

## BOTANY

## Lack of Calcium in Soil May Cause Nutrient Loss

**A** PLANT may be growing, yet at the same time instead of taking from the soil nutrients which are needed to build up proteins, it may actually be giving up some of these nutrients to the soil. Dr. William A. Albrecht, head of the department of soils of the University of Missouri's College of Agriculture, speaking before the Midwest Regional Meeting of the American Chemical Society, held at Purdue University, explained how advances in colloid chemistry are helping scientists to understand the way in which plants secure these nutrients.

"Only the finer clay fraction, a small part of ordinary soils, is really active in providing plants with nutrients," he said. "Seemingly clay can be so poor in its stock of such plant nutrients as nitrogen, potassium and phosphorus that a plant like the soybean may be running its woody tissue-making factory while the protein-making items like nitrogen and phosphorus are going in the reverse, from the plant to the soil."

Calcium, he explained, does not move in the reverse direction, though when the clay gives it up, along with potassium and magnesium, for instance, it takes hydrogen in their places. Not a plant nutrient itself, hydrogen makes the soil acid. "In reality, then," he continued, "more soil acidity means less nutrients in the clay and less fertility for crop production." By adding lime, a calcium compound, to the soil, the effect of the hydrogen is counteracted, and there is less chance for the nutrients originally provided by the seed to be lost by going into the ground.

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## RESOURCES

## Mercury Only Strategic Material Bought from Italy

**B**UYING from Italy only one strategic material in quantity—mercury—the United States is not endangered by loss of vital materials, as an immediate result of Italy's entry into war.

Italy herself, dependent on the United States and other countries for quantities of cotton, petroleum, copper, and scrap iron, is far more adversely affected by the trade consequences of lining up with Germany.

The United States can get along, if necessary, without Italy's mercury exports, mineralogists in Washington declare. Mercury, important in priming ex-

plosives and fixed ammunition, in drugs and chemicals, thermometers, antifouling paint for ships' bottoms, and other uses, is being produced this year in sufficient quantity in the United States to meet present needs. United States ore being far less rich in mercury than ores of Spain and Italy, production in this country is expensive. But since start of the war, the price of mercury has shot up from \$75 a flask to a record-breaking \$200, and at such a level mercury production here is stimulated.

Furthermore, there are substitutes for most uses of mercury, although some of the substitutes are not very satisfactory and using them requires changes in industrial processes.

Since a cartel arrangement between Italy and Spain has control over proportions of exports, possibility that Spain's shipments of mercury to Allied and neutral countries may be affected must be taken into account. A sudden loss of mercury imports would work hardship on France and England, particularly.

In 1939, the United States imported from Spain 2,601 flasks of mercury, 336 from Italy, 562 from Mexico. A flask is equal to 76 pounds.

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## PHYSIOLOGY

## Human Body Uses Iron Over and Over Again

**T**HE human body, like industry, uses iron over and over, say scientists of the U. S. Department of Agriculture, who are studying the body's need of this essential element. Iron is used in the red blood cells. As these cells break down, about 85% of the iron is recovered and returned to the bone marrow. In the whole body there is only enough iron to make an oversized shingle nail.

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## INVENTION

## Fair's Hall of Inventions Desires More Exhibits

**H**ISTORICAL exhibits on American invention and research can still be submitted to the Hall of Inventions of the New York World's Fair for possible display there. Institutions and individuals willing to loan such material for the duration of the Fair are invited by the World's Fair management to communicate with Frank S. Lyon, director of the Hall of Inventions. The Hall, which recently opened, already includes many important inventions.

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# IN SCIEN

## PSYCHOLOGY

## Boys and Girls Outgrow Delinquency of Childhood

**J**UVENILE delinquency is like a fever that must run its course. Boys and girls that run afoul of the law are not readily cured by present methods of treatment. They usually have to go through their troubles until mature.

This is indicated by a follow-up of Drs. Sheldon and Eleanor Glueck's famous 1,000 juvenile delinquents studied years ago and reported upon in 1934. These former delinquents are now grown up.

Delinquency or crime is abandoned when the individual reaches a certain maturity or social grown-upness, the Gluecks of Harvard indicate in a new book, "Juvenile Delinquents Grown Up" (Commonwealth Fund). But because individuals differ so in personality make-up and early surroundings, this maturity is not always reached at the expected "years of discretion."

Comparison of the careers of these juvenile delinquents with another group of 500 ex-inmates of a reformatory showed strikingly the course of this anti-social fever.

Although the criminal group averaged five years older than the delinquents when they first began to show delinquent behavior, and although they were subjected to many kinds of correctional treatment, yet the course of the two groups was very similar.

By the time the juvenile delinquents had reached an average age of 29, almost 40 per cent. had ceased to be criminals. And of those who continued to commit crimes, the proportion of serious offenders had dropped from 75.6 per cent. to 47.8 per cent.

The "reform" is credited to physical and mental changes that come with the passing of years. Those who failed seemed never able to mature, until they were physically and mentally "burned out" and began instead to disintegrate.

Another influence toward "reform" is the tendency in later life to lose energy and becomes less venturesome. Criminals, too, reach an age of retirement.

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# CE FIELDS

## RADIO

### Skew Radio Studios Newest Acoustics Advance

ONE of the newest acoustical tricks in improving radio is the use of "skew" studios in which all the walls and ceiling are non-parallel, Dr. L. Grant Hector of the University of Buffalo, reports. The slanting walls and ceiling are to prevent the formation of standing acoustical waves in the studio which may create an annoying fluttering noise in the background of the music or speech being picked up with the studio microphone.

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## CHEMISTRY

### Disease-Fighting Antibodies May Be Made by Chemistry

SCIENCE is scheming to put the horse out of another job. One of the essential services that our equine friends render to humanity is the manufacturing of serums for fighting of diseases, such as the pneumonias.

It may be possible to manufacture antibodies, disease germ fighters, in the laboratory by purely chemical means. Dr. Linus Pauling, California Institute of Technology chemist, holds out this hope in his latest studies of molecular structure and behavior.

The process by which an animal manufactures antitoxins has been, in the past, a complete mystery. The new theory provides a reasonable picture of this process, and makes it probable that the whole question will be settled by some further work.

The theory of how antibodies are formed and how they are constructed, as developed by Dr. Pauling, is based upon information about simpler molecules.

He pictures the process of antibody manufacture like this:

The raw material used would be serum globulin, a substance in animal blood, extracted by centrifuging and fractional crystallization without much difficulty. The blood used could be from slaughtered animals. The globulin is a complex protein molecule, a polypeptide,

composed of 1,400 amino acid units. In the blood the globulin particles have their units curled up. They would be treated with a substance to unroll them, a process called denaturing. Urea, or some similar reagent, would be used for this purpose.

Then this denaturing agent would be removed in the presence of an antigen, the foreign substance that it is desired to protect against. This would cause the long chain structure of the globulin to fold up again into a new structural form that can be thought of as a short rod on the two ends of which are claspers, ready to seize the foreign substance or toxin. The globulin will then be an antibody.

The way that antibodies catch their prey, to the benefit of the ill person, is by grabbing the germs in their "claspers," forming a clump of material that becomes so much debris without activity or danger.

The correctness of this idea of how antibodies are formed will be tested by experiments, including the attempted manufacture of them by the methods suggested by Dr. Pauling on theoretical grounds.

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## MEDICINE

### New Anesthesia Method Uses Pituitary Extract

OPERATIONS will be easier, for both patient and surgeon, as a result of a new way of giving anesthetics discovered by Dr. Ruth M. Latham, of Detroit. Two hours before the operation Dr. Latham injects a small amount of pitressin, extract from the posterior part of the pituitary gland. A second dose is injected just fifteen minutes before the operation. Result: much less anesthetic is needed to relax the abdominal organs, the surgeon can manipulate them more easily, and the patient awakes from the anesthetic within two or three minutes and almost never suffers from nausea, vomiting and other unpleasant after-effects from the anesthetic.

When the pituitary extract is given, ether was needed to complete the operation in only 18% of the cases, as compared with 66% in non-pituitary treated cases. Gas, such as the dentist uses in his office, and oxygen, sufficed to put the patient to sleep and enable the surgeon to operate in the other cases. Dr. Latham reported her results on over a hundred patients operated on for removal of gall-bladder, appendix and other types of abdominal operations to the American Medical Association in New York.

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## MEDICINE

### Low Resistance to Disease May Come from Faulty Diet

VITAMINS or some other food element may prove the means of protecting children against infantile paralysis, a discovery announced by Dr. Albert B. Sabin and Dr. Carl E. Duffy, of the University of Cincinnati, suggests. (*Science*, June 7)

Poor diet, they discovered, decreases the resistance of young rats to a disease similar to infantile paralysis in that it is caused by a virus which attacks the nervous system. The decreased resistance occurs whether the young rats are eating the poor diet during their growing period or whether their mothers were on the poor diet during the nursing period.

Lack of vitamin B<sub>1</sub>, of riboflavin, or of vitamin E may be the dietary fault that decreases resistance to virus invasion, or there may be some other dietary fault responsible.

Animals as they grow older develop resistance to involvement of the nervous system by certain viruses, Dr. Sabin discovered in previous studies. This increased resistance with age is not due to immunity acquired through exposure to infection nor because of a maturing of the whole animal or of its entire nervous system. It is the result of changes in certain tissues or structures which the viruses must pass before they can give rise to paralysis or encephalitis ("sleeping sickness").

These tissue changes, the latest studies show, are influenced by the diet of either the growing animal or its mother during the nursing period.

While inadequate nutrition could prevent or retard appearance of resistance to virus invasion of nervous tissue in young animals, it has not been possible to break down this resistance by poor diet in full-grown animals once they have acquired the resistance to the virus.

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## ORNITHOLOGY

### Slow Motion Pictures Aid in Portraying Flight

See Front Cover

THE LIFELIKE quality of the picture of mallards on the front cover of this week's SCIENCE NEWS LETTER was obtained by the etcher Richard E. Bishop partly through study of slow motion pictures of the birds in actual flight. He splices a few feet of film in a loop and runs it continuously for study.

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