

## BIOCHEMISTRY

**Protein Takes Part in Virus Infection Activity**

► THE VIRUS of tobacco mosaic disease can lose part of its protein and yet retain three-quarters of its infectious nature.

This discovery may throw light on many problems of infection and immunity in human as well as in plant diseases.

The new study of protein in the structure of the virus was made by Dr. Roger G. Hart of the University of California's virus laboratory.

It follows the recent discovery by Drs. H. Fraenkel-Conrat and Robley C. Williams of this university that the virus responsible for tobacco mosaic disease can be split into two harmless fractions, which can be recombined to produce a virus just as virulent as the original, (see SNL, Nov. 5, 1955, p. 292).

The two inactive parts of the virus have been identified as ribonucleic acid, a body chemical essential for cell growth, which the scientists consider the "core" of the active virus, and "covering" of protein.

"While there is as yet no clear understanding of the separate roles of virus protein and ribonucleic acid in the process of infection," Dr. Hart says, "it appears that the structural integrity of the ribonucleic acid is essential for activity, whereas the protein coat need not be intact."

Heating the protein part of the separated virus with detergent for 10 seconds, then giving it the reactivation treatment resulted in a new virus of lowered activity.

Dr. Hart states in *Nature* (Jan. 21) that "about one-fourth, and perhaps more, of the inactivation of tobacco mosaic virus in the heat-detergent treatment may be accounted for by the removal of part of its protein."

Science News Letter, February 4, 1956

## BIOCHEMISTRY

**Find Chemical Rating For Human Behavior**

► DISCOVERY of a kind of chemical yardstick of changes in human behavior is announced by Dr. Robert G. Grenell of the University of Maryland.

The yardstick is a chemical called ATP, short for adenosine triphosphate.

The ATP chemical reactions of certain nerve cells, Dr. Grenell found, are related to or "transduced into general behavior patterns."

The finding was made with the drug, chlorpromazine, used as a laboratory tool. This is one of the new tranquilizing drugs now widely used in treating mental patients.

When this drug is injected into laboratory rats, the behavior of the animals changes strikingly. This change is accompanied by "a marked alteration in metabolism," as shown by a significant increase in ATP. ATP is a primary source of energy for metabolic activities of brain cells.

Within 15 minutes after injection of the tranquilizing drug, the rats show "indifference" to messages coming into the brain and central nervous system. They failed to respond with survival reactions when dropped into a sink full of water, although their reflexes appeared intact.

Chlorpromazine acts primarily on the part of the brain called the hypothalamus. This normally contains the lowest concentration of ATP of four brain areas studied. After chlorpromazine injection, however, the hypothalamus showed the greatest increase in ATP. This bears out the finding of calmed behavior seen in patients given chlorpromazine.

In another phase of his work, Dr. Grenell studied what happens to ATP levels in the cortex of cats' brains when the animals are given electro-shock treatment, anesthetized with nembutal, or excited by metrazol.

ATP increased in the cats undergoing electro-shock and anesthesia, while it decreased in animals excited by metrazol. This shows that, at least so far as cortical ATP is concerned, electro-shock resembles anesthesia.

Dr. Grenell notes, too, that "the human cortex, anesthetized, gives a value for ATP that is practically the same as the value for the anesthetized cat."

The effects of chlorpromazine in this study provide "definite evidence for the association of a marked chemical change in specific nerve cells with a marked shift in behavior pattern," Dr. Grenell states.

The different so-called psychiatric drugs, including chlorpromazine, "act primarily upon different areas of the brain."

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## METEOROLOGY

**Airplane Flight Paths Calculated by Computer**

► THE BEST FLIGHT PATHS for airplanes flying between two cities have been calculated by electronic computer.

Frank Lewis of the Air Weather Service Headquarters in Washington said flight routes from a given starting place to several destinations could be printed out by the computer, each path being the one that would result in the shortest flying time.

Courses would be specified by the latitude, longitude and heading of the airplane at half-hour intervals, Mr. Lewis told a joint meeting of the American Meteorological Society and the Institute for Aeronautical Sciences in New York.

The mathematics required for the International Business Machines' 701 computer to print out minimal flight paths have been worked out. This computer, operated by the Joint Numerical Weather Prediction Unit in Suitland, Md., now makes daily forecasts of wind speeds at several heights in the atmosphere.

These forecasts are now recorded on magnetic tape. Plans to adapt upper air forecasts to include minimal flight paths are in progress.

Science News Letter, February 4, 1956

**IN SCIEN**

## HEMATOLOGY

**Find New Clotting Factor in Blood**

► DISCOVERY of a new clotting factor in human blood was announced by Drs. Francois Duckert, P. Fluckinger and Fritz Koller of the University of Zurich, Switzerland, at the Fifth Annual Symposium on Blood held in Detroit under the sponsorship of Wayne University College of Medicine.

The new blood clotting factor is called Factor X, the X meaning ten, not unknown.

Broader knowledge of bleeding diseases and of thrombosis are expected as a result of the discovery.

Patients suffering from two liver diseases, hepatitis and cirrhosis, have blood deficient in the newly found Factor X.

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## MEDICINE

**Relaxing Drug Dulls Excruciating Pain**

► ONE of the most agonizing disorders of the body, the excruciating pain on the whole side of the body that occasionally follows a stroke, apparently can be alleviated by chlorpromazine, a drug used in treating the mentally ill.

Successful alleviation of the pain in a 41-year-old housewife for nearly a year and a half has been reported by two psychiatrists at the University of California Medical Center, Dr. Lester H. Margolis and Dr. Alfred Gianascol.

Earlier trials of the drug against the condition, called the thalamic pain syndrome, apparently were unsuccessful because of relatively small doses used.

Thalamic syndrome, a relatively rare condition, is marked by terrible, burning pain throughout the side of the body affected by the stroke. Damage to the brain connections by the stroke is the cause.

Patients are sometimes driven by the constant, unbearable pain to attempt suicide, to drug addiction, or to beg for lobotomy, a brain operation that dulls pain reactions but may cause undesirable personality changes.

Chlorpromazine was tried on the housewife when she was hospitalized after her fourth suicide attempt and after all other drugs failed to bring relief. The doctors began to get a good response with 200 milligrams per day of the drug, and learned eventually that 400 milligrams gives the best results. This is several times larger than the doses of earlier trials.

The pain is still present to a moderate degree, but it has not interfered with the patient's household work.

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# CE FIELDS

## TECHNOLOGY

### Device Amplifies Light 40,000 Times

► A DEVICE to amplify low-level light as much as 40,000 times is now being produced by Bendix Aviation Corporation, its co-inventors, Drs. Ralph E. Sturm and Russell H. Morgan of Johns Hopkins Medical School, Baltimore, have announced.

Known as the Lumicon, the device is expected to be particularly valuable in medical work when linked to an X-ray machine. Using the Lumicon, doctors can examine patients with very low level X-rays, or can watch treatment in progress.

The Lumicon is actually a fluoroscopic screen viewed by an especially built television camera to make a bright TV image of very dim objects. It was installed at Lowell Observatory, Flagstaff, Ariz., in 1954 in an attempt to take good pictures of Mars during that planet's close approach. (See SNL, May 8, 1954, p. 298.)

Mars makes an even closer approach to earth this year, and astronomers expect to use the Lumicon to try again to take photographs that may prove or disprove the existence of canals on the planet.

Many astronomers who observe the solar system doubt that the so-called canals are actual markings on the Martian surface. Although others claim to have seen them, the canals have never been photographed.

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## HEMATOLOGY

### Store Blood in Liquid Nitrogen for Infinity

► FROZEN BLOOD can be stored in liquid nitrogen for an "essentially infinite" period, Dr. Harold T. Meryman of the Naval Medical Research Institute, Bethesda, Md., and Yale University, New Haven, Conn., reported at the Fifth Annual Symposium on Blood held in Detroit under the sponsorship of Wayne University Medical College.

Two human transfusions and several rabbit transfusions have been made successfully with frozen blood, he stated.

Storage in liquid nitrogen, he pointed out, has the added advantage of being the cheapest and easiest form of refrigeration. The temperature for the "infinite" storage period would be at 120 degrees centigrade below freezing. Dry ice, Dr. Meryman thinks, might permit storage for several years.

Freezing blood without giving ice crystals a chance to form inside the blood cells and cause them to collapse requires great speed in freezing.

The freezing can be done fast enough to avoid this and other damage if the

blood is sprayed through a fine plastic tube onto the surface of liquid nitrogen. The frozen blood is reconstituted by sprinkling the frozen droplets into warm salt solution or plasma.

Such frozen blood when reconstituted appears to be intact so far as cells, platelets and, in fact, all formed elements are concerned.

This is the kind of frozen blood Dr. Meryman reported transfusing. The blood contained some red cells tagged with chromium 51 so fate of the cells after transfusion could be determined.

Normal survival, this showed, is possible for the frozen blood. Platelets were somewhat reduced in number but intact, casual examination indicated. No change in the clotting mechanism of the plasma could be found with a whole battery of tests.

Dr. Meryman said his "crude laboratory procedure could not be safely extrapolated to routine blood banking."

Further studies, he said, are under way.

Science News Letter, February 4, 1956

## MINERALOGY

### Make Uranium Mineral In AEC Laboratory

► A URANIUM mineral first discovered and named coffinite in 1955 has now been made in the laboratory. (See SNL, May 7, 1955, p. 293.)

Synthesis of coffinite, a "major uranium mineral on the Colorado Plateau," is reported in *Science* (Jan. 20) by Drs. Henry R. Hoekstra and Louis H. Fuchs of Argonne National Laboratory, Lemont, Ill.

Man-made coffinite has a bluish-green color, contrasted with its black color when found in nature. When the naturally-occurring black mineral is heated, the scientists state, it turns a gray-green color characteristic of certain uranium compounds.

The synthetic coffinite was made in the laboratory by a hydro-thermal process and identified by its crystal structure.

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## TECHNOLOGY

### Largest Shovel Is Now At Work on Coal Seam

► THE LARGEST SHOVEL in the United States, tabbed "The Mountaineer," is also the largest unit of mobile land machinery ever built in this country.

It is 147 feet high and weighs 5,500,000 pounds. Its dipper has a capacity of 60 cubic yards.

Built by the Marion Power Shovel Company, Marion, Ohio, the huge earth-mover is being used to remove earth and rock overburden, averaging 90 feet deep from a five-foot coal seam, for the Hanna Coal Company, St. Clairsville, Ohio.

Its motors, which are all electric, are the largest mill-type horizontal and vertical motors manufactured by the General Electric Company.

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## ENTOMOLOGY

### 1956 Grasshopper Threat Is Predicted Serious

► AMERICAN FARMERS face a very serious threat from grasshoppers this year, the U. S. Department of Agriculture has warned.

Late summer and fall surveys show that cropland in more than 15 states and some 20,000,000 acres of rangeland in 16 states are in danger. At present, 1956 looks to be a worse grasshopper year than 1955. A survey next spring, the Department reported, will indicate how winter and spring weather has altered the picture.

The rangeland problem, entomologists warned, appears more widespread and severe in the Southwest than at any time in recent years.

The prolonged drouth, now in its sixth year in some Western range areas, has actually favored rapid increase of many kinds of range grasshoppers.

The worst rangeland threats appear to be in western Oklahoma, southwestern and south central Kansas, extreme southeastern Colorado, the Panhandle of Texas and eastern New Mexico.

Light to severe infestations of 'hoppers can be expected in the croplands of Minnesota, Wisconsin, Iowa and the northern half of Illinois and Indiana.

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## PHYSICS

### Aussies, British to Test H-Bomb in Sub-Antarctic

► BRITISH and Australian scientists will explode the British Commonwealth's first hydrogen bomb in an uninhabited area of the sub-antarctic regions next year.

"Trigger" A-bombs will be tested at Monte Bello Islands, 800 miles northwest of Perth, West Australia, in March and at the Maralinga proving ground in the South Australian desert in November.

Scientists have already tested a "trigger" bomb near Woomera rocket range in Central Australia. Result of the "trigger" bomb tests this year will be used to reduce the weight and increase the power of the H-bomb.

It is expected that the made-in-England H-bomb will be flown from Britain by RAF V-bomber to the new 8,000-foot airstrip at Maralinga, which will take the largest planes in the world. The H-bomb will be flown from Maralinga and dropped over its target in the southern ocean.

American observers may attend both bomb tests.

Supply Minister Howard Beale announced formation of a 25-aircraft task force of British and Australian planes for the Monte Bello tests. The planes will fly daily after mid-February over the Timor Sea from Darwin on the lookout for tropical storms.

The test, it is expected, will be held soon thereafter.

Science News Letter, February 4, 1956