life sciences

CELL BIOLOGY

Virus carries mouse DNA

A promising, though preliminary, step toward genetic engineering has been taken by Baltimore scientists who have used a virus to carry DNA into mouse cells.

In the usual course of a viral infection, a virus, which is a protein coat enveloping a core of genetic material, deposits its core into infected cells while leaving the protein coat behind.

Once inside, viral DNA or RNA is incorporated into the DNA of the host cell, generally with harmful results. But scientists have long accepted the theory that certain genetic diseases could be cured if missing or defective genetic information could be virally transmitted to patients. It is, however, a big jump from therapy to practice.

Drs. Joseph Osterman, Anna Waddell and H. Vasken Aposhian of the University of Maryland School of Medicine took an initial step toward that reality when they successfully demonstrated that a mouse polyoma pseudovirus can carry mouse DNA to mouse cells in laboratory culture. The polyoma virus they used, called a pseudovirus because its genetic core was mouse rather than viral DNA, was able to deposit its DNA in host cells, they report in the September PROCEEDINGS of the NATIONAL ACADEMY of SCIENCES.

Further experiments are necessary to determine whether this new DNA will be active in the mouse cells. Unless it could be active, it would be useless for genetic engineering purposes.

DRUG EFFECTIVENESS

FDA automates antibiotic survey

Not the least of the Food and Drug Administration's difficulties in guaranteeing safety and effectiveness of drugs on the market is its limited manpower. Therefore, a newly developed system for checking the potency of antibiotics could significantly help the FDA do its job.

The automatic analysis system, developed by an FDA staff team headed by Bernard Arret, is predicted to save agency scientists about 2,000 man-hours per year. It employs equipment that is generally available, at a total cost of about $6,000.

The new system measures turbidity—the cloudiness in a test tube produced by growing a bacterial culture in the presence of an antibiotic. The antibiotic inhibits bacterial growth in direct proportion to its potency. A complete test cycle takes only 12 seconds.

GENETICS

Test for carriers of Fabry's disease

As the medical community gains increasing interest in genetic counseling—there are now centers across the country—the development of sophisticated but relatively simple tests for detecting carriers becomes more and more important. In the Oct. 9 SCIENCE, Drs. Giovanni Romeo and Barbara Ruben Migeon of the Johns Hopkins University School of Medicine in Baltimore report a technique for detecting carriers of Fabry's disease and for prenatal diagnosis.

A hereditary disorder attacking the heart, kidneys and central nervous system, Fabry's disease usually kills its victims in their early twenties. Testing skin cells from a Fabry's patient, the investigators found them deficient in activity of a specific enzyme called alphagalactosidase. They detected the same enzymatic deficiency in skin fibroblasts taken from the patient's mother and sister, though examination of other cells, including leukocytes, from his relatives showed no deficiency. Thus, they suggest skin fibroblast analysis as an accurate test of this disease. The disorder is genetically linked to the X, or female, chromosome and is passed from mothers to their male offspring.

BIOCHEMISTRY

Cancers share chemical abnormality

In seeking clues to an explanation of cancer, investigators follow a variety of courses. Many have devoted their efforts to trying to find some factor or process which uniquely distinguishes cancer cells from normal ones.

At a symposium last week at the National Institutes of Health in Bethesda, Md., Dr. Ernest Borek of the University of Colorado Medical Center in Denver described work in many laboratories that points to such a distinguishing factor. Cancer cells from animals and man, he observed, have been found to share a common abnormality in the process by which instructions from DNA are translated into manufacture of proteins.

A molecule called transfer RNA is known to be central to this process. In about 25 different types of cancer cells, scientists have found that their transfer RNA's share an inability to incorporate normally a particular chemical unit called a methyl group.

Further, the methyl group abnormalities have been linked to the presence of abnormal enzymes whose job it is to handle the process of incorporation. Thus, methyl groups are not present in the proper location on the transfer RNA molecule and the cell's systems for protein manufacture go awry.

MICROBIOLOGY

Clue to toxemia of pregnancy

Toxemia, a metabolic disorder marked by swelling and high blood pressure, can be among the most serious of complications in pregnancy. Its cause is essentially unknown. For decades, obstetricians have advised pregnant women against weight gain of more than 10 to 14 pounds on the grounds that this would reduce the risk of toxemia, although a recent study by the National Academy of Sciences suggested that reasoning is ill-founded (SN: 8/1, p. 95).

While offering no therapeutic advice on the subject, two investigators from Finland postulate in the Oct. 9 SCIENCE that toxemia of pregnancy is partially involved with the body's immune system, and that it is more likely to occur between mother and son than between mother and daughter because the woman experiences a degree of histoincompatibility to the Y, or male, chromosome of her unborn son.

Drs. T. Hirvonen and P. Tiovanen of the University of Turku draw these conclusions on the basis of study of 1,061 cases.