Science & Technology

GREAT SCIENTIFIC EXPERIMENTS
by Rom Harré
Oxford, 1983
224 pp. $17.95

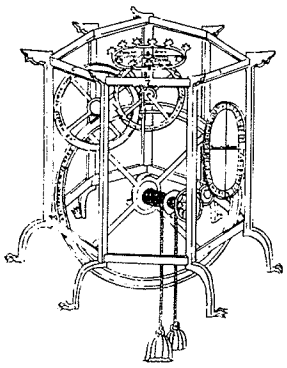
Selecting 20 experiments from the fifth century B.C. to the present, Harré, an Oxford philosopher, shows that the essence of science lies, first, in a systematic way of asking questions and, second, in painstaking testing and observation. These experiments range from ancient biology (Aristotle's notes on the development of chick embryos) to modern physics (Otto Stern's demonstration of the wavelike properties of matter). Some demonstrate that reason and observation yield theories whose proof must often await a powerful tool. During the 1950s, for example, researchers François Jacob and Élie Wollman had no direct evidence for their theory about the transfer of genetic material, but during the 1960s, the electron microscope proved them right. To his text, Harré adds a rich sampling of scientists' logs, drawings, even poetry.

A STROLL WITH WILLIAM JAMES
by Jacques Barzun
Harper, 1983
344 pp. $19.95

Henry James, the novelist, described his older brother William (1842–1910) as "my protector, my backer, my authority, my pride." Barzun is almost as reverent: This informative "stroll" unabashedly celebrates the Harvard psychologist who quietly proved to be "one of the makers of the new culture of our century." James's name has come to be associated with Pragmatism, a doctrine often misconstrued as a form of anti-intellectualism. Pragmatism held, as James himself explained, that "ideas become true just insofar as they help us get into satisfactory relation with other parts of our experience." Barzun, a former professor at Columbia, rightly identifies the 1890 masterpiece, *Principles of Psychology*, as the foundation of all James's explorations of human behavior, art, philosophy, and religion. James proceeded from a neurological base; his discussion of reflexes, Barzun argues, remains unrivaled. He made clear, among other things, that a "conditioned reflex," of the sort that Pavlov's dog made famous, is not a true reflex because it disappears when the stimulus is repeated

without reward. Though a naturalist, James refused to reduce mental life to a simple mechanistic theory, and that may account for his relative lack of renown: Even in America, Freud's reductivistic psychology eclipsed James's subtler notion that in experience alone were to be found "the constituents of the mind and the explanations of its performance." His horror of oversimplification may also explain why James acquired a small but select following (e.g., mathematician Alfred North Whitehead, physicist Niels Bohr, psychologist Jean Piaget). Barzun's book should, however, help bring James's arguments to a wider audience.

REVOLUTION IN TIME: Clocks and the Making of the Modern World
by David S. Landes
Harvard, 1983
482 pp. $20



Great thinkers from Heraclitus to Einstein have reflected upon the nature of time, but few have given much thought to its keeper, the clock. Landes, a Harvard historian, has done so in this richly detailed exploration. The Chinese, the pioneers of timekeeping, constructed as early as 1086 a water-powered clock that reproduced the movement of the "three luminaries" (the sun, moon, and stars) and showed both the hours and the *k'o* (roughly 14½ minutes). Destroyed by Tartars in 1126, this instrument marked the zenith of China's horological effort. In medieval Europe, the Church's strict observance of holy days and prayer times demanded accurate timepieces. The growth of cities, where time was more a function of commercial rhythms than of natural ones, made timekeepers of the bourgeoisie. The replacement of weights with springs reduced the size of the clock and led in the 16th century to the making of watches. People began living with one eye on the dial, a practice of which Protestant John Calvin heartily approved. As its precision increased, so did the scientific applications of the instrument. The invention of the marine chronometer in 1759 enabled navigators to determine their position by longitude. Modern atomic clocks in today's observatories beat 9,192,631,770 times a second. The nature of time may still elude us, but, as Landes observes, "we sure know how to measure it."