observation. Doppler radar systems, now under development by the National Center for Atmospheric Research in Colorado, bounce microwaves off objects that move with the wind (such as raindrops or ice particles) to gauge wind speed, and are thus more accurate at searching for microburst warning signs than conventional radar.

The Federal Aviation Administration plans to deploy Doppler radar at O'Hare, Kennedy, and 14 other major airports by 1989, and to require all airline pilots to undergo training to detect microbursts. The goal, McCarthy says, is to make wind shear accidents "a 20- to 30-year phenomenon instead of a one- to two-year phenomenon."

Sweet Memories

"Sweet Memories" by Paul E. Gold, in *American Scientist* (Mar.-Apr. 1987), Sigma Xi, 345 Whitney Ave., New Haven, Conn. 06511.

Doctors and dentists warn of the health hazards of too much sugar. But one sugar, glucose, and one hormone, adrenaline, may be key substances in forming memory.

Twenty five years ago, writes Gold, a professor of psychology and a member of the Neuroscience Program at the University of Virginia, scientists had no proof that "brains were biologically altered by experience." They knew only that important events were remembered better than other events. But Gold has now pinpointed "a physiological system that appears to determine which memories will be stored best."

While studying amnesia and memory enhancement, Gold found that test rats' level of arousal—specifically, associated levels of certain hormones in the blood—"appear[ed] to be the major contributor of additional information telling the brain to make new memories." The stronger the arousal, the better the memory of the event causing it.

Adrenaline, a hormone produced in response to environmental stresses, figures prominently in this process. Even when anesthetized, Gold's rats learned to be wary of a musical tone accompanied by an electric shock if they also received adrenaline injections; when the tone was later played without the shock, the rats still showed fear.

One consequence of high adrenaline levels in the blood is hyperglycemia (an increase in glucose levels). So Gold examined the effect of glucose on memory in rats, and found that injecting it had an effect similar to adrenaline's on memory performance. But unlike adrenaline, glucose has no harmful effects on the cardiovascular system, and can be used safely to study human memory. When healthy 70-year-old men and women were given glasses of lemonade, some prepared with glucose, some with saccharine, those who drank the glucose-sweetened beverage performed better on subsequent memory tests than their saccharine-only counterparts. And, Gold notes, older people who suffer from poor memory generally have poor regulation of blood glucose levels as well.

Gold cautions that scientists do not yet know *how* glucose affects the physiology of memory. But, he adds, research on adrenaline and glucose offers sweet promise of eventually "ameliorating memory impairments with pharmacological agents."