Mind-Altering Television

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NOVA PRESENTS STARTLING NEW FINDINGS ON HOW EARTH, LIFE, AND THE UNIVERSE BEGAN, ON *ORIGINS*, A FOUR-PART SPECIAL HOSTED BY POPULAR ASTROPHYSICIST NEIL DEGRASSE TYSON

NOVA PRESENTS *ORIGINS*
September 28 & 29, 2004, from 8 to 10 PM ET on PBS
www.pbs.org/nova/origins

Who would have predicted that a hot spot left over from the Big Bang would eventually lead to the Earth, the cosmos — and to us? NOVA covers all the exciting steps in between on *Origins*, a four-part miniseries on the beginnings of Earth, life, and the universe, airing Tuesday and Wednesday, September 28 and 29, 2004, from 8 to 10 PM ET on PBS (check local listings).

Hosting the series is astrophysicist Neil deGrasse Tyson, Director of the Hayden Planetarium at the American Museum of Natural History and one of the world's most popular lecturers on astronomy.

Tyson is the author of numerous books, including *The Sky is Not the Limit: Adventures of an Urban Astrophysicist* and *Origins: Fourteen Billion Years of Cosmic Evolution*, coauthored with Donald Goldsmith, and to be released by W.W. Norton simultaneously with the premiere of this series. Tyson is also widely known for his regular column, "*Universe,"* in *Natural History Magazine*. And among his lesser-known distinctions, was voted "Sexiest Astrophysicist Alive" by People magazine in 2000.

"What makes the series unique," says Tyson, "is the attempt to bring to the public, really for the very first time, a synthesis of all the branches of science that have relevance to answering the question, 'What is the origin of our place in the cosmos?'"

Origins tells the story of how the universe began amid chaos and eventually developed the remarkable property called life. Each program shows scientists grappling with different parts of the puzzle, by asking a common question: What happened to turn the universe into a place where life exists?

Viewers will voyage deep into the Earth to find analogues to the earliest life forms on our planet; they will travel a million miles from Earth with a space probe designed to record the first visible moments of the universe; they will watch astronomers devising ways to detect distant planets that may in fact harbor life; and they will learn that every atom in our bodies, and practically every bit of matter in the Earth, was made in the heart of stars.

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Episode One, *Earth is Born* (Tuesday, September 28, from 8 to 9 PM ET), shows that ancient cataclysms made our planet what it is today. Ironically, says Tyson, "Earth became a hospitable planet only after a series of devastating disasters in its early years."

Chief among these was a titanic collision between Earth and a Mars-sized object, an impact so immense that it obliterated the colliding object and part of the Earth itself to create a dense ring of orbiting material that eventually collected into the Moon. The collision tilted Earth's axis at an angle of 23.5 degrees—enough to cause the seasons. Other milestones in this eventful era include the formation of continental crust and the precipitation of water out of a hellish atmosphere.

All of these events probably happened in a remarkably short period of time, perhaps in the first few hundred million years of Earth's 4.5 billion-year history. This new picture of our planet's formative era implies that Earth may have reached a habitable stage much earlier than previously thought.

Episode Two, *How Life Began* (Tuesday, September 28 from 9 to 10 PM ET), highlights the most radical transformation ever in the history of our planet and perhaps the cosmos: the moment when inert, lifeless matter managed to organize itself into life.

"There's increasing confidence that when life did arise on this planet, it was not a protracted process using a chemistry that is pretty unlikely," says Harvard University biologist Andrew Knoll. "In fact, it's a chemistry that, when you get the recipe right, it goes, and it goes fairly quickly."

However it began, life may have developed as early as a few hundred million years after the formation of the planet, possibly at the earliest moment that conditions allowed. Afterward, it increased in complexity over the course of hundreds of millions of years, until primitive organisms in the oceans started converting carbon dioxide in the atmosphere into a waste molecule—oxygen. This very reactive gas combined with iron in seawater. Later, it began to build up in the atmosphere, setting the stage for a whole new class of organisms that thrived on oxygen—including us.

Episode Three, *Where Are the Aliens?* (Wednesday, September 29, from 8 to 9 PM ET), explores the latest news in the search for extraterrestrial life and asks, Given that our universe is broadly compatible to life, where is everybody?

Though scientists have been scanning the skies for radio traffic from E.T.s, they have not yet found any signals. That's not to say there aren't alien civilizations or that simpler life forms such as bacteria don't exist beyond Earth. But so far, nothing has turned up.

As far as Hollywood is concerned, aliens have turned up, and it's interesting to compare our popular conception of advanced E.T.s with what is biologically possible. Biologist and author Jack Cohen points out that, contrary to the movies, aliens probably wouldn't be even remotely humanoid. Nor would they be

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colossal bugs or grapefruit sized parasites living within us.

Where Are the Aliens? examines where rudimentary life might be hiding out in our solar system. And Tyson catches up with one of astronomy's most exciting recent breakthroughs: the discovery of the first planets to be found outside our solar system. Detecting more than one hundred of these brand new planets over the last few years, astronomers have developed an ingenious technique worthy of Sherlock Holmes for deducing whether or not they might be suitable for life.

"The history of exploration of our own world and the universe beyond has been full of surprises," says Tyson. "There's nothing special about our Sun; there doesn't seem to be anything magical about our solar system or our planet. And the chemicals of life are abundant in the universe.

"Are we alone?," he asks. "Are we rare? Are we common? We still don't know. But we will."

Episode Four, *Back to the Beginning* (Wednesday, September 29 from 9 to 10 PM ET), turns back the clock to the beginning of time itself to understand how a universe conducive to life materialized from the cataclysm known as the Big Bang.

For centuries most astronomers assumed that the universe was eternal. Then, just forty years ago, two researchers stumbled on the cosmic echo of the Big Bang, the event that started it all. Scientists are still gleaning data from this all-pervasive microwave "whisper" from deep space. *Back to the Beginning* focuses on two teams racing to measure the echo with unprecedented precision in order to discern what actually happened during the Big Bang and how it was that the first stars, galaxies, and ultimately the universe we inhabit now, came to be.

Meanwhile, other scientists are working to unravel the processes by which stars explode and disperse newly forged elements throughout space, which then serve as the building blocks for new generations of stars. This "star stuff" is recycled over and over, and it provided the raw material for Earth—and us. To demonstrate how this happens, star chef Michael Romano of New York City's renowned Union Square Café joins Tyson to cook up a cosmic broth—a soup rich with all the building blocks of life.

Summing up the current state of knowledge, astrophysicist Jeff Hester of the University of Arizona says, "We've reached the point that we can start with the origins of the universe, we can end with a conversation among intelligent beings about how things work, and we can have an awfully good understanding of every step that came in between the two."

Visit the NOVA pressrooms for the *Origins* press release, promotional photography, and addition program information. **pressroom.wgbh.org/nova** or **pbs.org/pressroom**

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Now in its thirty-first year of broadcasting, NOVA is produced for PBS by the WGBH Boston Science Unit. The *Origins* miniseries is a co-production of Thomas Levenson Productions, Unicorn Projects, Inc. and NOVA/WGBH. *Origins: Earth is Born* and *Origins: How Life Began* are Pioneer Film & TV productions for NOVA/WGBH and Channel 4. The director of the WGBH Science Unit and senior executive producer of NOVA is Paula S. Apsell. Executive producer for *Origins* is Thomas Levenson. Dr. Neil deGrasse Tyson is series host and executive editor. Major funding for NOVA is provided by the Park Foundation, Sprint, and Microsoft. Additional funding is provided by the Corporation for Public Broadcasting and public television viewers. Major funding for *Origins* is provided by the National Science Foundation.* Additional funding for *Origins* is provided by NASA's Office of Space Science and Alfred P. Sloan Foundation. NOVA is closed captioned for deaf and hard-of-hearing viewers by the Media Access Group at WGBH. NOVA is produced by WGBH Boston, America's preeminent public broadcasting producer, the source of one-third of PBS's primetime lineup. For more information visit www.pbs.org/nova.

The book *ORIGINS: Fourteen Billion Years of Cosmic Evolution*, by Neil DeGrasse Tyson and Donald Goldsmith [W. W. Norton & Company, September 28, 2004; $27.95 hardcover], is a wide-ranging, witty, and exhilarating tour through time—from the Big Bang to the dawn of man. In chapters titled "Antimatter Matters," "Let There Be Dark," and "Searching for Life in the Milky Way Galaxy," Tyson and Goldsmith relate how, through billions of years of evolving mass and energy and space, an unimaginable cosmic explosion eventually led to conditions that could sustain human life. In *ORIGINS* we learn to think of ourselves as kin to starlight, to the chemical elements dispersed in differing concentrations throughout the universe, and we see this massive earth we inhabit as a mere speck of dust in the grand scheme of things. Distilling complex science in clear and vibrant prose, Tyson and Goldsmith span the cosmos to reveal what the universe has been up to while turning part of itself into us.

The Pacific Science Center (PSC), a nationally recognized leader in educational exhibit and materials design, located in Seattle, Washington, has created the educational outreach materials to enrich the NOVA *Origins* television series. PSC has formed exclusive partnerships for *Origins* with ten pre-eminent science centers and museums. The *Origins* Outreach Partners will host a range of programs that will bring the core ideas of the television series to life within museums, science centers, schools and community agencies throughout the country.

The American Museum of Natural History is one of the world's preeminent scientific, educational, and cultural institutions. Since its founding in 1869, the Museum has advanced its global mission to explore and interpret human cultures and the natural world through a wide-reaching program of scientific research, education, and exhibitions. The institution houses 45 permanent exhibition halls, state-of-the-art research laboratories, one of the largest natural history libraries in the Western Hemisphere, and a permanent collection of more than 30 million specimens and cultural artifacts. The spectacular Frederick Phineas & Sandra Priest Rose Center for Earth and Space, features the rebuilt and rejuvenated Hayden Planetarium and striking exhibits about the nature of the universe and our planet.

*Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.