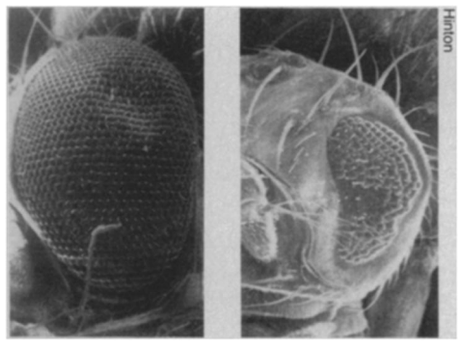
Biology

Transposon with a fixed address

Jumping genes that bound in and out of animal chromosomes, disrupting the action of the more immobile elements, are generally thought to land more or less randomly (see page 264). But a biologist at the College of Wooster (Ohio) now reports that one transposon inserts itself into only about 15 different sites along the three chromosomes of the pineapple fly *Drosophila ananassae* (a close relative of the more common laboratory subject *Drosophila melanogaster*). Surprisingly, in each of these sites the transposon has a similar effect on the fly. The normal structure of the eye (near right) is malformed, Claude W. Hinton reports in the April GENETICS. The fly and its descendants have misshapen eyes (far right).



Hinton, who has analyzed more than 100 instances of this mobile genetic element disrupting gene function and consequently eye morphology, says that further work may turn up a few more, but not many, insertion sites. The genes that control eye morphology in this species of fly were not previously known.

"The [eye morphology] genes are all turned on in the same tissue at the same time during normal development," Hinton says. "I speculate that the transposon recognizes and binds to a shared control element." Charles H. Langley and colleagues in Research Triangle Park, N.C., are working to identify the piece of DNA to which the transposon binds. This research may give clues both about how transposons insert and how different genes are turned on coordinately in development.

More friction over frostless harvest

An announcement early this month that scientists at the University of California at Berkeley have decided to go ahead with the first field experiments on a genetically engineered bacterium has been met with legal action by some environmentalists. The disputed work entails spraying of plots of potato plants at a field station in northern California with a common bacterium, *Pseudomonas syringae*, which has been altered so that it lacks the gene required for the bacterium to trigger ice formation. The project, led by Stephen Lindow and Nickolas Panopoulos, was originally scheduled for last fall (SN: 10/27/83, p. 132), but was delayed by a threat of legal action. Now the scientists say that six months of further greenhouse testing has confirmed the safety and usefulness of the technique.

But on April 12 a group of seven plaintiffs, led by Jeremy Rifkin of the Washington, D.C.-based Foundation on Economic Trends, sought a preliminary injunction in federal court to bar the National Institutes of Health (NIH) from authorizing release of these genetically engineered microbes into the environment. The plaintiffs argue that NIH approved the project last year without an examination of the possible environmental risks. "The NIH is playing ecological roulette," Rifkin says, "by authorizing the release of genetically engineered organisms into the environment without first undertaking the appropriate environmental studies to adequately assess the potential risks."

The scientists consider the planned experiment to be biologically equivalent to field tests they and others have already concluded with the same type of bacteria in which the ice-forming gene was disabled by natural or chemically induced changes rather than by recombinant DNA techniques.

Biomedicine

Targeting immunity with magnetic beads

Fighting a tumor with a freely circulating drug is like waxing your kitchen floor by standing at the front door and dumping wax into the house, says David Ranney of the University of Texas Health Science Center at Dallas. "Most of the wax will end up on the carpet, but some of it will probably get to the kitchen and wax it," he says. "In this case, the carpet is the liver, the gastrointestinal tract, [and] the hair that falls out."

Six years ago, Ranney, then at Northwestern University School of Medicine in Chicago, developed a method of packing a powerful anti-tumor drug into tiny protein beads laced with magnetite, which contains iron. When injected into rats, the beads can be guided with external magnets so that their toxic cargo diffuses specifically in the blood vessel beds that feed tumors, sparing healthy tissue (SN: 4/15/78, p. 230). Ranney now has turned his weapon against infection, by loading even smaller spheres — 20 could fit inside a red blood cell — with a hormone that chemically attracts the body's immune system scavengers, white blood cells called neutrophils.

In animal work he described this month at the meeting of the Federation of American Societies for Experimental Biology, Ranney injected the beads into arteries that lead to the lungs, and used a magnet to trap the hormone long enough for it to be taken up by the targeted tissue. The hormone, called FMLP (N-formylmethionyl-leucyl-phenylalanine), was then time-released in carefully controlled doses, during periods ranging from 15 minutes to 10 hours. "This is the first time that a biomodulator — a substance that changes the host response — has been entrapped, released and tested *in vivo*," Ranney says. Other peptides, he adds, can be used with the same technique to attract different classes of immune cells useful in battling infection.

The high accuracy achieved in targeting — 80 to 90 percent of the hormone reached the desired tissue — makes magnetic targeting one of the most valuable systems devised, Ranney says, for delivering small doses of potent drugs that are toxic when taken orally or by conventional injection. Tests of the system in humans are still at least two years away, he says, though eventual applications could include a more tailored suppression of the immune system in organ transplantation, as well as the treatment of severe localized infection and some cancers.

Are you my mother?

When he first peered into the world last month, "Pepito" had every right to look bewildered. Conceived in a test tube with the sperm and egg from fascicularis monkeys, and then implanted as a several-day-old embryo in the womb of a rhesus monkey, Pepito was reportedly the first primate ever born through such an interspecies transfer. Weighing a hefty 16 ounces at birth, he was larger than most fascicularis newborns who range from 7 to 14 ounces, says Thomas Pool of the University of Texas Health Science Center at San Antonio, where the monkey was born. Though it is difficult to generalize from a single animal, Pool believes the greater birth weight might stem from the fact that the rhesus is a larger breed and capable of carrying a bigger placenta, the channel of nutrition for the developing fetus. Pool says he hopes through the work to help tease apart maternal and genetic influences on human fetal growth and development.