

Gene expression: For the eyes only

The gene for a protein of chick lens has been transferred to mouse cells growing in culture. If the mouse cells come from skin, brain, kidney, liver or lung, few if any make the chick lens protein. But if the cells come from mouse lens, 40 percent synthesize the chick product, called delta (δ)-crystallin. "To our knowledge, this is the first demonstration that a cloned gene shows preferential expression in homologous cell types of different species," Hisato Kondoh, Kunio Yasuda and T. S. Okada of Kyoto University, Japan, say in the Feb. 3 *NATURE*. This situation may allow scientists to determine what controls which genes are active in cells of a specific tissue.

Getting genes to show such specificity has been a problem in genetic engineering. The specificity appears to be determined by stretches of DNA outside the coding regions of the gene. When the Japanese scientists replaced the DNA adjacent to the start of the gene with the control region of an animal virus, the gene was expressed in all the various types of cells rather than primarily in those from mouse lens.

The mouse cells appear able to correctly process the product of the chick gene. Because mammalian cells normally make a biochemically and immunochemically distinct lens protein, called gamma-crystallin, the scientists were able to identify very small amounts of δ -crystallin synthesized by mouse cells under the control of the chick gene. The product binds to an antibody to chick δ -crystallin and has the same molecular weight as the chick protein, Kondoh and colleagues report. This processing is no trivial matter, because the chick gene has 14 coding sequences interspersed with 13 intervening sequences.

Stolen genes in plant disease

It is a gene apparently picked up from a normal cell that makes some animal cancer viruses particularly virulent. Now biologists report the counterpart in plant disease. Hairy root disease, characterized by uncontrolled growth of tissue at the site of infection, is caused by a bacterium related to that responsible for crown gall disease. Frank F. White, Eugene W. Nester and colleagues at the University of Washington in Seattle report that the genetic material of a normal tobacco plant contains a stretch of DNA similar to that transferred from the hairy root disease bacterium, *Agrobacterium rhizogenes*, to plant chromosomes. This region seems to be present in only one copy in the normal plant, but in multiple copies in infected plant tissue, and apparently contains a gene "concerned with hairy root induction," they report in the Jan. 27 *NATURE*. "Perhaps in the evolution of *Agrobacterium*-plant relationships, the bacterium has captured plant genes, which it then reinserts into the plant genome, analogous to the acquisition of host oncogenes [cancer genes] by some [animal] RNA tumor viruses," they say. Alternatively, the plant sequences may have been acquired from past infections or the genes may have evolved from a common sequence.

From journal to market lickety-split

Just three months after the amino acid sequence of a human hormone was reported in the scientific literature, a biotechnology company has on the market a chemically synthesized gene for the hormone. According to the company, Creative Bio-Molecules, Inc. of Brisbane, Calif., the hormone gene is the first synthetic gene to be sold to the general research community. The gene codes for human pancreatic growth hormone-releasing factor, which directs secretion of growth hormone from the pituitary gland and may offer a treatment for certain human growth disorders (SN: 1/15/83, p. 38; 11/6/82, p. 292). The synthetic gene should now allow the substance to be produced in ample quantities by genetically engineered microorganisms for further studies.

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Discomfort forecast

Even as hints of spring promise to send warnings of "wind chill" into storage for the summer months, the National Oceanic and Atmospheric Administration has announced a new tool for gauging just how miserable the weather is likely to make us feel. The new "weather stress index" incorporates measurements of temperature, humidity and wind speed. The index compiled is relative to typical weather conditions in a given location. Thus, the index for a date is based on the average conditions for that day in past years at the same location. Lawrence S. Kalkstein of the University of Delaware in Newark explains that the index represents the percentage of days that would have felt more comfortable than a day under present conditions. A February temperature of 30°F would be about average to New Yorkers and would rate a weather stress index of 50 percent, he says. The same conditions in a place such as New Orleans, where warmer February temperatures are the rule, would be given an index of 99 percent. This would indicate that most people in New Orleans would perceive the 30°F day as extremely uncomfortable. Kalkstein, who developed the index for NOAA, says that it may be used daily "within a year." The weather stress index is published monthly in NOAA bulletins and then is circulated to meteorologists who use tables to gear the index to conditions at their particular location.

Long Valley quakes taper off

The intense swarm of small earthquakes in the Long Valley region of eastern California near the town of Mammoth Lakes has died down from a maximum of nearly 1,000 per day (SN: 6/12/82, p. 390; 1/15/83, p. 39) to about 30 per day, the United States Geological Survey in Menlo Park, Calif., reports. Seismologist David P. Hill says it appears that the quakes and continuing deformation of ground in the area are caused by movement of molten rock—magma—in the magma chamber known to exist several miles below the surface.

In an effort to understand the seismic activity at Long Valley, scientists are reviewing information collected during and after four earthquakes of Richter magnitude 6.0 and greater occurred near Mammoth Lakes in 1980. While it seems likely that a crack opened then as it filled with fluid, Hill says that one problem is that most magma is too thick to open a crack rapidly enough to cause earthquakes of those sizes. He says that the fluid instead may have been a gaseous or watery solution.

Lightning tracked from far afield

Static is music to its ears. A series of eight antennae arrayed along the eastern seaboard continuously detects and records nearly every cloud-to-ground flash that strikes from Maine to North Carolina, and as far west as Ohio. The system, designed by Richard Orville of the State University of New York at Albany, was installed last August and is the first network in the nation that records lightning throughout the winter. Records show that about one percent as many lightning strikes occur during winter storms as during severe summer storms, Orville says. The network intercepts lightning signals during a storm much as a car radio does, as indicated by the static that interrupts broadcast. The detectors pick up the static and pass the signal through microcomputers, and then send the information to a main computer in Albany where the location of the lightning is ascertained. The data, Orville says, will be correlated with information collected by satellites, radar and ground observations, and used in studying the entire structure of storm systems. The data also will be useful in characterizing certain aspects of cloud-to-ground lightning, such as polarity (positive or negative charge), size of charge and high peak currents—the most damaging form of current.

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