with oxygen by more than 90 per cent., he reported. Oxygen at one millimeter pressure saturates salt-free hemoglobin solutions to the extent of 50 per cent. When body salts are present the saturation is cut to one or two per cent. The greater the salt concentration of the blood, the harder it is for the hemoglobin to store and transport oxygen.

Bicarbonates exhibit this effect to the greatest degree, with phosphates, citrates, sulfates and chlorides exhibiting the effect in reduced degree.

"Much of the previous work on hemoglobin must now be re-interpreted or re-investigated, due to this unforeseen factor of the salt inhibition," he concluded.

### Iron Alone No Help

New light on the nature and treatment of anemia, the dread blood disease, is indicated by results of "synthetic nutritional anemia" induced in rats by a special diet. When anemic young rats fed on a milk-and-iron diet were given additional iron "rations" in their food, no significant improvement was noted unless copper was also present in their diet, Dr. W. H. Summerson of the Cornell University Medical School declared. But if copper was added, rapid improvement in the condition of the laboratory animals was noted.

More than normal quantities of iron are present in the blood serum, as distinguished from the red blood corpuscles, during blood diseases such as pernicious anemia, Prof. Burnham S. Walker of the Boston University School of Medicine stated. Iron content in the form of red blood corpuscles decreases markedly during pernicious anemia and other blood diseases. Adaptation of an iron-determination method developed for other uses was the principal point in Dr. Walker's research.

*Science News Letter, September 11, 1937*

ORNITHOLOGY

## Heron in New York Zoo Has Long Lease on Life

**See Front Cover**

HERONS, of whatever species, are invariably beautiful; and the idyllic little scene shown on the front cover of this issue of the SCIENCE NEWS LETTER adds a touch of feathered romance to the beauty.

But alas! the idyll was shattered. One of the pair died, and the widowed survivor was alone.

*Science News Letter, September 11, 1937*

CHEMISTRY

# Lighter Cars, Longer Mileage, Is Chemists' Vision of Future

SMALLER automobile engines getting more miles per gallon on new super-fuels were envisioned in a report before the meeting of the American Chemical Society at Rochester, N. Y.

Re-shaping of the molecules, tiny building blocks of nature that make up the gasoline, is the means of reaching the goal of these super-fuels, W. G. Lovell and J. M. Campbell of the General Motors Corporation research laboratory revealed.

Small quantities of these high test super-fuels have been made for use in airplane engines operating under extremely severe conditions and in the laboratory.

"The laboratory experiments show that fuels can be made of great effectiveness when we learn more about how to do it on a commercial scale."

### Connected With Knock Problem

The problems of better fuels, the scientists explained, is closely connected with the problem of the motorist's greatest curse, engine knock.

"Automotive engineers have long known that if they increased the compression ratio of an engine they got more power and economy out of it. It was something they wanted to do, but if they tried it, then they found that the engine would knock on the available gasoline, so that what they wanted to do they couldn't do."

The super-fuels predicted by the two chemists would solve this problem which has baffled automotive engineers, it was indicated.

"But it was found that not all gasolines were alike in this respect,"—some knocked less than the others. "Chemical research has found out why. It is because of the shape of the molecules in the gasoline. If a molecule has a long stringy shape, it knocks badly; but if a molecule of the same size is arranged compactly, more like a ball, then it makes a fine fuel.

"The difference between these two types of molecules of the same size is so great that a fuel made of one may give 50 per cent. more power in a suitable engine than another," they continued.

"True, both would give the same amount of heat in an oil furnace, for instance, but because one may be burned in an engine with higher compression ratio, without knock, it will give much more power there."

Common table salt, sodium chloride, in pure form would be precipitated in tremendous quantities if the Great Salt Lake of Utah evaporated to one-fourth its present size, Prof. Walter D. Bonner of the University of Utah told the Society.

Salt was actually precipitated from the briny inland sea during parts of the drought summers of 1934, 1935 and 1936, Prof. Bonner reported. He presented an analysis of the lake prepared by himself and four colleagues, R. D. Twelves, G. S. Winn, George Cronkhite and Elizabeth Sheldon.

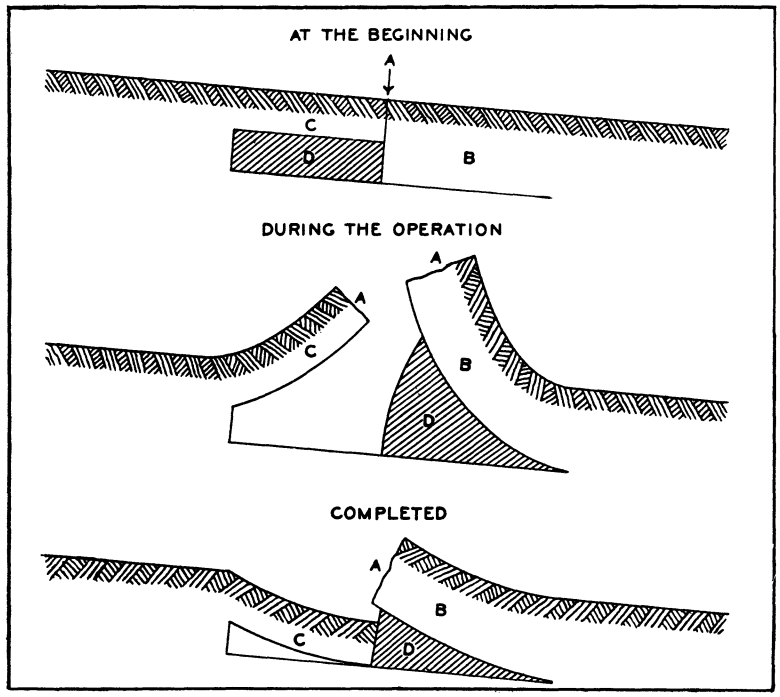
Great Salt Lake, with an area of 1600 square miles and an average depth of thirteen feet, is a shallow residue of a giant freshwater lake, Lake Bonneville, that covered this region of America in prehistoric times, he explained.

The salt concentration of the lake has varied over a long period of years from 15 to 30 per cent. Thirty per cent. is the maximum concentration of salt that will remain in solution. When evaporation, during the drought months of the last few years, began removing water salt was precipitated from the brine. Average "saltiness" of the lake is 28 per cent., the chemist stated.

### Glauber's Salt in Lake

Sodium sulphate or Glauber's salt, used as a medicine, is found in relatively large quantities in the lake, the chemists reported. Since Glauber's salt is much more soluble in warm water than in cold water, winter months frequently see the formation of pure sodium sulphate crystals.

The first 30 per cent. of the salt to be crystallized out of the lake by evaporation would be pure sodium chloride, Dr. Bonner explained. The next 30 per cent. would contain small amounts of other salts also present in the famous inland sea. "The greater part of the salts except sodium chlo- (*Turn to Page 170*)




*HOW THE MECHANICAL MOLE WORKS*

***Meaning of the letters in these cross-section diagrams is as follows: A, vertical cut made by the rolling colter; B, 8-inch sod strip lifted, but not turned over, on downhill side; C, 4-inch sod strip lifted, but not turned over, on uphill side; D, 4 inches of soil thrown under downhill sod strip.***

AGRICULTURAL ENGINEERING

## Machine Builds Terraces Without Destroying Sod

A "MECHANICAL mole" that builds terraces on pasture hillsides without making dangerous breaks in the sod has been developed by engineers of the U. S. Soil Conservation Service and Iowa State College.

Earning its nickname because it does all its work underground, the new implement consists of a rolling colter to cut the sod and three different plowshares, all mounted on the same plow-beam and pulled by a 20 horsepower tractor. The four tools, acting in succession, cut the sod, lift the edge of the downhill side eight inches, shove the earth from the uphill side under it to keep it up, and drop the edge of the uphill sod to the bottom of the shallow trench thus made.

The "mole" is pulled around the hillsides on contour lines, so that the succession of hollow terraces catch and hold the rain, thereby preventing erosion and loss of lime and other essential nutrient elements. The only soil raised by the operation, along the raised edge of the downhill side of the cut sod, is soon grown over by grass from above and below, leaving the pasture secure again in its green armor.

Terracing has been carried on successfully with the "mole" on hillsides with slopes as great as 18 per cent.

*Science News Letter, September 11, 1937*

PLANT PHYSIOLOGY

## Germination Inhibitors Hinted in Middle Ages

EXISTENCE of a substance in the flesh of fruits that inhibits the seed from sprouting too soon, only recently demonstrated by plant physiologists, was foreshadowed in the Middle Ages by the early scientist-saint, Albertus Magnus, who was a university teacher in Paris and Cologne.

Albertus wrote: "The moisture of apples, pears and similar fruits in no wise nourishes the seeds. And these, when they fall and germinate, do not gain their growth from the flesh of the fruit but from the earth. It is therefore to be concluded that the seeds germinate better if all the surrounding flesh is taken away, than if the seeds are left in it."

*Science News Letter, September 11, 1937*

## From Page 167

ride," he told his audience," remain in solution until more than 75 per cent. of the water has evaporated."

Tests revealed that the lake is slightly alkaline. Additional experiments revealed that water from the Great Salt Lake contains only one-sixtieth or less as much bromide salts as ordinary sea-water. Bromide salts are valuable in medicine, the manufacture of photographic films and for anti-knock motor car fuels.

### Liquid Helium in Quantity

A low-temperature plant to turn out a gallon of liquid helium per hour for use in vital scientific research was described by Prof. John G. Aston of Pennsylvania State College.

A "helium bomb" to allow a portion of some highly-compressed helium to expand, and in so doing take away heat from the remainder, liquefying that remaining portion, features the apparatus that will be placed in service shortly in the low-temperature laboratory of the Pennsylvania institution, Dr. Aston reported.

Liquid helium is one of the coldest substances known, boiling at a temperature of 452 degrees below zero Fahrenheit. Working temperatures of as low as 440 degrees below zero are obtainable by the use of liquid helium, Dr. Aston indicated.

Valuable studies of organic substances at temperatures from 440 degrees below zero up to their melting points are being carried out with equipment already in existence and using liquid air and liquid hydrogen as the cooling media. The helium plant will extend the range of temperatures.

The new helium equipment will make the Penn State laboratory one of the largest of its kind in the world. Comparable laboratories are located at the University of California at Berkeley, University of Toronto, and at Leyden, Holland, and Berlin.

Direct evidence of the existence of "zero point energy," one of the cornerstones of the scientist's picture of the way in which atoms work, was reported by Dr. Alexander Goetz of the California Institute of Technology.

A helium liquefier to chill atoms under test to 450 degrees below zero Fahrenheit linked to a spectroscope to analyze light and an X-ray machine were the tools Dr. Goetz used in his attempt to wrest from the atom further details of its life-history.

Atoms vibrate in a non-stop "dance of life" at ordinary temperatures, but when they are cooled the vibrations gradually slow down. Until a short time ago, it was thought that when absolute zero, the coldest temperature possible, 459.4 degrees below zero Fahrenheit, was reached they would stop altogether. Theory required, however, that there still be a very small bit of movement, "zero point energy," left over. Now Dr. Goetz has found additional means of finding and possibly measuring this tiny residue of energy.

New, sharp clear pictures of the way in which atoms are put together have been secured by means of the apparatus. X-rays passing through crystals are bent in different patterns according to the arrangement of atoms in the crystal. Such records have been made for many years, but Dr. Goetz has succeeded in getting clear photographs by cooling down the atoms and slowing down the vibration, which caused most of the photographs taken at room temperature to be somewhat foggy.

### Pioneered Uranium Study

Prof. Auguste Piccard may be best known to most of us for his daring balloon ascensions to high altitudes seeking data on the elusive cosmic rays, but he was also an early leader in one of the controversies regarding the age of the earth. This new and little-known fact was revealed at the meeting of the section on geochemistry.

Prof. Aristid V. Grosse of the University of Chicago's department of chemistry credited the views of Prof. Piccard that the "patriarch" of all the radioactive elements—actino-uranium—played a very important role in the early history of the earth.

Prof. Grosse is well-known in chemical circles for his work on super-heavy elements beyond uranium in the periodic table.

In his current report Prof. Grosse analyzes all the available physical and chemical data on the role played by actinium in helping to fix, geologically, the earth's age by means of experiments on the rate of radioactive disintegration of the heavy elements.

Some geologists and chemists who have carefully determined the atomic weights by chemical means believe that the actinium series of elements was of little importance in the early history of the earth and, therefore, that corrections in geologic age measurements are not needed.

The other point of view, early expressed by Prof. Piccard in 1917, said Prof. Grosse, holds that actino-uranium disintegrates much more rapidly than uranium and although now practically all disintegrated was very important in the earth's earlier geological years.

The physical methods of determining atomic weights, said Prof. Grosse, definitely support the second point of view, that actinium really was an important factor during the earth's early years. The only evidence not in support of such work is the evidence obtained by chemical atomic weight measurements. The physical methods using the mass spectrograph appear superior, he indicated.

### Greater Accuracy Needed

Prof. Grosse concluded that, "we chemists will have to reconcile ourselves with the fact that chemical atomic weight determinations although developed . . . to a state of precision perfectly satisfactory for orthodox chemical purposes, will have to give way to the still more accurate and reliable methods of the physicist in the future."

Chemistry teachers may soon begin introducing their students and the world at large to a brand new addition to the English language.

"Bas-cid" is the term and it refers to the base-forming or acid-forming properties of the elements.

A "bas-cid" scale as a part of the periodic table, the family chart of the 92 elements, was explained by Prof. Sidney J. French of Colgate University.

The scale, he said, is a part of a novel variation of the periodic table he has devised to make it easier for students to remember the elements, the A's, B's and C's of chemistry. The "bas-cid" scale will group together elements that form similar bases or similar acids.

Increasing "purity consciousness" on the part of the consumer has put pressure on research workers to devise new and faster, more accurate methods of analyzing commercial products, James S. Owens of the Dow Chemical Company told the chemists. He reported that analysis methods depending on the spectroscope, a device for analyzing light, were many times faster and more sensitive than other means in use.

Tiny quantities of impurities in drugs and other preparations, which the consumer demands shall show no color impurities, can easily be detected by the methods he and his colleagues have worked out.