Chemistry Promises Real Farm Relief

Chemistry

Following are reports of the opening sessions of the Institute of Chemistry of the American Chemical Society, meeting at Northwestern University, Evanston, Ill., from July 23 to August 18. Further reports will be given in following issues of the SCIENCE NEWS-LETTER.

Chemistry can beat legislation in solving the farm problem. This was the keynote of the opening session of the American Chemical Society's Chemical Institute at Northwestern University. This is because the chemist can find uses for the farmer's products other than for food and clothing — the ultimate destination now of nearly all the things that he grows.

At the first general conference of the Institute, which consisted of a survey of these new uses for farm products, Dr. H. G. Knight, chief of the Bureau of Chemistry and Soils of the U. S. Department of Agriculture, gave some examples of how this been done in the past. Some thirty commercial products are now made from the cottom seed which was formerly wasted, he said. "Practically all the cotton seed produced in the nation is now converted into useful industrial products, and there are some who contend that higher uses will be found for such material as cotton seed meal, which is now used principally as a stock food. All this has been done by the application of chemistry," said the speaker.

"The citrus by-product industry in California," he continued, "is an outstanding example. Some years ago the orange and lemon growers of that state awakened to the fact that the disposition of culls and waste citrus fruits was costing considerable money. In fact, the usual cost was about $1 a ton for disposal. Application was made by the Bureau of Chemistry for aid in developing methods for converting this waste into economical products. The outgrowth was the establishment of a citrus by-product industry producing citric acid, lemon and orange oil, pectin, etc., to the value of about a million dollars per annum. The citrus culls and waste, when delivered at the factory, are now returning the growers approximately $12 per ton!"

Cellulose, the principal constitutent of woody plants, and used commercially to make paper, artificial silk and a variety of other common things, is now one of the greatest agricultural wastes, the chemists were told in a paper sent to the meeting by Umberto Pomilio, one of Italy's leading chemists. Probably the United States will be one of the first countries to put a stop to this loss, he said.

In his paper Dr. Pomilio told of his own work in this field in Italy and in the Argentine. So much cellulose is available in the latter country, from wastes of wheat and flax stalks, that with only two-thousandth as much there would be enough cellulose to produce their entire supply of paper. At present these waste materials are almost entirely burned and so completely lost.

His work in Italy began after the war when the Italian government found that it had five plants for producing chlorine—one of the first of the poison gases—on its hands, and with no outlet for their product. He was in charge of one of them. This gas can be used with cellulose to produce useful chemicals, and so two waste products have been used. The cellulose has been used for making high grades of paper and stationery.

How a chemi- (*Turn to next page*)

Cabbage Grows Six Heads

Horticulture

A cabbage plant that produced six cabbage heads in turn, one above the other, and has finally ended its career with a crop of viable seed at the top of the eight-foot "stalk" is an unsual occurrence that is likely to go down in botanical history.

This plant was produced by keeping it at a high temperature of 70 degrees Fahrenheit or more steadily for over two years, according to Julian C. Miller, of Cornell University, who conducted the experiment. Seeds were produced only when the plant was removed last November to a cooler greenhouse where the temperature averaged from fifty-five degrees to sixty degrees Fahrenheit.

This cabbage is one product of a series of experiments that show that controlled temperature has an important effect on crops such as cabbage or beets that normally require two years to complete the cycle of fruit and seed. Vegetative growth continues so long as the plant is kept at the higher temperature, Mr. Miller has found. Seeds are not produced until the temperature is lowered, bringing (*Turn to next page*)

Aztec Pyramid Emerges

Archæology

One of the most important Aztec pyramids now in existence, because it retains architectural features hitherto not found preserved, is fast emerging from its funeral shroud of earth, piled on four centuries ago by respectful heathen worshippers to save it from Christian desecration.

The pyramid is at Tenayuca, about six miles northwest of Mexico City, and is the only one of its kind now known where borders of stone serpents such as were described by eyewitnesses at the time of the Conquest are still in place.

Only in a hole in the street in down-town Mexico City, where a corner of what was once the Great Teocalli now protrudes, a hole that is an eyesore to business and a pride and joy to archæologists, do similar traces of serpent borders remain.

The pyramid at Tenayuca was discovered a number of years ago by Dr. Manuel Gamio, Mexico's many-sided scientist, then chief of the Direction of Anthropology of the Mexican government. It was covered with earth and looked like any other cerro in the neighboring maguey-starred valley fringed with hills, except for the fact that Indians from the village of Tenayuca, whose huts are clustered around this hill, were extracting cut stone from one of its sides for building their walls and houses.

An exploration of the mound revealed its rare archæological nature and excavations were first begun about four years ago. Upon the untimely separation of Dr. Gamio from the Mexican service a short time thereafter, the work of clearing the ruins slowed up, but during this last year this unique structure has fast been coming to life again, under the care of Jose Reygadas Vertiz, Director of Archæology of the Mexican Ministry of Education. As excavation proceeds, repair work is done as demanded with the fallen material that remains, to save the structure from further ruin.

Practically the entire pyramid has now been uncovered and all four sides are exposed. On three of the sides around the base are the strange borders of coiled stone serpents which are nowhere else to be seen in Mexico. On the (*Turn to next page*)

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cal, made in a former distillery as a by-product in the manufacture of another by the action of a microbe, was of so little use that it was stored in a swimming pool, and how now the chemical has proven so useful on automobiles that the original main product is now the by-product, was told by C. L. Gabriel, of Terre Haute, Ind.

Acetone was the chemical first made at the converted distillery during the war, as it was needed in the manufacture of smokeless powder and airplane dope. It was made from corn by the action of a microbe. But in making it another chemical, butanol, was also obtained in large quantities. In order to save the butanol, it was stored in tanks, one of which is now used as a swimming pool. Butanol came into its own with the use of modern brushing lacquers. These are used under a variety of trade names for automobile finishes, as well as for use in the home. Now the acetone is a by-product, and is stored in some of the same tanks that were formerly used for the butanol.

This was given as an illustration of a way in which corn can be used for other purposes than food, and so yield a higher return to the farmer.

H. T. Herrick, of the U. S. Department of Agriculture's Bureau of Chemistry and Soils, told how a common mold, such as that which causes bread and fruit to spoil, has been used by chemists in the manufacture of valuable chemicals.

Science in general and chemistry in particular have now assumed a potency capable of changing the whole aspect of human affairs. It needs to be considered in legislation relating to national and international questions, both with regards to the need of the present as well as the future.

This was the theme of an address by Sir James Irvine, acting chancellor of St. Andrews University in Scotland, one of the world's leading chemists. His address was the first of a series of four on Chemistry and World Progress.

To illustrate his remarks, Sir James told of an imaginary chemist at an imaginary breakfast, every item of which, including the cloth on the table, the silverware, the porridge, the fish, the coffee, and everything else to his post-breakfast pipe is the result of chemical research.

But there is a darker side to the picture.

"Forts may be demolished, warships may be sunk, armies may be disbanded, but the chemical factory must always remain a source of potential destruction," said Sir James.

This was shown during the war. Chemists of other countries had looked with approval upon the German enterprise in making use of new chemical methods for obtaining nitrogen from the air, instead of from the Chili saltpeter that had been their former supply. "Thus," he stated, "Germany was able to prolong the war far beyond the calculated limit of her resources."

But Sir James confesses himself unable to give the solution. "How are chemical industries to be preserved and kept alive, yet kept in the paths of peace?" he asked. "The chemist can provide no answer and shudders with disquietude."

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Aztec Pyramid Emerges—*Continued*

fourth side, which is the west, there is a great stone stairway leading to the top many of whose steps are carved with symbolic pictures.

The stairway is very steep, like most ancient American stairways, which were not built for the white man's constitution. As one ascends one can not ever see the top until almost at the last step. In ancient days when the religious procession of priests or worshippers ascended, the sight of the temple that once crowned its top, must dramatically have come into view all at once and only when the top was reached.

Today the visitor climbing the stairway does not come to the temple platform on top of the pyramid after the last difficult step, as he should, but meets a sudden drop of many feet to the very bottom again. Facing him, across a wide space, is another similar but inside stairway, parallel to the one he has just climbed under false pretenses.

But it is the surroundings of the pyramid that are the most interesting of all. On a platform a few feet wide and about as high as a comfortable seat that runs around three sides of the pyramid, a border of snakes made of stone and cement, and coiled like short fat S's, offer the hospitality of the place to the visitor.

Tails face inwards and heads outwards, and mouths are wide open showing strong stone fangs and much red paint inside. The snakes were once plastered smooth and painted in brilliant colors, some of which remain in spots. Over a hundred of the stone creatures have been uncovered. Although they differ in size, their style is always the same.

Two larger coiled snakes not in the rank-and-file, but off the north and south sides of the pyramids, lie guard with heads erect and topped with curious headdresses. Near these two captains-of-the-guard stand altar-like structures. Another interesting feature of the site is a tomb-like platform at the foot of the southeast corner of the pyramid. It is ornamented with carved stone skulls and crossed ulna-bones, and an inner empty "casket" is painted with gaily colored funeral frescoes.

The only part of the pyramid now left to excavate is the southwest corner, and the diggers will not be surprised if in the next few weeks they come upon another such tomb-like structure in the symmetrical position on the other side.

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6-Headed Cabbage—*Cont'd*

about the necessary changes within the plant.

Ordinarily, farmers and seed growers put cabbage plants in storage through the winter and set them out the second spring to produce seed. Recent experiments at Cornell show that the cabbage plant requires only a two months' rest period in storage at thirty-five degrees to forty degrees Fahrenheit, after which the plants can be transplanted to a greenhouse for seed production. In this manner the two-year cycle can be compressed into one year. This method is particularly desirable for growing the first and second generation seed of any cross or selection.

Experiments on annual plants by W. W. Garner and H. A. Allard, of the U. S. Department of Agriculture, proved the importance of length of day in the maturing of annual crops. In the case of the cabbage, Mr. Miller has found that increasing the amount of light had no effect, but temperature appears to be a controlling factor of great importance.

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In 1909, the United States had only three miles of concrete rural highway.