the Holocaust. The European Jewish population has continued to decline, to little more than one million, the smallest it has been since the late Middle Ages. The world Jewish population has "yet to recover" from Hitler's genocide, hovering at some 13 million, compared with 16 million in 1939.

The United States replaced Europe as the center of the Diaspora after World War II, but the population of American Jews, who constitute about 40 percent of world Jewry, "is now headed for catastrophic decline," Krauthammer says. The Jewish population has decreased from three percent to two percent of the U.S. population in the last half-century. The biological replacement rate among American Jews is only 80 percent, so that there is a 20 percent population loss with each passing generation. Assimilation also takes a toll. In a poll conducted by the *Los Angeles Times*, only 70 percent of Jews said they were raising their children as Jews. Clearly, Krauthammer notes, "a population in which the biological replacement rate is 80 percent and the cultural replacement rate is 70 percent is headed for extinction."

Greenberg, the editor of *MindField* (a series of books on current issues), also fears that Israel has increased the vulnerability of the Jews, but for very different reasons. Before the founding of Israel, she says, the need to maintain an identity apart in various host countries fostered flexibility and a sense of openness in the Jewish culture. Greenberg argues that the equation of Jewish identity with the state of Israel, which increasingly emphasizes conformity and a uniform definition of Jewish identity, is sapping the culture of some traditional strengths. "Jewishness cannot be reduced to Israeli-ness," Greenberg insists. Jewish identity must be severed from Israel if the Jewish people are to survive.

Krauthammer, however, sees a strong Jewish state as the only hope for the future of the Jews. Much is made of the Jews' two returns, but those only "defied the norm." There would be no third return. Modern Jews are descended from Judah, the southern kingdom of Israel. They should not forget what happened to the Jews of the northern kingdom of Israel, the legendary 10 "lost tribes" who were overrun by the Assyrians in 772 B.C., exiled, and lost forever.

SCIENCE, TECHNOLOGY & ENVIRONMENT

When Sciences Converge

"History and the Scientific Worldview" by William H. McNeill, in *History and Theory* (Feb. 1998), Blackwell Publishers, 350 Main St., Malden, Mass. 02148.

Craving universal and unchanging truth, historians and social scientists have long looked wistfully at the natural sciences, with their imposingly objective, quantitative character. But the revolutionary transformation of physics and cosmology over the last half-century has made the natural and social sciences much more alike, contends historian McNeill, author of *The Rise of the West* (1963).

At the beginning of the century, physics and astronomy, being exact, cumulative, and predictive, were the ideal toward which not only social scientists but even scientists in other fields, such as biology and geology, aspired. But then, in the 1920s, the old, Newtonian certainties began "to crumble with the emergence of quantum mechanics," McNeill notes. Three decades later, "the universe as a whole became open-ended and unstable . . . when a coalition of cosmologists and small-particle physicists began to compose a new and very surprising story of how it all got started and proceeded to evolve across the past 10 to 15 billion years." Instead of the predictable cosmos, obeying universal mathematical laws, that scientists between the 17th and 19th centuries had seen, there was now an expanding universe that had begun with a Big Bang and in which "the ultimate limits of our familiar matter, energy, space, and time are sporadically approached, or perhaps even crossed, in the neighborhood of Black Holes, quasars, and the like."

This very different cosmos, McNeill observes, "begins to resemble the chaotic and changeable world that biologists and social scientists have always struggled to understand." In their effort to obtain eternal, objective truths, historians and social scientists have always been hampered by "the role of

the observer in creating what is observed." Now, physicists are haunted by the same dilemma. "Einstein's relativity and the oddities of quantum mechanics both drew attention to the inescapable involvement of the act of measurement with what is measured," McNeill notes.

Cosmologists, he continues, now debate whether the universe of their surmise may be forced "to conform to what human minds and humanly created instruments are capable of observing. The resulting epistemological dilemma is acute, even though practicing scientists usually prefer to disregard it. But the notion, propagated in the 17th century, that physical science, relying on the certainties of mathematics, could achieve accurate predictability and an unambiguous description of external reality is no longer very plausible."

At every level of intellectual organization—whether physical, chemical, or biological, or at the level of humanly invented verbal and mathematical symbols—complexity is giving rise to new and surprising sorts of behavior, McNeill points out. The natural and social sciences, he concludes, have begun to converge around a "grand evolutionary worldview." He predicts that this congruence of the sciences will prove to be "the primary intellectual achievement of the 20th century."

Why Rest?

"The Quest for the Essence of Sleep" by Alexander A. Borbély and Guilio Tononi, in *Daedelus* (Spring 1998), 136 Irving St., Cambridge, Mass. 02138.

Sleep is as necessary to human beings as food and drink, and most people spend one-third of their lives in this unconscious state. Yet, despite decades of research, the purpose of sleep remains obscure, notes Borbély, a professor of pharmacology at the University of Zurich, and Tononi, a Senior Fellow at the Neurosciences Institute in La Jolla, California.

Scientists have been studying sleep by measuring brain waves since the 1920s, but it was only in 1953 that researchers discovered that there are two kinds of sleep: the traditional "quiet" sort and an "active" type in which the eyes move rapidly beneath their closed lids while the body's heart rate, blood pressure, and breathing fluctuate. Sleep, Borbély and Tononi say, seems to be not a unitary state but "a complex dynamic process" in which "active" and "quiet" slumber cyclically alternate. Active (or "rapid eye movement") sleep typically accounts for 20 to 25 percent of adult rest.

For My Lottie: Femme Endormie, *by Lovis Corinth*

Not everyone needs the same amount of rest, the authors observe. Some people, like Albert Einstein, spend up to 10 hours at a time in bed, while others, like Thomas Edison, need only four to six hours. One 70-year-old retired nurse found by English researchers needed only one hour of sleep a night.

Most people believe that sleep serves to renew the whole human being, body and brain. However, it is clear to scientists that people sleep for the benefit of the brain, say Borbély and Tononi. If a person lies awake but motionless overnight, in the morning the body's muscles are relaxed but the mind is not—and the "sense of well-being is lost." But exactly what function sleep serves for the brain is unknown. Some scientists speculate that sleep has a restorative function; others theorize that it offers stimulation, much as, in the womb, a fetus's "active" sleep helps the brain to mature. Still other researchers suggest that during sleep a person may replay and thus "consolidate" memories of activities that occurred during the day—or else erase memories, so as to prepare the brain circuitry for a new day.

Understanding how sleep works could have practical benefits. In the United States alone, sleep loss leads to 25,000 deaths and 2.5 million injuries on the road and elsewhere every year, at an estimated cost of $56 billion.