

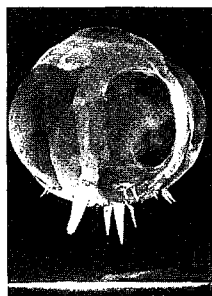
in a corrupt "old order of society" that prizes only "rank and consequences." Eventually, she abandons "prudence" to follow her heart, marrying the man of *her* choice.

In her last and unfinished novel, *Sanditon*, Austen leaves both Rationalism and Romanticism behind. Instead, she paints a portrait of a crass seaside resort, a developer's dream, dedicated to "distraction and amusement and idleness . . . fabricated out of words, money—and sand." This literary leap carried her far beyond the rural harmony presented in *Emma* and foreshadowed the Dickensian hard times soon to come.

Science & Technology

THE MAKING OF THE ATOMIC BOMB

by Richard Rhodes
Simon & Schuster, 1987
886 pp. \$22.95



In 1900, English scientist Frederick Soddy recorded the spontaneous transmutation of thorium gas into helium. From this observation, Soddy worked out the principle of radioactive half-life. It was, he later recalled, like the opening of a new world: "For more than two years, scientific life . . . became hectic to a degree rare in the lifetime of an individual."

Soddy's work made scientists rethink their concept of the atoms as stable components of elements. Over the next 45 years of research chronicled here by author Rhodes, the discoveries of a few remarkable men would unleash the most destructive force the world has known. The path from Soddy's laboratory to the first explosion at the Trinity test site in New Mexico seems all but inevitable, but Rhodes makes dramatically clear the importance of the special genius of men like Denmark's Niels Bohr, who developed the model of the atom with its orbiting electrons, and Hungary's Leo Szilard, who in 1933 envisioned the possibility of splitting atoms with neutrons.

Drawing on recently released government documents, interviews, and memoirs, Rhodes plumbs the motives of those who wanted to make the bomb. Scientific curiosity was a factor, as Robert Oppenheimer, director of America's Manhattan Project, admitted. But politics and survival were paramount. Throughout World War II, Britain, Germany, Japan, Russia, and America all sought to come up with the winning weapon first. Bohr, like other physicists who fled to the United States, had

witnessed Hitler's ravages in Europe. Edward Teller, a Hungarian Jew who had lived through the 1918 Hungarian Revolution, was as hostile to Communists as he was to Nazis.

Rhodes draws few conclusions about the subsequent arms race, but he pointedly cites the question Bohr asked when he arrived in Los Alamos in 1943: "Is it really big enough?" Big enough, that is, according to Rhodes, "to challenge mankind to find its way beyond man-made death to a world more open and more humane."

THE SOCIETY OF MIND

by Marvin Minsky
Simon & Schuster, 1987
339 pp. \$19.95

How does the human mind work? How can that lump of individually unthinking cells that we call the brain possibly contain intelligence?

Minsky, a noted artificial-intelligence researcher, has spent much of his life trying to duplicate human thought processes in machines. His work clearly informs his answers to questions about the mystery of mind.

Like a computer, he says, the mind is built of "mindless stuff, from parts that are much smaller and simpler than anything we'd consider smart." Dubbing these particles or miniprocesses "agents," Minsky uses them as the basic mental units in his model of the brain. Alone, each agent can perform only one simple task. Together in "societies," agents produce intelligence—acts of thinking, decision-making, remembering.

Minsky's book is itself a society: groups of one-page essays on topics ranging from the learning process to language skills. Do we have one self or many? Minsky contends that "we construct the myth that *we're* inside ourselves." "What is consciousness? It is a series of "great machines . . . countless processes of which we're never much aware." Memories? "Fragments of our former states of mind," invoked by an agent or agents associated with those former experiences.

Above all, Minsky wants to lay to rest mankind's age-old belief in souls, spirits, the spark of genius. A human being's value, he believes, lies in his or her "vast, constructed crust"—the complex interplay of mental agents. People may not even have a monopoly on self-awareness. Machines designed to keep good records of their activities are, says Minsky, "potentially capable of far more consciousness than we are."