

THE SCIENCE NEWS-LETTER

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EDITED BY WATSON DAVIS

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EDWIN E. SLOSSON, Director
WATSON DAVIS, Managing Editor



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LARGEST AMERICAN SUN DIAL BUILT BY ANCIENT MAYA

America's largest sundial, built at the time when the Christian era was but a few centuries old, has been discovered and checked by modern science, according to reports just received at the Carnegie Institution of Washington.

It is located in Honduras in the ruins of the great Maya Old Empire metropolis, Copan, which flourished 2000 to 1500 years ago, and was the center of activity for one of the most highly skilled nations of astronomers that the world has ever seen.

The great sundial consists of two hieroglyphic monuments, painted red, set 4-1/8 miles apart so as to determine a line that runs nearly due east and west across the valley in which the great city of Copan once lay. Stela 10, as the western stone is called by the archaeologists, stands on the crest of the western range of hills. From Stela 12, the eastern monument located near the crest of the eastern range of hills, the setting sun in the spring can be seen to sink nearly behind Stela 10.

In April of this year archaeologists of the Carnegie Institution, engaged in reconstructing and studying the Maya ruins of Yucatan and Honduras, made an exploration trip to determine the correctness of previous theories as to the time-telling functions of these two monuments. Under the leadership of Dr. Sylvanus G. Morley, a party, including John Lindsay, Carnegie Institution scientist, Joseph Linden Smith, archaeological painter, Dr. Thomas Gunn of the University of Liverpool and Maya authority, and R. A. Franks, jr., of New York City, travelled by mule train to Copan and made observations to determine the astronomical significance of the great sun dial.

"The first task was to reerect the fallen western monument in its original position and thus to re-locate the original western end, or objective of the line of sight," Dr. Morley reports. "But here a curious difficulty arose.

"Where this monument had stood in ancient times was marked by a well-defined hole in the stone platform. But to re-erect the monument in its exact former position proved a delicate matter.

"During the revolution which devastated Honduras two years ago, the Copan Valley was the scene of several bloody engagements. Indeed, on this very platform of Stela 10 General Tosta, in command of one of the opposing armies, had his headquarters, and here during the course of one of the battles one of his soldiers was killed. The gaping hole, where fifteen centuries before Stela 10 had stood, was a ready-made grave and here the dead Hondurenean revolutionary was buried and stones piled on top of the body. It seemed perhaps wanting in feeling to disturb this soldier's last

long sleep, and so instead of reerecting Stela 10 in its original position directly over his grave, it was set up 3 feet behind, care being taken that together with Stela 12 it defined the same east and west line as before.

"And now another unforeseen difficulty arose in the execution of this experiment. Throughout western Honduras the month of April is dedicated to burning the brush off the fields preparatory to planting them at the beginning of the rainy-season early in May. When the experiment was begun a dense smoke-haze obscured the sky at Copan, and each night the sun sunk out of sight not at the horizon, but somewhat above in this thick smoke-haze.

"The true astronomical bearing of the line between Stela 10 and Stela 12 was absolutely essential to the success of the experiment, for even if the exact position of the sun at the moment of setting on any given day could not be determined because of the smoke-haze, this position could be calculated from solar observations. This difficulty of ascertaining the bearing of this base line was solved by building an enormous pyre of fat pine behind Stela 10, 12 feet high, and 12 feet wide, and setting fire to it at night.

"Mr. Lindsay at Stela 12 with his transit was ready. The night was dark, and, except for a few directly overhead, the smoke haze obscured even the stars. Minutes passed and still no signs of a distant spark. Suddenly through the night and haze there began to glow a faint red spark like the dull glow of iron cooling in a blacksmith's forge. This spark grew sufficiently bright and large so that Mr. Lindsay at the instrument was able to distinguish a small black object at the ground level and in its center. This was Stela 10, and he soon was able to secure the true bearing of the line between the two stelae.

"Later two heavy rainstorms so cleared the atmosphere that it was possible to secure several direct observations of the sunset. On April 12 as well as upon the reciprocal day, September 7, the sun was found to set directly behind Stela 10 as observed from Stela 12.

"But what does all this mean? Why were the ancient Maya astronomer-priests at Copan so anxious to mark the line of the setting sun on this particular day?

"It appears highly probably that these two monuments on each side of the Copan Valley marked the path of the setting sun at the beginning of the agricultural year, the eve of the burning of the fields preparatory to the planting season in May when the rainy season begins.

"Imagine the ancient astronomer-priests watching the sunset night after night from Stela 12, and noting its gradual approach nearer and nearer to Stela 10 on the distant western edge of the valley. The great disc of fire had already reached its maximum speed on March 21, the vernal equinox, and was beginning to slow down. The dry season was nearing its end. Throughout the region the brush had been felled and piled against the day of burning. The fierce suns of March had dried it to a state of tinder. It wanted only the touch of a brand and fire would sweep through the countryside. And still the priests withheld the signal which would permit the firing of the fields. The sun, though nearing Stela 10, was still setting south of it. And then came the night of April 12; the sun set fairly behind the distant western monument and the time had come.

"Picture runners carrying this news throughout the region, and fires springing up here, there, and everywhere, until in a few days, the sky was covered with a dense pall of smoke, even as it is today."

HARDY TOMATOES DEVELOPED TO RESIST DISEASE

Kansas

State agricultural experts have been hard at work to save one of the state's most important truck crops. Tomato wilt which has spread havoc among the truck growers of this state, is caused by a parasitic fungus which refuses to succumb to any of the usual methods of attack.

It can only be overcome, says R. P. White of the Kansas State Agricultural Experiment Station, by developing specially resistant types of tomatoes that will withstand the disease. Of the many introduced varieties tested out at the agricultural experiment station six have proved resistant to the wilt and by encouraging market gardeners to grow these varieties it is hoped that the tomato crop will again assume its normal proportions.

ELECTRIC FARMING

By Dr. Edwin E. Slosson

One of the funniest things I saw in Sweden when I was over there recently was the use of electrical cookstoves in forest cottages. Sweden is short on coal and oil, but long on wood and water. The Swedes are growing trees faster than they are cutting them, the reverse of the policy that prevails in America. Consequently they have wood to burn, but they prefer to cook with water instead. The water falls down faster than the trees can grow up. So they turn it into turbines and with them grind the wood into pulp, and ship it over to America to be made into the yellow journals and silky stockings that are so conspicuous in our country. Electricity is cheap over there and besides they have an ingenious kind of cooking contrivance that keeps in the heat and the steam, so a few watts will cook a lot of food, and it takes a lot of food to satisfy a Swede.

About forty-five per cent. of the farms of Sweden are using electricity for lighting and light power. In the United States "not more than 3 per cent. of the farms are receiving electric current from power lines", according to G. E. Tripp, chairman of the Westinghouse. California of course, claims the lead, with 554,000, 000 horse-power-hours of electric power used in agriculture during the year 1923, but 80 per cent. of that is employed in pumping water for irrigation. The number of electric power consumers on farms in California is reported as 26,915. Ohio has 17,000 farms supplied with rural electric service, and Iowa and Pennsylvania have about 12,000 each.

To read over the list of the applications of the current one would think that the electrical farmer hadn't any chores to do and that his electrical stock were

living in the lap of luxury. I am skeptical, as one of my age naturally would be, about the moral effect of all these new fangled ways. Incandescent lights in the piggery! Electric fans in the cattle shed! Ultraviolet rays for hogs and hay! Is it good for young hens to be kept up all hours of the night under the white lights, gadding about and stuffing their crops with rich food? Can a thermostat altogether replace the maternal instinct?

And what will be the effect on the farmer and his family? Will he continue his commendable habit of early rising if he can milk a dozen cows at a time by simply turning on the juice? Will not the farmer's wife lose the well rounded arms that she developed by long hours at the churn and the rosy complexion that she acquired over the cook stove? Will the tungsten filament give that well grounded education that we, or anyhow our forefathers, got by means of the torch or tallow dip. Will the tennis racket adequately take the place of the buck-saw in the development of the muscles and the sense of duty? In short, will those whose hardest labor has been to press a button or jerk a switch acquire those sterling qualities which have made us what we are?

GERMANY ADMITTED TO INTERNATIONAL RESEARCH COUNCIL

The scientists of the Germanic countries, enemies of the Allies during the war, have been invited to sit in the councils of international science. The International Research Council has by unanimous vote of the twenty countries attending the recent meeting in Brussels invited Germany, Hungary, Austria and Bulgaria to join the council. This action will bring all of the principal nations into the circle of international science and end the exclusion hitherto suffered by enemies of the allied nations. The matter of changes in the basis of dues of the various countries in the council was left for later decision by the various international unions affiliated with the International Research Council and the Council's officers. Dr. Vernon Kellogg, permanent secretary of the American National Research Council, Dr. F.G. Cottrell, director, Nitrogen Fixation Laboratory, and Prof. George Birkhoff of Harvard University represented America at the meeting and supported the resolutions admitting Germany.

The action of the International Research Council admitting the Central European Powers to its membership brings to fruition the effort of protagonists for international scientific amity to consolidate the relationships of the international scientific world. The International Research Council was organized during the world war by representatives of the Allied and neutral nations and at that time membership of the enemy countries was out of the question. Since, however, the International Research Council replaced the older international organizations that were disrupted by the outbreak of the war, a strong sentiment grew up for the admission of the former enemy countries just as soon as the war feelings died away. Last year the American delegation supported by England, Sweden, Denmark, Norway and Holland, urged the admission of the former enemy organizations, but although those nations were in the majority, a minority, represented chiefly by France, Belgium, Czech-Slovakia and Poland, together with the rules of voting, prevented the admission of Germany, which has now been accomplished.

SIMPLER SYSTEM OF AUTO NUMBERS INVENTED

Science steps in to make it easier to read number plates on automobiles. The constantly increasing number of cars, which in many states has passed the million mark, makes bigger and bigger numbers on the license tags that are correspondingly bunglesome and difficult to read.

As an approach toward simplifying this problem James D. Weinland of Lehigh University has made a series of tests to ascertain which combinations of letters and numerals are most quickly and clearly perceptible. Each license was exposed for one-fifth of a second and the numbers of correct readings made by the fifteen college students used as subjects were recorded.

The results showed that 90 per cent. of the readings were correct when only five numerals were used but the accuracy went down to 56 per cent. when they were increased to six. Three letters and three numerals in combination gave 76 per cent. correct readings when the numbers came first and 70 per cent. when the letters preceded the numerals. Four letters followed by two numbers gave 85 per cent. results, whereas with three letters and four numbers the number of correct readings dropped down to 45 per cent.

With the scheme worked out by Mr. Weinland it will be possible to furnish different license number combinations for more than 20,000,000 cars with a fairly high degree of perceptibility of the licenses. The same scheme may also be applied to the numbering of freight cars or any series of objects where quick and accurate perceptibility of number is desirable.

MOST BECOMING CLOTHES ARE SCIENTIFIC

If you have some suit or dress or entire outfit that your friends insist is particularly becoming, it is almost sure to be an example of scientific principles of wearing clothes. This fact was stressed by Miss Grace M. Morton, assistant professor of home economics of the University of Nebraska, who explained some of the latest developments in the psychology of dress before the American Home Economics Association at its recent session.

Since the beginning of time, some individuals, especially women, have consciously or unconsciously dressed to suit their types of personality, Miss Morton pointed out. But it has remained for this scientific era to help out those who do not have a sure intuition about dress by ferreting out the scientific principles involved and reducing them to formulas, and by creating a new vocation of clothing adviser.

"Considered from a purely physical standpoint, there are short stout and tall stout people, thin angular ones, and the rest," said Miss Morton. "Especially must be remembered those with special difficulties of proportion which call for an application of that psychological principle requiring that we make something interesting happen to carry the eye away from the particular difficulty we wish to conceal.

"A study of the spiritual and mental characteristics of women reveals two outstandingly different classes -- the one stately, dramatic, striking, forceful; and

the other dainty, petite, demure, naive. Most of us are combinations of these two types, but nearly all of us have tendencies toward one or the other."

Such personality study and also new developments in the psychology of design, color and texture, are revolutionizing the teaching of clothing, she added.

YOUNG CHILDREN NEED BOTH SCIENCE AND HOME GUIDANCE

Science must set a shoulder to the wheel and help the parents of young children if the children are to develop their talents and possibilities to the best advantages, according to Miss Edna N. White, director of the Merrill Palmer School, Detroit.

Young children who have the advantage of a regular regime of rest, food, and exercise, and whose individual differences are carefully studied are likely to be above the average in physical fitness, Miss White told the American Home Economics Association at its recent meeting. She added that on the mental side it is impossible without expert service to determine a child's approximate abilities and to provide an environment suitable for those to develop.

"The educational problems of the first years of life are probably more varied than at any later period, and less is really known about methods and possibilities," she said. "These are the years for the development of vocabularies, the beginning of appreciation of color, form, rhythm, and tone, the time when fundamental habits, mental and physical, are formed and the time when attitudes toward authority, affection and reality are set."

The nursery school plan, which is being widely adopted in this country and in England, was described by Miss White as one of the best developed efforts to pool the findings of the specialists in child study and to view the child as a whole.

"The nursery school should never be regarded as a substitute for the home in any sense," said Miss White. "Unless such schools are cooperative ventures with the home, they are not socially sound. The nursery school should be an agency for determining the needs of the child and interpreting these needs to the parents, in order that the educational program may meet the requirements of the child in question."

CELLULOSE BATH PRESERVES FLOWERS

Pressed flowers in botanical collections are too delicate to stand the wear and tear of classroom and museum use, so F. M. Woodruff, curator of the Chicago Academy of Sciences, has invented a process to make them last longer.

The whole card on which the flower is mounted is passed through a solution of transparent liquid celluloid, allowed to dry and the whole operation repeated three times to assure a permanent coating.

"BUSY BEE" CALLED LOAFER

Bees like to doze and sleep during the day-time, and they do it unmolested, according to Prof. Karl von Frisch, eminent entomological worker of Germany. Not only does Dr. von Frisch find that honey bees enjoy daily siestas, but love of ease varies greatly in individual bees.

Continuing his earlier researches in bee-psychology, Dr. von Frisch devised a method of marking individual bees with indelible colors. Carefully placed observers were able to follow the movements of these marked bees even in flight. And through glass-enclosed hives they saw marked bees return to their particular spot on the comb, indulging, after moderate activity, in periods of inactivity ranging from minutes to hours, although their total span of life is approximately five weeks.

It was not until the marking device was hit upon that Herr von Frisch fathomed some of the age-old mysteries of bee-civilization. To attempt to learn these by watching at random forty thousand bees in the hive was a hopeless task, Dr. von Frisch declared, adding:

"It was always the bees we weren't looking at that moved!"

FUNGI FOUND FREQUENT CAUSE OF TROPICAL DISEASE

Fungi, the type of parasitic plant growth that makes little scabs on fruit and leaves of trees, are an important cause of disease in human beings. It has become so usual to think of bacteria as the principal source of infections that it is rather surprising to learn that over 20 per cent. of the maladies of the tropics are due to fungous growths, according to a statement by Dr. Aldo Castellani, international authority on tropical disease, in a recent lecture before the College of Medicine at the University of Illinois.

Ringworm was one of the first afflictions shown to be caused by a fungus and it is now known that similar parasitism may attack any system of the body, the skin being the most frequently invaded and the nerves the least. Many bronchial troubles and diseases of the tonsils, as well, may be traced to such a source, he declares.

Dr. Castellani makes a strong appeal for more cooperation between medical science and the botanical specialists who study fungi and the diseases they produce in higher plants. Such cooperative research, he maintains, is one of the objectives of the department of tropical medicine at Tulane University at New Orleans where Dr. Castellani is now stationed as professor of tropical hygiene.

Cypress swamps in Louisiana, long regarded as useless, are to be replanted with Tupelo gum trees.

FIRST DAYS OF LIFE FOUND MOST HAZARDOUS

The number of babies that are born dead or that die soon after birth is almost as great as the number of infant deaths in all the rest of the hazardous first year of life. This condition, which is described as astounding, is reported to the American Child Health Association, by Dr. Fred L. Adair, of the University of Minnesota Medical School.

Thousands of babies are being saved by medical progress, but practically all of the lessening of the infant death rate has taken place after the first two weeks of life, Dr. Adair finds.

"It is disconcerting," he says, "to recognize that in spite of our supposed increase of medical knowledge and improvement of medical practice, the stillbirth and neo-natal death rates have remained practically the same for the past twelve or fifteen years at least."

Many deaths in the first hours of life can be traced to the dancing and automobile riding of pleasure loving mothers, while many more babies die because their mothers are subjected to over-strain and over-work.

Dr. Adair urges that the general level of obstetric knowledge and practice must be raised so that fewer deaths may occur. He also believes that conditions surrounding the newly born infant should be improved, so that there will be less chance of infections and better opportunity for finding out abnormal conditions in time to remedy them.

STEP TAKEN TOWARD UNDERSTANDING TUBERCULOSIS

An important step toward the understanding of tuberculosis may be taken as a result of researches by Dr. Florence B. Seibert, of the University of Chicago and Otho S. A. Sprague Memorial Institute, who has reported to scientific publications the discovery of the chemical compound in tuberculin that elicits the skin reaction.

Tuberculin is a preparation of various forms and modifications made from cultures of the bacterium that causes tuberculosis and is commonly used as a test for the presence of the disease in both men and animals. Ever since the time of Koch, the famous bacteriological pioneer, many experimenters have attempted to determine just what it is in tuberculin that brings about a skin reaction in those suffering from tuberculosis.

Dr. Seibert has now found and crystallized a protein substance contained in tuberculin that carries with it the ability to produce the characteristic reaction.

A parachute that can be used in drops of less than 100 feet is being tested.

BIG RUSSIAN TELESCOPE NEARING COMPLETION IN ENGLAND

The lens for a new telescope which will be the largest of its kind in the world and intended for the Russian astronomical observatory, at Simois, in the Crimea, is now nearing completion, and has not proven unsatisfactory, as previously reported, according to Prof. Alexei N. Kriloff, a Russian astronomer now residing in London.

This great lens is being made at the works of Sir Howard Grubb, Parsons and Co., at Newcastle-On-Tyne, and will be used with a telescope mounting which has already been completed. One of the discs of glass for the lens, known as the "crown glass", has been finished, and, it is said, has proven to be a perfect piece of glass. As it is desired that so large a lens shall approach as closely to perfection as possible, however, it is stated that several discs have been cast for the flint glass, the other component of the lens, while still others are in the course of preparation. When completed, the best will be selected.

Prof. Kriloff states that the lenses have not yet been ground to the curves which will be required to make them into an actual telescope lens.

DANISH GEOLOGIST-EXPLORER PLANS GREENLAND EXPEDITION

The little known east coast of Greenland will be explored this year by a Danish Government expedition headed by Dr. Lauge Koch, the Danish geologist in charge of the Greenland Geological Survey, who on his last trip brought back important information about the formation and age of the northern part of that great sub-arctic continent.

Preliminary plans for the expedition are now made and it is proposed by Dr. Koch to spend a year on the east coast between 70 degrees and 76 degrees north latitude mapping the geology of the region.

Dr. Koch is to be accompanied by an English palaeobotanist and a Danish geologist, who is a specialist on Mesozoic fossils. It is expected that the travelling conditions will be good and that there will be opportunity for getting Eskimo assistance, so that interesting results should be obtained.

The United States imported 61 million pounds of tomatoes from Mexico last year.

Egyptian mummies are being studied through their wrappings by X-rays.

Work done by a tractor in 24 days would take almost 200 days if done by a horse.

TABLEID BOOK REVIEW

PSYCHOLOGIES OF 1925. Edited by Carl Murchison. Worcester, Mass., Clark University. 1926. 412 pages. \$6.00.

Any one who knows enough about psychology to realize that there are almost as many psychologies as there are experts in this field, will find this book enlightening and interesting. The chapters, all by prominent psychologists, were originally delivered as lectures at Clark University. Each of the nine professors presents his own ideas, and those of the school of thought he approves. Some of them show convincingly how very wrong other current theories must be until you advance to the next chapter and find the situation and the names reversed.

Six types of psychology are presented, ranging all the way from the extreme Behaviorism explained so vividly by John Watson to Purposive Psychology championed by Morton Prince and William McDougall. The Gestalt Psychology, now popular in Europe, is expounded by Kurt Koffka and Wolfgang Kohler. The other authors of the book are Walter S. Hunter, Robert S. Woodworth, Knight Dunlap, and Madison Bentley.

The book is aptly described in the introduction by Dr. Murchison as "a genuine cross-section of contemporary theoretical psychology".

ELEMENTS OF INDUSTRIAL CHEMISTRY. By Allen Rogers. Second Edition. New York: D. Van Nostrand Co. \$4.50.

This is a condensed form of the standard work on Industrial Chemistry and contains all that most people need to know about the manufacture of inorganic and organic chemicals. An immense amount of authentic and practical information is in a single volume and should go on the open shelves of the public library.

SCIENCE IN THE HOME. Radio Publication No. 23. University of Pittsburg. 75 cents.

These Radio Talk pamphlets are becoming a sort of guide to modern science in everyday language. This one contains practical advice on foods, textiles, insecticides, fuel, table-ware and building materials.

Immigrants at Ellis Island are shown moving pictures each Friday night.

The newly discovered chemical element, Illinium, has been detected by means of the spectroscope, but has not yet been isolated.