Medicine

An artificial pancreas

A system for the automatic continuous control of sugar in the blood of diabetic patients that simulates the performance of the normal pancreas has been developed by Miles Laboratories. The first commercially available unit was sold to the University Medical Center in Ulm, West Germany, where it has been successfully used since June to manage several severely ill diabetics.

The system consists of an analyzer for the continuous micro-measurement of blood sugar, a micro-computer for precise calculation of the insulin or glucose required to maintain the patient's blood sugar level within the normal range and a delivery system for infusion in exact dosage. It maintains normal levels of blood sugar in the diabetic patient regardless of diet or stress—a level of physiological control that is rarely if ever achieved by conventional diet and insulin therapy.

This insulin delivery system will have important applications in diabetes research, training and treatment centers, especially in the management of insulin-sensitive diabetics and diabetics in coma, undergoing surgery or kidney dialysis or who are pregnant. The system is also a step toward the development of an artificial pancreas that diabetics can wear on their persons.

How concussion blunts the brain

Persons who experience concussion (minor head injury) are known to experience drowsiness, irritability, confusion and memory loss during the hours after the injury. Concussion can also impair the processing of information for days afterward, D. Gronwall and P. Wrightson of the Auckland Hospital in New Zealand report in the Sept. 14 LANCET.

The Auckland neurosurgeons studied several groups of concussion patients up to several months after their head injuries. They found that the patients had difficulties processing information, compared with persons without head injuries, but that this difficulty usually abated a month or so after concussion. However, some of the patients continued to experience information-processing problems up to 70 days after concussion. These were usually the patients who had suffered memory loss for more than an hour after their injury, and who experienced headache, fatigue and inability to concentrate during the days following it.

What does the elderly in?

Fractures of the leg or hip have often preceded the deaths of many older people, especially women, causing investigators to conclude that the fractures were the cause of death. But how could fractures trigger their deaths? T. P. Eddy of the London School of Hygiene and Tropical Medicine suggests in the Sept. 13 NATURE that the cause is probably not fractures, but smoke pollution.

Eddy has found that deaths among the elderly in Britain that were associated with fractures receded from 1940 to 1950, rose from 1950 to 1959, and have decreased from 1959 to the present. This pattern parallels annual estimates of air pollution in Britain caused by railway and industrial smoke. Many of the women who died after fracturing bones also experienced bronchial infections. So Eddy concludes that they probably died, not from fracture complications, but from bronchitis contracted from smoke pollution. It's quite possible, of course, that other older people who had not fractured their bones also died during these years from bronchitis caused by smoke pollution.

Earth Sciences

Earth, moon and the origin of life

The growth patterns of coral and certain algae are sensitive to the solar day. Studies of their fossils reveal that in the earth's distant past the day was shorter than it is now (420 days per year 3 billion years ago). The conservation of angular momentum in the earth-moon system with the earth rotating that much faster would require the moon to be closer. This has led to calculations that about 2.85 billion years ago (give or take a quarter billion years), the moon was only about a third its present distance.

Three Cornell University scientists speculate in the Sept. 13 NATURE that this former proximity of the moon may have contributed to the evolution of life on earth.

Such a close approach would have caused very large tides and enormous energy dissipation. The tidal heating could have been great enough to vaporize the oceans. The three scientists take note that there is evidence in the geological record, published last year, that a pulse of high temperature volcanism occurred about 2.8 billion years ago. Many of the high-temperature intrusions in ultrabasic rocks are dated at that time. Such intrusions, they speculate, could be a result of tidal heating.

The "implied catastrophe," the scientists note, roughly coincides with the first records of life. The first cell-like objects, from the Onverwacht Series of rocks in southern Africa, are between 3.0 and 3.3 billion years old. The earliest fossil algae, it has been suggested, may have formed in scalding waters, "which is consistent with the idea of thermal catastrophe." Taking note of laboratory experiments in which heating and cooling of "organic soup" leads to formation of remarkably cell-like aggregates, the Cornell scientists conclude: "It seems within the realm of possibility that a global thermal event might have been involved in the origin of life."

Colors of the sky at sunset

Everyone has marveled at the beauty and diversity of sunsets. Scientists, in their own way, do too. As physicists Charles N. Adams, Gilbert N. Plass and George W. Kattawar of Texas A&M University put it: "Each sunrise and sunset is unique, unrepeatable and highly dynamic."

Using the CDC 7600 computer at the National Center for Atmospheric Research in Boulder, Colo., the three physicists have studied the influences on the radiance and color of the twilight sky. They used five different models of the earth's atmosphere to calculate how changes in the amounts of ozone and aerosols alter the sky's brightness and color. Aerosols, systems of solid or liquid particles dispersed in the air, include haze, most smokes and some fogs and clouds.

The studies verify that molecular scattering alone cannot explain the colors of the twilight sky. The addition of ozone absorption to the model is necessary to reproduce the blue of the sky overhead. The deep blue of the overhead sky and the pure red and orange colors above the horizon, they report in the September JOURNAL OF THE ATMOSPHERIC SCIENCES, are obtained only when a realistic model is used that combines molecular and aerosol scattering and ozone absorption.

They found that when the aerosol amount is three times normal the blue of the zenith sky becomes deeper and more extensive. But when the aerosol amount is 10 times normal the purity of the blue overhead decreases markedly. Above the horizon, greater aerosol concentrations cause larger and brighter regions of red and yellow colors.