SCIENCE NEWS

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CROP SURVEYING FROM AIRPLANES

AGRICULTURAL observers are trying the plan of going up in the air in order to find out quickly and accurately what is happening on the earth. A test flight in an army plane has now been made over the fields of North Carolina, with a view to determining the practical possibilities of this method in surveying crop conditions.

The plane flew over a 200 mile area producing cotton, tobacco, peaches and other important crops, at a height of from 500 to 2,000 feet; and an agricultural statistician in the service of the U. S. Department of Agriculture noted with unassisted eye the extent of damage done by insects or storms, and the general healthiness of the crops. No attempt was made to estimate the acreage yield of the fields in this test.

Mr. Charles E. Gage, adminstrative officer of the U. S. Office of Crop and Livestock Estimates, says that an observer in an airplane could cover hundreds of miles in a day and arrive at reasonably accurate conclusions as to the state of the crops. No Sherlock Holmes microscope is needed to show the ravages of insects, or of wind, rain or drought. A cotton field that is a dark, healthy green has obviously escaped weevil attack. Another field that is moderately infested will be of a lighter color, and a field that has fed a huge army of hungry weevils may be left entirely bare of foliage. The color of the soil shows an air observer whether land is suffering from drought or is plentifully supplied with moisture.

A quick means of reporting on the state of growing crops might prevent some disturbance of market prices due to guesses and rumors. After a big storm reports of damage are apt to be exaggerated. And sometimes there is difficulty in finding out the truth because trained crop observers may not be available or transportation may be interfered with by washouts or bad roads.

The ordinary method of finding out the condition of the crops in a state is to send out questionnaires to farmers and then to tabulate the answers received. In the case of a severe storm, special questionnaires may be quickly sent out, supplemented by reports from trained observers who travel through the region by automobile or train. By such means it takes not less than ten days to get a conservative estimate of damage, whereas an airplane observer might report on a large area within a few hours.

DETECTION OF DEFECTS IN STEEL BY MAGNETIC TESTS

STEEL girders and cables that appear to be perfect but that contain dangerous hidden flaws will no longer deceive engineers and menace public safety when one more of nature's mysteries has been fully probed.

Magnetic analysis is the method that promises so much in the way of searching out defects in steel. For two years, the U. S. Bureau of Standards has been working with this method, in the hope of making it practical and thus providing a more searching test for elevator cables than the usual visual inspection. As the congress has made no appropriation for the work for the coming year, an advisory committee of engineers, physicists, manufacturers and insurance experts interested in the tests will meet at Washington this month to hear a final report of what the government has accomplished in this important field.

R. L. Sanford, physicist at the Bureau of Standards, says that magnetic analysis meets all of the requirements for a practical non-destructive test of steel, except for the fact that as yet the results of a test can not always be interpreted accurately. The method is simple, rapid and inexpensive.

The basis of the magnetic tests, Mr. Sanford explains, is that changes in mechanical qualities of steel are found to be accompanied by corresponding changes in the ease with which the material can be magnetized.

In the method under investigation, a photographic record is made of the magnetic quality of a specimen of steel wire along its length. Uniformity of properties is indicated by a straight line record. This indicates absence of flaws. Irregularities in magnetic quality are revealed by corresponding irregularities in the record. Defects in the material cause such irregularities. The difficulty is that other causes which do not impair the strength of the steel may also, musteriously, produce an irregular record. A flaw was indicated in one bar of steel, and it was broken and the flaw found. But in several other tests similar reactions were noted, and when the bars were broken no flaws were found. The present problem, therefore, is to discover the key to the interpretation of the magnetic records.

Mr. Sanford says that when the principles of magnetic analysis are fully understood it should be possible to test a steel girder or a cable before it leaves the factory, and again when it is put in place, and whenever its safety is questioned.

The Bureau of Standards may continue the experiments in a limited way from its regular funds.

TESTS FOR INTOXICATION

"When is a man intoxicated?" is still a burning question in this sixth year of the Volstead era. Courts and police have tried all sorts of tests, from making a suspect say the alphabet backwards to having him walk a chalk line. And now comes Dr. H. L. Hollingworth, of Columbia University, who has put six college students to a two-week drinking test, and who says that the most accurate tape line for measuring intoxication is the psychological method.

Dr. Hollingworth sought to find out whether a state of intoxication could be most reliably detected by a person observing the behavior of the suspect, or by the mental state of the drinker as he himself honestly described it, or by scientific tests. The report of his work will appear in a forthcoming issue of *The Journal of Applied Psychology*.

Neither the drinkers nor the observers who took part in the experiment were told on what days alcohol was included in the diet of the drinking students. The observers, who were present in the laboratory throughout the investigation, noted the conversation, conduct, appearance and attitude of the students. At the end of every day, each observer reported any unusual signs noted in any of the test men, or else wrote that their behavior was normal.

Each of the men under test kept a diary in which he recorded his sensations and feelings, his activities in the evening after the days tests were over, and the amount and quality of his sleep at night. Psychological tests were also made on each student daily. These tests measured their steadiness, speed and control in tapping with a pencil, ability to put a pointed instrument into something which resembled a keyhole, their clearheadedness at adding figures, and at naming colors, and other significant reactions which might be affected by intoxication.

Dr. Hollingworth reports that a comparison of the results of the three methods of detecting intoxication shows that the most accurate method is the psychological test, in which abilities of the subject are definitely determined. By a scientific test it is possible to detect the effects of relatively small doses of alcohol, doses so small that the "judgment tests" declared the subject to be normal.

ORIGIN OF THE BANANA

IN a scathing denunciation of what he termed the great American banana myth, Dr. W. E. Safford, economic botanist of the U. S. Department of Agriculture, has attacked evidence recently brought forward in support of the theory that bananas originated on this hemisphere and were cultivated by prehistoric Indians.

Commenting on the discovery of fossil banana seed in coal beds of Colombia and the connection of this discovery with statements made by early writers as to the Indians' use of the fruit, he declared positively that the home of the banana was in the Malay archipelago, that it was unknown in America when Columbus reached here, and that the same writers who reported it as native to the New World demonstrated similar ignorance in regard to the potato and other plants.

Fossils show that there were horses, camels and elephants in North America ages ago, but there were none here when the Spaniards reached this hemisphere. Fossil banana seed can prove nothing in regard to American banana trees, for our bananas do not have seed. They must be propagated vegetatively from cuttings.

Columbus and his followers listed the plants they encountered, but made no mention of the banana. Bananas were introduced into the West Indies from the Canary Islands by Padre Tomas de Berlangas in 1516. They were also carried to Pacific islands by early migrants; but their native home was in the Malay archipelago.

The persistence of the myth of the American origin, according to Dr. Safford, was due to the great Humboldt, who evidently was not himself a botanist, and accepted the statements of Garcillaso de la Vega, a descendant of the Incas, who claimed in the early sixteenth century that bananas were a staple food of South American Indians in pre-Columbian times. This man, Dr. Safford said, was ignorant of the agriculture he pretended to describe. Most of his information was second-hand and his exaggerated and unreliable statements lack confirmation. Humboldt also accepted statements that the Irish potato was found in Virginia by early colonists when it has been definitely established that it was a native of Peru and was unknown in North America before the coming of the white man.

ANCESTRY OF THE REPTILES

A MISSING link in the prehistoric past of the reptiles has been brought to the attention of American scientists by Dr. Peter B. Sushkin, of the Russian Academy of Sciences, who is now examining specimens at leading museums in the United States.

The prevailing theory is that the family tree of the reptiles can be traced back through the amphibians, which are at home both on the land and in the sea, and thence back to fish-like ancestors. But the amphibians so far found do not fit into this diagram. All amphibians known are in some respects more advanced than reptiles, and so can not be considered their ancestors. I find such evidence in the Russian material, and nothing contrary to the theory is shown in the material which I have seen in museums of the United States.

The evidence indicates that amphibians so far known represent only a side branch of development. Dr. Sushkin states that these arguments are based on the relations between the ossicles, which are small bones of the ear, and the quadrate, a bone supporting the under jaw, and on the structure of these bones. In the fish and in the principal reptiles, the bone which corresponds to the ossicle is directly connected with the quadrate. In the known amphibians, the connection has already been broken, indicating that they had progressed to an advanced stage.

The amphibians which the Russian academist has been studying were somewhat like the frogs of to-day, except that they were much larger, some being ten or fifteen feet long. They hatched their eggs under water and the young lived and breathed under water until lungs formed in their bodies, after which they could breathe only in the air. Reptiles, even those that live in water, are altogether air breathing creatures.

The prehistoric amphibians belong to the Permian age, which geologists place 25 or 30 million years ago in the earth's history. They are thus older than the oldest mammals so far discovered, as the earliest mammals finds belong to the Triassic period, which was about 20 million years ago. The earliest man whose bones have been found, *Pithecanthropus erectus*, dates back only a million years.

Dr. Sushkin says that there are many gaps in the past history of the earth's creatures, but wonderful progress has been made considering that most of the paleontological research has been done in the past forty years, and only a small part of the earth's surface has been scratched.

THE ORIGIN OF THE MOON

THE earth is the parent of the moon in more than a poetic sense, in the opinion of Dr. R. H. Rastall, lecturer in economic geology at the University of Cambridge, who recently announced a theory that our satellite is made of material that was once part of the earth's crust.

Dr. Rastall's theory, however, differs from that of Sir George Darwin and others who have previously made similar suggestions, for he thinks that a layer of the earth's crust, about 41 miles thick, and covering about two thirds of its total area was peeled off by the attraction of the sun. This tidal action of the sun was effective while the crust was still in a plastic state, and the moon's own gravitational attraction caused it to roll up into a ball of the form that we now see in the sky. The crustal area left on earth formed the continents.

This theory also accounts for the fact that while, according to generally accepted ideas, masses of lighter density such as make up the earthly continents should cover the entire surface of the globe, they actually cover only about a third, the missing two thirds consisting of the moon. Measurements of the moon's density by its effect on the earth show that it is about three and a half times as heavy as an equal volume of water. This is more dense than the average for the continental land masses, but Dr. Rastall assumes that at the time of the disruption, some of the heavier underlying material was also torn away.

The new theory also fits in with the ideas recently set forth by a German geologist, Professor Alfred Wegener, who believes the American continent was originally united with Europe and Africa, and that it floated away to its present place. This would not have been possible so long as the entire earth was covered with such a crust, but after the moon had been torn away, it was possible for the continents to separate from their long embrace.

A HEAT-OPERATED ICEBOX

AN artificial icebox that operates like a coffee percolator and generates cold from heat has been invented by two young Swedish engineers of the Stockholm Institute of Technology, Carl Munters and Baltzar von Platen. When heated at one point, either by gas, electricity or kerosene, it cools the usual kind of food chest and for ordinary household purposes needs to be run only a few hours a day. When operated with gas at the Stockholm prices it produces the equivalent effect of eight pounds of ice at the cost of one cent, and in view of the mild winter and the consequent shortage of natural ice facing the country, the new invention comes most opportunely.

The construction of the new ice chest is extremely simple. It has no movable, mechanical parts, no pistons, fans, pumps, ventilators, or any gears to get out of order. The action is initiated by heat which sets an ammonia solution in motion in a small boiler. The ammonia then passes through condensation tubes and while trickling down a generator mixes with hydrogen and by thus evaporating absorbs enough heat to cool the food in the refrigerator. In a third cylinder, called the "absorber," the ammonia is washed free from the hydrogen and then percolates down through a set of tubes into the boiler again, where the heat once more sets it in motion. While this action is kept up the refrigeration process continues. To effect the condensation running water has so far been used, but an air cooling system is being devised by the inventors.

For the launching of the new idea the Royal Board of Trade has granted a loan of 300,000 kroner and manufacturing has already started on a commercial scale.

ITEMS

MINERALS needed in the building and working of the human body are removed from many vegetables by cooking, and Professors W. H. Peterson and C. A. Hoppert, of the University of Wisconsin, have discovered that the best way to avoid such losses is to cook by steam. In tests of sixteen vegetables they found that cabbage, celery, beet greens and onions suffer great mineral losses. Spinach, however, showed a complete and unlooked for retention of its calcium.

THE United States Public Health Service has announced results of experiments which prove that severe cases of human pellagra can be either prevented or cured by means of dried yeast. Surgeons Joseph Goldberger, G. A. Wheeler and W. F. Tanner, after the successful treatment of twenty-five out of twenty-six patients, were led to this discovery by following another disease in dogs. Black tongue, a bacterial disease with somewhat similar effects on the skin as are produced in severe cases of pellagra, also a bacterial infection, was produced experimentally in dogs. Then the dried yeast was given. The cures were so satisfactory in the cases of the dog disease that the Public Health Service surgeons tried the yeast treatment on pellagra patients. As early as the second or third day after the treatment beneficial effects were noted.

A NEW form of tool which cuts metal at higher speeds and in larger chips than is practicable with the standard tools now used was described to the American Society of Mechanical Engineers meeting at Milwaukee by its inventor, Dr. Hans Klopstock, of Berlin. Tests made in foreign railroad shops indicate that production can be increased about 30 per cent. by means of the new tool.

How large power plants can save thousands of dollars in summer coal bills by tapping lower levels of lake water was the subject of a paper read before the American Society of Mechanical Engineers recently meeting in Milwaukee by Professor A. G. Christie, of the Johns Hopkins University. By placing intakes for cooling water for use in condensing steam so that they would reach the cold bottom layers of northern lakes, Professor Christie showed that water 10 to 20 degrees colder could be obtained. With this colder cooling water additional vacuum could be obtained in the condenser and the consumption of steam could be decreased. He estimated that the decrease in steam consumption due to increase of vacuum would result in a saving of $36,956 in four and one half months' operation of a 100,000 kw. plant.