

of the last century, has now dismantled his huge generator and taken it to Cambridge where it will be housed in a pressure tank. The giant airship hangar at Round Hill, Mass., formerly used, will be abandoned for its research purposes. Dr. Van de Graaff's pioneer giant instrument has served valuably in helping to show needed changes in construction methods and operating techniques which can only be learned after equipment has been built.

Dr. Herb, at Wisconsin, has announced that a very small amount of carbon tetrachloride—familiar as a cleaning fluid—has aided in improving the operating characteristics of his apparatus. It has been suggested that the vapor will break up in the presence of ionization in the tank and that the chlorine part serves to turn swift-flying electrons in the apparatus into slow-moving, larger ions. Thus the rapidity of spark-over is diminished and better operation secured.

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## MYCOLOGY

## Mushrooms Grown in Air-Conditioned Houses

**M**USHROOMS grown in air-conditioned houses are the newest offering for gourmets' tables. Near West Chester, Pa., thirty growing houses have been fitted with apparatus to control the temperature and humidity and by that means to increase the mushroom yield from two crops to three. Previously the houses were shut down during the summer months because hot weather produced inferior mushrooms.

Control of temperature and humidity marks another chapter in the art of mushroom growing, one of the world's most specialized crafts. Parisian mushroom growers long ago found a partial solution to the problems of variable temperature and humidity by placing their growing beds in galleries and cellars from 60 to 160 feet below the surface of the ground.

Credit for the suggestion to apply air-conditioning to mushroom-growing goes to William E. Chambers, vice-president of the Grocery Products Manufacturing Corporation.

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England became a tea drinking country because of its Oriental trade and tea plantations, whereas Holland and France took to coffee because of their coffee plantations in the Indies.

## CHEMISTRY

# Milk: Its Whence and Whither Discussed at Chemists' Meeting

## Chemistry of Other Foods and Their Health Importance Are Increasing Concern of Members of Profession

**C**HEMISTS are looking into cows, nowadays. Pioneer research that may open the road to learning how milk is made was reported before the annual meeting of the American Chemical Society in Rochester, N. Y., by Drs. Ross A. Gortner and Stanley M. Jackson of the University of Minnesota.

Great changes in the relative amounts of different proteins were found in the mammary glands of heifers, "fresh" cows, and "dry" cows, they declared.

In what was described as the first real attack on the problem of how milk is secreted, they reported that albumins—proteins such as the white of egg which are soluble in water and which are coagulated by heat as in boiling an egg—decreased very sharply when the glands became active. Similarly globulins, another type of protein, increase in amount.

"Just what the changes mean, insofar as the synthesis of proteins in milk are concerned, still remain to be worked out, but this study does show that when the gland becomes active there are major changes in the physical state of the proteins making up the glandular tissue," they concluded.

### Making Smaller Curds

By adding enzymatic extract of hog's pancreas, cow's milk curds can be made small enough closely to approximate the curds in human milk, Dr. Victor Conquest and his colleagues of Armour and Company reported. In the past, cow's milk that was to be fed to babies had to be diluted with water and lactose in order to make the digestion of its relatively large curds easy for an infant's stomach.

"The method of preparing this product is identical with the pasteurizing processes except that a slight incubation period for the milk after it has been mixed with a small amount of dried enzymatic extract of the hog pancreas has proven to be successful," Dr. Conquest explained.

Nutritive qualities of the milk are

not affected by the treatment, which is easily carried out on a large scale, it was indicated. "The purpose of our investigation has been to reproduce such a milk in a manner that will not take away any of the valuable constituents of normal cow's milk, the method of which will be fast and the resulting product such that it will produce a flaky curd in the stomach and which will give a curd tension reading low enough to be classified as a soft curd milk."

### Pint a Day Sufficient

To get an adequate amount of calcium for bone building, children need only a pint of milk a day, not a quart as has been sometimes claimed. This is the verdict of a study of five University of Illinois scientists, presented in a report to the chemists. More milk would be needed by a child who has been underfed or improperly fed, however, they emphasized, in order to make up for past deficiency.

The verdict, Miss Julia Outhouse, one of the five scientists, explained, is based on how much calcium a child can absorb in order to build its bones and its teeth. Other food requirements which a larger milk supply would fill can be obtained from other than milk sources.

Results of the Illinois experiments are said to be the nearest approach to determining scientifically how much milk children should have. Associated with Miss Outhouse in the study were Gladys M. Kinsman, Millicent L. Hathaway, and Janice M. Smith of the University's Department of Home Economics, and H. H. Mitchell, chief in animal nutrition.

Only one-fifth of the calcium in milk solids can be used by growing children who were well nourished with respect to all other known food requirements.

Five little girls, ranging between three and a half and five years of age, were used in the experiment. The average daily calcium requirement was found to be seven milligrams per kilogram of



#### KIN OF MOUNTAIN GOAT AND CHAMOIS

*The takin, one of the most difficult to hunt of Asiatic animals, is the subject of a new habitat group recently opened to public view at Field Museum of Natural History in Chicago. In the group are five specimens ranging from young calf to old buck, mounted in lifelike attitudes amid a scene representing their mountainous home. The specimens were collected by the Marshall Field Zoological Expedition to China under the leadership of Floyd T. Smith. The group was prepared for exhibition by Staff Taxidermist Julius Friesser and his assistant Frank C. Wonder, and has a background by Staff Artist Charles A. Corwin.*

body weight, or 114 milligrams altogether for the average child, whose weight was 16.5 kilograms (a little more than thirty-six pounds).

This much calcium would be absorbed from one pint of milk per day, the researchers pointed out.

Because most parents would not know clearly and safely that their children did already receive a sufficient amount of calcium, it is probable that a standard quart of milk, daily, might well be the best rule for the layman. This was the unofficial comment of scientists who heard the Illinois report.

Specific enzymes do not cause the richer flavor of milk during the winter, contrary to general chemical opinion, George R. Greenbank of the U. S. Bureau of Dairy Industry stated. Its richer flavor is due to changes in oxidation and reduction of substances in the milk, he declared.

Contentment and milk of unblemished flavor are the lot of cows pastured near a certain rayon knitting mill as a result of a novel, but cheap and efficient method of treating waste products of the plant.

Oil and soap from the knitting mill, Dr. Foster Dee Snell, New York chemical engineer, reported, were troubling

nearby farmers. They declared that milk from their cows, which drank from the turbid stream into which the waste had been drained, had an objectionable taste.

Running the waste through a bed of ashes from the plant, Dr. Snell found, removed the soap and oil and turned the stream crystal clear. Secret of the success was that the ashes contained calcium chloride. Calcium compounds in the ashes, Dr. Snell explained, removed the soap from the waste, and with it the oil. Rayon for knitting is treated with oil to make it handle more easily; after the knitting process is finished, soap is added and the soap and oil boiled off together.

Raw food lovers haven't as great a Vitamin C advantage as is commonly supposed over their softer-toothed fellows who prefer their vegetables cooked.

Proper methods of cooking, Dr. Donald K. Tressler, head of the chemistry department of the New York State Agricultural Experiment Station at Geneva, pointed out, cause the loss of only a small portion of scurvy-preventing vitamin C, contrary to the general belief.

Applesauce made from Northern Spy apples, which have a high vitamin content, contains two-thirds as much vitamin C as the raw apples, Dr. Tressler

and his colleagues, Miss Katherine M. Curran and Prof. Charles G. King of the University of Pittsburgh, reported. Their statements were based on extensive experiments.

Little vitamin C is lost in peeling the apples, they also pointed out, despite popular belief to the contrary. But apple pie, particularly when stale, contains only a small residue of vitamin C.

Previous investigators have been led to believe that cooking lowers the vitamin C content of food by the fact that they measured the content of only the cooked vegetable itself, neglecting to study the juices.

"It is probable that this idea became prevalent because but few nutritional investigators took into consideration the amount of the vitamin which dissolved in the cooking water. The fact that the water in which vegetables, rich in vitamin C, have been cooked may be as rich in this vitamin as tomato juice is of great importance," Dr. Tressler stated.

Stomach ulcers, produced artificially in laboratory rats, can be controlled by a rich diet in proteins such as lean meat. Laboratory animals were first fed acids and pepsin, a digestive juice, to induce stomach ulcers and then fed a diet which prevented the ulcers from actually forming.

#### Fasting Essential

Earlier experiments indicated that a period of fasting was necessary to induce the ulcers, for animals fed a standard diet—after being fed the acid-pepsin mixture—did not develop ulcers. Controlled diet tests named proteins such as casein, gelatin, and lean meat as the substances preventing the ulcers from forming. The tests were conducted by Drs. Milton J. Matzner and Charles Windwer and Albert E. Sobel of the Brooklyn, N. Y., Jewish Hospital.

Previous work in blood chemistry and earlier ideas about the way in which the red blood corpuscles carry oxygen to the tissues will have to be revised in the light of an unexpected discovery, Prof. T. R. Hogness of the University of Chicago declared.

Body salts markedly decrease the oxygen carrying-capacity of the blood's hemoglobin, Prof. Hogness reported. The effect had not been suspected before and interpretations of the way in which the blood does its work had not considered this effect, he added.

Bicarbonate of soda and other salts normally present in the blood cut down the ability of hemoglobin to combine

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.

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### ORNITHOLOGY

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

See Front Cover

**H**ERONS, 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.

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### CHEMISTRY

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

**S**MALLER 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*)