front of the room, "his arms outstretched, his two hands hovering, fluttering, and diving in air" around two antennas attached to a high-frequency oscillator, according to Glinsky. From a rudimentary loudspeaker came the melody of Camille Saint-Saëns's "Swan." Theremin (1896–1993) had developed a musical instrument that could be played without physical contact.

Theremin and his "etherphone" (soon called the "theremin") won worldwide acclaim. He played concerts in the Soviet Union, Europe, and the United States, for audiences that included V. I. Lenin, Sergei Rachmaninoff, Arturo Toscanini, and George Bernard Shaw. Some reviewers likened the ethereal music to "celestial voices," though Shaw remarked that he had heard pleasanter sounds from a tissue-covered comb. Theremin believed that his instrument, inexpensively mass-produced, would replace the parlor piano. Without any training, people could "wave their hands and express their own musical personality," he said, "providing they possess a musical feeling." He moved to New York City and tried to market the instrument while working as a musician, teacher, inventor, and perhaps spy.

In 1938, Theremin returned to the Soviet Union—and disappeared. Caught up in Stalin's purges, he was imprisoned for eight years and then assigned to a secret research facility. (One of his Cold War inventions came to light in 1952 when a British radio operator in Moscow heard U.S. ambassador George F. Kennan dictating letters. Technicians searched the ambassador's house and found a listening device hidden inside a bas-relief Great Seal of the United States, a hand-carved goodwill gift from Soviet boy scouts seven years earlier.) Invisible and presumed dead for 25 years, Theremin reappeared in the mid-1960s, around the time the Beach Boys used a theremin in "Good Vibrations." During the remainder of his long life, he was honored as the father of electronic music.

Glinsky, a composer who teaches at Mercyhurst College in Pennsylvania, faced many obstacles in writing Theremin's life story. "Theremin routinely supplied different versions of the same incident to different interviewers at different times," he writes. "And when he was finally politically free enough to tell his own story he could no longer be counted on to tell it reliably." In addition, Theremin's contemporaries were mostly dead, and many of the materials were incomplete or infected with historical revisionism.

Through indefatigable research, Glinsky has nonetheless managed to provide a nuanced, comprehensive portrait. Though he is no wordsmith—paragraphs lack transitions, characters are introduced out of place, the chronology meanders—his biography is a triumph. The tale is so bizarrely dramatic that the book is nearly impossible to put down.

Glinsky skillfully uses the inventor's life to contrast communism and capitalism. After Theremin designed a television during the 1920s, for example, the Soviet government confiscated it, stamped it classified, and transformed it into a surveillance device for border guards. During his decade in the United States, by contrast, the Radio Corporation of America hired Theremin as part of its effort to place a television in every living room. "The divergence of Soviet and American culture can be almost unfathomable," Glinsky observes. "And it would be laughable, had it not been so tragic and so typical."

—Steve Weinberg

Science & Technology

THE UNDERGROWTH OF SCIENCE: Delusion, Self-Deception, and Human Frailty.
By Walter Gratzer. Oxford Univ. Press. 328 pp. $27.50

A scientist can go bad in any number of ways. Some of them, such as trimming facts to fit theories, are lamentable but almost understandable. Others, such as making up facts altogether, are unforgivable.

One way of going bad, however, is harder to judge. A reputable, even eminent scientist discovers something unexpected and nearly undetectable. The scientist is intrigued, then enthralled, then obdurately convinced. A few fellow scientists concur, but others, unable to repeat the discovery, attack. War

breaks out. The defenders claim greater perceptual acuity and explain away all findings to the contrary. The attackers finally gather enough counterevidence, and the original finding is dismissed. Gratzer, a British biophysicist and frequent contributor to *Nature*, calls this insistent embrace of an untenable hypothesis "communal derangement"; physicist Irving Langmuir called it "pathological science."

Around 1900, for example, the distinguished French physicist René Blondlot announced the discovery of "N-rays": nearly imperceptible electromagnetic radiation that passed through quartz but not through water. Scientists all over Europe repeated his experiments. Some saw the radiation and made further claims—one announced that N-rays heightened the sensitivity of the human retina—but others couldn't detect it. N-ray defenders derided the critics as insufficiently perceptive. "If N-rays can only be observed by rare privileged individuals," responded one critic, "then they no longer belong to the domain of experiment." Finally, Blondlot claimed to see N-rays even after a colleague had removed an essential part of the experiment. N-rays disappeared from physics.

The Undergrowth of Science assembles case studies in pathological science: Groups of growing cells supposedly emit radiation. Changes in an animal's body are inherited by the animal's offspring. Implanted monkey prostate glands rejuvenate aging men. Disagreeable inherited traits, from imbecility to alcoholism to criminality, are abolished by sterilizing the people who inherited them. Radiation given off by menstruating women kills microorganisms. Fusion, the energy source of the Sun, is reproduced in a jar.

None of these case studies rose to outright fraud. Instead, they resulted from a very human combination of ambition, overcommitment to a dubious investment, hero worship, mass hysteria, and an aversion to being wrong, especially in public. Scientists, Gratzer observes, "are as much a prey to human frailty as anyone else, and their capacity for unbending objectivity is circumscribed."

Pathological science remains with us—fusion-in-a-jar dates from the late 1980s—but it can be difficult for nonscientists to recognize. Gratzer's cases seem like the usual science news that first sounds unreasonable and then turns out to be right or wrong, either one. Throughout history, scientists have successfully defended marginal data, and theories that sounded silly have proved revolutionary. And, though Gratzer explains the experiments thoroughly and clearly, the general reader doesn't know the principles that make, say, radiation from growing cells just plain impossible. Perhaps such principles are uncodified and unspoken. If so, readers have to take a lot on faith.

Still, they're going to like this book. The writing is elegant and unusually intelligent. Science and politics are credibly interwoven. And the hapless scientists, clinging to their theories as the counterevidence mounts, come across as at once terribly weird and terribly normal.

—Ann Finkbeiner

ONE GOOD TURN: A Natural History of the Screwdriver and the Screw.
By Witold Rybczynski. Scribner.
173 pp. $22

When the *New York Times Magazine* asked for an essay on the best tool of the millennium, Rybczynski settled on the humble screwdriver. *One Good Turn* recounts his broadening gyre of historical research and, in the process, reminds us that extraordinary stories sometimes lurk behind ordinary things.

A professor of urbanism at the University of Pennsylvania and the author of *Home: A Short History of an Idea* (1986), Rybczynski begins with a look at the cursory lexicographical attention routinely paid to the word *screwdriver*, proceeds in search of the origins of the tool earlier generations called *turn screw*, and then, perhaps more important, concentrates on the screw. "The screwdriver is hardly poetic. . . ." he writes. "The screw itself, however, is a different matter. It is hard to imagine that even an inspired gunsmith or armorer—let alone a village blacksmith—simply happened on the screw by accident."

The screw thread is not, he explains, a spiral but a helix, "a three-dimensional curve that twists around a cylinder at a constant inclined angle." The earliest known