

life sciences

VIROLOGY

Unusual virus is valuable tool

Viruses, which cannot reproduce on their own, infect cells and usurp their genetic machinery for use in making new viruses, which then get out of the cells by rupturing their membranes, which destroys the cells. But just how viruses use the cell machinery is unknown.

Dr. Dan Ray of the University of California at Los Angeles reports that some answers may come from work with an unusual virus, called M13, that has a particularly compatible relationship with male *Escherichia coli* bacteria—the only type it infects. Instead of destroying the cell, new M13 virus particles somehow slip through the membrane without rupturing it. Even though the virus has used its genetic machinery, the bacterium continues to grow and divide. Studies of *E. coli* before and after M13 infection, Dr. Ray suggests, may hold a key to understanding the basic biology of viral replication.

GENETICS

YY fish better fighters

Whether or not an extra Y or male chromosome inclines a man to mental dullness and crime as some scientists have recently suggested (SN: 10/26, p. 410), two Y chromosomes confer a clear competitive superiority on supermale killifish.

Using carefully timed doses of sex hormones to produce chromosomal changes (this technique works only in species low on the evolutionary ladder), Dr. James B. Hamilton of Downstate Medical Center in Brooklyn produced normal male killifish with one X (female) and one Y chromosome, normal XX females and some YY supermales. The XY and YY males were set in competition for the opportunity of mating with females. The male that proves dominant in a battle of swift darting movements and nipping then circles the female, grasping her with his fins to make her lay eggs which he will fertilize. In 155 tests, the scientist reports in the February issue of *ANIMAL BEHAVIOR*, YY males won 137 contests and XY males were superior in only 18 cases.

Dr. Hamilton is reluctant to draw parallels between his findings in fish and evidence of aggressive behavior in men who have an extra male chromosome, saying that understanding the evidence will be a “long and difficult process.” Meanwhile, he will try to determine in fish whether the Y chromosomes cause their effect directly or indirectly by stimulating the production of male hormones.

PHOTOSYNTHESIS

Reaction centers isolated

Photosynthetic reaction centers from two widely different organisms have been isolated by Dr. J. P. Thornber and John Olson of the Brookhaven National Laboratory, Upton, L.I., N.Y. Up to now, these chlorophyll-protein complexes could be studied only in complex membrane fragments.

The chlorophyll in photosynthetic organisms is divided into “reaction centers,” which are located near enzymes and perform photochemical reactions, and “light har-

vesting” molecules which absorb light and transfer its energy to the reaction centers.

Dr. Thornber used a common household detergent, sodium dodecyl sulfonate, and other chemicals to isolate two different light harvesting pigments from a higher plant—one light harvesting pigment from a blue-green alga, and one reaction center each from a green alga and a purple photosynthetic bacterium—all organisms capable of photosynthesis.

Most recently, Dr. Thornber separated bacterio-chlorophyll molecules of the purple photosynthetic bacterium *Chromatium* into two fractions, each containing a different reaction center and its associated light harvesting pigments. Only two years ago, most workers thought that bacteria, unlike algae, had only one such center.

MOLECULAR BIOLOGY

Active site of protein found

The specific portion of a protein molecule that incites an animal disease called experimental allergic encephalomyelitis has been isolated and identified. In EAE, myelin, the white sheath of matter surrounding nerves, deteriorates. This causes paralysis and death in animals much the way multiple sclerosis attacks human beings.

Drs. E. H. Eylar and George Hashim of the Salk Institute in San Diego report in the February issue of the *ARCHIVES OF BIOCHEMISTRY AND BIOPHYSICS* that the active fragment of an EAE-causing protein taken from bovine nervous tissue is a peptide chain of 16 amino acids. A tenth of a microgram of the peptide injected into a guinea pig will induce EAE, according to the scientists, who are now trying to synthesize this fragment so that different molecular versions of it can be made and used as research tools to explore basic mechanisms of the disease. Scientists have known for 20 years that brain and spinal cord tissue from a number of animals can induce EAE in guinea pigs but this is the first time the actual molecular inducer has been localized.

CELL BIOLOGY

Sex hormone penetrates cells

Hormones in both plants and animals have been thought of broadly as biological catalysts, agents that trigger but do not directly participate in chemical reactions. However, a Michigan State University scientist reports that prolactin, a sex hormone, can actually penetrate cellular membranes and regulate protein manufacture within cells. Previously, it was not known whether the large molecule could get through a cell's outer coat.

Dr. William L. Frantz recently told the Cell Biology-Biophysics meeting in Chicago that he injected pigeon crop tissue with prolactin at a time when its protein-making activity was low. He found that within four days the inner lining of the crop sac increased in size up to 100-fold and that protein in the lining increased.

Then he injected puromycin, an antibiotic known to halt protein synthesis by interfering with the cell's machinery, into the tissue. Subsequent injections of prolactin reversed the effect of the puromycin, showing that the hormone plays a direct role in cellular activity.