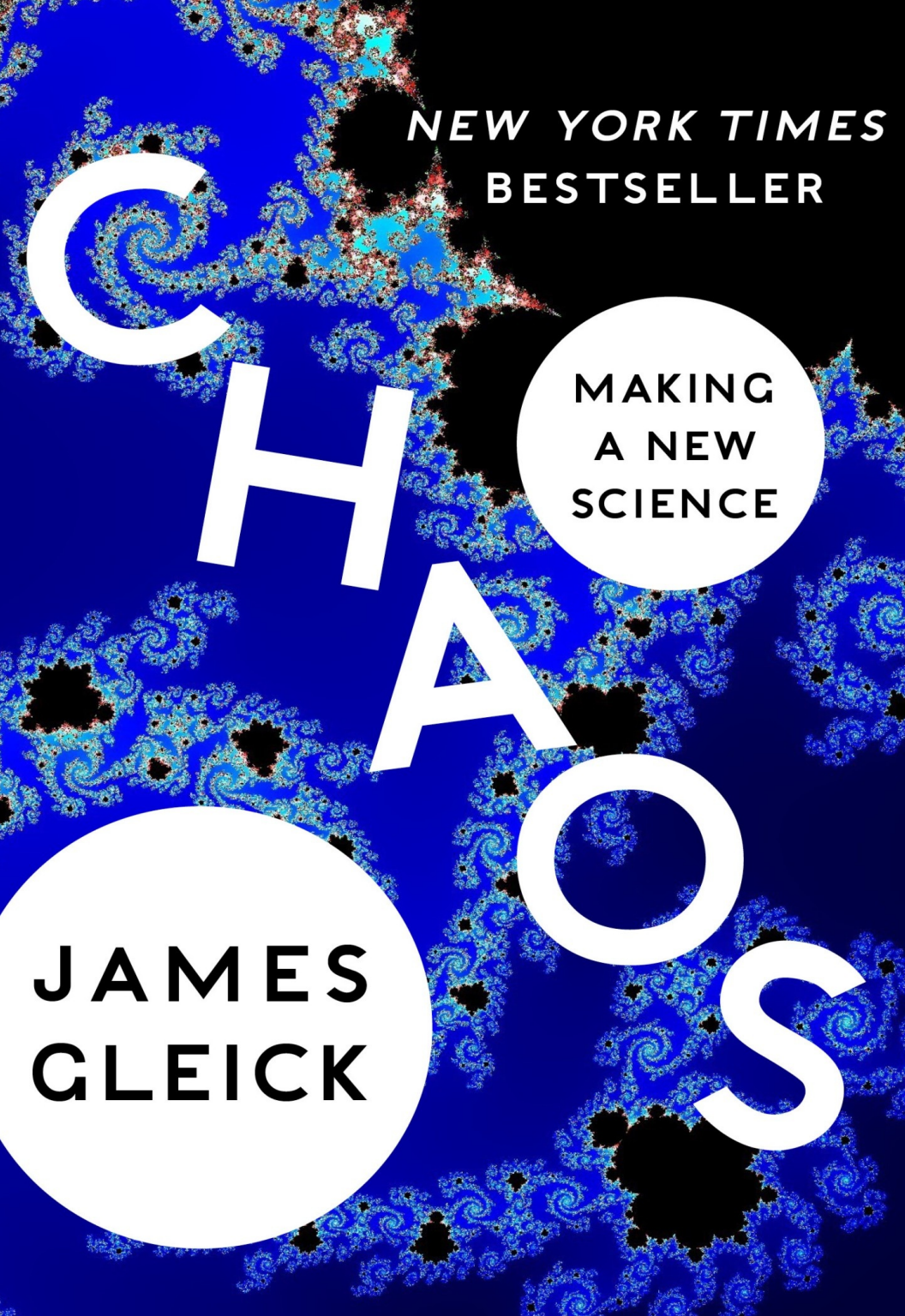
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To Cynthia

human was the music,
natural was the static...

—JOHN UPDIKE

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CHAOS

PROLOGUE

THE POLICE IN THE SMALL TOWN of Los Alamos, New Mexico, worried briefly in 1974 about a man seen prowling in the dark, night after night, the red glow of his cigarette floating along the back streets. He would pace for hours, heading nowhere in the starlight that hammers down through the thin air of the mesas. The police were not the only ones to wonder. At the national laboratory some physicists had learned that their newest colleague was experimenting with twenty-six–hour days, which meant that his waking schedule would slowly roll in and out of phase with theirs. This bordered on strange, even for the Theoretical Division.

In the three decades since J. Robert Oppenheimer chose this unworldly New Mexico landscape for the atomic bomb project, Los Alamos National Laboratory had spread across an expanse of desolate plateau, bringing particle accelerators and gas lasers and chemical plants, thousands of scientists and administrators and technicians, as well as one of the world's greatest concentrations of supercomputers. Some of the older scientists remembered the wooden buildings rising hastily out of the rimrock in the 1940s, but to most of the Los Alamos staff, young men and women in college-style corduroys and work shirts, the first bombmakers were just ghosts. The laboratory's locus of purest thought was the Theoretical Division, known as T division, just as computing was C division and weapons was X division. More than a hundred physicists and mathematicians worked in T division, well paid and free of academic pressures to teach and publish. These scientists had experience with brilliance and with eccentricity. They were hard to surprise.

But Mitchell Feigenbaum was an unusual case. He had exactly one published article to his name, and he was working on nothing that seemed to have any particular promise. His hair was a ragged mane, sweeping back from his wide brow in the style of busts of German composers. His eyes were sudden and passionate. When he spoke, always rapidly, he tended to drop articles and pronouns in a vaguely middle European way, even though he was a native of Brooklyn. When he worked, he worked obsessively. When he

could not work, he walked and thought, day or night, and night was best of all. The twenty-four–hour day seemed too constraining. Nevertheless, his experiment in personal quasiperiodicity came to an end when he decided he could no longer bear waking to the setting sun, as had to happen every few days.

At the age of twenty-nine he had already become a savant among the savants, an ad hoc consultant whom scientists would go to see about any especially intractable problem, when they could find him. One evening he arrived at work just as the director of the laboratory, Harold Agnew, was leaving. Agnew was a powerful figure, one of the original Oppenheimer apprentices. He had flown over Hiroshima on an instrument plane that accompanied the Enola Gay, photographing the delivery of the laboratory's first product.

"I understand you're real smart," Agnew said to Feigenbaum. "If you're so smart, why don't you just solve laser fusion?"

Even Feigenbaum's friends were wondering whether he was ever going to produce any work of his own. As willing as he was to do impromptu magic with their questions, he did not seem interested in devoting his own research to any problem that might pay off. He thought about turbulence in liquids and gases. He thought about time—did it glide smoothly forward or hop discretely like a sequence of cosmic motion-picture frames? He thought about the eye's ability to see consistent colors and forms in a universe that physicists knew to be a shifting quantum kaleidoscope. He thought about clouds, watching them from airplane windows (until, in 1975, his scientific travel privileges were officially suspended on grounds of overuse) or from the hiking trails above the laboratory.

In the mountain towns of the West, clouds barely resemble the sooty indeterminate low-flying hazes that fill the Eastern air. At Los Alamos, in the lee of a great volcanic caldera, the clouds spill across the sky, in random formation, yes, but also not-random, standing in uniform spikes or rolling in regularly furrowed patterns like brain matter. On a stormy afternoon, when the sky shimmers and trembles with the electricity to come, the clouds stand out from thirty miles away, filtering the light and reflecting it, until the whole sky starts to seem like a spectacle staged as a subtle reproach to physicists. Clouds represented a side of nature that the mainstream of physics had passed by, a side that was at once, fuzzy and detailed, structured and unpredictable. Feigenbaum thought about such things, quietly and