BIOLOGY

Hormones made with ticket for release

Cells synthesize a hormone by following genetic instructions that specify a precursor molecule, 16 to 30 amino acids longer than the final active polypeptide. Günter Blobel of Rockefeller University suggests that the extra stretch of amino acids is a ticket that identifies polypeptides that are to be packaged for secretion and that allows them to enter the spongelike structure where packets form.

The hormone tickets are valid over a wide range of organisms, Dennis Shields and Blobel reported in the May PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES. When messenger RNA molecules from either of two fish species direct synthesis of the prehormone preproinsulin, microsomal membranes from dog pancreas cells can collect the hormone and correctly snip off the extension pieces. The tickets for the various hormones must have common features, Blobel says, but they have not yet been identified.

In more recent work Blobel, Vishwanath R. Lingappa and Anne Devillers-Thiery demonstrate that the clipping enzyme is in the microsomal membranes, the packaging department of the cell, and that it acts while the other end of the prehormone is still being synthesized. If synthesis of growth hormone or prolactin precursors is completed in the absence of microsomal membranes, the products are not cleaved or collected, they report in the June PROCEEDINGS.

Bang, boom: Bad for baby hamsters

Young hamsters are most susceptible to hearing damage from loud noises shortly after their inner-ear organs mature, researchers at the University of Pennsylvania report in the July 22 SCIENCE. Gregory R. Bock and James C. Saunders exposed hamsters to a 2.5 minute blast of noise having an intensity comparable to the sound of a jet taking off 100 meters away. The investigators tested the animals' hearing five days later. The youngest (16 days old) and the oldest (80 days old) hamsters showed no effect of the noise. A significant hearing loss, however, resulted from exposure when the animals were 27 to 55 days old. Bock and Saunders are currently looking for anatomical changes responsible for this loss.

Hamsters are born with much less mature sensory systems than are humans. Therefore, if a susceptible period occurs in people, its onset would probably be prenatal, Bock explains. Studies of premature babies exposed to the noise of incubators may identify such a critical period in infants.

What makes limbs regenerate?

The natural ability of some animals to regenerate amputated limbs is intriguing because of its desirability to humans. There seem to be three key ingredients affecting this mystical process: the initial injury, extent of wound and presence of nerve cells at the amputation site.

A recent experiment has specifically examined the "extent and kinds of injury" needed to provoke the natural restoration process in newt limbs. A preliminary result suggests that natural regrowth may occur only if an injury causes more than some minimum amount of damage.

Roy A. Tassava and Robert M. Loyd of Ohio State University grafted skin onto the ends of freshly amputated newt limbs, thereby inhibiting natural regeneration. Five weeks later they reinjured the stumps in various ways: slicing off or across the stump ends, puncturing with a needle and partially or entirely removing the graft. In all except the puncture cases, the reinjured stumps, to varying extents, regrew limbs. Tassava and Loyd speculate in the July 7 NATURE that one possibility is "the small wound epidermis areas [caused by the needle] were insufficient for regeneration to occur."

PHYSICAL SCIENCES

Predicting magnetic storms

Geomagnetic storms are disturbances of the earth's magnetic field that cause a large number of phenomena from spectacular auroral displays to disturbances of radio communication. Their periodic occurrence has led to attempts to link them to solar phenomena. Now observers at Kitt Peak National Observatory have found that geomagnetic storms can be predicted by watching the appearance of holes in the solar corona (SN: 12/18-25/76, p. 399).

Coronal holes are regions of the sun's corona in which the magnetic-field lines open outward and the density falls off, allowing a larger amount of material than normal to flow out into the solar wind. This produces an increase in the speed and the amount of the solar-wind material, which is mostly charged particles. The increased solar wind passes the earth about seven days after the appearance of the coronal hole, and the increase in charged particles going by causes disturbances of the geomagnetic field. With regular observations of the sun by the Solar Vacuum Telescope at Kitt Peak, observers find they can get a week's warning of the occurrence of geomagnetic storms.

No mini black holes yet

Originally, black holes were suppposed to be stars that had collapsed to densities at which matter was squashed to nothing and nothing could ever get out again. Then Stephen Hawking of Cambridge University proposed that the big bang that formed the universe might have created miniature black holes that could still be around and might even be scattered through the solar system. Hawking also proposed, contrary to previous theory, that certain radiation could indeed get out of a black hole and that in fact black holes might evaporate or eventually disappear. At the end of their disappearance black holes of the miniature variety should explode with sizable pops of gamma rays.

A search for the Cerenkov light made by such gamma rays as they enter the upper atmosphere has been conducted by the Harvard-Smithsonian Center for Astrophysics using giant mirrors at Mt. Hopkins, Ariz., and White Sands, N.M. Trevor Weekes of the center's Mt. Hopkins staff and Neil Porter of University College, Dublin, report no evidence for such gamma rays, indicating that the density of such primordial black holes is not more than 1/100 of previous estimates.

No new charms at 6 GeV

The first of the new and exciting class of physical particles called charmed hadrons were discovered in the annihilation collisions of electrons and positrons at an energy (particle mass) of about 2.5 billion electron-volts (2.5 GeV). Since that discovery, a whole new hierarchy has been built up as more and more particles have been found with rising energy of electron-positron collisions.

Charmed particles have also been discovered in other types of interactions, and hints of various other new particles have also been found. Hints of possible new particles found in collisions of hadrons at 400 GeV at the Fermi National Accelerator Laboratory in Batavia, Ill., have sparked another search with the SPEAR storage ring at the Stanford Linear Accelerator Center, this time with the highest interaction energies yet for such collisions. The work was done by D. G. Aschman of Princeton University and 25 others of Princeton, the University of Pavia, the University of Maryland, the University of California at San Diego and SLAC. It concerned the interaction energy range between 5.67 and 6.73 GeV. The experimenters report in the July 18 PHYSICAL REVIEW LETTERS that no evidence for new particles has been found.