GODEL, ESCHER, BACH: An Eternal Golden Braid
by Douglas R. Hofstadter
Basic Books, 1979
777 pp. $18.50
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Metamorphosis. *Woodcut by M. C. Escher. ©The Escher Foundation, 1979. Rights arranged courtesy of Vorpal Galleries.*

In any mathematical system, propositions exist that cannot be proved or disproved. Czech mathematician Kurt Gödel shocked his peers with this "incompleteness" theorem in 1931. Now Douglas R. Hofstadter, an Indiana University computer scientist, sets out to probe the human thought process by examining the logic of Gödel's proof, the 18th-century music of Johann Sebastian Bach, and the 20th-century art of M. C. Escher. In Gödel's mathematical deduction, Hofstadter finds the concepts of self-reference—"Strange Loopiness"—and circular argument. (For a parallel, consider the irony in the simple declaration, "This statement is false.") Gödel used mathematical reasoning to explore mathematical reasoning itself; Escher and Bach developed self-mirroring and irony in their works. Thus, Escher drew staircases that seemingly ascend and descend simultaneously. Bach invented musical themes, then reversed and inverted them in different keys. Like a Lewis Carroll story, this often funny book—connecting art, literature, and science—has its own offbeat circularity.

DISTURBING THE UNIVERSE
by Freeman Dyson
Harper, 1979
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"I have always remained a problem solver rather than a creator of ideas," writes Freeman Dyson, a physicist at the Institute for Advanced Study in Princeton. In these essays, Dyson supplies a philosophic insider's view of America's leading nuclear physics laboratories. Dyson never helped devise nuclear bombs, but his friends did. He recalls that the famed Robert Oppenheimer, a Jew, "was driven to build atomic bombs by fear that if he did not seize this power, Hitler would." Physicist Edward Teller, a Hungarian, was driven to build hydrogen bombs by the Stalinist threat of world domination. In 1958, Dyson took part in the planning of the now-defunct Project Orion (a spacecraft to be powered by nuclear explosions). Discussing such topics as nuclear energy and recombinant DNA, Dyson describes the scientist's dilemma of reconciling a "technically sweet" project with its potential ill effects.