life span to reach 75 years around the year 2030. (Life expectancy in the West today is 73 years.) Efforts to increase life expectancy 50 percent faster—so that the average life span reaches 75 years by 2015—would put the total population at 4.90 billion in 2000, an increase of only 2.1 percent, and a modest price to pay for a much healthier population.

At this point in the demographic transition, the biggest population changes are likely to come from drops in the fertility rate. The UN projections assume an annual decline of .07; a 50 percent greater decline would mean an 18.8 percent *decrease* in the projected population by 2100. In fact, the most effective techniques for extending life expectancy cut infant mortality *and* reduce fertility. Education of women, for example, results both in fewer infant deaths and in raised aspirations that delay marriage and curtail childbearing.

First Bird

"Running, Leaping, Lifting Off" by Kevin Padian, in *The Sciences* (May-June 1982), New York Academy of Sciences, 2 East 63rd St., New York, N.Y. 10021.

How did birds learn to fly? Most paleontologists today believe that birds began as tree-dwelling reptiles that leaped from branch to branch. At first, their broadening primitive "wings" helped to break their fall; then, with further evolution, feathered appendages enabled them to glide and, finally, to fly.

But, says Padian, a Berkeley paleontologist, this theory errs in assuming that it is an easy step from gliding to flying. In order to sustain the "flight stroke"—which works on an entirely different aerodynamic principle—birds have a specialized bone structure, a high metabolism, and powerful muscles. Present-day gliders, such as flying squirrels, depend on little more than a membrane stretched between their limbs. Notes Padian, "there is no evidence that any group of gliding animals . . . are, or have ever been, 'on their way' to active flight."

Recently, three scientists at Northern Arizona University—ornithologist Russell P. Balda, chemist Gerald Caple, and physicist William R. Willis—have developed another scenario, based on estimates of the evolutionary steps that might have been necessary to make the complex flight stroke possible.

The flight stroke consists of two motions of the wings—down and forward and then up and backward—which together describe a lazy figure eight. "Proto-birds," the three scientists argue, were small, land-based dinosaurs that flushed out insects, ran them down, and caught them in their mouths. When a human runs he balances his stride by swinging his arms alternately. But in two-legged dinosaurs, the tail did the balancing and the forelimbs hung useless—ready to evolve a new function.

The proto-birds were able to achieve greater stability and lift as their finger bones enlarged to support a winglike surface. By swinging these "wings" forward—much the way a long jumper throws forward his

Archaeopteryx, the first bird, evolved from the reptiles some 130 million years ago.

From What on Earth Happened Before Man Arrived *by William G. Cartner.*

arms—they were able to prolong their lunges. By repeating the swing several times and gradually developing a return stroke that minimized drag, they could leap even further. Once natural selection refined their wings and increased their endurance, they left the ground behind.

Science and the Old South

"Science in the Old South: A Reappraisal" by Ronald L. Numbers and Janet S. Numbers, in *Journal of Southern History* (May 1982), % Bennet H. Wall, Dept. of History, University of Georgia, Athens, Ga. 30602.

"By 1850 the cotton kingdom had killed practically every germ of creative thought." When historian Samuel Eliot Morison wrote those words in 1927, he touched off a heated debate among scholars over ante-bellum Southern attitudes toward science. Now historians have data to settle the question, according to the authors, a historian of science and a clinical psychologist at the University of Wisconsin.

In 1860, Southerners made up 20 percent of the U.S. nonslave population. But only 11.6 percent of the scientists who held office in, or presented a paper to, the American Association for the Advancement of Science were from the South; by contrast, New England, with half as many people, produced three times as many AAAS leaders. Other indicators—the number of Southerners who published or wrote for scientific journals, for instance—suggest that Dixie trailed far behind the Northeast (but not the recently settled North Central states) in scientific accomplishment.

What accounts for the disparity? Historian Clement Eaton in *The Mind of the Old South* (1964) blamed the rise of "religious and proslav-