

THE RADIOACTIVE BOY SCOUT



Ken Silverstein



R A N D O M H O U S E

THE RADIOACTIVE BOY SCOUT

The True Story of a Boy and His Backyard Nuclear Reactor

KEN SILVERSTEIN



Random House • NEW YORK

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To my parents

Acknowledgments

First and foremost, my thanks to this work's primary editor, Courtney Hodell, who called the day my story on David Hahn appeared in *Harper's Magazine* and said she was determined to see that I turn it into a book. She then patiently and skillfully helped transform a very rough first draft into this final product. Any of the book's shortcomings are surely mine and not hers.

Special thanks also to my agent Melanie Jackson and to several other editors who worked on this book at Random House and Fourth Estate, especially Katie Hall, but also Tim Farrell and Clive Priddle.

I'd also like to thank Clara Jeffery, who edited the *Harper's* story on David Hahn, and Lewis Lapham, that magazine's editor, who commissioned it.

My thanks also to David Hahn and his family for enduring my frequent visits to the Detroit area as well as my endless phone calls asking for just one more piece of information.

Last but not least, thanks to my wife, Clara Rivera, and my two children, Sophia and Gabriel, for their patience throughout.

Prologue

Men in White: The Nuclear Age Comes to Golf Manor

There is hardly a boy or a girl alive who is not keenly interested in finding out about things. And that's exactly what chemistry is: Finding out about things—finding out what things are made of and what changes they undergo. What things Any thing! Every thing!

—*The Golden Book of Chemistry Experiments*, 19

Golf Manor is the kind of place where nothing unusual is supposed to happen, the kind of place in which people live precisely because it is more than twenty-five miles from downtown Detroit and theoretically away from the poverty, crime, and other complications attendant on that city. It's the kind of place where money buys a bit more land than in the city, perhaps a second bathroom, and so reassures residents that they're safely in the bosom of the middle class.

Nestled in a small community called Commerce Township, Golf Manor takes its name from the eighteen-hole golf course at its entrance. The houses wind along about a dozen streets lined with trees both old and varied enough to make Golf Manor feel more like a neighborhood than a subdivision, and the few features that do convey *subdivision*—a sign at the entrance saying, “We have many children but none to spare. Please drive carefully”—have a certain 1950s charm.

A typical summer afternoon in Golf Manor brings, under sunny blue skies and a light breeze, the sight of mothers exchanging gossip as they push their newborns in strollers and the sounds of a few lawn mowers and an occasional whoop from kids jumping on a trampoline or swimming in a backyard pool. In short, it is the kind of place where the only thing lurking around the corner is likely to be a Mister Softee ice-cream truck or a religious devotee peddling the Gospel door-to-door.

However, June 26, 1995, would not go down in Golf Manor's collective memory as a typical day, in fact Dottie Pease grasped immediately when she turned onto Pinto Drive. Dottie had risen early for work and now, with the sun beginning its slow late-afternoon descent, wanted nothing more than to pull off her shoes and drop to the living-room couch for a rest before dinner. As she neared her home though, Dottie registered a scene so strange that she might as well have driven straight into an *X-File* episode.

For what she saw, through a fog of bewilderment and dread, was eleven men swarming across her carefully manicured lawn—three of them enveloped in white, ventilated moon suits. The attention of

the men seemed to be focused on the backyard of the house next door to hers, specifically on a large, wooden potting shed that abutted the chain-link fence between the properties. Thick, leafy branches from a tree in Dottie's yard covered the top of the shed, which sat directly in front of a swimming pool that was largely empty save for a small forest of six-foot weeds growing up through cracks in the bottom.

The three men in protective suits were dismantling the potting shed with electric saws. Several others were running an industrial-strength vacuum cleaner across the grass and through the swimming pool. The crews were dumping the shed remnants and vacuumed debris into large, jet-black steel drums emblazoned with bright yellow signs warning of radioactivity.

Dottie parked her car in her driveway and ran to join a group of about twenty Golf Manor denizens who were mustered in front of the house where the men were working. The moods on the block ranged from perplexed and anxious to flat-out panicked. The fear only grew as the chainsaw-wielding clean-up crew, who Dottie learned worked for the federal Environmental Protection Agency, offered no explanation for its activities beyond vague and empty-sounding assurances that there was nothing for residents to worry about.

In lieu of information, Golf Manor residents had only speculation. Unfortunately, they had little to go on. The home that so preoccupied the EPA belonged to a middle-aged couple, Michael Polasek and Patty Hahn, who on weekends were joined by Patty's teenage son, David. A polite young man with blond hair, hazel-green eyes, and a freckled face, David didn't seem the sort to cause serious trouble. But he was not in Golf Manor on the day of the EPA's arrival to answer for himself.

Michael and Patty, on the other hand, did have a few quirks. For starters, they were drinkers whose arguments had on occasion become loud, nasty, and public. Furthermore, Patty, though generally pleasant, had an edgy, hostile streak that could show itself without the slightest warning. Michael seemed less volatile, but he sometimes startled and annoyed neighbors by behaving like an overgrown adolescent. One of his occasional pastimes was relaxing in the backyard with a beer and a small pile of M-80s (a powerful firework whose kick is equivalent to a quarter stick of dynamite), which he detonated in the abandoned swimming pool.

Still, Dottie had never spotted anything seriously weird at the house next door—at least not weird enough to explain the federal intervention unfolding before her eyes. Now, though, as she huddled with her neighbors and tried to make sense of the situation, Dottie heard one resident who claimed to have woken late on a recent night and seen, from a back window, the potting shed emitting an eerie glow. This pushed Dottie's alarm to new heights, she later recalled. "I went inside and called my husband. I said, 'Da-a-ve, there are men in funny suits walking around out here. You've got to do something.' "

Bill Larson, a newcomer to the neighborhood, lived just three doors down from Michael and Patty. He was in an especially fine mood when he pulled onto Pinto Drive that afternoon, as he had just been visiting his wife and three-day-old son at the hospital. But as he daydreamed about bringing his newborn home to this cozy nook of a neighborhood, he was suddenly confronted with the EPA spectacle. Great, he thought, I've got a new house for my family and it's sitting in the middle of a toxic dump.

For the next three days, the EPA crew worked away in Michael and Patty's backyard. They broke down the potting shed until nothing remained in its place but a patch of dirt. They painstakingly vacuumed up every last piece of debris and dust from the work site. And then they loaded the steel drums with the radioactive-warning signs onto a flatbed truck, which departed for points unknown.

All the while, the workers refused to provide residents—or the handful of TV and newspaper journalists who dropped by after hearing about the story from Dave Pease—with concrete information about their assignment. A mixture of good-neighborliness and timidity kept residents from questioning Patty or Michael, who didn't make themselves available for inquiries in any case. During the entire ordeal, Patty emerged just once and very briefly, trying angrily to shoo away onlookers. Otherwise, she and Michael were sequestered in their home, with the phone off the hook.

In fact, neither the Peases nor the Larsons nor anyone else in Golf Manor discovered precisely why the EPA had briefly invaded their neighborhood. When asked for details some years later, several residents mumbled something about a small-scale chemical spill. No, others weighed in, the potting shed had sat atop the remains of an industrial-waste site created decades earlier. Still others recalled having heard—probably from the few brief stories filed by reporters, who were hindered by official stonewalling—that young David Hahn was involved and that it had had something to do with a small amount of mildly radioactive material.

This last group came closest to the truth, but they knew only a small part of the story. If Golf Manorites had been fully informed at the time of the EPA cleanup, their concern and panic might well have given way to full-blown hysteria. For federal authorities had set up camp in their neighborhood because they'd discovered levels of radiation in the potting shed so high as to place the area's forty thousand residents at serious health risk. Calm, placid Pinto Drive had in fact been the epicenter of a surreal crisis that had triggered the government's Federal Radiological Emergency Response Plan, the protocol for dealing with any public exposure to radiation, be it a small-scale radioactive release from an industrial accident or a major crisis, such as the near meltdown of the Three Mile Island nuclear-power plant in 1979. Indeed, the EPA's precision strike on the potting shed had been planned after consultations with other government agencies, including the Nuclear Regulatory Commission and the Federal Bureau of Investigation.

Most bizarre of all, David Hahn had done far more than play around with a few radioactive elements. He'd attempted to build a model breeder reactor in his backyard, an effort that grew out of his quest to win an atomic-energy merit badge from his local Boy Scout troop.

Chapter 1

Roots: The Making of a Teenage Scientist

You—Scientist!

—*The Golden Book of Chemistry Experiments*, 19

David Hahn's earliest memory seems appropriate in light of later events; it is of conducting an experiment in the bathroom when he was perhaps four years old. With his father at work and his unmindful mother listening to music in the living room of the family's small apartment in suburban Detroit, he rummaged through the medicine chest and undersink cabinet and gathered toothpaste, soap, medicines, cold cream, nail polish remover, and rubbing alcohol. He mixed everything in a metal bowl and stirred in the contents of an ashtray used by his mother, a chain-smoker. "I was trying to get a magical reaction, to create something new," he remembered later. "I thought that the more things I threw in, the stronger the reaction I'd get."

After he finished blending the ingredients together, young David was disappointed to see that all he had in the bowl was a lifeless, grayish glob. Hence, he went back to the cabinet beneath the sink and pulled out a bright-blue bottle, which years later he realized was probably a drain-cleaning product. He uncapped the bottle and poured a healthy amount into the bowl; soon, the mixture began to bubble and threatened to boil over. In a panic, David flushed the contents of the bowl down the toilet. His parents never knew what happened, and David promised himself that he would never again try something so foolish. It was the first of many similar vows made over the years, all broken in short order. It also established a pattern: experiment, trouble, cover-up.

If David was a slightly odd child, his parents, lost in their own preoccupations, hardly noticed. His father, Ken Hahn, grew up in the Detroit area along with his four brothers and sisters. Ken's father was a skilled tradesman, a tool-and-die maker who worked for General Electric and Pratt & Whitney. At night, Ken would sit with his dad and pore over blueprints of the tools his dad made during his workday. By the time he reached Henry Ford High School, Ken had decided to pursue a similar career though he was fascinated by the idea of drawing the blueprints, not building the tools. He enrolled in a college-prep program for mechanical engineering and after graduating attended Lawrence Technological University, a local school.

Ken was so wrapped up with his engineering studies that he had little time for dating or romance.

But while a sophomore at Lawrence Tech, he and a friend were cruising Woodward Avenue just outside of Detroit when they spotted two pretty girls driving alongside his Chevy Chevelle. After signaling for them to pull into a Big Boy hamburger drive-in, Ken zeroed in on nineteen-year-old Patty Spaulding and came away with her phone number. For Ken, it was love at first sight. “She was cute as a bug,” he remembered later, proudly showing off a picture of a beautiful young woman with bouncy smile.

But Patty, having recently ended a stormy relationship, was initially aloof. She had not had many positive experiences with men. Patty had been raised in a poor region of West Virginia, and her father had abandoned the family when she was young. Her mother, Lucille, had packed up and moved the family to Detroit, where they had relatives. Lucille found work at a doctor’s office, and the family moved into the middle class, albeit at the lower end of that category. It wasn’t an easy life, but it was better than West Virginia.

Ken was a determined suitor, though. After a four-year courtship during which he displayed the same tenacity that he normally reserved for work-related engineering challenges, Ken finally wore down Patty’s resistance. They were married in July 1974.

Like those of all residents of contemporary Detroit, Ken and Patty’s lives were shaped physically, economically, and socially by the automobile industry. The metropolitan area was then home to Ford, General Motors, and Chrysler, as well as to thousands of small shops that produced machine parts, brake linings, and industrial tools for the Big Three automakers. Soon after the wedding, Ken found a job as a mechanical engineer at a General Motors subcontractor, and he and Patty moved into a suburban apartment complex not far from his office. David, their only child, was born on October 30, 1976.

Ken worked long hours, designing robotic welding machines and other assembly-line equipment. He left home punctually at six in the morning, rarely returning before six in the evening and sometimes not until after David had gone to bed. Tightly wound, Ken was a dutiful husband and father but not a demonstrative one. Combined with his constant air of preoccupation, his reserve must have been confounding to a child. Even when Ken was around the house, there was little interaction between father—David remembered him as “always off in a fog”—and son, who developed an especially close bond with his mother.

In contrast to her husband, Patty was outgoing and affectionate. She loved children and painted watercolors of kids at play, some which were displayed for years at the Detroit Children’s Hospital. Patty lacked Ken’s focus, though, and had a hard time sticking with anything. She’d dropped out of high school three weeks prior to graduation and, despite several attempts, never got around to completing her GED. For a time, she talked about becoming a model and even put together a portfolio before abruptly abandoning the idea.

Patty doted on her son and gave him the attention he couldn’t get from his anxious and distant father. When David wanted a basketball hoop in his room, Patty made Ken put one up. If David liked a song, she’d play it for him over and over again. As David remembered, “My mom might be sleeping in her room when I got home from [elementary] school, but she always popped up to see me, and we’d do my homework together. If I did a drawing at school, she always put it up on the wall and bragged

about how great it was to whoever came over, even the plumber. I thought she was the most wonderful person in the world.”

But troubles began to dog Patty, though David was largely unaware of what was happening. She developed the drinking problem that ran in her family. A few years after David was born, she began to hear voices and thought strangers were after her. She was diagnosed with depression and paranoid schizophrenia. A variety of antipsychotic medications were prescribed. Fearing someone was trying to kidnap David, Patty took to changing the locks on the doors. She heard ghosts in the apartment building and would take David by the hand, creep down the basement stairs with a flashlight, and make sure nothing was lurking there. Ken hired a retired woman who lived nearby to check up on Patty and his son when he was at work, but by the time David was four Patty's condition had deteriorated so badly that she had to be committed to a mental hospital.

To explain her absence, Ken told David that his mother had been hurt when her car skidded off the road during a rainstorm. David suspected the story wasn't true—it couldn't have provided much comfort in any case—and felt completely abandoned. Upon hearing that Patty would have to “be away for a while,” he hid behind the couch in the living room, clasped his knees to his chin, and rocked himself back and forth.

Patty returned home six months later, and though she wasn't hospitalized again after her release her illness lingered and deepened. She rarely worked and spent most of her time at the apartment, caring for David when he wasn't at school and watching TV, listening to Top 40 hits, and playing cards with her girlfriends when he was. Though Patty still pampered David, she became somewhat less attentive. Left on his own, David developed a wild imagination. He built elaborate sets in his room—caves built from pillows and forts constructed in his closet—on which he could act out games with make-believe space explorers and superheroes. He fantasized endlessly about comic-book hero Spider-Man, the alias of Peter Parker, a dweebish, bespectacled high school student who gained superpowers after being bitten by a radioactive spider.

Meanwhile, the marriage between David's parents was falling apart, riven by financial troubles and Ken's frustration with Patty's failure to look for work or, in his view, deal with her mental troubles. As David peered out from his bedroom, his parents would scream at each other across the living room and on occasion Patty would hurl a vase or a lamp at the wall. In 1985, when David was nine years old his parents finally split, and Patty lost custody of her son. It was then that David's troubles really began.

David stayed with his father, who soon began dating a GM engineer named Kathy Missig. Ken and Kathy—whose daughter from a previous marriage, Kristina, was David's elder by a year—didn't marry until six years later, but within a year of meeting they bought a house together in Clinton Township, a conservative working-class area about twenty miles north of downtown Detroit.

Thanks to Detroit's devotion to the automobile, urban planning and mass transit were, and are, almost unknown to the region. Clinton Township, like other outlying areas, was an endless sprawl of fast-food restaurants, strip malls, shopping centers, and other signposts of suburbia. The Hahns' new home was a small but cozy split-level. The family room boasted birch paneling and a fireplace, while David's bedroom, on the top floor, looked out on a diamond-shaped deck in the backyard, with the

requisite affordable luxuries of a barbecue grill, patio furniture, and an aboveground swimming pool.

Ken remained wrapped up with his job and was rarely at home and even more rarely available to his son. He'd often get back long past the dinner hour, so Kathy would leave a plate of food warming for him in the oven. David saw his dad as a hard worker but conservative and living a boring lifestyle. "He talked a lot about work and people I didn't know anything about," he said. "He was always telling me that he didn't spend much money, just a few dollars a day. I wanted my life to be more exciting than that."

Nor was David close to Kathy, who had the impossible task of replacing David's adored mother. He resented her efforts to impose rules and regulations in his father's absence and felt that Kathy favored Kristina, with whom David had a strained relationship. One Christmas Day, David remembered with pain many years later, Kristina excitedly opened a number of carefully wrapped presents while he received only a "mad scientist" kit containing multicolored goop, something he thought was for babies. For David, growing up was a battle, and he felt that he had to fight for everything, be it affection or money. "With the new family, no one paid attention to what I was doing," he said. "The caring went away."

Weekends and holidays offered a certain relief, as David stayed with his mother and her new boyfriend, Michael Polasek. They lived about forty-five minutes away in Commerce Township, which exuded the same comfortable—if slightly less affluent—suburban atmosphere as Clinton Township. An amiable but hard-drinking retired GM forklift operator with a ninth-grade education, Michael looked like he had stepped out of a casting call for *Grease*. He collected muscle cars, like a yellow 1968 Camaro with black racing stripes and a cherry-red 1983 Jaguar, which sat, buffed and shined, in the driveway. Michael was just as finicky about the house, which he kept spotless even as he fawned over their five cats.

Michael loved to read, especially books about American history, which made a big impression on David. A further and very different attraction was his ready supply of cherry bombs and bottle rockets. Michael, Patty, and David often drove out into rural Michigan and hiked along trails that went miles and miles into the wilderness. After pitching a tent and building a campfire, Michael and David would set off a cache of fireworks as Patty flipped burgers on the grill.

Life in Commerce Township, though, was far from idyllic, especially given Patty's continual battle with alcoholism and mental decline. While Patty desperately tried to hold herself together when David was around, she suffered violent mood swings and several times disappeared for days. Pictures of Patty from these years bear no resemblance to the sparkling girl in Ken's photograph. In place of the ebullient teenager was a sullen woman, overweight and bloated from drinking.

Despite the fact that David was shuffled between eccentric and erratic households, his early years seemed ordinary and happy enough. A short, good-looking kid with an angelic smile, he joined baseball and soccer leagues, explored the neighborhood and woods near his father's home, and spent hours with his friends riding bikes, shooting hoops at the school playground, and playing in a fort that they built out of two-by-fours in the branches of an oak tree near a forested trail at the edge of the subdivision.

There were, however, some early indications of a quirky personality. David began exhibiting a mildly destructive bent around the age of five—surely an angry reaction to his mom’s hospitalization. He let air out of tires on cars parked in the neighborhood. Once, with a group of friends, he started a fire in the woods that escaped control and required the fire department to put out. (David and his buddies fled the scene before the fire trucks arrived and never told anyone they were responsible for the small blaze.)

Just a few years later, David became utterly fascinated with everything mechanical. Ken bought him an endless supply of robots, model kits, radios, tape recorders, printers, even simple remote controls. David didn’t want the items for their intended purposes but instead spent hours disassembling and reassembling them to try to figure out how they worked. “He didn’t want the plastic body,” his father remembered. “He wanted the guts.” David himself says he was intrigued with the idea of using parts from everyday products to make something entirely new. He passed hours dreaming about building a jetpack he could strap to his back and use to fly over the neighborhood or a robot that could mow the lawn or take out the garbage.

David spent a good deal of time with Patty’s mom, Lucille, who lived in the town of Berkley, four miles outside the Detroit city limits. Lucille remembered the young David as a hyperactive, skinny kid surrounded by huge piles of batteries, which he’d somehow string together and use as a power source for lightbulbs and small appliances. “He spent a lot of time trying to build things,” said Lucille, a short woman whose height was extended by a bouffant hairdo. “He didn’t play outside as much as most kids do.”

David’s budding scientific persona bloomed especially brightly in Golf Manor, largely because he had little responsible adult supervision. Like many young boys, David soon discovered the existential pleasures in blowing things up, a pursuit to which he devoted considerable time and energy. He perfected a recipe for homemade gunpowder and manufactured small bombs, which he and Michael, his partner in demolition, detonated in the woods, at the bottom of their empty swimming pool, and anywhere else that the urge struck. “We went out to the boondocks and blew those things up,” Michael, who even as a middle-aged man loved a big boom, recalled with a laugh and an admiring shake of his head. “He scared the hell out of me.”

At first glance, David’s behavior might not appear terribly different from the mix of adventurousness, curiosity, and mischief displayed by plenty of young boys. In fact, until the age of ten, David’s scientific fantasies (and explosives workshop) were merely distractions; sports, skateboarding, and exploring the woods with his friends were the focus of his life. The first sign that his hobby was becoming a mania came when John Sims, Kathy’s father, gave him a used, long out-of-print copy of *The Golden Book of Chemistry Experiments*. Just about every young boy at some point goes through a chemistry phase, which typically doesn’t advance far beyond mixing a few chemicals in a test tube to produce smoke. In David’s case, the *Golden Book* provoked a more lasting and powerful reaction, akin to a chemical pairing of nitric acid with glycerin.

Written by Robert Brent and published in 1960, the *Golden Book* practically vibrated with a relentlessly upbeat tone and colorful futuristic illustrations. One showed a happy, maskless farmworker spraying chickens with a cloud of insecticide, while another featured three workers operating a spotlessly clean nuclear reactor, a technology fairly new at the time the *Golden Book* was

published.

Comparable chemistry books sold today are designed for parents as much as for kids, offering the wan pleasures of experiments that require no glass pieces and no open flames and use only environmentally safe materials. Take *The Usborne Book of Science Experiments* (1991), widely available in toy stores. Among the experiments described in its pages are watching a sunset in a box, making a garden in a jar, observing microbes under a microscope (“Yeast comes to life!”), and constructing a wormery. To gauge by the *Usborne Book*’s cautious tone, science is something to be approached with trepidation more than excitement. Warning signs abound throughout the text: Treat the worms in your experiments gently, and put them back where you found them; wash your hands thoroughly before handling foodstuffs; never use household electricity for experiments.

The *Golden Book*, by contrast, promised to open the doors to a brave new world. It was the era of JFK and the New Frontier, of satellite launches and the race to the moon. The sky truly was the limit. “Chemistry is one of the most important of all sciences for human welfare,” the *Golden Book* asserted with unwavering optimism. “Chemistry means the difference between poverty and starvation and the abundant life.”

And this was just the start. New and improved chemicals, David learned, would make it possible “to keep food fresh without refrigeration in any climate.” Future travel would occur largely at supersonic speeds. “Planes and rockets will require materials that can stand tremendous heat and new fuels capable of providing enormous energy. Chemistry will provide them.”

Of all the wonders of the future described in the *Golden Book*, few promised more “for the welfare of all humanity” than the harnessed powers of the atom. Nuclear power, he read, would be the driving force of a scientific revolution that would soon transform the planet as the “force hidden in the atom will be turned into light and heat and power for everyday uses.”

This especially intrigued David because he thought nuclear power might be a solution to his family’s problems. The energy crisis of the 1970s and early 1980s had hit Detroit—the nation’s biggest car producer and a major manufacturing hub—especially hard. The soaring cost of energy was a frequent topic of conversation in the Hahn household—David heard over and over again that the United States was dependent on foreign countries for oil—and the growing monthly electric bill was a constant source of conflict between Ken and Kathy.

Perhaps nothing David read in the *Golden Book* affected him more than the story of Marie and Pierre Curie, whom he worshiped with the same intensity with which his friends revered basketball great Earvin “Magic” Johnson, who had played at Michigan State University in nearby Lansing a few years earlier and was now a superstar with the Los Angeles Lakers. The Curies were the heroes of Chapter 10 of the *Golden Book*, which featured a picture of the couple working diligently in their lab, bathed in the soft, embracing glow of radium emanating from a small jar.

The Curies spent years investigating a mineral called pitchblende, which emitted rays that were stronger than its uranium content could explain. To discover the source of the rays, the couple obtained eight tons of ore from Bohemia, boiled it down with acids, and purified the remains with processes they invented. After two years of backbreaking labor in their drafty shed, the Curies isolated

and removed the uranium. They soon discovered that the substance that remained glowed powerfully in the dark; the Curies named this new substance radium, a name derived from the Latin *radius*, meaning *ray*. (In Roman times, a radius was a bright, long-lasting candle used to illuminate stadiums hosting gladiatorial events.) Marie Curie named a second element found in the pitchblende polonium after her native Poland.

The story of the Curies, said the *Golden Book*, demonstrated “all the features that show the nature of the true scientist. Curiosity first.”

Written in an era well before lawyers began earning such good livings off the proponents of bad advice, the *Golden Book* today seems amazingly oblivious to the volatility of the experiments it described. One chapter, entitled “Chlorine—Friend and Foe,” carried an illustration of a soldier dashing into combat wearing a gas mask. The good news here was that chlorine had a number of beneficial uses, not least that it protected the nation’s drinking-water supply. On the downside, chlorine was “dangerous when used improperly because it affects the lungs. As a ‘poison gas’ it caused many casualties in World War I.” Tens of thousands of casualties to be precise—soldiers whose lungs filled with a greenish vapor that stripped away the mucus lining, causing them to drown in their own body fluids.

Having passed briefly over the deadly legacy of chlorine gas, the *Golden Book* went on breezily to teach readers how to brew their own in a home lab. The three-step recipe was simple, requiring as equipment only three widemouthed bottles corked with rubber stoppers and connected with glass tubes. In step one, young scientists combined a touch of Sani-Flush and Clorox in bottle A, whereupon chlorine gas would form and fill bottle B, with the excess of gas then being absorbed by a lye-water solution in bottle C.

The book warned somewhat inadequately that when removing bottle B, bottles A and C should be connected to prevent chlorine gas from “getting out in the room.” Furthermore, readers should perform the experiments outdoors or before an open window. Most important of all, the book cautioned, “Be careful not to breathe fumes!”

David had always had an obsessive streak. Before discovering the *Golden Book*, he had built a huge baseball-card collection, which he relentlessly organized and reorganized, arranging the players first in the order of their batting averages, then their number of career home runs, and on and on. Now his punctiliousness turned to science.

Following the detailed instructions in the *Golden Book*, David set up a laboratory at his father’s house. His first base of operations was his small bedroom. He bought beakers, Bunsen burners, and test tubes, as well as sodium hydroxide, potassium nitrate, sodium nitrate, ammonia, sulfur, magnesium, and a vast range of other chemicals and raw materials. David frequently had up to a dozen experiments and projects in progress simultaneously. In the early days, these were simple matters, such as assembling clocks and alarm systems from kits. He also conducted most of the two hundred experiments described in the pages of the *Golden Book*, from learning simple evaporation and filtration techniques to making rayon and alcohol.

Having imbibed the *Golden Book*’s worshipfully uncritical approach to science and braced by even

teenager's assumption of invulnerability, David gave little thought to any potential dangers from his experiments. He produced chloroform, a primitive anesthetic commonly used during surgery in the mid-1800s, from a recipe in the *Golden Book* that involved gently heating a mixture of ethanol and sodium-hydrochloride solution. The book urged readers to sniff carefully and savor the "peculiar sweetish odor of chloroform"; David took the challenge but apparently sniffed a bit too vigorously and ended up flat on his back. He estimated he was out for more than an hour.

His parents, charmed by David's interest in what seemed like a stimulating, safe pastime—he carefully kept from them episodes such as his chloroform blackout—initially offered encouragement and modest financial support. But science, as practiced by David, wasn't cheap. To pay for his activities, he started the Big D Lawn Mowing Service, posting handmade flyers around the neighborhood, passing them out at community events, and slipping them under doors. Business boomed; when he wasn't in his bedroom lab, David was pushing the family mower over the neighborhood lawns.

David's neighborhood friends would stop by to see if he wanted to throw around a Frisbee, hang out at a park, shoot some hoops, or just sit around and watch TV. He now declined most invitations and headed for the public library, where he'd comb shelves and pester the reference librarian in a quest for information on his new passion. By the age of twelve, David had become a voracious reader of scientific books, including his father's college chemistry books, which he digested without difficulty. That impressed Ken, though he seemed to regard it as a quirk, not a sign of precocious scientific talent. When David spent the night at Golf Manor, his mother would wake to find him asleep on the living-room floor, surrounded by open volumes of the *Encyclopaedia Britannica*. Frustrated by his inability to memorize material he deemed important to his unfolding scientific career—like the entire *Merck Index*, a reference guide that catalogues thousands of pharmaceuticals, compounds, and hormones—David sought to increase his brainpower with megadoses of two products he bought by mail order: ginkgo biloba, an herbal remedy, and a steroid called pregnolone.

Now in middle school, David had a hard time concentrating on anything but science. Never the most popular kid, he gained a reputation as a space cadet as he walked the halls of the school reading books about nuclear power and chemistry, excitedly talking to himself when he had an epiphany. Even worse, David experimented on himself with hair dyes he had concocted. The dyes were as strong as store-bought products—too strong, in fact. Once, he was unable to rinse out the various shades he had manufactured over the weekend and turned up at school Monday morning with his blond hair turned green, brown, and black. During English class, a group of girls teased him mercilessly and fired spitballs at him every time the teacher looked away.

Adults, too, began to treat David as something of a freak. He once told a science teacher that he was studying radioactive materials and wanted to understand the difference between two isotopes. The teacher shook his head, told him to quit making up stories, and walked away.

One of the few people David could talk to about his growing interest in science was John Sims, Kathy's father. John lived in the nearby town of Mount Clemens, and whenever he dropped by the house he would inevitably find David sequestered in his bedroom amid a jumble of electrical wires, batteries, and test tubes. A retired GM engineer with a strong academic background in chemistry, John took David's experimenting seriously and didn't treat him like a flaky kid. John was impressed but

startled by David's quick mastery of scientific material. "He was a very inquisitive boy and was experimenting with things he didn't realize the full consequences of," his stepgrandfather later said. "Within a few years he progressed well beyond my level of chemistry."

The kingdom of science offered David a welcome refuge from many traumas: a work-obsessed father, a mother with crippling mental problems, the stress of two new homes and two new stepparents, not to mention the normal growing pains of preadolescence. He spent hours locked in his room, poring over pictures and absorbing the texts from a pile of scientific books, while the world outside faded away to the level of background noise. "My family's problems seemed unsolvable, so whenever I was in trouble, or my parents were fighting, I'd go right back into my books," he said.

There was something else about science that appealed to David: He was good at it. Being smaller and skinnier than most boys his age, he'd never excelled at sports and was the sort of kid who got picked last when it came time to choose up sides during gym class. Nor had he shone in the realm of academics, as he was easily distracted and bored in most of the classes. It showed in his report cards, which were a mix of Cs and Ds, with the latter usually in the majority. Mastering the *Golden Book's* simple experiments gave him a sense of control, self-confidence, and self-respect, and at the same time it transformed his view of the world from a narrow, cramped battleground to a universe whose vast horizons were ever expanding in lockstep with the march of science. "I tried other stuff but I never got anywhere," he said. "Science was something that I could master. Finally, there was something that I had control over."

In *The Making of the Atomic Bomb*, Richard Rhodes referred to several psychological profiles of pioneering American scientists conducted in the early twentieth century. One of the studies, which used the Rorschach and Thematic Apperception tests, found that scientists were frequently raised in homes where the father had died early, worked away from home, or remained so distant and nonsupportive "that their sons scarcely knew them." Those with living fathers described them as "rigid, stern . . . and emotionally reserved," and the scientists themselves were "slow in social development, [and] indifferent to close personal relationships [or] group activities."

A second study cited by Rhodes had produced a "composite portrait" of America's most eminent scientists. They were sons of professional men, typically engineers or doctors. This composite scientist "in boyhood began to do a great deal of reading. He tended to feel lonely and 'different' and to be shy and aloof from his classmates. . . . Once he discovered the pleasures of [science], he never turned back. He is completely satisfied with his chosen vocation. . . . He works hard and devotedly in his laboratory, often seven days a week. . . . Better than any other interest or activity, scientific research seems to meet the inner need of his nature."

David doesn't precisely match this profile—which is a rather long-winded description of what adolescents know more straightforwardly as a geek—but the similarities are abundant and striking. In one important way, though, David greatly differed from the composite scientist: He had no "fatherly science teacher" to guide him through his early years, and hence his experimenting took place with little input—or encouragement or supervision—from adults.

One of David's favorite pastimes was building model-kit rockets, which he souped up with his own fuels and elaborate design and engine innovations. When David was twelve years old, Ken bought him

a Helicat rocket from Toys “R” Us. The bright yellow Helicat came with snap-on carbon-dioxide cartridges that served as the propulsion system, giving it a range of about six hundred feet—high enough that safety instructions warned that the rocket should be launched only in a large field away from power lines, tall trees, and low-flying aircraft. David spent hour after hour in the backyard looking for ways to increase the Helicat’s range. He experimented with various types of siding to decrease wind resistance before settling on a thin aluminum sheet. Then he devised a means to attach additional carbon-dioxide cartridges to boost the rocket’s power. By the time David was finished, the rocket soared at least three times higher than advertised. “That thing would shoot up straight as an arrow; it must have reached almost a mile into the sky,” Ken recalled. “He spent so much time working on it that it got to the point where I was sorry I bought it.”

David also became expert at making his own fireworks. His formula, which he adapted from a primer on the subject he found at the local library, called for large quantities of magnesium shavings. Fortunately, Michael’s son from an earlier marriage, who was nearly twenty years older than David, drilled out manifolds at an auto shop. At David’s request, he delivered bags of small, curly magnesium tailings to the house in Golf Manor.

David combined the magnesium with various metals, placed the mixtures in bowls, and set them afire, which produced effects like oversized sparklers. Copper and magnesium made for a green sparkler, while potassium produced a purplish hue. Strontium—which David secured by splitting open highway-safety flares that he bought at a hardware store—created a bright red glow. “I felt like I was learning and accomplishing something with the fireworks and explosives, but it was also a way for me to get attention,” David admitted. “I was always a superstar at the Fourth of July. I tried to beat everyone on the block with big bangs and beautiful colors. That was my time.”

One of David’s chief successes was a power skateboard he built by attaching a small electronic motor to the bottom of a store-bought model. He controlled the speed—which topped out at more than ten miles per hour—with a jury-rigged joystick of his own design. Save for a handlebar rising from the base, David’s creation was quite similar to the motorized skateboards that a few years later became immensely popular with teenagers in the United States and Europe.

David used the skateboard to tool around the neighborhood until Kathy took it away after he fell off while cruising at maximum speed and sprained his wrist. This was one of many episodes that resulted in a trip to the medicine chest, the doctor’s office, or worse. One particularly scary accident occurred when a propane stove David and a friend were fiddling with suddenly ignited, searing his arm with second-degree burns. “He had to go to the hospital so many times I lost count,” his stepmother said, just a touch facetiously. “Finally I’d say, ‘Ken, you take him, I’m going to bed.’ ”

Before long, David was becoming known as Clinton Township’s homegrown mad scientist. He was frequently seen wandering the streets of his neighborhood, pockets bulging with copper wire, splice connections, transistors, and a soldering gun. When new friends found out David was her stepbrother, Kristina would get a flurry of questions about what it was like to live with such a strange guy.

As David’s interest in science grew, he withdrew further and became increasingly secretive. The refrigerator at Ken and Kathy’s was perennially stuffed with blenders, soup cans, and stainless-steel mixing bowls containing David’s chemical mixtures, which he warned other members of the family,

in vague though vigorous terms, to leave sealed.

Then there were the smelly concoctions that fair-skinned David manufactured in an effort to protect himself from sunburn. He took stalks of celery—which contains 8-MOP, a substance that activates an enzyme in the skin that increases the production of melanin, a dark pigment—and ran them through a blender until they turned into a thick green sludge. He read in the *Merck Index* that 8-MOP was soluble in acetic acid, so he added vinegar (which is 30 percent acetic acid) to the sludge, heated the mixture on the stove top, and applied it directly to his skin.

In his ongoing efforts to improve his memory and general brainpower, David also blended “shakes” out of green vegetables and Portobello mushrooms, which produced a horrible brownish muck that he believed capable of heightening intelligence. Kristina still remembers her trepidation when opening the door of the refrigerator; she never knew what noxious odor would come wafting out.

With scientific pursuits swiftly becoming the center of his life, David decided to set up a second laboratory at his mother’s house in Golf Manor, where he spent weekends and holidays. He found the perfect spot: a long-out-of-use backyard potting shed. David spent weeks cleaning it up, throwing out old soda bottles, paint cans, copper pipes, and broken-up slabs of concrete, the latter of which he tossed into the empty swimming pool. He finished the job with a coat of white paint and a red radioactive symbol on one wall before finally moving in his lab equipment. The *Golden Book* urged readers to “follow in the footsteps” of the Curies by mastering filtration, evaporation, crystallization, and other laboratory methods they employed. Now David, who had taken the exhortation literally, was ready to do so.

David told Michael and Patty to keep out of the shed so as not to mess up his experiments. In keeping with their laid-back approach to parenting—and perhaps intimidated by his budding confidence and intelligence, especially given their lack of formal schooling—they heeded his demand. He was thus able to expand his research into thrillingly perilous territory. “He was so young, who figured he could do anything really dangerous?” Michael said, years later.

The archetypal suburban American boy with a penchant for chemistry conducts rudimentary gunpowder experiments; David quickly raced past that point. After discovering that it was impossible for a twelve-year-old boy to purchase nitric acid—a powerful chemical with which he planned to make bigger and better explosives, notably nitroglycerin—David attempted to fabricate his own variant from a formula he found in *Modern Chemistry*, one of his father’s old college textbooks. (He ignored a warning in the textbook that said that terrible accidents “have occurred through the unintentional discharge of explosives. . . . And under no conditions should an amateur ever try to make an explosive.”) David mixed and heated together two commercially available chemicals, saltpeter and sodium bisulfate, then bubbled the gas that was emitted through a container of water to condense it back to liquid.

Like any good scientist, David tested the results. Knowing that nitric acid oxidizes copper, he threw a few coils of copper wire into his product and placed it on a window ledge in the basement of Michael and Patty’s home. Before long, the acid was roiling and eating away at the wire, to David’s satisfaction. This inventive single-mindedness, so completely absent from the rest of his life, proved to be typical of David’s attempts to get hold of whatever he needed for his science projects, no matter

how tightly controlled and regulated the materials he was after.

David's most impressive achievement came when he turned a bug zapper from Radio Shack into a remote-control system that increased and decreased the electrical voltage throughout the house. Ken and Kathy were lying in bed ready to doze off one night when lamps on the bedside tables and the TV started going on and off by themselves. Ken raced down the hall to David's room, from which he detected a pungent smell. When he threw the door open, he found his son tinkering with what looked like a galvanized pipe wrapped in copper wire—this was the bug zapper's electrically charged stalk, which David had extracted and wired so that it plugged into his bedroom outlet. The bizarre gadget was emitting sparks that caused the air in the room to crackle with electricity and releasing a stream of smoke that caused Ken's eyes to water. "This was one of the times that I got so mad at him that I [wanted to] chase him down the street," said Ken.

David's invention was as dangerous as it was original; during one test, the modified bug zapper once gave him a shock so severe that it pushed him four feet. But as he did with Patty and Michael, David snowed Ken with sincere promises about a new commitment to safety. Like the parent who believes his kid's story about having eaten something spoiled after he's been discovered stumbling home at midnight and throwing up in the bushes, Ken credulously took David at his word.

Kathy, on the other hand, was becoming exasperated by David. His bedroom, where he carried out most of his experiments, was all but completely destroyed. The walls were badly pockmarked from a multitude of chemical explosions, and the carpet was so stained that it eventually had to be ripped out. Even the padding and plywood subflooring underneath was stained blue from spills of indole, an alkaloid derived from indigo pigment that David used to make natural-highlight shampoos.

Pressed by his wife to do something, Ken finally took action—though, typically, it didn't involve disciplining his son. Instead, he pushed David to enroll in the Boy Scouts, a step that ultimately proved to be as crucial to the unfolding of David's bizarre story as his discovery of the *Golden Book*. A former scout himself, Ken had organized camping trips in his teens and for four years been a patrol leader with Troop 207 in Detroit. He believed that the organization would provide the discipline—an distraction—needed to keep his son out of trouble. He also thought that scouting would give David a chance to bond with other kids and that it might bring father and son together as well. "For me, scouting built character," Ken said. "It taught me leadership skills, how to speak in front of groups, and gave me confidence. I thought it would be good for David and me if he joined."

David was reluctant, thinking that scouting was for nerds, but he grudgingly joined Clinton Township Troop 371. To his surprise, he loved the Boy Scouts. There were camping trips, cookouts, and a host of other outdoor activities, as well as regular meetings where he and other enlistees learned traditional scouting skills, like rubbing sticks together to start a fire and using a compass if lost in the woods. Ken's own father hadn't supported him during his years in scouting, and he was determined to do better. And so while he was otherwise largely absent from David's life, Ken often tagged along to scouting events.

David's scoutmaster, Joe Auito, resembled an aging Deadhead rather than the rock-ribbed conservative of scouting legend. He later recalled David as one of the more active members of the troop—a great swimmer and camper, a fast learner, and a big help with the younger scouts.

But Joe's most vivid memories of David concerned his oddball nature and freelance scientific activities. Once David turned up for a scout meeting with his face tinted beet red and his hair bright orange. As Joe remembers it, David's startling appearance that day resulted from a chemical mishap, though David suspects it was caused by an overdose of canthaxanthin, a steroid that he ordered from the back of a muscle magazine and was taking as part of an experiment on artificial tanning.

One year, David enrolled in a program called Survival Camp, which required scouts to camp outdoors overnight during the dead of winter. Ken had passed through Survival Camp as a young scout, and it made him vastly more appreciative of the comforts of home. He was excited that David would undergo the same experience and hoped that his son would come away with the same feelings after a night out in freezing weather. But David came away with a somewhat different lesson—namely, that science could make life easier and more comfortable, just as the *Golden Book* had promised. He arrived at Survival Camp with a backpack full of batteries, which he rigged up to a heating element that he placed inside his sleeping bag. While most kids shivered through the night and counted the minutes until it was over, David read magazines by flashlight before drifting off for a cozy night's rest.

All the while, David was becoming more and more submerged in scientific reverie. As his intellectual horizons expanded, he began to broaden his reading to more advanced material from the public library. Still, his favorite resource was the *Golden Book*, which he never tired of rereading. At its conclusion, there was a one-page chapter titled "What's Ahead in Chemistry?" "Chemists of the future, working with their brother-scientists, the physicists, will find new ways of harnessing and using the atoms of numerous elements—some of them unknown to the scientists of today," it enticed. "Do you want to share in the making of that astonishing and promising future?"

It was an appeal for converts, and it struck a deep chord with David. Increasingly friendless and estranged from family, he longed to feel himself part of something important, of a larger cause and tribe. With the *Golden Book* as his bible, he joined the atomic fraternity.

Chapter 2

From the Radium Craze to the Soaring Sixties: Science Conquers All

The physiological action of radium is not unlike a fairy tale. It stimulates all cell life, particularly that of the enzymes, thus aiding and improving metabolism. . . . No toxic or lasting ill effects have been reported.

—Douglas Moriarta, *Radium*, 19

From the beginning, the history of radioactivity and atomic research has been marked by cycles in which amazing discoveries produce mass elation only to give way to fear of the consequences of the new knowledge. The first cycle began in 1896, when Wilhelm Conrad Roentgen discovered X rays, a highly penetrating form of electromagnetic radiation and the first practical application of the radioactive age. Almost immediately, X rays produced astonishing medical breakthroughs, including the ability to diagnose ailments such as tuberculosis and pneumonia, to locate bullets in gunshot wounds, and to kill diphtheria microbes.

As recounted in the delightful book *Nukespeak: Nuclear Language, Visions, and Mindset*, having your own personal X-ray portrait soon became a status symbol in New York, that city always in search of a new fad. There was much discussion about the possibility of seeing through clothing; one firm even offered lead-lined, X-ray-proof underwear. A poem published in a photography magazine in 1897 captured the spirit of the time:

The Roentgen Rays,

What is this craze?

The town's ablaze,

For nowadays,

I hear they'll gaze

Thro' cloak and gown—and even stays,

These naughty, naughty Roentgen Rays.

This wave of excitement persisted despite quickly emerging evidence that exposure to radiation could cause severe injuries and even death. By mid-1897, a year after the discovery of “Roentgen Rays,” *The New York Times* was already warning of the dangers of X rays, citing multiple cases of

severe burns. By 1905, many doctors who employed X rays had already died or suffered amputations to stave off cancer. Dr. John Hall Edwards, one of the early pioneers, wrote at the time, “I have not experienced a moment’s freedom from pain for two years. In cold weather I am unable to dress myself, and the pain experienced cannot be expressed in words.”

Even then, researchers and the public gave little thought to the potential dangers of radioactive materials. In fact, a new and more hysterical period of popular, commercial, and scientific enthusiasm was generated by research into radium, which the Curies had discovered in 1898. Sir William Ramsay, a leading expert on the new field of radioactivity, believed there were no limits to what radium might mean to the world. “[The] philosopher’s stone will have been discovered, and it is not beyond the bounds of possibility that it may lead to that other goal of the philosophers of the Dark Age—the elixir vitae,” he prophesied, referring to the mythical tonic that ensured health and longevity.

According to *Nukespeak*, “The luminous properties of radium soon produced a full-fledged radium craze. A famous woman dancer performed dances using veils dipped in fluorescent salts containing radium. . . . Radium roulette was popular at New York casinos, ‘featuring a roulette wheel . . . washed with a radium solution, such that it glowed brightly in the darkness.’ A patent was issued for a process for making women’s gowns luminous with radium, and Broadway producer Florenz Ziegfeld snapped up the rights for his stage extravaganzas.”

The Radium Chemical Company of New York City ran ads in professional journals in which it listed radium’s effects internally as improving blood pressure, increasing urine secretion, helping with arthritis pain, and producing “a general stimulation.” Patients received radium injections to treat high blood pressure, menstrual cramps, depression, and an ailment that doctors labeled “debutante’s fatigue.” By the 1930s, hundreds of radium-based products, including eyewashes, suppositories, and even candies, were available to the public. A Harvard graduate and con artist named William John Aloysius Bailey claimed his patent medicine, Radithor, which contained two microcuries—a millionth of a curie, now the standard measure of radioactivity—of radium, was a powerful aphrodisiac that would make women “look much fresher and become more slender.” Men who drank Bailey’s elixir—which at a dollar per bottle was popular only with the ultrarich—would experience “a sexual rejuvenescence.”

During these days, radium was completely unregulated by the federal government because a law passed in 1906 deemed it to be a naturally occurring element, not an artificial drug. But it was subsequently determined that virtually all medical applications of radium amounted to pure quackery. This was temporarily obscured by the fact that the body defends itself against radiation by producing extra red blood cells, which can give the appearance of vibrancy and good health—until radiation-damaged cells outnumber and overpower healthy ones. Radium’s only truly effective medical use is in cancer therapy. Beginning early in the century, a technique was developed in which tiny needles filled with radium were used to kill cancer cells. (The theory holds that controlling the dose of radiation allows for the selective irradiation and elimination of cancerous cells.) Even this procedure entailed risks, though, and during the past quarter century radium has mostly been dropped in favor of safer techniques involving radioactive isotopes of cobalt and cesium.

X rays had demonstrated that external sources of radiation could lead to grave health problems. In the mid-1920s, radium provided the first signs that ingesting radioactive materials could be equally

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