzzling that Eden is synonymous with paradise when, if you think about it at all, it's more like a maximum-security prison with twenty-four hour surveillance. It's a horrible place. Adam and Eve have no childhood. They awaken full-grown. What is a human being without a childhood? Our long childhood is a critical feature of our species. It differentiates us, to a degree, from most other species. We take a longer time to mature. We depend upon these formative years and the social fabric to learn many of the things we need to know.

So here are Adam and Eve, who have awakened full grown, without the tenderness and memory of childhood. They have no mother, nor did they ever have one. The idea of a mammal without a mother is, by definition, tragic. It's the deepest kind of wound for our species; antithetical to our flourishing, to who we are.

Their father is a terrifying, disembodied voice who is furious with them from the moment they first awaken. He doesn't say, "Welcome to the planet Earth, my beautiful children! Welcome to this paradise. Billions of years of evolution have shaped you to be happier here than anywhere else in the vast universe. This is your paradise." No, instead God places Adam and Eve in a place where there can be no love; only fear, and

Ann Druyvan is a cowriter with the late Carl Sagan of the Emmy and Peabody award-winning series Cosmos. Their twenty-year professional collaboration included NASA's Voyager Interstellar Message and many speeches, articles, and books, including Shadows of Forgotten Ancestors and Comet. She was co-creator with Sagan of the motion picture Contact, and a credited contributor to his Pale Blue Dot, The Demon-Haunted World, and Billions and Billions. She is co-founder and CEO of Cosmos Studios, as well as Program Director of Cosmos 1, the first solar sailing spacecraft mission. She and Carl Sagan were married until his death in 1996. They have two children.

fear-based behavior, obedience. God threatens to kill Adam and Eve if they disobey his wishes. God tells them that the worst crime, a capital offense, is to ask a question; to partake of the fruit of the Tree of Knowledge. What kind of father is this? As Diderot observed, the God of Genesis "loved his apples more than he did his children."

This imperative not to be curious is probably the most self-hating aspect of all, because what is our selective advantage as a species? We're not the fastest. We're not the strongest. We're not the biggest. However, we do have one selective advantage that has enabled us to survive and prosper and endure: A fairly large brain relative to our body size. This has made it possible for us to ask questions and to recognize patterns. And slowly over the generations we've turned this aptitude into an ability to reconstruct our distant past, to question the very origins of the universe and life itself. It's our only advantage, and yet this is the one thing that God does not want us to have: consciousness, self-awareness.

Perhaps Genesis should be read as an ironic story. Here's a god who does not give us the knowledge of good and evil. He knows we don't know right from wrong. Yet he tells us not to do something anyway. How can someone who doesn't know right from wrong be expected to do the right thing? By disobeying god, we escape from his totalitarian prison where you cannot ask any questions, where you must never question authority. We become our human selves.

Our nation was founded on a heroic act of disobedience to a king who was presumed to rule by divine right. We created social and legal mechanisms to institutionalize the questioning of authority and the participation of every person in the decision-making process. It's the most original thing about us, our greatest contribution to global civilization. Today, our not-exactly-elected officials try to make it seem as if questioning this ancient story is wrong. . . . That the teaching of our evolving understanding of nature, which is a product of what we have been able to discover over generations, is somehow un-American or disrespectful of strongly held beliefs. As if we should not teach our children what we've learned about our origins, but rather we should continue to teach them this story which demonizes the best qualities of our founding fathers.

This makes no sense and it leads me to a question: Why do we separate the scientific, which is just a way of searching for truth, from what we hold sacred, which are those truths that inspire love and awe? Science is nothing more than a never-ending search for truth. What could be more profoundly sacred than that? I'm sure most of what we all hold dearest and cherish most, believing at this very moment, will be revealed at some future time to be merely a product of our age and our history and our understanding of reality. So here's this process, this way, this mechanism for finding bits of reality. No single bit is sacred. But the search is.

And so we pursue knowledge by using the scientific method to constantly ferret out all the mistakes that human

beings chronically make, all of the lies we tell ourselves to combat our fears, all of the lies we tell each other. Here's science, just working like a tireless machine. It's a phenomenally successful one, but its work will never be finished.

In four hundred years, we evolved from a planet of people who are absolutely convinced that the universe revolves around us. No inkling that the Sun doesn't revolve around us, let alone that we are but a minuscule part of a galaxy that contains roughly a hundred billion stars. If scientists are correct, if recent findings of planets that revolve around other stars are correct, there are perhaps five hundred billion worlds in this galaxy, in a universe of perhaps another hundred billion galaxies. And it is conceivable, even possible, that this universe might one day be revealed to be nothing more than an electron in a much greater universe. And here's a civilization that was absolutely clueless four or five hundred years ago about its own tiny world and the impossibly greater vastness surrounding it. We were like a little bunch of fruit flies going around a grape, and thinking this grape is the center of everything that is. To our ancestors the universe was created for one particular gender of one particular species of one particular group among all the stunning variety of life to be found on this tiny little world.

There was only one problem. These very special beings for whom the universe was created had a holiday called Easter and they wanted to be able to celebrate it on the same day at the same time. But in this geocentric universe that they blissfully inhabited, there was no way to create a workable calendar that was coherent. At this time, there was a phrase to describe what science was. It is suffused with disarming candor and not a bit of self-consciousness at all. It was called *saving the appearances*. That was the task of science: To save the appearances. Figure out a way to take the reported appearances of the stars and the planets in the sky and predict with some reliability where they would be in the future. It's almost as if they knew they were living a cosmic lie. To call it saving the appearances is wonderful.

So the Lateran Council of 1514 was convened, and one of its main goals was to figure out a calendar that everybody could use so that they won't be celebrating Easter on different days. A man named Nicolas Copernicus, who was a very religious guy, whose lifelong career was in the church, had already figured out what the problem was. He was invited to present

this information at the Council, but he declined because he knew how dangerous it would be to puncture this cosmological illusion. Even though the pope at that moment was not actually terribly exercised about this idea, Copernicus's fears were not baseless. Even sixty years later, a man named Giordano Bruno was burned alive for one reason: he would not utter the phrase, "There are no other worlds."

I've thought about this a lot. How could you have the guts to be willing to be burned alive? Bruno had no community of peers to egg him on. He wasn't even a scientist, he didn't really

have any scientific evidence, but he chose this horrible death because he refused to say this phrase: "There are no other worlds." It's a magnificent thing, it's a wondrous mystery to me, and I don't think I completely understand how it was possible.

Copernicus did find the courage to publish his idea when he was comfortably near a natural death. When in 1543, *On The Revolutions of Celestial Spheres* was published, something unprecedented happened—a trauma from which we have never recovered. Up until that time, the sacred and the scientific had been one. Priests and scientists had been one in the same. It is true that two millennia before Copernicus there had been the pre-Socratic philosophers, who really were the inventors of science and the democratic values of our society. These ancient Greeks could imagine a universe and a world without God. But they were



Ann Druyan

very much the exception, flourishing too briefly before being almost completely extirpated philosophically by the Platonists. Many of their books were destroyed. Plato loathed their materialism and egalitarian ideals. So there really wasn't a vibrant school of thought with a continuous tradition that survived down through the ages, daring to explain the wonder of nature without resorting to the God hypothesis.

It was actually initiated by a group of uncommonly religious men like Copernicus, Newton, Kepler, and (much later) even Darwin, who catalyzed that separation between our knowledge of nature and what we held in our hearts. All four of them either had religious careers or were contemplating such a profession. They were brilliant questioners, and they used the sharpest tools they had to search for what was holy. They had enough confidence in the reality of the sacred to be willing to look at it as deeply as humanly possible. This unflinching search led to our greatest spiritual awakening—

the modern scientific revolution. It was a spiritual breakthrough, and I think that it is our failure to recognize it as such that explains so much of the loneliness and madness in our civilization, so much of the conflict and self-hatred. At that time, the public and their religious institutions, of course, rejected out of hand their most profound insights into nature. It was several hundred years before the public really thought about this, and took seriously what Copernicus was saying. The last four centuries of disconnect between what our elders told us and what we knew was true has been costly for our civilization.

I think we still have an acute case of post-Copernican-stress syndrome. We have not resolved the trauma of losing our infantile sense of centrality in the universe. And so as a society we lie to our children. We tell them a palliative story, almost

It has only been through science that we have been able to pierce this infantile, dysfunctional need to be the center of the universe, the only love object of its creator.

to ensure that they will be infantile for all of their lives. Why? Is the notion that we die so unacceptable? Is the notion that we are tiny and the universe is vast too much of a blow to our shaky self-esteem?

It has only been through science that we have been able to pierce this infantile, dysfunctional need to be the center of the universe, the only love object of its creator. Science has made it possible to reconstruct our distant past without the need to idealize it, like some adult unable to deal with the abuse of childhood. We've been able to view our tiny little home as it is. Our conception of our surroundings need not remain the disproportionate view of the still-small child. Science has brought us to the threshold of acceptance of the vastness. It has carried us to the gateway of the universe. However, we are spiritually and culturally paralyzed and unable to move forward; to embrace the vastness, to embrace our lack of centrality and find our actual place in the fabric of nature. That we even *do* science is hopeful evidence for our mental health. It's a breakthrough. However, it's not enough to allow these insights; we must take them to heart.

What happened four or five hundred years ago? During this period there was a great bifurcation. We made a kind of settlement with ourselves. We said, okay, so much of what we believed and what our parents and our ancestors taught us has been rendered untenable. The Bible says that the Earth is flat. The Bible says that we were created separately from the rest of life. If you look at it honestly, you have to give up these basic ideas, you have to admit that the Bible is not infallible, it's not the gospel truth of the creator of the universe. So what did we do? We made a corrupt treaty that resulted in a troubled peace:

We built a wall inside ourselves.

It made us sick. In our souls we cherished a myth that was rootless in nature. What we actually knew of nature we compartmentalized into a place that could not touch our souls. The churches agreed to stop torturing and murdering scientists. The scientists pretended that knowledge of the universe has no spiritual implications.

It's a catastrophic tragedy that science ceded the spiritual uplift of its central revelations: the vastness of the universe, the immensity of time, the relatedness of all life and its preciousness on this tiny world.

When I say "spiritual," it's a complicated word that has some unpleasant associations. Still, there has to be a word for that soaring feeling that we experience when we contemplate 13 billion years of cosmic evolution and four and a half billion years of the story of life on this planet. Why should we give that up? Why do we not give this to our children? Why is it that in a city like Los Angeles, a city of so many churches and temples and mosques, there's only one place like this Center for Inquiry? And that it's only us here today? Fewer than a hundred people in a city of millions? Why is that? Why does the message of science not grab people in their souls and

give them the kind of emotional gratification that religion has given to so many?

This is something that I think we have to come to grips with. There's a confusion generally in our society. There is a great wall that separates what we *know* from what we *feel*.

Medicine has had an oath that goes back to Hippocrates. Hippocrates is an amazing figure, both a father of scientific ethics and first articulator of the insight that frees humankind to discover the universe. He's one of those pre-Socratic philosophers I was talking about earlier, and he said something that resonated for me at a moment in my life when I realized what my path would be. His words inspired me to try as hard as I could in my own life to make it matter what is true. Hippocrates was writing in an essay called *Sacred Disease* 2,500 years ago. He was writing about the sacred disease that is now called epilepsy, and very matter-of-factly he said something that struck me like a lightning bolt. I'll paraphrase: "People believe that this disease is sacred simply because they don't know what causes it? But some day I believe they will, and the moment they figure out why people have epilepsy, it will cease to be considered divine." Why don't we have schools everywhere that teach children about Hippocrates, about the power of asking questions, rather than cautionary tales about the punishment for doing so. Our kids are not taught in school about Hippocrates, not taught about this multigenerational process of divesting ourselves of superstitions, false pattern recognition, and all the things that go with it, racism, sexism, xenophobia, all that constellation of baggage that we carry with us. We live in a society now where our leadership is all about promoting superstition, promoting xenophobia.

* * *

It seems to me that the biggest challenge we face is to evolve a language that couples the cold-eyed skepticism and rigor of science with a sense of community, a sense of belonging that religion provides. We have to make it matter what is true. If instead we say that what really matters is to have faith, what really matters is to believe, we'll never get there. It's not enough to have forty minutes of science in the daily school program, because science shouldn't be compartmentalized that way. Science is a way of looking at absolutely everything.

What I find disappointing about most religious beliefs is that they are a kind of statement of contempt for nature and reality. It's absurdly hubristic. It holds the myths of a few thousand years above nature's many billion-year-old journey. It says reality is inferior and less satisfying than the stories we make up.

* * *

We need to create a community of skepticism for people of all ages. We desperately need some good music. We don't have to cut any corners on our ethos of skepticism. We do have to learn how to instill a sense of community, a rational experience of communion with nature and each other.

I would love to see, actually, not so much building more Centers for Inquiry, which would be great, but why don't we take over the planetaria of the country, of which there are hundreds, and turn them into places of worship. Not worship of the science that we know of this moment. Always give the message, over and over again, that our understanding could be wrong, this is what we think at this moment. The wonder of science is that we may find out that all of this is untrue. Why don't we take over these places and have services in the planetaria. We can connect. We can find inspiration in the revelations of science. We can have skepticism and wonder, both.

* * *

To me, faith is antithetical to the values of science. Not hope, which is very different from faith. I have a lot of hope. Faith is saying that you can know the outcome of things based on what you hope is true. And science is saying in the absence of evidence, we must withhold judgment. It's so hard to do. It's so tempting to believe in the lie detector or in heaven or that you know who you are based on the day of the month that you were born. It's a sort of unearned self-esteem. It's an identity that you can slip right into, and it's tremendously reassuring. So, I don't have any faith, but I have a lot of hope, and I have a lot of dreams of what we could do with our intelligence if we had the will and the leadership and the understanding of how we could take all of our intelligence and our resources and create a world for our kids that is hopeful.

I had a wonderful experience writing for the relatively new Rose Center at the Hayden Planetarium in New York. It's the greatest virtual reality theatre on Earth; completely immersive

in the experience of travelling through the universe. I was honored to cowrite, with our *Cosmos* cowriter Steve Soter, the first two shows that inaugurated the planetarium center. And this is what got me thinking about how we might offer something that would be at least as compelling as whatever anyone else in the religion business is offering. We get to take you through the universe, and through the history of not only the Milky Way Galaxy but also the larger universe, and to tell something—the second one's called *The Search for Life, Are We Alone?*—something about the nature of life. It's a very uncompromising message about evolution and I think very directly promotes the kind of values and ideas that I think we share. Every kid who goes to a city public school gets taken to these shows. It was eye-opening to me, first of all, how far you could go in this direction, and what you could do with music and a

It's not enough to have forty minutes of science in the daily school program, because science shouldn't be compartmentalized that way. Science is a way of looking at absolutely everything.

fantastic technical capability that lets you tour that part of the universe we have come to know something about. You really hold on to your chair. You feel like you're traveling through the galaxies. It's uplifting. I constantly get mail about this and everyone is saying the same thing: you made me feel a part of something. You made me feel, even though I'm really small, that I'm a part of this greater fabric of life, which is so beautiful. And that's the kind of stuff that Cosmos Studios is working on, all of our projects. If they don't combine rigorous science with that soaring, uplifting feeling, then they don't qualify as a project for us. So I would say that that there's a lot in the entertainment world that we could be doing that I think has the power to really reach people.

* * *

Since we founded Cosmos Studios in the spring of 2000, we have accomplished the following: We are launching *Cosmos 1*, the first solar sailing spacecraft later this year. Our partners are The Planetary Society and the Babakin Space Research Center of Russia. We are actually launching the spacecraft from an intercontinental ballistic missile based on a Russian submarine. We have taken this weapon of mass destruction and converted it to a means of advancing the dream of space exploration. Solar sailing is an idea that has been around in science since the 1920s, but it's never been tried before. If we succeed, we will have demonstrated a practical means of literally riding light all the way to the stars. We liken our solar sail to what the Wright brothers did at Kitty Hawk, because although they were aloft for only twelve seconds and went 165 feet, they demonstrated

that powered flight in a heavier than air vehicle was possible. What we're trying to demonstrate is that solar sailing is possible, and solar sailing is the only physically sound way of which we know to travel so quickly that it begins to be feasible to do interstellar flight on human time scales—two thousand years to the nearest star instead of twenty thousand years.

Cosmos Studios has funded research that has resulted in two papers published in the journal *Science*. We have produced a spiffed-up version of the thirteen-hour *Cosmos* TV series on DVD. We have produced three full-length documentaries. Perhaps our most promising project is an ambitious new way of teaching science from pre-kindergarten through high school. This involves a whole new approach to curricula. We hope to engage people from early childhood in science as a way of thinking.

I'm also at work on a book dealing with the themes I've tried to cover here.

* * *

[In answer to a question about Carl Sagan's role in garnering support for the legitimate scientific search for extraterrestrial intelligence (SETI) and taking on the creationists]:

Congress cut off federal funding for SETI years ago. I was with Carl when he went into Senator William Proxmire's office after Proxmire had given the Golden Fleece Award to the SETI program. Carl sat down with him. I didn't say a word. I was just a witness. And I just watched Carl. I was inspired by him, by not only the breadth of his knowledge, but his patience, his lack of arrogance, his willingness to hear the other person out. Senator Proxmire did a complete turnabout as a result of that meeting.

And there were other instances of Carl's remarkable persuasiveness. One was a great story of a so-called "creation scientist" who watched Carl testify at a hearing about creationism in schools. Carl testified for about four hours. It was somewhere in the South, I can't remember where. And six months later a letter came from the "creation scientist" expert who had also testified that day, saying that he had given up his daytime job and realized the error of what he was doing. It was only because Carl was so patient and so willing to hear the other person out. He did it with such kindness and then, very gently but without compromising, laid out all of the things that were wrong with what this guy thought was true. That is a lesson that I wish that all of us in our effort to promote skepticism could learn, because I know that very often the anger I feel when confronting this kind of thinking makes me want to

start cutting off the other person. But to do so is to abandon all hope of changing minds.

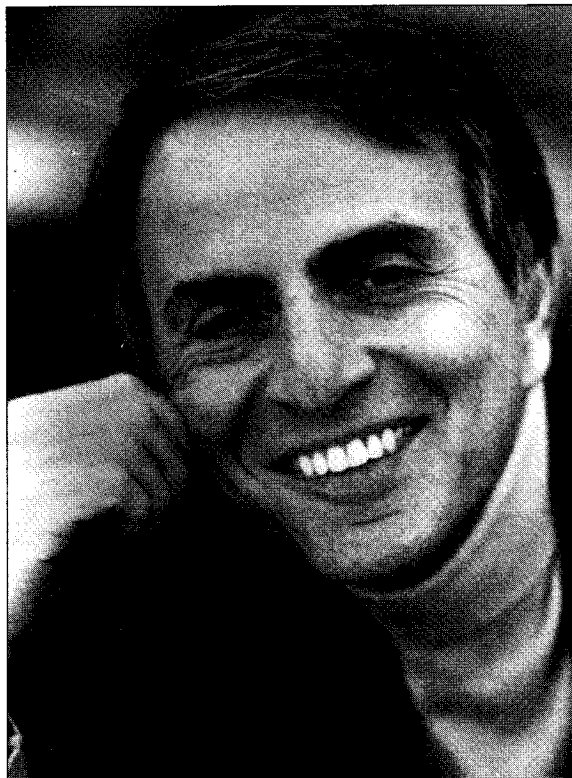
* * *

When my husband died, because he was so famous and known for not being a believer, many people would come up to me—it still sometimes happens—and ask me if Carl changed at the end and converted to a belief in an afterlife. They also frequently ask me if I think I will see him again. Carl faced his death with

unflinching courage and never sought refuge in illusions. The tragedy was that we knew we would never see each other again. I don't ever expect to be reunited with Carl. But, the great thing is that when we were together, for nearly twenty years, we lived with a vivid appreciation of how brief and precious life is. We never trivialized the meaning of death by pretending it was anything other than a final parting. Every single moment that we were alive and we were together was miraculous—not miraculous in the sense of inexplicable or supernatural. We knew we were beneficiaries of chance. . . . That pure chance could be so generous and so kind. . . . That we could find each other, as Carl wrote so beautifully in *Cosmos*, you know, in the vastness of space and the immensity of time. . . . That we could be together for twenty years. That is something which sustains me and

it's much more meaningful. . . . The way he treated me and the way I treated him, the way we took care of each other and our family, while he lived. That is so much more important than the idea I will see him someday. I don't think I'll ever see Carl again. But I saw him. We saw each other. We found each other in the cosmos, and that was wonderful.

Copyright ©2003 Ann Druyan



Carl Sagan

Here is the dedication Carl Sagan wrote in his best-selling book *Cosmos*:

For Ann Druyan

In the vastness of space and the immensity of time,
it is my joy to share
a planet and an epoch with Annie.