

# BLUE SKY METROPOLIS

## **M.G. Lord** **Cold Warrior's Daughter**

I am the daughter of a Cold War rocket engineer. Although my father was a civilian, we lived like a military family. Each morning he donned his uniform—short-sleeved shirt, skinny necktie, plastic pocket protector—and drove off to ply his brain, which is to say, his weapon, in the all-consuming fight against Soviet Russia.

Mother and I stayed home. If a wife had a brain to ply, she did so in the house, or volunteered with, say, the Girl Scouts, a paramilitary organization that promoted cleanliness, piety, and obedience to patriarchal authority.

In 1962, I was six years old. I remember a spat between my parents about whether women should be allowed to fly in space. Astronaut John Glenn, freshly returned from his triumphant orbit, had declared this a bad idea in his testimony before the House of Representatives' space committee. "The men go off and fight the wars and fly the airplanes and come back and help design and build and test them," he said. It's just a "fact of our social order." My mother was oddly ticked about this. She herself had a degree in chemistry but quit work to keep house for my father—an endorsement of the "social order," if ever there was one. She instructed me that being a Catholic wife and mother was the highest of callings. Yet she empathized with that woman pilot from the hearing—Jerrie Cobb, I now know her name to be—and those other women who aspired

to blast off. They had trained; they could do the work. Did Glenn have any right to ground them? And besides, rumor had it that the Russians planned to launch a woman.

"Well, of course," my father countered. "The Russians are savages. They have no decency. No respect for life. They sent up a dog, remember? And they killed it—intentionally. We're better than that. We brought Sam, our monkey, back."

"Then we sent up Miss Sam, and brought her back." My mother smiled. "We're very fair when it comes to the animal kingdom."

My father scowled. "What if a woman died up there? What if she suffocated?"

My mother said nothing, but her look suggested that quick suffocation in space might be preferable to slow suffocation in this house. "Can you imagine the public relations disaster?" he continued.

My mother walked over to the dining-room table, where I had spread out my homework, pencil case, and space-themed metal lunch box. The box was my favorite accessory. It depicted an orange-and-ochre planet scape bustling with rovers, rockets, and people in space suits—a thriving extraterrestrial colony. I maintained ardently that the figure in the shapely pressure suit was a woman—not some midget guy with a cinched waist. My mother chose this moment to agree with me.

The gauntlet had been thrown down, but my father ignored it. He lifted the lunch box and examined the figure in question. Then he addressed me rather than my mother: “You could be right. This scene takes place a long time in the future. Things may be different then.”

Ten years later, in 1972, things were indeed different—though not in the way the lunch box had predicted. My father was broken, as was his treasured “social order.” His wife, whom he had, in fact, cherished, had been dead for two years. But from 1967 to 1970, throughout her battle with cancer, he was largely absent from her side. He was an engineer on Mariner Mars 69, a critical space mission, and in his rock-hard world of emotionless masculinity, missions always came first.

He never doubted the urgency of his work—and especially, the urgency of the Apollo program, the crown jewel in the Cold War space effort, which had landed a man on the moon. Yet here it was, December 19, 1972, and Apollo was over. The last mission splashed down. No new one would launch.

Technically, the Cold War ended in 1989, when the Berlin Wall fell. But we had won its decisive battle twenty years earlier, when Neil Armstrong planted his pressurized boot in the lunar soil. The entire world had watched that moment. Now nobody cared about the moon, or what we did up there—motor around in a dune buggy, whack a golf ball. The lavish party was over. My father felt confused and betrayed, as did the other legions of men who had won the space race. For the first moment in years, he had time on his hands—time he wished he could have spent comforting his dying wife.

I, too, had changed in those ten years. Grieving for my mother, angry at his absence, I hardened into a feminist. In high school, I read many books, including Betty Friedan’s 1963 classic, *The Feminine Mystique*. She identified the malaise from which

my educated mother had suffered, long before her fatal cancer. It was “the problem that has no name,” chronic unhappiness and a lack of self-worth inherent in a system that ignored female intelligence. Worse, Friedan discovered, market researchers had confirmed the existence of this problem and, rather than solving it, used it to manipulate women into buying products. I was angry, too, at the weird polarization of the genders—the way the “social order” demanded that men think and women feel. I blamed it for squelching my father’s latent tenderness, which had robbed me of parenting.

By 1972, feminists had gained visibility—Bella Abzug was elected to Congress; Friedan’s book was a best-seller. And they had begun to get results. Congress passed Title IX, an amendment to the educational code, which said that an educational institution that receives money from the federal government cannot discriminate based on sex. Title IX was not just about sports, though it led to girls playing on boys’ teams and athletic scholarships for women. The law precluded discrimination in admittance to classes, extracurricular activities, and benefits.

For girls my age, the world had cracked open. We scrambled to avail ourselves of opportunities, fearing they might again be taken away. In 1973, I entered Yale University, which until 1969 had been exclusively male. That September, men on campus outnumbered women two to one. But the symbolic victory was ours. We had planted a foot—indeed, a high-heeled Frye boot—in the door.

Because it affected education in science and engineering, Title IX made an impact on aerospace culture. For aerospace contractors to co educate their workplaces, universities had to produce women engineers, which, before Title IX, many were slow to do. But there was only so much the law could accomplish. It specifically exempted “educational institutions training individuals for military services

or for the merchant marine”—a reflection of the nation’s long-standing aversion to women in battle.

Of course, in 1958, when NASA was chartered, its whole *raison d’être* was its civilian identity—removing spaceflight from the purview of the armed services. In actuality, however, NASA was more military than the military. Its astronauts were military pilots, “single-combat warriors,” as Tom Wolfe called them in *The Right Stuff*. Its budgets were initially as high as the heavens it wished to penetrate. After the Apollo program, the space agency began to lose both its generous funding and its military veneer. But until the late 1990’s, it divided its projects into “manned” and “unmanned” missions, rather than using the inclusive adjectives—“human” and “robotic”—that it employs today. Not until 1983 would an American woman be permitted to fly in space (Sally Ride). And not until 1995 would a woman command a mission (Eileen Collins).

For women to achieve equality as astronauts, scientists, and engineers, space exploration must be divorced from the military. It must be truly civilian: financed by private individuals for private individuals. Doubtless, the U.S. government will continue to maintain a presence in space—if only for national security reasons. But in the same way that the airline industry opened the skies to non-military pilots and passengers, so, too, will private space entrepreneurs unlock the zone beyond the earth’s atmosphere to a greater variety of explorers. In 1972, given the price tag for space missions, the idea of private funding was preposterous. The only private entity with that kind of money was the Vatican or the Mob. But in the 1990’s, two things happened: the Cold War formally ended and the economic landscape shifted. The so-called tech bubble placed billions in the hands of private entrepreneurs. One of them was Anousheh Ansari—an Iranian American woman who had come to this country as a teenager, learned English, studied engineering, and founded Prodea Systems, a

billion-dollar Internet company.

Although Ansari had dreamed of flying in space, she did not go the NASA route. She believed in private spaceflight and invested in it. In 2004, she cofinanced the Ansari X Prize, a \$10 million purse for the first nongovernment organization to launch a spaceship into suborbit twice in two weeks. (Before her contribution, Peter Diamandis, the space activist who founded the prize in 1995, had been struggling to fund the purse in full so the competition could take place.) In 2006, she bought a tourist seat on a Russian flight to the International Space Station.

I did not pursue a technical career, but I remained fascinated by spaceflight—following space missions the way that other people followed sports. I was amazed at the stubborn persistence of dated gender roles in the technical community. In the mid-1990’s, when women engineers finally broke the glass ceiling, or, in any event, pushed it higher, I traveled from my home in Manhattan to Los Angeles to write a book about the Jet Propulsion Laboratory (JPL), the organization that had once stolen my father away. I wanted to meet the women who were changing things and see whether the men had changed, too. But I discovered that to understand the 1990’s, I had to look back to World War II, the crucible from which Glenn’s “social order” had emerged.

Because my mother had died when I was fourteen, I never had a chance—adult to adult—to ask her about World War II or about why she had quit graduate school in chemistry to work in the personnel department at a public utility. But as part of my research, I asked her best friend, Betty Nolan, who, like my mom, had grown up in New Orleans, earned an undergraduate degree in chemistry, and wound up at New Orleans Public Service. During World War II, Betty told me, she had been recruited to work as a chemist in the New Orleans branch of

a national paint manufacturer that made “retreating compound,” a green waterproofing substance for tents. But when the war ended, she was laid off, with this backhanded “letter of recommendation”: “We had to let Miss Nolan go because of her outstanding performance,” her boss wrote. Her next job would have to have been production supervisor in a factory— “not a suitable job for a woman.”

Betty’s experience was not unique. In her landmark book, *Women Scientists in America: Before Affirmative Action 1940–1972*, historian Margaret W. Rossiter describes the way in which women were dragged into scientific jobs during the war and shoved out as soon as it was over. Yet not all women left because they were forced. Many veterans had returned in pieces: shell-shocked, alcoholic, unable to recover from the horrors they had witnessed. And some women relinquished their careers to prop these sad men up. The men had, after all, won a horrible war, and they were now forced to fight another: a war of appearance, concealing their torment behind a stoic facade. Women became emblems of maternal nourishment. Dior’s New Look dress dominated fashion. It was girded at the waist, accenting feminine curves. As a metaphor, the dress was particularly resonant, for it had a soft, pillowlike bust where a shattered man could rest his head.

Throughout popular culture, wives struggled to care for their broken husbands. In William Wyler’s powerful movie *The Best Years of Our Lives* (1946), a wife fights to keep her husband, whose combat experiences have left him closer to his buddies than his family. In Sloan Wilson’s penetrating novel *The Man in the Gray Flannel Suit* (1955), a vet finds greater solace in alcohol than in his marriage. And in J. D. Salinger’s ominous short story “A Perfect Day for Bananafish” (1948), a selfish wife ignores her husband’s pain, driving him to suicide.

Glenn may not have been a deep thinker—he had to scrape together correspondence credits for the college diploma that the astronaut program required. But he was a decent man. He lived by the code of chivalry implicit in the “social order.” He was a protector, a rescuer. As a military man, he was comfortable within a chain of command, yet he stood up to his NASA bosses when the agency’s policy hurt his family. Before his historic flight, when his wife, Annie, who had a severe stutter, was hounded by reporters, he ordered NASA to make the press back off.

Other men in the space program were not so chivalrous. They were crude and gratuitously demeaning. Wernher von Braun, the ex-Nazi SS officer who had connived to become the public face of American rocketry, fell into this category. In 1962, the same year Glenn testified before the congressional committee, von Braun was asked during a talk at the University of Mississippi whether NASA would ever fly women astronauts. Yes, he said. On a future mission, NASA planned to “reserve 110 pounds of payload for recreational equipment.”

Whether they behaved like Lancelots or louts, men in technical fields often feared women—or, in any event, feared their biology. In his nonfiction book *The Life and Death of a Satellite* (1966), Alfred Bester, best known for such picaresque, male-oriented sci-fi novels as *The Stars My Destination* (1956), described how women’s tiny hands could be useful in assembling the little parts that men had designed for satellites. However, he added, “Women are not permitted to work on delicate components during their menstrual periods. Engineers dare not run the risk of subjecting the components to the extra acidity of women’s skin at those times of the month.” Bester never questioned the inanity of this proscription. I did—in almost every interview I conducted for my JPL book. And without exception, every engineer and scientist called it embarrassing nonsense, without any basis in fact.

At JPL, physicist Marcia Neugebauer is best known as the first woman chief scientist on a robotic mission, Ranger I, which went to the moon. But she also spearheaded a change in JPL's fear-based policy on maternity leave, which had been codified, she said, "by the Caltech medical staff, who had never seen a pregnant woman before." In the 1950's, when Neugebauer had her first child, women had to disappear without pay three months before their due dates and not return until three months after. Perhaps, she joked, the Caltech doctors worried that women might go into labor, or, worse, give birth in the ladies' room, while on the job. But by the 1690's, when a pregnant colleague on whose work Neugebauer relied declined to leave, Neugebauer fought for her—and the policy changed.

Fear also held back women pilots. The military worried that they would fly poorly during their periods, even though nothing of the kind had been documented. Fear may also have grounded the so-called Mercury 13, Jerrie Cobb and the other women pilots who had trained to be astronauts—not because they did poorly on tests, but because they did well. The last thing the male astronauts wanted was a crackerjack woman pilot who could withstand more physical discomfort and medical torture than they could.

The women trained in a rogue program devised by space physician William Randolph Lovelace, director of the Lovelace Foundation for Medical Education and Research in Albuquerque, New Mexico. It was largely financed by Jacqueline Cochran, a wealthy aviatrix. At a certain point, however, if women were to fly in space, they would need to train on the specialized equipment designed for the Mercury 7 astronauts. And when the guys refused to share, the women took their case to Congress—where Glenn's testimony quashed their future. In 1998, NASA announced plans to launch an old person on a shuttle flight, to study how aging affected function in a weightless environment.

Feminists thought this would be a great occasion to give Jerrie Cobb, who was then sixty-seven years old, the chance she had been denied, and they campaigned on her behalf. But despite the many transformations wrought by feminism in the thirty-six years since Glenn's testimony, the dated "social order" prevailed. At age seventy-seven, for a second time, Glenn was blasted into orbit.

Glenn may have won that dogfight, but his worldview was fast becoming antique—museum material, like the F4U Corsair he had flown in World War II. By the late 1990's, Title IX and similar legislation had opened many doors for women. Feminist ideas percolated through scientific and technical communities. Men no longer shunned what had been regarded as "women's work"; in 2010, Caltech astronomer Mike Brown, for instance, devoted much of his book on planet hunting—*How I Killed Pluto and Why It Had It Coming*—to his involvement in caring for his newborn daughter. At JPL, women project managers, lead scientists, and chief engineers became almost commonplace. To me, however, the greatest measure of progress on gender equity was what I heard from male engineers, especially those in two-career couples. They told me what I wished my dad had said: They refused to work around the clock because they wanted to see their kids. And their wives, too, had responsibilities at the lab.

Nor do science-minded girls lack for role models. The girl geek has become enshrined in popular culture—a decisive measure of social transformation. Not only does toy manufacturer Mattel make a software engineer Barbie doll (with glasses and a tiny computer), but *Big Bang Theory*, a popular sitcom on television, features a woman neurobiologist. To comic effect, she is every bit as nerdy and socially maladroit as her male counterparts—two physicists and an engineer.

The aerospace industry was born in Southern California, flourished during the Space Race, and foundered after the Cold War. It is, however, again ascendant—reinvented—thanks in part to the small, private aerospace companies headquartered there. Hawthorne-based Space Exploration Technologies (SpaceX), for example, scored a triumph in 2010 with the successful launch of its Falcon 9 rocket, designed to slash the price tag for reaching orbit—an essential first step to opening space to non-government-affiliated travelers. Although the firm was founded by Internet entrepreneur Elon Musk, Gwynne Shotwell, its president, often serves as its public face—an emblem, perhaps, of the key role women will play in the new, truly civilian space age.

In terms of symbolism, however, no achievement can trump what occurred on September 29 and October 4, 2004: SpaceShipOne, a passenger craft built without government money, executed two suborbital flights within two weeks to win the Ansari X Prize.

How vividly I remember that first flight. Hours before sunrise, thousands gathered at the airport in Mojave, California—a cruel, rocky oven at midday, but as mystical and otherworldly as a Chesley Bonestell planet scape in the frail dawn light. The acrid smell of jet fuel hung over the tarmac. To reach the viewing stands, onlookers had to trudge past dozens of abandoned jetliners—beached metallic whales—stored in the dry, clear desert to avoid the ravages of snow and rain. Many spectators had parked their RVs near the airport. Some had spent the night partying; the campground felt like Burning Man or Woodstock. Like kids, many had been too keyed up to sleep.

With SpaceShipOne lashed to the bottom of its fuselage, the mother ship, called the White Knight, taxied down the runway and took off. When it reached an altitude of 46,500 feet, the smaller craft detached, firing its rocket engine. No matter what

happened next, history would be made.

For feminists in the crowd, of course, history had already been made. Anousheh Ansari—a woman—cosponsored the award, and her name blazed forth from the authorized signs and placards that blanketed the airport. Her name shimmered on baseball caps, T-shirts, and coffee mugs that vendors hawked everywhere. When space activist Peter Diamandis founded the X Prize in 1996, it had not a single woman on its board of directors. Now it owed its solvency to a woman.

True, engineer Burt Rutan designed the winning craft; Microsoft cofounder Paul G. Allen bankrolled it, and pilot Mike Melvill pulled it out of a scary, unplanned roll on its glide back to Earth. But without Ansari's money—the fruit of her technical accomplishments—they would have had no arena for their exploits.

After the postflight press conference, I headed back to Los Angeles, where I was now living. (The JPL book had drawn me back to the West Coast, and I had decided to stay.) My parents were not alive to witness this momentous flight, but my mother's friend, Betty Nolan, was. Betty had no children of her own. We had grown close through our many conversations while I was writing my book. And as soon as I left Mojave, where cell-phone coverage was terrible, I pulled to the side of the road and dialed her number.

Betty immediately grasped the powerful symbolism of the flight. We joked that it would have left my father deeply conflicted. He would not have loved Ansari's name everywhere. But he would have adored the triumph of private enterprise, or as one wag put it on a hand-lettered sign: "SpaceShipOne; Government Zero."

Virgin Atlantic Airways founder Richard Branson spoke at the press conference, I told Betty. He's

starting a “spaceline”—Virgin Galactic— that will sell tickets on suborbital flights within the next ten years. She laughed and asked me whether I planned to book a seat.

“Are you kidding?” I blurted. “Tickets are 100,000 a pop.”

“Never say never,” she said. But on a freelance writer’s budget, “never” seemed apt.

The following summer, after a sudden skirmish with bone cancer, Betty died. I felt bereft. I thought of our conversation after the X Prize flight, and of all our other conversations, and I wondered if they had been as meaningful to her as they were to me. When her will was read, I got my answer: Betty had left me the price of a Virgin Galactic seat.