

STARMAN

Neil deGrasse Tyson, the new guide to the "Cosmos."

BY REBECCA MEAD

It was a mild October day in Hollywood, but a trace of artificial snow remained on the ground as Neil deGrasse Tyson, the director of the Hayden Planetarium, at the American Museum of Natural History, walked around a back lot at Paramount Studios. Late the previous evening, the street corner outside a fake storefront had stood in for the bus depot on a snowy night in Ithaca, New York, and a young actor had portrayed the Tyson of nearly forty years ago: a senior at the Bronx High School of Science who had been summoned to Cornell University by Carl Sagan, at the time the best-known astrophysicist in the world. Tyson had filmed a short introduction to the scene. Toeing snow with the tip of a cowboy boot, he told me, "I faced straight to the camera and said, 'This is a moment from my past.'"

In the flashback scene, Tyson is heading home to New York after a daylong visit. Sagan hands Tyson his home phone number, telling him to call if the bus is delayed by weather. The encounter is being reconstructed for a thirteen-episode series, *"Cosmos: A Spacetime Odyssey,"* which Fox will begin airing on March 9th. The show is a sequel to *"Cosmos: A Personal Voyage,"* the celebrated series that was hosted by Sagan and broadcast on PBS, in 1980. Sagan, who died in 1996, was an erudite guide to the universe, conveying the excitement of discoveries within the solar system and beyond.

Tyson is the host of the new *"Cosmos,"* and he was in Los Angeles for the final days of shooting. After nine months in locations ranging from Iceland to Italy, *"Cosmos"* had come to the Paramount lot to shoot special effects, including a simulation of how a New York City street would look in zero gravity. A common misconception is to think that, in such conditions, everything floats upward, as in a vision of Rapture. Tyson observed an extra, wearing a hidden harness, walk up

a stepladder that had been placed in front of a green screen. At the top, he continued a diagonal trajectory, as if there were invisible steps. "He's a good zero-g guy," Tyson said.

Tyson hosted PBS's *"NOVA ScienceNOW"* for four seasons, and he is a frequent guest on *"CBS This Morning"* and *"The Colbert Report."* He has flown to and from Los Angeles within hours to appear on Bill Maher's program. But *"Cosmos"* is Tyson's first Hollywood production, and he was interested to discover that a movie set has laws almost as stringent as those of physics. "The crew doesn't speak to the talent, unless the talent speaks to them," he said, as he stepped over snaking lighting cables. Tyson spoke to everyone, like a politician working a room. Chatting with an intern, he debated the strengths of Shake Shack versus those of In-N-Out Burger.

He is tall and charismatic, with a deep, commanding voice that can shift register from a honeyed purr to a practiced roar of outrage. His wardrobe invites notice: bright patterned vests, suede shirts, broad-brimmed felt hats in the style of Indiana Jones. (Onscreen for *"Cosmos,"* he was required to dress down—a blue suit, a safari jacket.) As a makeup artist powdered his hairline, he began talking with her about New Age philosophy. Tyson questioned its vaunting of ancient wisdom. "In practically every idea we have as humans, the older version of it is *not* better than the newer version," he said. "With the invested effort of generations, and centuries, and sometimes millennia of smart people who have been born since the idea came out, we have improved ideas."

The shoot went late into the evening, but Tyson seemed tireless, pacing in front of the camera like a prowling lion. At one point, he read copy that described different kinds of light, visible and invisible. "In microwave light we can see all the

way back to the birth of the universe," he read from a teleprompter. "We have only just opened our eyes." He repeated the lines a dozen times, to get the proper balance of authority and wonder. For a scene rendering the Big Bang, he posed against a green screen, coolly put on a pair of sunglasses, then flung out his arms in a gesture suggesting a crucifixion, all the while affecting the stony countenance of an action hero.

Sagan, who was born in 1934, was a scientist of the Apollo era, when the year 2001 connoted not terror but Stanley Kubrick's vision of a lone astronaut journeying deep into space, in pursuit of expansive enlightenment. Sagan was the chairman of a committee that selected the recordings included on gold-plated disks carried into space by the two Voyager interstellar spacecraft, in 1977: Beethoven, Chuck Berry, greetings in fifty-five languages. Sagan was not altogether optimistic about the future of his own species: the threat of nuclear annihilation is a motif of the original *"Cosmos."* But he did believe that certain battles against ignorance had been decisively won, and that humankind was oriented firmly toward progress.

The context in which Tyson promotes science suggests otherwise. A few years ago, when the Museum of Natural History mounted an exhibition devoted to Charles Darwin, officials felt it necessary to train docents how to respond to challenges from creationists, who still number nearly half the American public, according to a 2012 Gallup poll. Since the mid-sixties, NASA's funding has dwindled from four per cent of the federal budget to half of one per cent. Tyson, who is fifty-five, was a child when astronauts first landed on the Moon and barely a teen when the missions ended, in 1972. Recently, he has been obliged to contend with the conspiracy theory that the landings were a government-

When explaining science, Carl Sagan drew his comparisons from ancient history. Tyson makes pop-culture references.

publishing house in the world. Several industry people told me that it was intended to provide Penguin Random House, as the new company is called, with more bargaining power against Amazon. But book publishers have been consolidating for several decades, under the ownership of media conglomerates like News Corporation, which squeeze them for profits, or holding companies such as Rivergroup, which strip them to service debt. The effect of all this corporatization, as with the replacement of independent booksellers by superstores, has been to privilege the blockbuster. Penguin Random House and Barnes & Noble are hardly Davids to Amazon's Goliath. "It's like you turn into your enemy," the head of one New York house said. "Publishers are in a bad position to be representing themselves as speaking for the artists."

Lately, digital titles have levelled off at about thirty per cent of book sales. Whatever the temporary fluctuations in publishers' profits, the long-term outlook is discouraging. This is partly because Americans don't read as many books as they used to—they are too busy doing other things with their devices—but also because of the relentless downward pressure on prices that Amazon enforces. The digital market is awash with millions of barely edited titles, most of it dreck, while readers are being conditioned to think that books are worth as little as a sandwich. "Amazon has successfully fostered the idea that a book is a thing of minimal value," Johnson said. "It's a widget."

There are two ways to think about this. Amazon believes that its approach encourages ever more people to tell their stories to ever more people, and turns writers into entrepreneurs; the price per unit might be cheap, but the higher number of units sold, and the accompanying royalties, will make authors wealthier. Jane Friedman, of Open Road, is unfazed by the prospect that Amazon might destroy the old model of publishing. "They are practicing the American Dream—competition is good!" she told me. Publishers, meanwhile, "have been banks for authors. Advances have been very high." In Friedman's view, selling digital books at low prices will democratize reading: "What do you want as an author—to sell books to as few people as possible for as much as possible, or for as little as possible to as many readers as possible?"

The answer seems self-evident, but

there is a more skeptical view. Several editors, agents, and authors told me that the money for serious fiction and nonfiction has eroded dramatically in recent years; advances on mid-list titles—books that are expected to sell modestly but whose quality gives them a strong chance of enduring—have declined by a quarter. These are the kinds of book that particularly benefit from the attention of editors and marketers, and that attract gifted people to publishing, despite the pitiful salaries. Without sufficient advances, many writers will not be able to undertake long, difficult, risky projects. Those who do so anyway will have to expend a lot of effort mastering the art of blowing their own horn. "Writing is being outsourced, because the only people who can afford to write books make money elsewhere—academics, rich people, celebrities," Colin Robinson, a veteran publisher, said. "The real talent, the people who are writers because they happen to be really good at writing—they aren't going to be able to afford to do it."

Seven-figure bidding wars still break out over potential blockbusters, even though these battles often turn out to be follies. The quest for publishing profits in an economy of scarcity drives the money toward a few big books. So does the gradual disappearance of book reviewers and knowledgeable booksellers, whose enthusiasm might have rescued a book from drowning in obscurity. When consumers are overwhelmed with choices, some experts argue, they all tend to buy the same well-known thing.

These trends point toward what the literary agent called "the rich getting richer, the poor getting poorer." A few brand names at the top, a mass of unwashed titles down below, the middle hollowed out: the book business in the age of Amazon mirrors the widening inequality of the broader economy.

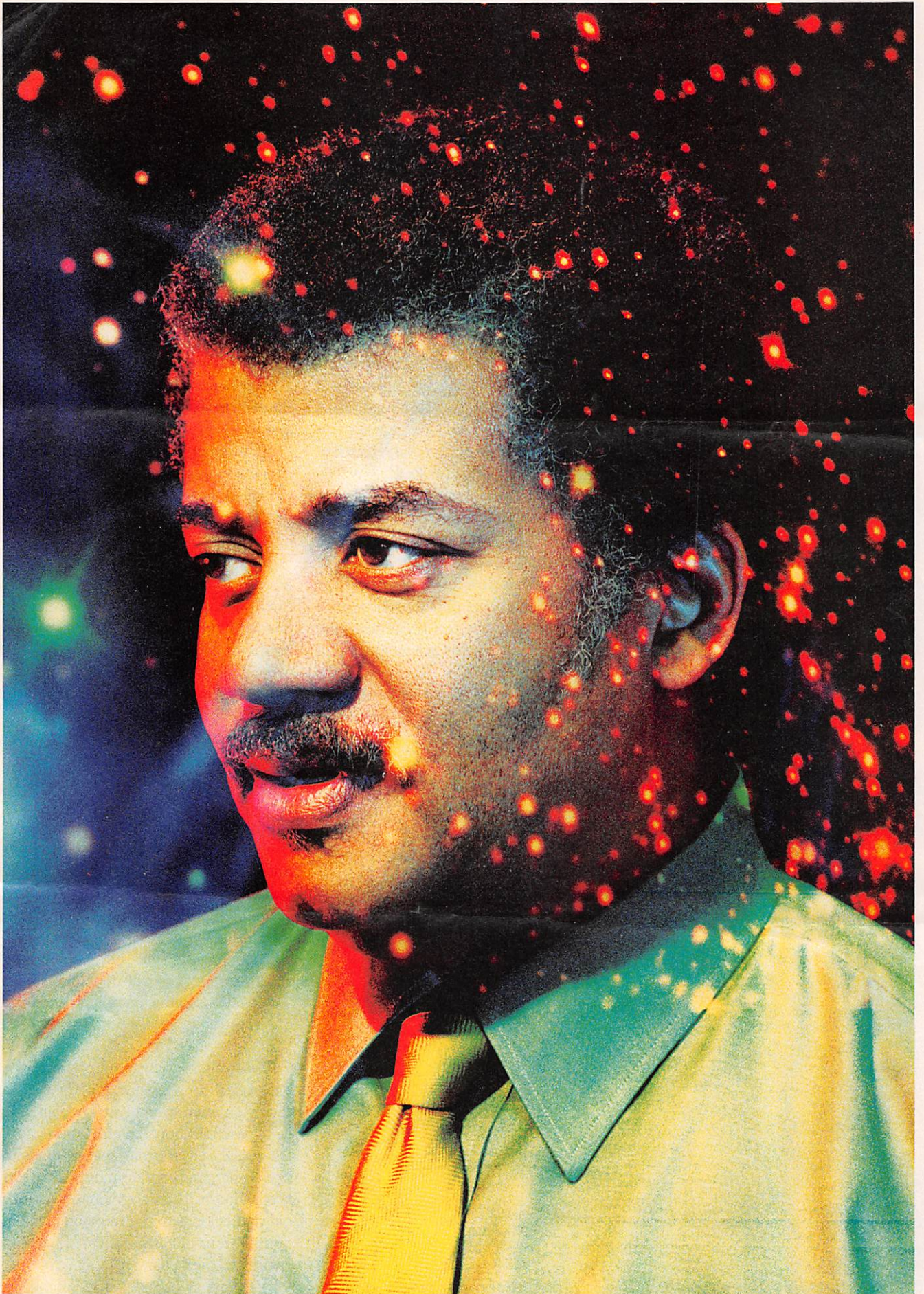
In 2009, after a career at publishers large and small, Robinson was laid off by Scribner, amid downsizing. Faced with his own professional extinction, and perhaps the industry's, he co-founded a new company, OR Books, with a different business model. Robinson did research and found that fifty to sixty per cent of the list price of a book goes to Amazon or to another retailer. When he was starting out, in the eighties, that figure was more like thirty or forty per cent. A small-to-midsize publisher has to spend between ten and fifteen

per cent on sales, warehousing, and shipping. This leaves little more than twenty-five per cent of the book's price for editorial counsel, production costs, publicity, paying the author, and whatever profit might be left over. A shared sensibility for a certain kind of fiction or nonfiction writing unites everyone along the way: authors, agents, editors, designers, marketers, reviewers, readers. "The only point at which Bezos enters that chain is to take all the money and the e-mail address of the buyer," Robinson said. "There's an entire community of people, and Bezos stands in the middle of it and collects the money."

Instead of going through Amazon, OR Books sells directly to customers, using printers in Minnesota and the U.K. It pays about fifteen per cent to the printer and keeps the rest. "After four years, we're just profitable," Robinson told me. "It works."

To the Big Five, locked in a death struggle with Amazon and the distracted American reader, this kind of experimentation might seem unrealistic. To survive, they are trying to broaden their distribution channels, not narrow them. But Andrew Wylie thinks that it's exactly what a giant like Penguin Random House should do. "If they did, in my opinion they would save the industry. They'd lose thirty per cent of their sales, but they would have an additional thirty per cent for every copy they sold, because they'd be selling directly to consumers. The industry thinks of itself as Proctor & Gamble. What gave publishers the idea that this was some big goddam business? It's not—it's a tiny little business, selling to a bunch of odd people who read."

At the moment, those people are obsessed with how they read books—whether it's on a Kindle or an iPad or on printed pages. This conversation, though important, takes place in the shallows and misses the deeper currents that, in the digital age, are pushing American culture under the control of ever fewer and more powerful corporations. Bezos is right: gatekeepers are inherently elitist, and some of them have been weakened, in no small part, because of their complacency and short-term thinking. But gatekeepers are also barriers against the complete commercialization of ideas, allowing new talent the time to develop and learn to tell difficult truths. When the last gatekeeper but one is gone, will Amazon care whether a book is any good? ♦



sponsored hoax—a theory promoted, in part, by a widely seen television special broadcast by Fox. (In a podcast interview, Tyson dismissed the theory with characteristic verve. “If there were ever a state secret that the government wanted to keep, it would be the behavior of President Clinton’s genitals, O.K.? But that got out!” he said. “You’re going to hoax a Moon landing by telling ten thousand scientists and engineers to keep it secret for forty years?”)

Tyson’s rhetorical style differs dramatically from Sagan’s. Sagan paid deference to high culture: he drew his comparisons from ancient history and his vocabulary from literature. Tyson’s preferred frame of reference is pop culture. This does not mean that he has unsophisticated tastes: his friends still talk about the hundred-year-old wine that he served at a nine-course dinner celebrating the turn of the millennium. And he has a library of rare antiquarian scientific volumes, including a third edition of Sir Isaac Newton’s “Principia,” which he considers the most important book ever written. But when explaining science he is most likely to point to a movie such as “A Bug’s Life.” (An ant constructs a telescope by wrapping a blade of grass around a water droplet, thus illustrating the concept of surface tension.) He is the host of an entertaining radio show, “StarTalk,” whose guests include both pro-

fessors and comedians. Tyson meets people where they are, rather than seeking to raise them to where he is. Joe Patterson, a professor of astronomy at Columbia University, told me, “Neil is kind of a combination of Carl Sagan and Mister Rogers.”

Sagan continued to do research even as he appeared on the “Tonight Show.” Tyson, too, is still active in the laboratory, though it has been five years since he published in a scientific journal. His astronomical thinking has been featured, however, in a Superman comic: at the request of DC Comics, Tyson pinpointed a star that could support a planet like Krypton. Academic colleagues say that Tyson’s record as a scientist is sound but not extraordinary. David Spergel, an astrophysicist at Princeton, where Tyson did post-doctoral work, says, “Neil could have pursued a research career and been a good researcher. But he’s *great* at what he does.”

Colleagues say that Tyson keeps close track of advances in his field, so that he can relay them to the public. Sean Carroll, a theoretical physicist at Caltech, says of him, “He has absolutely mastered the ability to convey not only the substance of the science but the real excitement and passion that scientists are feeling when they are doing it.” Tyson can go to goofy lengths to communicate that passion. At a recent panel discussion, he got so

worked up while debating the motives for space exploration that he rose from his chair, in mock anger, before being playfully restrained by Bill Nye the Science Guy. Many people find Tyson’s assertive intelligence very seductive. “I am the straightest guy you ever met, but if @neiltyson showed up at my door with a bottle of wine and a Barry White CD I’d let him in,” one admirer tweeted, to Tyson’s delight. He works hard at making his public appearances look easy. Before going on “The Daily Show” for the first time, he studied past episodes, counting how many sentences Jon Stewart permitted a guest to speak before butting in with a joke. Stewart told me that Tyson’s compulsion to elucidate continues even when the camera is not rolling. “To have someone who was able to explain science, in relative layman’s terms, with that force of conviction was one thing. But I also remember that we had a Rubik’s Cube sitting in the greenroom, and he had to solve it. He can’t leave things unsolved.”

Tyson is vigilant about correcting misrepresentations of science in popular culture. Last fall, he issued a series of lighthearted tweets pointing out errors made by the director of “Gravity.” (Satellites generally circle the globe west to east, yet in the movie all the debris was coming east to west; Sandra Bullock’s hair remains unruffled in zero-g conditions.) His correctives were considered newsworthy enough for Brian Williams to include them on the “NBC Nightly News,” and for the “Saturday Night Live” team to spoof them. Tyson has more than 1.6 million followers on Twitter, and his feed is filled with appetizing science facts: “Yup. Comet ISON croaked. You would have too, if you were made of ice and you buzz-cut the Sun.” The author or co-author of ten books of popular science, Tyson is considering compiling a volume of his tweets for publication.

Tyson’s dark, cluttered office at the American Museum of Natural History is an environment fit to delight an eight-year-old boy. An almost six-foot-tall model of a Saturn V rocket stands in one corner, and in a desk drawer Tyson keeps a football-size fragment of an asteroid that belongs to the museum’s collection. Dozens of cosmic-themed neckties are draped over a hanger. A replica of van Gogh’s “Starry Night” hangs behind his



“Skip to the part where the princess climbs to the top of the corporate ladder.”

desk. Shelves are filled with science books and framed certificates, including one for an asteroid that was named in Tyson's honor. There are also kitschy artifacts like glow-in-the-dark Band-Aids with cosmic motifs and a can of Dole pineapple chunks with a starburst theme on the wrapper. Tyson believes that such objects indicate a collective fascination with his sphere of expertise. "There are no DNA-helix pineapple cans," he said one afternoon.

We had just watched a preview of the Hayden Planetarium's new space show, the first for which Tyson had provided the narration. The show tackles the esoteric subject of dark matter and dark energy, which together make up ninety-five per cent of the known universe, and which are only scantily understood. Tyson was pleased with the result, which included footage of the Mount Wilson Observatory, in Los Angeles; images from the atmosphere of Jupiter, beamed to Earth by the Galileo space probe; and simulated renderings of the universe that made dark matter discernible, allowing viewers, as Dennis Overbye wrote in the *Times*, to see "the galaxies drift apart like stragglers in the parking lot after the bar closes." The show was to open in a few days, but before then, Tyson told me, he was hosting a private sky tour in the planetarium dome—a prize won at a benefit—for the family of David Koch, the chemical-industry billionaire and conservative activist, who supports science museums and at the same time politicians who are skeptical of climate change. Koch has given twenty-two million dollars to the Museum of Natural History and is a member of its board of trustees. He says of Tyson, "I can listen to him for hours and not lose my attention in any way." Tyson once visited Koch's Southampton home, where he taught members of the family how to use a telescope. He did the same for Mayor Michael Bloomberg, at Gracie Mansion.

Being able to pivot comfortably between the general public and the political plutocracy is a skill no less complex than being able to analyze data from the Hubble telescope; being able to do both is very unusual. Tyson has served on two Presidential commissions, under George W. Bush, an experience that has given him insight into the horse-trading necessary to gain funding for any venture, and a pragmatism about the motivations of any elected official. "In a capitalist democracy,

everybody agrees that they want more money tomorrow than they do today," he says. "But not everyone agrees that they want to walk around on the surface of Mars. Not everyone agrees that finding life on Europa"—one of Jupiter's moons—"is an interesting problem."

His preferred strategy is to explain how funding space exploration will contribute to economic growth, by requiring an investment in science education that would open up the possibility of unimagined technological and scientific advances. "I'm not talking about spinoffs here—you can't justify the space program on spinoffs," he says. "I'm talking about the culture of innovation that comes about when everybody is innovating and making great discoveries that make headlines every day. Before Wilhelm Röntgen discovered X rays, he wasn't thinking, 'How can I create a medical device?'" In 2012, Tyson wrote an influential essay for *Foreign Affairs* that made a case for manned missions to space, on the ground that they would serve the United States' economic and defense interests, just as funding Columbus's voyage to the New World served the interests of the Spanish crown. "I'm saying, 'Go into space so that you can get rich,' not because it's a beautiful thing," he says. "Because I think my read of history tells me that's the only way we're going to go into space." He is fond of joking that the U.S. would hasten to land astronauts on Mars in a year or two if the Chinese leaked a memo that described plans to build military bases there.

Unlike Sagan, who opposed President Ronald Reagan's "Star Wars" program, and who was arrested during a protest at the nuclear test site in Nevada, Tyson refuses to take explicit political positions in public, or to criticize elected officials, even those who reject evolution; he would rather invest his energies in creating a more enlightened electorate. Nevertheless, his political and cultural leanings seem clear, and his insistence on objectivity can seem disingenuous. After the Newtown massacre, he tweeted, "In Walmart, America's largest gun seller, you can buy an assault rifle. But company policy bans pop music with curse words." On Christmas Day, he tweeted, "Born on

this day, long ago, was a man who showed us all a way to know the Cosmos. Isaac Newton, Dec 25, 1642 Lincolnshire UK."

Tyson attended a Catholic church as a boy, but he began questioning the Church's tenets before entering his teens. When pressed, he calls himself an agnostic, but he resists labels, maintaining that atheism has come to imply activism. "My confidence that there is a loving God who

cares at all for your health or your longevity, based on what I see in the physical universe, is so low that it is not something that I would spend any time investing in, to try to explore any further about whether or not it's true," he says. "I'll let other people do that exploring. And, if they bring the evidence to me, that's

fine." Tyson's dogged nonpartisanship can be seen as a form of retreat. In an interview that has been watched 1.3 million times on YouTube, he says that he does not have the time, energy, or interest to enter a debate about atheism. "It's odd that the word 'atheist' even exists," he says. "I don't play golf. Is there a word for non-golf players? Do non-golf players gather and strategize? Do non-skiers have a word, and come together, and talk about the fact that they don't ski?"

Tyson lives in lower Manhattan with his wife, Alice Young, who trained as a mathematical physicist and worked as a programmer at Bloomberg L.P., and their two teen-age children, who attend public school. A native New Yorker, Tyson first visited the Hayden Planetarium when he was nine years old. "I was never the same after that," he says. "The lights go off and the stars come out—I had never seen that in my life. I grew up in the city, and you look up and there's a tall building, and air pollution, and light pollution. You don't have a relationship with the night sky. You don't even know it's there." Tyson characterizes the experience in mystical terms. "The universe chose me—I had no say in the matter," he says. "After that one session with the deep voice of the planetarium director—the God voice—resonating in the cavity of the dome, looking at the universe. That is some pretty impactful life experience."

Tyson grew up in the Riverdale section



of the Bronx. "People who live in Riverdale don't say they live in the Bronx," he says. "But I liked the Bronx, and I always said the Bronx, out of solidarity with those who couldn't say they lived in Riverdale." His father, Cyril, a sociologist, was a human-resources commissioner in the Lindsay Administration; his mother, Sunchita, became a gerontologist when Tyson was in high school. He was the middle of three children and showed an early aptitude for science; he rigged up a system of fishing weights that automatically closed the bedroom door that his sister always left open, and he periodically turned one of the apartment's bathrooms into a darkroom.

Tyson attended public schools, and was not a distinguished student. He was social, and teachers criticized him for being inattentive. When speaking to other educators, he stresses the importance of reaching not just the A students, who are already likely to succeed, but the B students, who might succeed if they were more deeply engaged by their teachers. He is on the board of the Harlem Educational Activities Fund, which seeks to offer such encouragement to students in public schools. Calvin Sims, a former chairman of the fund, says, "To have someone in Neil's position talking about these great ideas, and to do it in a humorous and animated way—and to have someone who looks like them do that—I think means the world." Not long ago, Tyson's elementary school, P.S. 81, invited him to give a commencement address; he declined. He recalls telling the administrators, "I am where I am not because of what happened in school but in spite of it, and that is probably not what you want me to say. Call me back, and I will address your teachers and give them a piece of my mind."

A more important education came from his parents. "We used New York City as a learning laboratory," Sunchita told me. Every weekend, the family visited a museum or went to a sporting event, or to a Broadway play or the Metropolitan Opera. Tyson's mother gave him a pair of folding opera glasses, which provided his first magnified look at the night sky. In middle school, he bought a telescope with money that he earned by walking neighbors' dogs—"It was the golden age of dog walking, because you didn't have to clean up after them," he recalls—and studied the sky from the roof

of his apartment building. In his bedroom, he arranged glow-in-the-dark stars in the shape of constellations.

Tyson often took the subway alone to the Museum of Natural History, attending lectures and classes. At fourteen, he won a scholarship, through the Explorers Club, for a cruise on the S.S. Canberra to Mauritania, to view a solar eclipse. He went by himself. As he boarded, his mother buttonholed older couples and asked them to keep an eye on her son. "He had a ball on that ship," Sunchita says. "He even won the Charleston contest." The same summer, he attended a camp in the Mojave Desert focussed on astronomy and physics; it was run by Joe Patterson. "He was pretty unusual—he was more of an urbane character," Patterson says. "There were a lot of kids at the camp who were very nerdy, but Neil was somebody who made friends easily. He asked a lot of questions. He was not intimidated by adults."

At the age of eleven, Tyson spoke with a teacher at P.S. 81 about his fascination with astronomy. Tyson's older brother, Stephen, who is an artist, recalls, "The teacher asked, 'Why do you want to go into science? There aren't any Negroes in that field. Why don't you go into sports?'" One evening, when he and his father were entering Van Cortlandt Park carrying a telescope, the police stopped them. "I guess they thought it was a bazooka," Sunchita says. "Just keeping my kids on the straight and narrow—and getting them not to hate people, in some instances, because of the way they were treated—was a full-time job." On another occasion, police were called to Tyson's building by neighbors who were alarmed by his rooftop activities; Tyson ended up showing the officers the stars.

At Bronx Science, he was captain of the wrestling team and the editor of the physical-science journal. He applied to study physics and astrophysics at Harvard, N.Y.U., M.I.T., Princeton, and Cornell. (All but Princeton accepted him.) Despite being wooed by Sagan, Tyson was fiercely rational in deciding where to go. He made a spreadsheet that listed recent contributors of physics and astrophysics articles to *Scientific American*, showing which schools they had attended and which faculty they had later joined. The school that appeared most frequently on the spreadsheet was Harvard, so he went there.

In a memoir, "The Sky Is Not the

Limit," published in 2004, Tyson mentions that Caroline Kennedy was a classmate, but says that he had little time for social life: he was consumed by his studies, and he also joined the wrestling team. He often tells the story of how another African-American member of the team, Frederick T. Smith—an eventual Rhodes scholar, who intended to put his economics degree to use among impoverished communities—criticized him for devoting himself to science. "Blacks in America do not have the luxury of your intellectual talents being spent on astrophysics," he told Tyson. (Smith, who became an attorney in Newark, died in 2005.) "Never before had someone so casually, yet so succinctly, indicted my life's ambitions," Tyson later wrote.

Tyson was undaunted, though, and after Harvard he began postgraduate work at the University of Texas at Austin. As soon as he arrived, a faculty member encouraged him to join the department's basketball team. Others suggested that he aim at teaching in a community college, or leave astrophysics for industry, where he could make more money. Tyson was certainly an unusual student for a science department: he rowed competitively, and won trophies in local competitions as part of the school's Latin-dance team. In his memoir, he reveals that he considered supplementing his income by working as an exotic dancer in a strip club, until he discovered that one dance routine would require him to wear, and ignite, an asbestos-lined jockstrap soaked with lighter fluid. (These days, he occasionally sneaks a few dance steps into a public appearance, with mock reluctance.)

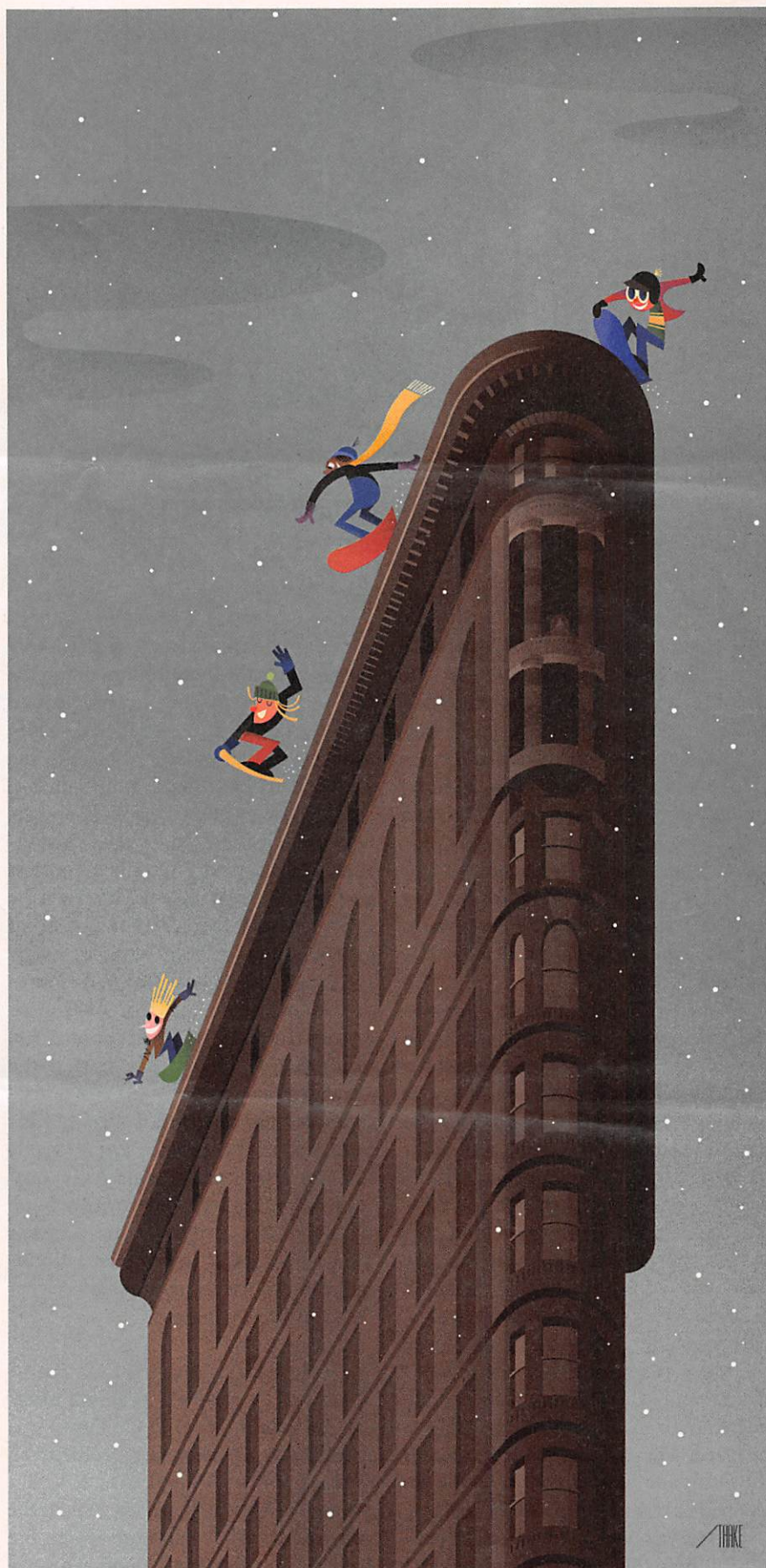
Tyson transferred to Columbia for his Ph.D., studying the chemical composition and the velocity of stars in the "galactic bulge"—the dense zone of stars at the center of most spiral galaxies. He also published his first book, "Merlin's Tour of the Universe," a collection of pop-science columns that he had written for *Star Date*, an astronomy magazine. While at Columbia, Tyson was interviewed for the first time by a local television reporter, about solar explosions. Watching the segment that evening, he had a realization that answered the challenge of his old wrestling teammate: this was the first time that he could recall seeing a black person being interviewed on television as an expert about something

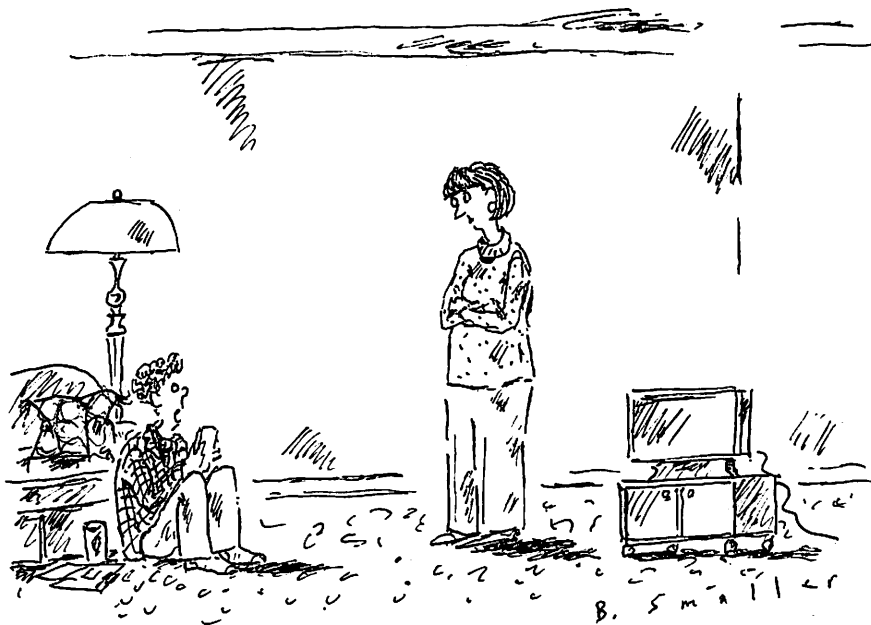
that had nothing to do with being black.

When Tyson graduated from Columbia, in 1991, he was invited to give a speech at the convocation. He described the lowered expectations that he had experienced at school in New York and, later, in Austin. "To spend most of my life fighting these attitudes levies an emotional tax that is a form of intellectual emasculation," he announced, noting that, by his count, his graduation brought the total number of black astrophysicists nationally to seven, out of about four thousand. "Given what I have experienced, I am surprised there are that many," he said.

He became a post-doc at Princeton, continuing his studies of the galactic bulge. (His other research interests include star formation and exploding stars. Many of his published papers have titles that might almost belong to Dave Eggers novels: "On the Possibility of Gas-Rich Dwarf Galaxies in the Lyman-alpha Forest," "The Faint-End Slopes of Galaxy Luminosity Functions in the COSMOS Field.") In astrophysics, as in other sciences, there are observers, who collect and analyze data, and theorists, who speculate about what the data mean. Tyson was an observer. "Theory is generally considered more high-powered, but observation tends to be what drives the field," David Spergel, a theorist, says. Spergel remembers accompanying Tyson on a trip to Chile. "We were on a mountain, and what I remember most was an earthquake the first night of observing," Spergel says. "It shook the mountain, and Neil claimed it showed that the observatory gods were angry, because we brought a theorist to the top of the mountain." Tyson was also a gifted teacher—another skill that is traditionally accorded less respect than research, but one that recommended him for a position outside academia.

In the mid-nineties, the board of trustees of the Museum of Natural History began a search for a new director of the Hayden Planetarium. The chairman of the board solicited recommendations from J. Richard Gott, a member of the astrophysics department at Princeton. "I said, 'The perfect person is a post-doc right here,' and it's the single best piece of advice I've ever given anyone," Gott told me. Tyson became the Frederick P. Rose Director in 2006. A condition of his appointment was the creation of an in-house department of





"Yes, I have taken my medication. Have you taken your medication?"

astrophysics. David Helfand, the president of the American Astronomical Society and a former chair of Columbia's astronomy department, recalls, "I had many discussions with him about the degree to which he should focus, as some curators do, on his own research, rather than taking a larger role in the public presentation of science. In academia, there is a prejudice that the only thing that matters is research—teaching is a waste of your time and public education is a waste of your time."

It was clear, however, where Tyson was most effective. One of his first tasks in the new job was selling wary members of the Landmarks Preservation Commission on building a modern replacement for the original planetarium, which was completed in 1935. "Many neighbors didn't want to see construction going on, so there was opposition," Gott says. "Neil presented the plan to the commission and explained how the new planetarium would present educational opportunities that the old one couldn't, and he said how he loved the old planetarium—no one loved it more than Neil." The commission voted unanimously to allow the old building to be razed. The glass-walled Rose Center for Earth and Space, containing the revamped planetarium, opened in 2000.

Tyson was also instrumental in conceiving how the new building could it-

self be an educational tool, with its enormous internal sphere representing the sun and mock planets arrayed around it. Tyson decided not to include Pluto among the planets, relegating it to the status of an object in the Kuiper Belt—the band of icy bodies that astronomers discovered in 1992, six decades after scientists had named Pluto the outermost planet in the solar system. Gott calls the Pluto decision Tyson's most significant contribution to science—even if, strictly speaking, the part he played had more to do with public relations than with astrophysics. In 2006, the International Astronomical Union voted to change the status of Pluto to a dwarf planet. "Sometimes you say a person is ahead of his time, and in this case we know exactly how far ahead of his time Neil was," Gott says. Tyson, who wrote a book about the Pluto controversy, has achieved the peculiar status of being an astronomer famous for losing a planet, rather than for discovering one.

In early January, the American Astronomical Society held its annual meeting, in Washington, D.C. Tyson was scheduled to give an evening presentation, "Tales from the Twitterverse & Other Media Excursions." I arrived early in the vast, characterless ballroom where the event was to take place. Daunting rows of

chairs stood empty—a public speaker's worst nightmare—but gradually people arrived, like stars materializing in the sky at dusk, until the room was densely populated. The talk started late, because there were technical difficulties connecting Tyson's laptop to the large screens on either side of the stage. "How many world-leading astrophysicists does it take to set up a presentation?" a young man sitting behind me, who wore a badge identifying him as an M.I.T. student, said. Pleased with his joke, he said it again.

Eventually, Tyson launched into an entertaining disquisition about his quest to bring science to the general public, and about his conviction that there was a growing interest in scientific matters. He talked about going to Comic Con—"an extraordinary celebration of the geekiverse," he called it—and showed a photograph of himself with a young woman in alien makeup and a scanty costume. He showed newspaper cartoons that assumed a degree of science literacy. (One featured a bespectacled scientist pointing at a chalkboard filled with equations and saying, "Along with 'Antimatter' and 'Dark Matter,' we've recently discovered the existence of 'Doesn't Matter,' which appears to have no effect on the universe whatsoever.") He showed images of science-related tattoos, including one of Carl Sagan's face inked onto a leg. The work of scientists, he said, was landing on "fertile territory that has been tilled by this kind of activity."

He spoke about his "Gravity" tweets: "People went bat crazy," he said. He mentioned a tweet that he'd posted a couple of days earlier, on January 4th: "Merry Perihelion to all. Earth, in its oval orbit, is closer to the Sun today than on any other day of the year." He told his listeners, "We all know this, but you keep it to yourself! Don't! Spread the love!" Tyson talked for an hour and a half; then, as technicians tried to clear the room, he kept talking, without amplification, to more than a hundred audience members, who mobbed him at the edge of the stage. After a while, a conference organizer walked onstage to drag him off to a reception for which he was already late. Tyson broke into a moonwalk, to roars of approval. "You're all astronomers—learn to moonwalk!" he said. "You'll need it one day!"

Last fall, Tyson travelled to Washington for a ceremony at the Library of Congress, which was celebrating its acquisition

of the papers of Carl Sagan. He and other eminences spoke of Sagan's vision, and of the ways in which scientific progress has fallen far short of Sagan's hopes and predictions. David Morrison, the director of the Carl Sagan Center for the Study of Life in the Universe, at the SETI Institute, in Mountain View, California, said, "Sagan thought we would have colonies on the Moon by now. He believed SETI would have succeeded." Tyson told the story of his encounter with Sagan in Ithaca, and of learning from Sagan the importance of engaging with students. Tyson emphasized that he now made student visits to his office a priority. "I could be on the phone in my office to the White House—'Barack, I've got to call you back,'" he said, to general amusement. (In fact, Tyson is not on first-name terms with the President, though he went to a White House Christmas party this year.)

Another speaker was Seth MacFarlane, the creator of the Fox television series "Family Guy," who had bought the Sagan papers from Sagan's estate, and then donated them to the library. MacFarlane, who was seven when "Cosmos" aired, expressed dismay that "a nationwide scientific regression has taken place." He called Tyson "the heir-apparent to Carl's rare combination of wisdom and communicative power."

MacFarlane brokered the deal with the Fox network to make the new "Cosmos," of which he is an executive producer. (It will be shown in a hundred and eighty countries.) Ann Druyan, Carl Sagan's widow, who was a writer on the original series and is the writer and lead executive producer on the new one, told me that she took the proposal to other networks, including PBS, but none of them offered the budget that Fox did, or the freedom. "The others wanted creative control, and complete content control," Druyan said. Fox gave a free hand to Druyan and her team. Druyan told me that she hoped the new series would kindle an interest in science among young people, as the old one did, though she acknowledged that the practical impact of Sagan's "Cosmos" had been limited. "If Carl were alive, and I could tell him that creationism is still a viable way of seeing things!" she told me, shaking her head.

The new series casts Tyson in a Saganesque mold that differs somewhat from his own public persona: there is less joking

and irony, more earnestness and awe. The first episode opens with Tyson standing on the same cliffs in Monterey where Sagan stood as he began his own odyssey. And the show brings back a number of the original series' celebrated storytelling devices, including the Cosmic Calendar, which has been digitally enhanced, and the Spaceship of the Imagination, which originally resembled a dandelion head and now looks like the first flying Apple product. Science geeks in Hollywood have been persuaded to work on "Cosmos" for considerably less than their usual rate, among them Bill Pope, who was the director of photography for the "Matrix" trilogy. Courtesy of animators drafted by MacFarlane, the lives of historical figures have been rendered elegantly in pictures, instead of being represented by bewigged actors; it's an inspired way to get a contemporary audience to stick with the story of, say, Giordano Bruno, the sixteenth-century philosopher who built on the Copernican view of the universe and was burned at the stake for heresy. (MacFarlane provides the voice for Bruno.)

The show treads lightly on known unknowns—at one point, Tyson calls the origins of life on earth "one of the greatest unsolved mysteries of science." But in its steady insistence on fact "Cosmos" counters anti-science rhetoric of the sort found on Fox News and in the culture at large, while being visually appealing in a manner that stands a good chance of captur-



ing the attention of an audience accustomed to computerized thrills. The larger question presented by "Cosmos" is whether the series will merely entertain, or whether it might infuse young viewers with a grander view of technological progress. The Carl Sagan who guided Americans through the original "Cosmos" would not, perhaps, have identified Sandra Bullock's unmoving hair as the problem with "Gravity." He might instead have identified the desperate efforts of

Bullock's character to return to Earth—"I hate space," she mutters to herself at one point—as the problem, and diagnosed the earthbound fear of space that characterizes the movie as an expression of a larger cultural timorousness.

Tyson never dreamed of becoming an astronaut, even as a child. "It was clear that I wasn't who they were looking for," he told me one afternoon, in his office. "The skin color didn't match up. This is the sixties, when 'Hair' is the No. 1 musical on Broadway, and here are these guys with crewcuts. War is becoming rapidly unpopular in the sixties, and yet nearly all the astronauts are drawn from the military. It was something that didn't include me." In any case, his mother told me, he used to get queasy in an elevator.

Tyson is impatient with the diminished ambitions of America's space program. "If you're an astronaut today, you're boldly going where hundreds have gone before—into Earth orbit," he said. To illustrate his point, he grabbed a schoolroom globe and a replica of the Moon that had roughly the circumference of a dessert plate. "This is about the correct relative size of the Earth and Moon to each other," he said.

I had no idea that the Moon was so large, its diameter a full quarter of the Earth's. "We have one of the biggest moons in the solar system relative to our home planet," Tyson said. "We have a totally rocking moon!" By now he was on his feet, theatrically holding the globe aloft. He asked me to guess how far away from the globe he would have to hold his moon to represent the true distance between them. I made a stab at an answer: out on the street?

"Thirty feet—at the end of the corridor," Tyson said. "Mars would be a mile away." He then hovered one finger above the surface of the globe, almost touching it, and leaned in close to me. "The Space Shuttle, the Space Station, the Hubble telescope—they're orbiting three-eighths of an inch above Earth," he exclaimed. "And NASA has convinced us that's space. To me, that's not space. I want to go somewhere! *That's* space. Take me to Europa—I'll sign up." Tyson was warming to his theme, even with an audience of one. "The dude who took his jump from space—the Red Bull jump from space? *One-sixteenth* of an inch above the Earth's surface," he declared. "I tweeted that." ♦

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