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This Week in Science

t is not easy to root out latent viruses; they cause no obvious disease symptoms, and in their undetectable state there is no simple way to get a biochemical handle on them. Studies of three serious human pathogens that can establish latent infections in their hosts-HIV-1 (the AIDS virus that establishes latent infections in quiescent T lymphocytes), EBV (the prototype lymphotropic virus latent in B lymphocytes), and HSV-1 (the prototype alphavirus latent in neurons)-suggest that while the latent phase of each is distinctive, some features are common to them all (page 815). Garcia-Blanco and Cullen report that host cells harboring latent viruses all fail to produce transcription factors that are critical for the activation of genes of the virus that bring about replication; in addition, in some cases, host cells may produce repressor substances that prevent viral gene expression. The interplay of viral and host genes is complex; insights into their relations and the stimuli and signals that drive viruses out of latency and into the replicative phase could boost clinical efforts to find therapies for controlling these viruses that have insidiously developed mechanisms for taking up residence in their hosts for life.

High-temperature superconductivity

chieving high-temperature superconductivity with doped fullerides and developing quantitative theories to explain the phenomenon are two fast-evolving areas of materials science. Iqbal et al. report that, if the metal thallium is used as a codopant with rubidium or potassium, critical temperatures of superconducting doped fullerides can be raised (page 826). Several new high-temperature superconducting fullerides were produced with pure C₆₀ and with C₆₀ diluted with about 15% C70. Superconducting transition temperatures of some of these materials were above 45 K. Erwin and Pickett have calculated, from first principles, the shape of the Fermi surface of the superconducting fulleride K_3C_{60} (page 842). The Fermi surface is a mathematical representation of electron energy as a function of momentum in three dimensions; its shape embodies the electronic properties of a material. K_3C_{60} appears to have an unusual Fermi surface, one which should provide important information about superconductivity in this material.

Dinosaur extinction

inosaur census takers have determined that there were many dinosaurs from diverse taxonomic families living in the Great Plains at the end of the Cretaceous (page 835). In some 15,000 hours of fieldwork at the Hell Creek Formation of Montana and North Dakota, Sheehan and colleagues and trained volunteers in search parties scoured the area for visible dinosaur bones. They found that family-level diversity of dinosaurs did not decline near the end of the Cretaceous (the Hell Creek Formation records the last two to three million years of that Period). This adds credence to the theory that the extinction of the dinosaurs was brought about by some catastrophic event, most likely the crash of an asteroid or comet into the Earth; it does not support the opposing scenario in which a changing climate or other environmental factor was causing a gradual decline in the diversity of dinosaur families during the Cretaceous.

Cell polarity

B pithelial cells form barriers in the body across which they can move ions and other molecules. For example, in the gut the epithelial layer acts as a conduit through which ingested food is internalized. Enzymes and other proteins that participate in these transport processes are not uniformly distributed in epithelial cell membranes but typically concentrate at one surface or the other. Often newly synthesized enzymes are sorted as they move along intracellular membranes from their sites of synthesis. But this form of sorting does not occur in the case of the enzyme Na⁺, K⁺-ATPase (page 847). Hammerton et al. found that this enzyme travels to membranes on both sides of cultured epithelial cells but that it is only stable at the basallateral side; thus, it concentrates there. At the apical side, the enzyme is unstable. They propose that the enzyme's stability may be ensured if it gets assembled into membrane-cvtoskeleton complexes, which in these cells form only on the basal-lateral surface.

Clearance role of antibody

sually viruses are cleared from host cells by cells of the immune system that recognize viral antigens on the host cell surface; because the host cell is lysed, casualties of this process are both the viruses and the host cells. A known exception to this clearance mechanism is the virusinfected neuron, which regularly escapes recognition and lysis. Levine et al. have found that neurons can be cleared of viruses by antibodies (page 856). Hyperimmune serum was injected into immunodeficient mice that were infected with the Sindbis virus, an alphavirus. These mice could not mount their own immune response to the virus. But within 48 hours of the serum transfer, the brains and spinal cords of the mice were completely free of viruses, and some time later they were also free of viral genes. Among the antibodies that were effective were those directed against the viral envelope glycoproteins. In vitro studies showed that the antibodies interfered with viral gene expression, which blocked synthesis of viral proteins and the replication of the viruses. Eventually, mature viruses were no longer being produced. Antibodies have long been known for their role in neutralizing extracellular viruses, but their ability to clear viruses from neurons is an unexpected ■ RUTH LEVY GUYER property.

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Figure 1: Expression Data A. Expression B. Flow Through C. Wash D. Elution



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Investigators wishing to obtain any of these materials should send requests to:

Dr. Craig W. Reynolds Biological Response Modifiers Program NCI-FCRDC Building 1052, Room 253 Frederick, MD 21702-1013 FAX: 301-846-5429

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