



Tycho Brahe, with his pre-telescope instruments.

a great conjunction of Jupiter and Saturn, and a transit of Mercury across the face of the sun.

Galileo Galilei (1564–1642) was only eight years old when the first supernova appeared; the appearance of the second in 1604 helped turn his interest to astronomy. He quickly grasped the supernova's cosmological implications. Four years after it faded from view, he took the telescope, which had been invented about 1600, “turned [it] on the heavens for the first time and ushered in a new age of astronomy.” When the second large comet appeared in the heavens in 1618, astronomers across Europe viewed it not only with new telescopes but with new eyes.

The rare celestial show that nature put on over the course of seven decades did not do more than the invention of the telescope to create the revolution in scientific thought, Baumgartner says. But it certainly helped. By the time the show was over, the curtain had been brought down on the traditional theory.

Call of the Tame

“In From the Cold” by Stephen Budiansky, in *The New York Times Magazine* (Dec. 22, 1991), 229 W. 43rd St., New York, N.Y. 10036.

Strident animal-rights activists insist that dogs, cattle, horses, and other domesticated beasts have been enslaved by that tireless despoiler of nature, man. And most other people take for granted that man at least imposed domestication on the animals. Journalist Budiansky, author of *The Covenant of the Wild: Why Animals Chose Domestication* (1992), suggests that animals “chose us as much as we chose them.” Far from being a crime against nature, the domestication of animals, he argues, was “a product of nature, an evolutionary process driven by the animals’ own need to adapt to the rapidly changing climatic conditions that swept the earth at the end of the ice age.”

The glaciers that repeatedly swept the continents of North America, Europe, and Asia during the ice age demanded adaptability, Budiansky argues. The million years that preceded the glaciers’ final re-

treat was really a series of small ice ages, marked by enormous swings in climate. Natural selection favored in many animals the “youthful” characteristics of curiosity, an ability to learn, and lack of fear of new situations. These opened the way for them to approach and be approached by humans.

Human efforts to domesticate beasts by force alone would have been impossible, Budiansky says. The ancient Egyptians, for example, tried and failed to domesticate gazelles and other species. And there is mounting evidence to suggest that the rise of agriculture and animal husbandry some 9,000 years ago was not at first “an obvious improvement” for man. Early agriculturalists suffered “an epidemic of injuries, malnutrition and infectious disease” unlike anything experienced by hunter-gatherers. Over the long term, however, the advantages to man and beast alike are plain.

Domesticated animals have enjoyed much more "reproductive success" than they would have in a state of nature. Man, far

from being the oppressor of animals, is upholding "a remarkable evolutionary compact among the species."

Japanese Junk

"What?! Garbage in Japan?" by Phyllis Austin, in *Garbage* (Nov.-Dec. 1991), Old House Journal Corp., 2 Main St., Gloucester, Mass. 01930.

First in autos, first in TVs, and first in the management of solid waste as well. That is the view of a number of environmentalists who have studied Japan and estimate that the island nation recycles about 50 percent of its solid waste. After a visit to Japan, however, journalist Austin reports the reality there is far less rosy.

Second only to the United States as a garbage producer, Japan, she says, is "in a crisis" over what to do with the 4.1 billion tons of waste it generates each year. As Japanese wealth has mounted, so have the junk piles. The newly affluent Japanese jettison "perfectly functional, slightly used" televisions, stereos, bicycles, or furniture as if they were yesterday's newspaper. In just three years, according to a 1990 report from the nation's Ministry of Health and Welfare, waste production increased by more than one-third—to three pounds per person per day.

With 120 million people crammed into a country the size of California, Japan has little landfill space left. The government has resorted to creating garbage "islands" in Tokyo Bay and Osaka Bay. Rural towns are courted, frequently unsuccessfully, by

garbage managers seeking dump sites. "Midnight dumping" by private waste-disposal firms is on the rise. In 1989, there were more than 2,000 arrests for illegal dumping.

Most of what the Japanese cannot recycle, they burn, and the prospects for increased recycling are "negligible, very limited," says Makoto Saito, the ministry's deputy director of waste management. No official estimate of Japan's overall recycling rate is available. But contrary to the extravagant claims made by some U.S. environmentalists, Harold Levenson of the U.S. Congress's Office of Technology Assessment calculates—on the basis of data from the Clean Japan Center, a quasi-governmental agency—that Japan's recycling rate may be as low as 26 percent. That is still nearly twice the U.S. rate—and so would indicate that the United States can do a lot better at recycling. But this modest success, in "a country noted for its dependence on imports of raw materials, its homogeneous culture, and its propensity for citizen cooperation in community activities," suggests that recycling's potential is not as great as some have hoped.

Death Begins At 85?

"How Long Is the Human Life-Span?" by Marcia Barinaga, in *Science* (Nov. 15, 1991), American Assoc. for the Advancement of Science, 1333 H St. N.W., Washington, D.C. 20005.

All of us must die, of course, but what is the natural limit to a human life? Against a chorus of critics, Stanford rheumatologist James Fries has argued that the human body is biologically destined to begin falling apart at about age 85.

"It is frailty, rather than disease," that kills people at very old ages, Fries told Barinaga, a *Science* writer. Despite all the medical progress during the past decade, he points out, the remaining life span for

65-year-olds has been constant: 18.6 years, on average, for women, 14.7 years for men. Moreover, if the curves since 1900 for life expectancy from birth and from age 65 are extrapolated into the future, the lines converge early in the next century at about age 85—suggesting, Fries says, that that is roughly the biological limit to life.

Nonsense, say his critics. The recent plateau in life expectancy after 65, Duke University demographer Kenneth Manton as-