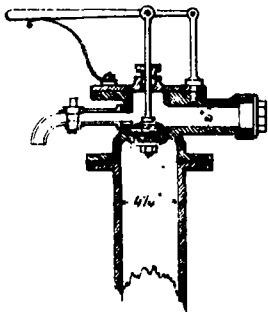


behavioral capacity" to share information, and there are fundamental similarities between lower animals' "cultural" traits and man's. But man's bigger, more complex brain allows him to accumulate a staggering amount of data (which writing helps him to recall) and to invent new solutions to problems. Humans' *genetic* capacity for culture far surpasses that of their animal distant cousins.

THE ENGINEERING DRAWINGS OF BENJAMIN HENRY LATROBE

edited by Darwin H. Stapleton
 Yale, 1980
 256 pp. \$62.50



Journal of the Franklin Institute.

Benjamin Latrobe (1764–1820), as an architect, is well-known for his part in designing the U.S. Capitol and for supervising the rebuilding of the White House after the British burned it in the War of 1812. But Latrobe has largely been forgotten as an engineer. Yet his engineering successes include the Chesapeake and Delaware Canal, the Washington Canal, the National (Cumberland) Road, the Philadelphia Waterworks, and the Washington Navy Yard dry-dock. This oversized book includes 84 of Latrobe's careful drawings, rarities of comprehensive draftsmanship, with a long introductory essay. Stapleton, an assistant professor at Case Western Reserve University, emphasizes the complexity of Latrobe's undertakings: Latrobe combined science (geology, topography, hydrology); mechanics (pumps, pile drivers, steam engines); and precision surveying and cartography. A master at investment and self-advertisement, Latrobe was a one-man 19th-century construction company.

MATHEMATICS: The Loss of Certainty

by Morris Kline
 Oxford, 1980
 366 pp. \$19.95

With its beginnings among the surveyors and builders of ancient Egypt and Babylon, later transformed into a formal science by the Greeks, mathematics has been a tool used to define our surroundings. Mathematical principles underlie, unify, and reveal the order in the natural world. During the Renaissance, Kepler, Newton, Galileo, and Descartes believed that the universe functioned according to a pattern and that mathematics was the God-given key to understanding it. Pure

mathematics — the study of numbers and their arrangement—relies on deductive reasoning within a set system of rules. But over the centuries, argues Kline, professor emeritus at New York University, mathematicians too often relied on intuition and arguments that produced “correct” results but lacked logical justification. By 1800, mathematics was in trouble. The 19th-century invention of non-Euclidian geometry played havoc with traditional notions about spatial relationships (parallel lines *could* meet). In this century, Bertrand Russell, Kurt Gödel, and others demonstrated the impossibility of proving that math’s methods and rules are consistently correct. Yet, Kline reminds us in this deft history, mathematics, despite its limitations, works. It has taken us into outer space *and* has brought us back.

THE AGE OF BIRDS

by Alan Feduccia
Harvard, 1980
196 pp. \$20

In 1861, a zoological clue of great importance was unearthed in a Bavarian limestone quarry. The 140-million-year-old *Archaeopteryx* fossil linked birds with reptiles. It had been feathered *and* had teeth. Even ardent evolutionists were troubled by *Archaeopteryx*’s teeth. For a long time many suspected that its skull had belonged to another animal. Skepticism subsided with the discovery of more *Archaeopteryx* fossils beginning in 1897. Today, arguments about the evolution of birds center on finer technical points that Feduccia, a zoologist at the University of North Carolina and a research associate at the Smithsonian, lucidly discusses. What was the original purpose of feathers—warmth or flight? Did the first birds lift themselves up from the ground or glide down from high places? Were they at home on the ground or in trees? The answers are all the more elusive, Feduccia notes, because most bird bones are hollow—to enhance flight—and do not preserve well. Moreover, beneath their feathers, birds tend to be very much the same. And, of course, the evolution of *flightlessness* among elephant birds, rheas, emus, and ostriches must still be explained.