

## *Einstein's Curious Mistake*

"The Reluctant Father of Black Holes" by Jeremy Bernstein, in *Scientific American* (June 1996), 415 Madison Ave., New York, N.Y. 10017-1111.

"Black holes"—celestial objects so dense that their gravity prevents even light from escaping—seem strange and improbable. Yet modern science, drawing on Albert Einstein's general theory of relativity and his invention of quantum-statistical mechanics, insists that they really exist. Ironically, writes Bernstein, a physicist and former staff writer for the *New Yorker*, Einstein himself rejected the weird notion.

Before the turn of the century, astronomers had begun to identify "white dwarfs": small, dim stars that must be extremely dense. In 1930, Subrahmanyan Chandrasekhar, a young Indian scientist, calculated that any white dwarf whose mass was greater than 1.4 times the mass of the sun would collapse under the force of its own gravitation. This conclusion, Bernstein says, "set off a revolution," and pointed the way toward the modern understanding of black holes.

Coming at the problem of the black holes (though he did not use that term, which was coined in 1967) from another direction, Einstein himself tried to show that their existence is impossible. He had been impressed in 1916 when a German astronomer named Karl Schwarzschild, working out the extremely complicated gravitational equations in the case of a planet orbiting a star, had come up with an exact solution. But something Schwarzschild had discovered while doing that, and had dismissed as of no practical consequence, bothered Einstein. Schwarzschild had

found, Bernstein explains, that at a certain distance from the center of the star, "the mathematics goes berserk. At this distance, now known as the Schwarzschild radius, time vanishes, and space becomes infinite." Schwarzschild's analysis "did not satisfy certain technical requirements of relativity theory," Bernstein says. That piqued Einstein's interest.

Looking at a collection of small particles moving in circular orbits under the influence of one another's gravitation, Einstein wrote in a 1939 paper that such a configuration could not collapse into a stable star with a radius equal to its Schwarzschild radius, Bernstein says.

Einstein's reasoning about a *stable* star was correct but irrelevant, Bernstein explains. "It does not matter that a collapsing star at the Schwarzschild radius is unstable, because the star collapses past that radius anyway."

At the same time that Einstein was doing his research, physicist J. Robert Oppenheimer and a student, using Einstein's general theory of relativity, came to a very different conclusion. They found, Bernstein writes, that what seems to happen to a collapsing star "depends dramatically on the vantage point of the observer." To a distant observer, the star seems frozen at its Schwarzschild radius. It is only from close up that the star appears to be collapsing. Einstein was undone, in other words, by his own theory.

## *A Grinch's Guide to Garbage*

"Recycling Is Garbage" by John Tierney, in *The New York Times Magazine* (June 30, 1996), 229 W. 43rd St., New York, N.Y. 10036.

It's not really news anymore that recycling, virtuous though it may make citizens feel, is generally wasteful. (See *WQ*, Autumn 1995, p. 131.) But in the course of a comprehensive critique of the practice, Tierney, a staff writer for the *New York Times Magazine*, offers some glittering nuggets worth recycling:

- A federally financed study of the costs of curbside recycling in six communities found that all but one of the programs, and all the composting operations and waste-to-energy

incinerators, increased the cost of waste disposal.

- Mandatory bottle-deposit programs do encourage recycling and reduce litter, but they typically cost \$500 for every ton of cans and bottles collected, "which makes curbside recycling look like a bargain," Tierney says. The most efficient way to cut litter is to hire cleanup crews, which pick up more than just bottles and cans. Recycling saps support from other cleanup efforts. When New York City's

Sanitation Department started its recycling program, it cut back on street cleaning.

• Are reusable cups and plates better than disposables? “A ceramic mug may seem a more virtuous choice than a cup made of polystyrene. . . . But it takes much more energy to manufacture the mug, and then each washing consumes more energy (not to mention water),” Tierney notes. According to one chemist’s calculations, the mug would have to be used 1,000 times before it consumed as little energy per use as the foam cup. And then there is the matter of bacteria surviving on the reusables. . . .

But isn’t landfill space disappearing? Well, no, says Tierney. While the 1987 saga of the

garbage scow *Mobro* was presented by the news media as “a grim harbinger of future landfill scarcity . . . it actually represented a short-lived scare caused by new environmental regulations.” Landfills in the rural South and Midwest now vigorously compete for East Coast garbage.

Does that make these dumping grounds losers? Not at all, argues Tierney. The private operator of the new landfill in Charles City County, Virginia, for example, pays the county fees totaling \$3 million a year—as much as the county takes in from all its property taxes. “If you are heavy with garbage and guilt,” Tierney writes, “Charles City is the place to lay down your burden.”

## ARTS & LETTERS

### *The Great American Novel?*

“U.S.A.” by Daniel Aaron, in *American Heritage* (July–Aug. 1996), Forbes Bldg., 60 Fifth Ave., New York, N.Y. 10011, and “‘U.S.A.’ Today” by Joseph Epstein, in *The New Yorker* (Aug. 5, 1996), 20 W. 43rd St., New York, N.Y. 10036.

John Dos Passos’s monumental trilogy, *U.S.A.*, was hailed by Lionel Trilling in 1938 as “the important American novel of the decade,” and indeed, many people at the time felt the novelist had achieved what Joseph Epstein, editor of the *American Scholar*, calls “the literary Holy Grail”: the Great American Novel. By casting his fictional characters into “the snarl of the human currents of his time,” Dos Passos was attempting to evoke, in Epstein’s words, “the tumult of American life in the first three decades of the century.” Aaron, a Harvard University English professor, calls the work “an idiosyncratic biography of a nation,” one that has, in his view, lasting worth.

In *The 42nd Parallel*, *Nineteen Nineteen*, and *The Big Money* (all initially published between 1927 and 1936, and now reissued by the Library of America to mark the centenary of Dos Passos’s birth), Dos Passos portrayed an America populated by “a servile generation of white-collar slaves” and “moneygrubbers,” and a huge “disunited strata of workers and farmers kept mostly in an opium dream of prosperity by cooing radios, the flamboyant movies, and the installment plan.”

But how best to depict the nation’s moral bankruptcy? Building on techniques he had employed less successfully in *Manhattan Transfer* (1924), Dos Passos wove together

the fictional strands of *U.S.A.* by employing three distinctive literary devices: “newsreel,” in which he strung together scraps of popular song and newspaper clippings to convey the interconnectedness and fabric of seemingly unrelated events across the nation; biographies—26 portraits of “important personalities of the time,” including the Wright brothers, Thorstein Veblen, and Eugene Debs; and, finally, “The Camera Eye.” This last is the closest thing the books have to a narrative voice, with the protagonist being, Aaron explains, the author self-observed as he passes through a “moving cyclorama” of his own design. At the trilogy’s core is the politically charged Sacco-Vanzetti case, which led to the 1927 execution of the two anarchists convicted of murder and outraged Dos Passos and others on the left.

*U.S.A.*, Aaron notes, “isn’t an atlas or a cultural guide to the United States”; the South and Far West receive short shrift and black Americans “are conspicuously absent.” Moreover, the fictional characters in Dos Passos’s swirling pastiche of the American scene are reduced, as one critic said, to “colliding billiard balls.” Nevertheless, Aaron maintains, in the 60 years since the final volume in the trilogy appeared, no other work has come closer to realizing that oft-pursued but elusive dream