

## Science Finds God

**The Achievements Of Modern Science Seem To Contradict Religion And Undermine Faith. But For A Growing Number Of Scientists, The Same Discoveries Offer Support For Spirituality And Hints Of The Very Nature Of God.**

By **Sharon Begley** | NEWSWEEK

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THE MORE DEEPLY SCIENTISTS see into the secrets of the universe, you'd expect, the more God would fade away from their hearts and minds. But that's not how it went for Allan Sandage. Now slightly stooped and white-haired at 72, Sandage has spent a professional lifetime coaxing secrets out of the stars, peering through telescopes from Chile to California in the hope of spying nothing less than the origins and destiny of the universe. As much as any other 20th-century astronomer, Sandage actually figured it out: his observations of distant stars showed how fast the universe is expanding and how old it is (15 billion years or so). But through it all Sandage, who says he was "almost a practicing atheist as a boy," was nagged by mysteries whose answers were not to be found in the glittering panoply of supernovas. Among them: why is there something rather than nothing? Sandage began to despair of answering such questions through reason alone, and so, at 50, he willed himself to accept God. "It was my science that drove me to the conclusion that the world is much more complicated than can be explained by science," he says. "It is only through the supernatural that I can understand the mystery of existence."

Something surprising is happening between those two old warhorses science and religion.

Historically, they have alternated between mutual support and bitter enmity. Although religious doctrine midwived the birth of the experimental method centuries ago (following story), faith and reason soon parted ways. Galileo, Darwin and others whose research challenged church dogma were branded heretics, and the polite way to reconcile science and theology was to simply agree that each would keep to its own realm: science would ask, and answer, empirical questions like "what" and "how"; religion would confront the spiritual, wondering "why." But as science grew in authority and power beginning with the Enlightenment, this detente broke down. Some of its greatest minds dismissed God as an unnecessary hypothesis, one they didn't need to explain how galaxies came to shine or how life grew so complex. Since the birth of the universe could now be explained by the laws of physics alone, the late astronomer and atheist Carl Sagan concluded, there was "nothing for a Creator to do," and every thinking person was therefore forced to



admit "the absence of God." Today the scientific community so scorns faith, says Sandage, that "there is a reluctance to reveal yourself as a believer, the opprobrium is so severe."

Some clergy are no more tolerant of scientists. A fellow researcher and friend of Sandage's was told by a pastor, "Unless you accept and believe that the Earth and universe are only 6,000 years old [as a literal reading of the Bible implies], you cannot be a Christian." It is little wonder that people of faith resent science: by reducing the miracle of life to a series of biochemical reactions, by explaining Creation as a hiccup in space-time, science seems to undermine belief, render existence meaningless and rob the world of spiritual wonder.

But now "theology and science are entering into a new relationship," says physicist turned theologian Robert John Russell, who in 1981 founded the Center for Theology and the Natural Sciences at the Graduate Theological Union in Berkeley. Rather than undercutting faith and a sense of the spiritual, scientific discoveries are offering support for them, at least in the minds of people of faith. Big-bang cosmology, for instance, once read as leaving no room for a Creator, now implies to some scientists that there is a design and purpose behind the universe. Evolution, say some scientist-theologians, provides clues to the very nature of God. And chaos theory, which describes such mundane processes as the patterns of weather and the dripping of faucets, is being interpreted as opening a door for God to act in the world.

From Georgetown to Berkeley, theologians who embrace science, and scientists who cannot abide the spiritual emptiness of empiricism, are establishing institutes integrating the two. Books like "Science and Theology: The New Consonance" and "Belief in God in an Age of Science" are streaming off the presses. A June symposium on "Science and the Spiritual Quest," organized by Russell's CTNS, drew more than 320 paying attendees and 33 speakers, and a PBS documentary on science and faith will air this fall.

In 1977 Nobel physicist Steven Weinberg of the University of Texas sounded a famous note of despair: the more the universe has become comprehensible through cosmology, he wrote, the more it seems pointless. But now the very science that "killed" God is, in the eyes of believers, restoring faith. Physicists have stumbled on signs that the cosmos is custom-made for life and consciousness. It turns out that if the constants of nature--unchanging numbers like the strength of gravity, the charge of an electron and the mass of a proton--were the tiniest bit different, then atoms would not hold together, stars would not burn and life would never have made an appearance. "When you realize that the laws of nature must be incredibly finely tuned to produce the universe we see," says John Polkinghorne, who had a distinguished career as a physicist at Cambridge University before becoming an Anglican priest in 1982, "that conspires to plant the idea that the universe did not just happen, but that there must be a purpose behind it." Charles Townes, who shared the 1964 Nobel Prize in Physics for discovering the principles of the laser, goes further: "Many have a feeling that somehow intelligence must have been involved in the laws of the universe."

Although the very rationality of science often feels like an enemy of the spiritual, here, too, a new reading can sustain rather than snuff out belief. Ever since Isaac Newton, science has blared a clear message: the world follows rules, rules that are fundamentally mathematical, rules that humans can figure out. Humans invent abstract mathematics, basically making it up out of their imaginations, yet math

magically turns out to describe the world. Greek mathematicians divided the circumference of a circle by its diameter, for example, and got the number pi, 3.14159 . . . . Pi turns up in equations that describe subatomic particles, light and other quantities that have no obvious connections to circles. This points, says Polkinghorne, ""to a very deep fact about the nature of the universe," namely, that our minds, which invent mathematics, conform to the reality of the cosmos. We are somehow tuned in to its truths. Since pure thought can penetrate the universe's mysteries, ""this seems to be telling us that something about human consciousness is harmonious with the mind of God," says Carl Feit, a cancer biologist at Yeshiva University in New York and Talmudic scholar.

To most worshipers, a sense of the divine as an unseen presence behind the visible world is all well and good, but what they really yearn for is a God who acts in the world. Some scientists see an opening for this sort of God at the level of quantum or subatomic events. In this spooky realm, the behavior of particles is unpredictable. In perhaps the most famous example, a radioactive element might have a half-life of, say, one hour. Half-life means that half of the atoms in a sample will decay in that time; half will not. But what if you have only a single atom? Then, in an hour, it has a 50-50 chance of decaying. And what if the experiment is arranged so that if the atom does decay, it releases poison gas? If you have a cat in the lab, will the cat be alive or dead after the hour is up? Physicists have discovered that there is no way to determine, even in principle, what the atom would do. Some theologian-scientists see that decision point--will the atom decay or not? will the cat live or die?--as one where God can act. ""Quantum mechanics allows us to think of special divine action," says Russell. Even better, since few scientists abide miracles, God can act without violating the laws of physics.

An even newer science, chaos theory, describes phenomena like the weather and some chemical reactions whose exact outcomes cannot be predicted. It could be, says Polkinghorne, that God selects which possibility becomes reality. This divine action would not violate physical laws either.

Most scientists still park their faith, if they have it, at the laboratory door. But just as belief can find inspiration in science, so scientists can find inspiration in belief. Physicist Mehdi Golshani of Sharif University of Technology in Tehran, drawing from the Koran, believes that natural phenomena are ""God's signs in the universe," and that studying them is almost a religious obligation. The Koran asks humans to ""travel in the earth, then see how He initiated the creation." Research, Golshani says, ""is a worship act, in that it reveals more of the wonders of God's creation." The same strain runs through Judaism. Carl Feit cites Maimonides, ""who said that the only pathway to achieve a love of God is by understanding the works of his hand, which is the natural universe. Knowing how the universe functions is crucial to a religious person because this is the world He created." Feit is hardly alone. According to a study released last year, 40 percent of American scientists believe in a personal God--not merely an ineffable power and presence in the world, but a deity to whom they can pray.

To Joel Primack, an astrophysicist at the University of California, Santa Cruz, ""practicing science [even] has a spiritual goal"--namely, providing inspiration. It turns out, explains Primack, that the largest size imaginable, the entire universe, is 10 with 29 zeros after it (in centimeters). The smallest size describes the subatomic world, and is 10 with 24 zeros (and a decimal) in front of it. Humans are right in the middle. Does this return us to a privileged place? Primack doesn't know, but he describes this as a ""soul-satisfying cosmology."

Although skeptical scientists grumble that science has no need of religion, forward-looking theologians think religion needs science. Religion "is incapable of making its moral claims persuasive or its spiritual comfort effective [unless] its cognitive claims" are credible, argues physicist-theologian Russell. Although upwards of 90 percent of Americans believe in a personal God, fewer believe in a God who parts seas, or creates species one by one. To make religions forged millennia ago relevant in an age of atoms and DNA, some theologians are "incorporat[ing] knowledge gained from natural science into the formation of doctrinal beliefs," says Ted Peters of Pacific Lutheran Seminary. Otherwise, says astronomer and Jesuit priest William Stoeger, religion is in danger of being seen, by people even minimally acquainted with science, "as an anachronism."

Science cannot prove the existence of God, let alone spy him at the end of a telescope. But to some believers, learning about the universe offers clues about what God might be like. As W. Mark Richardson of the Center for Theology and the Natural Sciences says, "Science may not serve as an eyewitness of God the creator, but it can serve as a character witness." One place to get a glimpse of God's character, ironically, is in the workings of evolution. Arthur Peacocke, a biochemist who became a priest in the Church of England in 1971, has no quarrel with evolution. To the contrary: he finds in it signs of God's nature. He infers, from evolution, that God has chosen to limit his omnipotence and omniscience. In other words, it is the appearance of chance mutations, and the Darwinian laws of natural selection acting on this "variation," that bring about the diversity of life on Earth. This process suggests a divine humility, a God who acts selflessly for the good of creation, says theologian John Haught, who founded the Georgetown (University) Center for the Study of Science and Religion. He calls this a "humble retreat on God's part": much as a loving parent lets a child be, and become, freely and without interference, so does God let creation make itself.

It would be an exaggeration to say that such sophisticated theological thinking is remaking religion at the level of the local parish, mosque or synagogue. But some of these ideas do resonate with ordinary worshipers and clergy. For Billy Crockett, president of Walking Angel Records in Dallas, the discoveries of quantum mechanics that he reads about in the paper reinforce his faith that "there is a lot of mystery in the nature of things." For other believers, an appreciation of science deepens faith. "Science produces in me a tremendous awe," says Sister Mary White of the Benedictine Meditation Center in St. Paul, Minn. "Science and spirituality have a common quest, which is a quest for truth." And if science has not yet influenced religious thought and practice at the grass-roots level very much, just wait, says Ted Peters of CTNS. Much as feminism sneaked up on churches and is now shaping the liturgy, he predicts, "in 10 years science will be a major factor in how many ordinary religious people think."

Not everyone believes that's such a hot idea. "Science is a method, not a body of knowledge," says Michael Shermer, a director of the Skeptics Society, which debunks claims of the paranormal. "It can have nothing to say either way about whether there is a God. These are two such different things, it would be like using baseball stats to prove a point in football." Another red flag is that adherents of different faiths--like the Orthodox Jews, Anglicans, Quakers, Catholics and Muslims who spoke at the June conference in Berkeley--tend to find, in science, confirmation of what their particular religion has already taught them.

Take the difficult Christian concept of Jesus as both fully divine and fully human. It turns out that this

duality has a parallel in quantum physics. In the early years of this century, physicists discovered that entities thought of as particles, like electrons, can also act as waves. And light, considered a wave, can in some experiments act like a barrage of particles. The orthodox interpretation of this strange situation is that light is, simultaneously, wave and particle. Electrons are, simultaneously, waves and particles. Which aspect of light one sees, which face an electron turns to a human observer, varies with the circumstances. So, too, with Jesus, suggests physicist F. Russell Stannard of England's Open University. Jesus is not to be seen as *really* God in human guise, or as *really* human but acting divine, says Stannard: ""He was fully both." Finding these parallels may make some people feel, says Polkinghorne, ""that this is not just some deeply weird Christian idea."

Jews aren't likely to make the same leap. And someone who is not already a believer will not join the faithful because of quantum mechanics; conversely, someone in whom science raises no doubts about faith probably isn't even listening. But to people in the middle, for whom science raises questions about religion, these new concordances can deepen a faith already present. As Feit says, ""I don't think that by studying science you will be forced to conclude that there must be a God. But if you have already found God, then you can say, from understanding science, "Ah, I see what God has done in the world'."

In one sense, science and religion will never be truly reconciled. Perhaps they shouldn't be. The default setting of science is eternal doubt; the core of religion is faith. Yet profoundly religious people and great scientists are both driven to understand the world. Once, science and religion were viewed as two fundamentally different, even antagonistic, ways of pursuing that quest, and science stood accused of smothering faith and killing God. Now, it may strengthen belief. And although it cannot prove God's existence, science might whisper to believers where to seek the divine.

### **AN UNEASY TRUCE**

Throughout Western history, science and religion have been like siblings--sometimes at loggerheads, sometimes on common ground.

800-1000 The Islamic Empire, where it is believed that astronomy and mathematics provided a glimpse of God, is for centuries the only repository of many Greek and Egyptian texts.

1268-73 In writings on Aristotle's physical studies, Thomas Aquinas synthesizes scientific inquiry with Christian thought. After him, medieval scientists see their role as uncovering the divine plan.

1543 Copernicus publishes "De Revolutionibus." It concludes that the earth revolves around the sun, challenging man's exalted place at the center of God's plan of the universe.

1633 Galileo is censured by the Inquisition for writing about and teaching the Copernican system against papal orders. He's made to recant and is placed under house arrests.

1687 Isaac Newton's gravitational theory, published in the "Principia," completes the mechanistic vision of the cosmos. Newton leaves in a sliver of God--as the "first cause" of the universe.

1802 In "Research on the Organization of Living Bodies," the chevalier Lamarck posits an evolutionary

view of animal species--contradicting the idea that God created them in immutable, constant form.

1842 Richard Owen determines that recently found fossils belong to an extinct animal group he calls dinosaurs. Some see further evidence of mutating species, others the effects of Noah's flood.

1859 In "Origin of Species," Charles Darwin concludes that species evolve and that change is driven by variations in offspring that are either favored or eliminated in the struggle for survival.

1871 Darwin publishes "The Descent of Man," in which he undermines the Biblical doctrine that humans are a divine creation. Instead, he argues, mankind evolved from apes.

1905 John William Strutt determines the age of a rock: 2 billion years, officially disproving James Ussher's 1650 assertion that, according to Genesis, the universe was created on Oct. 22, 4004 B.C.

1916 Albert Einstein's groundbreaking theories of relativity reject Newton's carefully ordered universe. "Science without religion is lame. Religion without science is blind," he later says.

1925 John Scopes, a high-school teacher in Tennessee, is indicted for teaching evolutionary theory. Scopes--along with Darwinism itself--is put on trial and convicted.

1948 George Gamow coins the term "big bang" to describe the theory that the universe began in a primeval explosion. An instantaneous creation leaves open the idea of a creator.

1965 Arno Penzias and Robert Wilson find that space is filled with background radiation, a discovery supporting the big-bang model. In 1989, the COBE satellite makes an image of this radiation.

1992 Pope John Paul II apologizes for the Roman Catholic Church's condemnation of Galileo. Four years later, he endorses evolution as part of God's master plan.

## **CHARLES TOWNES**

PHYSICIST AND CHRISTIAN

He shared the 1964 Nobel Prize in Physics for discovering the principles that underlie the laser. "As a religious person, I strongly sense. . .the presence and actions of a creative being far beyond myself and yet always personal and close by," he says. Now at the University of California, Berkeley, Townes believes that recent discoveries in cosmology reveal "a universe that fits religious views"--specifically, that "somehow intelligence must have been involved in the laws of the universe."

## **WILLIAM STOEGER**

ASTRONOMER AND JESUIT PRIEST

Stoeger, who joined the Jesuits at 17, now teaches at the University of Arizona and is a member of the Vatican Observatory. "I did have one conflict between science and religion, in sixth or seventh grade," he says. "I got a book on paleontology from my uncle Don, so I read it only at night when no-one else was

around. This conflict [between evolution and Genesis] was wonderfully resolved in high school," Stoeger says, when a priest showed him that the Bible could be read metaphorically.

### **S. JOCELYN BELL BURNELL**

ASTRONOMER AND QUAKER

For some scholars, there are limits to the conciliation of research and faith. Bell Burnell, discoverer of the spinning stars called pulsars, is active in the Religious Society of Friends. She wills herself to accept Christian theology, she says, because the absence of belief is too lonely and frightening a prospect. But she keeps her beliefs separate from her astronomy work at England's Open University. "Would I do science differently if I weren't a Quaker?" she asks. "I don't think so."

### **JOHN POLKINGHORNE**

PHYSICIST TURNED PRIEST

After a distinguished career in particle physics, Polkinghorne was ordained an Anglican priest in 1982. "For me," he explains, the fundamental component of belief in God "is that there is a mind and a purpose behind the universe." He sees hints of that divine presence in how abstract mathematics can penetrate the universe's secrets, which suggests that a rational mind created the world. As for purpose, he sees it in how nature is fine-tuned to allow life and consciousness to emerge.

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