From the library

Remembrance of things past

Bellow was as vivid a presence in Chicago as Henry James had been in London or Beckett was in Paris. Chicagoans regularly glimpsed him lunching at Whitehall Club on the near north side or rummaging through used books at Staver’s bookshop on 57th Street. Joseph Epstein, writing in the New York Times book review, was fascinated by the novelist’s “singular appearance: gap-toothed, white-haired, with a nose “Gogol would have approved,” he radiated a quietly charismatic presence. His eyes were his most notable feature: “they are dark brown, and go deep and seem extraordinarily young. All the more young for the fact that the rest of his face looks to have taken its full fifty-five year share of the ravages of weather, work and general tribulation.” (James A. Baldwin, Biography. New York: Random House, 2000:403.)

Protein regulation and human diseases

Proteins are the essential fabric of which every cell is made. Strands of protein act as the kernel or template for a multitude of proteins as they become no longer needed or fail to fold into their compact coils is a subject of some interest. Abnormal regulation of proteins within cells can lead to human disease in at least three ways. (1) In a number of hereditary anemias, a mutant gene leads to abnormal haemoglobin production. This in turn leads to proteinosematas destroying the abnormal haemoglobin and thus anaemia results. (2) In the case of cystic fibrosis, a gene mutation that ordinarily codes for a protein that moves chloride across a cell’s outer membrane is abnormal. The protein is slightly misshapen and once again proteinosematas break the protein down before it can reach the cell membrane. The mucous build up that occurs in this disease is directly related to the lack of normal chloride transporters. (3) In the case of several degenerative neurological diseases including Parkinson’s, Huntington’s, and Alzheimer’s, clumps of misfolded proteins accumulate in association with the proteinosematas in certain neurons. It is not clear why the neurons in these disorders fail to destroy the abnormal proteins as they do in the previous two examples. This is a focus of much of the research investigating these diseases. However, in the case of Parkinson’s disease that is inherited, recent investigations suggest it results from a mutation in a gene for a specific type of proteinase enzyme that causes proteins to build up in brain cells and subsequently destroy them. (Scientific American 2001;January:68–73.)

Can diabetes type 1 be prevented?

Type 1 diabetes is an autoimmune disorder that affects approximately four million people in Europe and North America. It occurs as the result of the patient’s own immune system attacking the islet cells of the pancreas. The inciter of this inflammatory response is yet unknown, although in some cases the disease runs in families and some investigators have suggested that a viral infection may be important in the pathogenesis. Investigators at Bristol University are now studying heat labile enterotoxin of the E. coli bacterium. They have demonstrated that in rats the enterotoxin prevents the immune system from destroying the insulin producing islet cells. The enterotoxin apparently binds to the receptors on the surface of macrophages which in turn produce chemicals that inhibit the immune system. In experimental animals a nasal spray of the enterotoxin stopped the progression of type 1 diabetes. Since the early stages of type 1 diabetes can be detected in humans via antibodies found in the blood, the Bristol team hopes that screening of high risk groups before the islet cells are completely damaged might identify a population that would be amenable to therapy with the heat labile enterotoxin. (New Scientist 2000;16 December:10.)

Optical illusions: a battle between the two sides of the brain?

In the past decade, Professor John Pettigrew, a neurobiologist at the University of Queensland in Brisbane, Australia, has been investigating the underlying phenomenology of visual illusions. These studies suggest that many optical illusions may work not by deceiving the visual system but rather by making it vulnerable or collapseable in the two halves of the human brain. Pettigrew has suggested that it is not just groups of neurons that compete in binocular rivalry but the rivalry between the right and left hemispheres of the cerebral cortex that underlie the perception of visual illusions. His studies have involved using ice water administered to one eardrum, which induces a caloric response and an enhanced activity of the cortex on the side of the stimulus. In other patients, a highly focused one tesla magnetic field is used to disrupt the neural activity of the hemisphere to which it is applied. These studies seem to support Pettigrew’s theory that binocular rivalry may provide a simple diagnostic test for manic depression. (Scientific American 2001;284:24–6.)

Treating rather than screening the blood supply to keep it safe

Each year more than 40 million units of blood are transfused to into human patients around the world. In most parts of the developed world the blood supply is relatively safe thanks to regular screening and elimination of donors infected with dangerous viruses, particularly HIV and hepatitis B. However, bacterial contamination of the blood supply is an increased worry as well as the possibility that an screened virus may evade the check. At the recent American Society of Hematology meeting in San Francisco, investigators from Dartmouth Medical Center, New Hampshire, described a new approach to treating blood to prevent transmission of infectious agents. This study takes advantage of the fact that red blood cells contain no nucleus and thus do not depend on DNA or RNA. Obviously, viruses and bacteria rely on these nucleic acids to replicate and to function. Scientists at the Vitex Corporation have developed a small molecule they call inactine that penetrates the cell membrane. Once inside the cell the inactine molecules, which are negatively charged, bind to the negatively charged DNA or RNA and produce a chemical reaction that leaves these molecules unable to function. Treatment with inactine reduces the viral contamination 10 000-fold which appears to be enough to cleanse most blood supplies. Moreover, functional studies of the red blood cells indicated that the inactine had in no way interfered with the red blood cells themselves. (New Scientist 2000;16 December:12.)