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EGYPTIAN RECORD OF JEWS SLAVERY FOUND

What is believed to be direct confirmation by contemporary records of the Biblical story of the enslavement of the Children of Israel in Egypt, has been unearthed at Beisan in Palestine by the archaeological expedition of the University of Pennsylvania Museum under the direction of Dr. Clarence S. Fisher. The find is a "stela" or graven stone record, set up by Rameses II when the Egyptians were occupying the fortress of Bethshean, which is the ancient name of the present Arabic town.

The stela consists of 24 lines, almost wholly devoted to a eulogy of the king and accounts of his might in battle and of the havoc which he wrought among his enemies. But in the midst of all this flowery language is a simple little statement that Dr. Fisher believes to be the long-sought confirmation of the account in the Book of Exodus of the forced labor of the Children of Israel in the Land of Egypt, where it is written that their taskmasters forced them to "build for Pharaoh store cities, Pithom and Rameses". For on this graven stone made at the command of Rameses II is the statement that he compelled Semites to labor for him in the building of his "name city" in the Delta of the Nile. The Israelites were Semites.

The stela is nine feet high, three feet wide and of black basalt. The top has the usual rounded form and the face is divided into three parts, a scene in relief at the top, the main inscription and a row of captives at the bottom.

The main text consists mainly of the fulsome adulation of the king that this Rameses so often inscribed upon his records. For example:

"His majesty has done justice to the widow, protected the orphan and fed the needy. This solid fortress of Egypt (that is himself) who is a buckler to millions, and a protector of multitudes, sustains all peoples. All lands are under his feet. He grasps his bow upon his horse and seizes his arrows. He is like a shooting star in the midst of multitudes of people. He has seized the rebels at the ends of the earth and has overthrown their warriors with his soldiers. His majesty is amongst their offspring like the bull god of the town of Ombos. Like a hawk in the sky among the other birds. Like a fierce lion in a pen of goats. His foes he scatters like feathers before the wind. Never hath been done before what he has done in any land. Never has his majesty spoken with contradictions or boastings."

In line 11, he says that he has "collected together the Semites that they

might build for me my city Per-Rameses."

Incidentally this would also establish Rameses II as the "Pharoah of the Oppression", an old identification that has persisted in spite of weighty opposition.

Beisan, or Bethshean, where the find was made, is in the vally of Jezreel on the edge of the plain of Armageddon, famous for its great and decisive battles from the days of the Hebrew patriarchs to those of the World War, for it was there that General Allenby won a cavalry battle with the Turks that hastened the conquest of Palestine, and it is there that according to Old Testament prophecy the final battle of the nations will be fought. It is in southern Galilee, and on the main routes from Egypt to Assyria and from Palestine to Asia Minor.

Excavations by the University of Pennsylvania already indicate a history of the place extending back to 2,000 B.C., or to the days of the Early Bronze Age. The Egyptians held it from 1313 to 1167 B.C., after their ancient enemies, the Hittites, had been in possession. After the Egyptians, the Philistines held the place, and on the slopes of Mt. Gilboa, some three miles away, inflicted the memorable defeat upon the army of King Saul, so graphically recorded in the Biblical records. This was avenged some years later by King David who took the fortress itself by storm, and burned it so thoroughly that the mud bricks, baked red by the intense heat, have been found by the Museum expedition as have portions of charred beams. The town paid tribute to Solomon, his son and successor, and its military importance was never regained.

The ruins, however, disclose evidences of its occupation by the Greeks and Romans, to whom it was known as Scythopolis, after invading Scythians who had settled there. During the Christian period the city was noted for its many magnificent churches. Later the invading Mohammedan hosts took the place and still later the Crusaders captured it and held it for years. This is but an outline of the history of this spot, a history which Dr. Fisher hopes to extend to 3,000 years before the Christian era.

READING REFERENCE -- The Bible.

Wells, H.G. The Outline of History. New York, Macmillan Company, 1922.

Montgomery, James A. The Opportunity for American Archaeological Research in Palestine. Smithsonian Institution Publication No. 2611, Washington, Smithsonian Institution, 1921.

PHOTOS WITHOUT LIGHT TAKEN IN TWENTY BILLIONTHS OF SECOND

Electrical disturbances lasting only a few billionths of a second can be made to record themselves on a photographic plate, without light, according to a discovery announced by J. F. Peters, electrical engineer, Westinghouse Electric and Manufacturing Company at Pittsburg. The application of this discovery will be of great importance to electric transmission engineers, Mr. Peters asserts.

The instrument used to obtain the photographs consists of a suitable plate holder for receiving ordinary photographic plates, provided with suitable electrical connections so that electrical disturbances may be brought into contact with the sensitized side of the plate.

When surges occur in the transmission line they photograph themselves. The surges may last twenty billionths of a second, so that the photographic plate must register them in that minute space of time. Mr. Peters states that he has never yet detected visible light in the camera while photographing a surge and that therefore the impulses must contain some property in themselves that affect the plate. The prints obtained from such plate exposures show many geometrical figures of beautiful shapes and also take on certain definite forms according to the character of the voltage at the time the surge or impulse occurred. It is possible to tell from the developed plate whether the voltage at the time of the surge was positive or negative, whether it was alternating or undirectional, and its direction and intensity.

Positive, negative, and oscillatory surges produce figures having quite different configurations. The voltage is shown by the diameter of the figure photographed, and the time is indicated by its position on the sensitized chart that moves at known speed. The direction of the surge is shown by comparing the configurations of figures from two instruments, one connected from line to the ground, the other connected across an inductance that is in series with the line.

Mr. Peters states that the photographs obtained are of great importance to transmission engineers. Since the instrument for taking the photographs is the only practical device yet devised for obtaining data in regard to that type of line disturbances known as surges. Heretofore engineers have only known that surges occur but where they occur and their nature has been largely guess work. The photographic plate now gives the characteristics of surges, thus giving the engineers data with which to devise line protection. The instrument, Mr. Peters states, will do much to enable the engineering profession to increase the reliability and continuity of service on existing power lines. The device is applicable to transmission lines of all kinds, and is connected to them by means of an electrostatic potentiometer.

In early tests Mr. Peters used a condenser discharge to simulate the condition that occurs during the period of a surge. From these discharges were obtained his first photographs of electrical impulses. Tests were made later with the instrument connected directly on a transmission line.

WET CLEAN ROADS SAFER THAN DRY

Automobiles were found to skid less on wet pavements than on dry ones at a braking test in Washington recently, participated in by several makes of cars, under the auspices of the Society of Automotive Engineers and the National Bureau of Standards. The most dangerous surface was found to be one which was partially wet, especially if it were dirty and covered with a thin film of oil, but tires were found to hold on thoroughly wet and clean pavement rather better than they did on dry.

One child out of every ten in the public schools of the United States has defective vision.

THE FERTILITY VITAMIN

The two chief characteristics of life are growth and reproduction, the magnification and the multiplication of living beings. Essential for both is food. But what kinds of food? This is the question that is being gradually solved by feeding experiments on man and lower animals carried out under chemical control by hundreds of investigators during the last quarter century.

The first thing found out was that there were four main essentials in food; (1) proteins, such as the casein of milk, (2) carbohydrates, such as sugar or starch, (3) fats, and (4) certain mineral salts, such as calcium phosphate.

But when these four food factors were prepared chemically pure and mixed together they were found not to form a complete and satisfactory diet. The animals fed on it failed to grow, or showed certain symptoms of disease. Evidently there was a lack of something or some things. This was a puzzle for whatever they might be they were too delicate in structure for the chemist to extract, and too minute in amount for him to weigh. They have been named the "vitamins" and distinguished provisionally by the letters of the alphabet. Although nobody has yet seen a vitamin, we know pretty well which foods contain them and what happens if they are wanting. They are defined negatively, as salt was defined by the school-boy: "Salt is what makes potatoes taste bad when you don't put any on".

If you don't have Vitamin A you are likely to get a certain sort of sore eyes. If you don't have Vitamin B you are likely to get beri-beri. If you don't have Vitamin C you are likely to get scurvy. If you don't have Vitamin D you are likely to get rickets.

With the four main food factors in purified form and the four vitamins pretty well identified the investigators could now make up an artificial diet on which animals, white rats being usually used, would grow as big as those who were fed on natural food. They were as handsome and happy as any, and lived as long. But they failed to provide for the continuance of the ratty race. Their offspring were few and infrequent, or none and never, which is contrary to the custom in rat families. But the investigators, instead of accusing the rats of race suicide, surmised that this failing might be a deficiency disease, so they set themselves to find the missing vitamin. And they have found it, or at least they have found that there is one. Herbert M. Evans and Katharine Scott Bishop of the University of California and Barnett Sure of the University of Arkansas have carried on experiments leading to the same conclusion.

It is found, for instance, that on a diet composed of milk casein for protein, cornstarch for carbohydrate, lard for fat, and the proper mineral salts, with the addition of a little butter for Vitamin A, yeast for B, orange juice for C, and cod-liver oil for D, the rats grew normally and thrived, but they failed in fertility. Increasing the amount of the diet or of any of its constituents did not remove the deficiency, but the addition to the dietary of a little lettuce or rice, even the polished kind, enabled the rats to reproduce. Four successive generations have been raised on such a synthetic diet.

It is interesting to recall that rice, which had so marked an effect in these experiments, has a high reputation in the Orient for the promotion of fertility. This significance survives in our marriage customs today, and we often see on a

depot platform a bridal party showering the young couple with rice in spite of their attempts to evade it. Other foods found to contain this anti-sterility factor are yellow corn, rolled oats, velvet bean-pod meal, dried alfalfa, field pea seedlings, egg yolk and cooked meat. It is missing from milk.

Evans and Bishop have found that the male as well as the female is affected by the lack of this substance, and they have been able to extract it from favorable foods by alcohol and ether. When the extract is added to the "pure food" diet on which the rats were sterile, they gain the power of reproduction. These investigators call the substance, as Roentgen called his rays, "Vitamin X", but Professor Sure proposes to promite it in the alphabet and class it as "Vitamin E".

READING REFERENCE - Ellis, Carleton and Macleod, Annie Louise. Vital Factors of Foods, Vitamins and Nutrition. New York, D. Van Nostrand Company, 1922.

McCollum, E. V. The Newer Knowledge of Nutrition. New York, Macmillan Company, 1922.

GAS WARFARE USED TO CURE SENATORIAL COLDS

Poison gas is being tried on the Senate. The Chemical Warfare Service supplies the gas, the Senate survives and thrives under the treatment. The only fatalities are among the maleficent germs that seek to pasture themselves in Senatorial throats and lungs to the detriment of the health of that body.

Every day from 11 to 12 the room of the Senate Committee on Appropriations is turned into a gas chamber, and into it walk fearlessly the leading orators of both the Senate and House who happen to be suffering from colds, coughs, or other impairment of the vocal and respiratory organs. The gas is turned on and they remain in it for an hour or so, engaged in reading or conversation until the time for the treatment has expired.

The gas used is chlorine, the same as that used in the historic first gas attack of the Germans at Ypres in 1915. The difference is in concentration. The Germans used the pure gas. For use against Senatorial colds it is diluted to something like one part of chlorine to from 100,000 to 130,000 parts of air. In this dilution the gas is barely perceptible and after a few minutes exposure to it, the patients are said not to notice it at all. Its effect, when so diluted, is to kill the bacteria in the respiratory organs without causing any congestion or irritation.

Many senators and representatives have taken the treatment for colds and have testified as to its efficacy. Those who take an hour or so of gas treatment daily are free from such complaints, while nearly all those already affected with colds find themselves speedily improved by the use of the chlorinated air.

READING REFERENCE - Slosson, Edwin E. Creative Chemistry. New York, Century Company, 1920.

NEW RECORDING DEVICE TO AID AIRSHIP DESIGN

A new electric gage which makes possible the recording of sudden strains thrown on the girders of the metal framework of the giant rigid airship as it battles with the storm has been developed at the U. S. Bureau of Standards by Burton McCollum and O. S. Peters, electrical engineers. Sixty of these devices have been used in tests of the "Shenandoah" and the data secured is expected to prove of great value in the design of airships in the future. Such tests were in progress when the "Shenandoah" broke away from its mooring mast during a recent storm.

The instrument is also said to solve for the first time the problem of successfully measuring the effect of the impact of motor cars and trains on bridges.

With these recording machines clamped to girders in widely separated parts of the airship and connected by wire to a central station, the operator can sit in comfort and observe the stresses taking place at many points in the framework at the same time, no matter how hard they are to reach.

The gage has two blocks which are clamped to the girder or other part of the structure to be measured. A change of load on the girder causes a minute change in the distance between these blocks. These changes are transmitted to a series of carbon disks under pressure, which form a device the resistance of which varies as the pressure is changed. These resistance changes bear a definite relation to the strain in the member under test.

Efforts to make a reliable strain gage on this principle have hitherto failed due to the erratic performance of the carbon plates. These difficulties have been overcome in the new gage, it is claimed.

NEW PROCESS SEASONS LUMBER IN 3 DAYS

Artificial seasoning of lumber so effective that within three days after a tree has been felled in the forest its wood is made ready for the finest cabinet work has just been perfected in Sweden. The process is known as Forselle vacuum drying, and consists essentially of running logs into a large cylinder in which a vacuum is created by pumping.

Logs fresh from the stump are placed in the Forselle cylinder, which accommodates about 3,600 board feet at a time. A centrifugal pump is then brought into action, which gradually creates a vacuum drawing off the moisture evenly and simultaneously both from the heart wood and the sap wood of the logs. Since the escaping moisture keeps the surface of the log wet during the process no cracks are formed, and, indeed, already existing cracks are closed up. Experts who have observed the tests report that after 48 hours of drying most of the samples were ready for immediate use. Incidentally there is no weakening of the fibres in spite of the high rapidity of drying.

The practical value of the Forselle process is evident in all work where time is an important factor, as in the construction of air craft or naval vessels. It also eliminates the costs of storage, piling, insurance, etc., which accumulate when timber has to be kept in the yard during long periods of time.

Drying plants of this type are to be installed within the near future in Finland and Japan as well as Sweden. The present cost of operation is estimated as little more than $1.00 per thousand board feet.

MODERN URGE FOR SPEED DAMAGES TOAST FLAVOR

An experiment just completed at Chicago has convinced the chemist in charge of it that abandonment of grandfather's old-time open fireplace has not been without its draw-backs. Mistakes in applying modern fuels, such as gas and electricity, are responsible, this chemist claims, for the disappearance of two of grandfather's favorite foods. These are parched corn, and golden-brown toast, often made alongside the corn in a slow-heating open fireplace.

Dr. L. A. Rumsey, research chemist of the American Institute of Baking, undertook to find out what was wrong with modern toast, since it has been slowly going out of favor. He purchased toast at fifty different hotels and restaurants as the first move in the investigation. Then he prepared toast on all available types of electric and gas heaters, as well as an open wood fire. The result was the discovery that while the toast made at the open fire had developed a golden-brown or "caramelized" crust, exactly similar to the caramelized crust on parched corn, the toast made on electric and gas toasters had developed only carbonized bread upon the new crust. By a series of experiments in slowing up gas and electric toasters, it was found that both gas and electricity would make the kind of toast that grandfather knew.

Three minutes, Dr. Rumsey found, was the shortest time in which a caramelized crust could be produced, while carbonized crust would appear on any slice of bread toasted in less time. A movement against "flash" or blackened toast, and in favor of golden-brown, "caramelized", toast is now being started by electrical manufacturers and by hotel and restaurant chefs, under the guidance of the American Institute.

RUBBER AND WATER MIXED MAKE NEW USES POSSIBLE

A method of dispersing rubber in water in such a way that it can be used for coating fabrics, making paper, treating leather, doctoring trees, making chewing gum, and many other articles has been patented in Italy by William Beach Pratt as a result of work at his laboratory at Wellesley, Mass..

Crude or coagulated rubber is brought into suspension by the new process with such completeness that the dispersed solution is substantially the same as the original rubber latex from which the crude rubber is coagulated.

Last year several rubber factories began to import and use rubber as liquid latex rather than in the solid form, claiming that it is possible to use it more economically and with better results for coating fabrics.

The new process developed by the Pratt laboratory is claimed to have the advantages of the latex without the extra cost of transportation due to its liquid form.

It is possible to compound with the crude rubber before dispersion any desired fillers, oils, sulphur, accelerating agents, and similar compounds. This allows vulcanization of such rubber compounds.

Inflammable, dangerous and costly solvents, such as benzol, now used in making solutions of rubber are not needed in the new process, but soaps and glues are introduced into the spaces between the rubber particles and cause small globules of rubber to become dispersed in the water.

Among the ways in which the new water dispersed rubber can be used are:

It can be spread upon fabrics, which, after removal of the water, can be used in the manufacture of tires, hose, rain coats, and vehicle tops, or boots and water proof garments.

It can replace the ordinary rubber cement made with organic solvents

With additions of oils and waxes, or alone, it can be mixed with pulp in making paper or can be spread on the surface of cardboard or paper, and then vulcanized.

Leather can be filled or coated with it.

Wounds in trees can be covered with a paste made of the new rubber compounded with substances toxic to insects.

It can be used as binder for ground leather, cork, asbestos, cotton, and other materials and the compound applied with a trowel.

A rubber chewing gum can be made by incorporating with the dispersed rubber, sugars, waxes, gums and flavors.

READING REFERENCE - Geer, William C. The Reign of Rubber. New York, Century Company, 1922.

ANTIMONY NOT ONE METAL BUT MIXTURE

Antimony, the brittle metal used by printers to impart hardness to type, seems to be a mixture of metals, and not a single chemical element, as the books tell us. The ingredients are the so-called "isotopes", which are identical in chemical behavior, although they differ in a few physical properties.

According to data from the Cambridge metallurgical laboratory, antimony from Hungary is apparently composed of atoms which are lighter than those in samples received from Bolivia. The difference is only one per cent., however, a quantity which never will trouble the printer, but which provokes the analytical chemist who cannot make his antimony analyses agree with published professional standards. The atomic weight value obtained in preliminary work with Hungarian antimony is 121.1, and with Bolivian metal 122.4.

Ages ago, when chaos was becoming cosmos, most of the twin and triplet elements, or isotopes, were very intimately mixed. Chlorine, for example, is

undoubtedly a mixture of substances; but so thorough was the mixing process that chlorine from all parts of the world now has a constant composition. Thus chlorine for all practical purposes plays the role of a single element. Antimony, however, does not seem to have been so carefully mixed in the melting pot of the Creator.

SCIENTISTS HELP DENTISTS DO ENDURING WORK

Future occupants of dentists' chairs may feel more secure confidence in the result and permanence of the operators' handiwork as the result of a research upon dental materials now being conducted at the National Bureau of Standards. The overworked expres ions, recurrent decay, failure of filling material, and teeth not holding fillings well, should become less familiar. Dentists will be enabled to feel more confidence in the materials and the methods which will be recommended. Dr. Wilmer Souder of the Bureau's staff is supervising the work.

Gold alloys for casting and for corrective work are being studied from the point of mechanical and physical properties, chemical composition and micrographic structure in the plan to evaluate their efficiency and permanence. The casting technique and equipment are also being studied. In the same connection an investigation is being made of the properties of pattern waxes and how best to manipulate them.

The work is being conducted with the cooperation of the Weinstein Research Laboratories of New York City. A number of leading dentists are being kept advised as to its progress and have been invited to make suggestions. The aim is to formulate definite standards which, if complied with, will practically guarantee enduring dental work.

EARTH'S STEAM TO RUN CALIFORNIA TOWN

Natural steam from the "Devil's Gulch" region in Sonoma county, California, will soon be lighting and heating the town of Healdsburg, 23 miles away. The steam will be used to develop electric power.

The third well making use of the earth's internal heat is now being drilled, and it is expected to develop 2,500 horsepower. Two other wells have been supplying power for some time to regions near the source of supply. The area of the subterranean reservoir from which the steam is being drawn is supposed to be about 10 miles long and half a mile wide.

IODINE HELPS IN FERTILIZERS

The addition of small quantities of potassium iodide to fertilizers has been found by French scientists to increase materially the yield of sugar beets. Larger amounts decrease the yield of sugar in the beets. It is thought that the iodine has an important effect upon the power of the plants to utilize the energy of the sunlight for the transformation of plant food into plant substance.

TABLOID BOOK REVIEW

VALENCE AND THE STRUCTURE OF ATOMS AND MOLECULES. By Gilbert Newton Lewis. Professor of Chemistry, University of California, New York, The Chemical Catalog Company, Inc.

This book is one of the series of monographs being issued under the auspices of the American Chemical Society in its attempt to found an American chemical literature without primary regard to commercial considerations. It is a technical work briefly reviewing past and present theories of atomic structure; calling the attention of chemists to some of the astounding accomplishments of modern physics and pointing out "the magnitude of the revolution in scientific thought which probably must occur before physical science can once more be a homogeneous whole, free from the most glaring inconsistencies and contradictions."

YES, VARIETY IS THE SPICE OF LIFE

The working capacity of persons engaged in dexterous physical work may be greatly increased by varying their work from day to day, says Dr. J. P. Baumburger of Leland Stanford University as the result of a recent study of the problem of human efficiency.

In work there is a slight change in the task from time to time it was discovered that the actual working capacity was about 7.7 per cent. below the maximum capacity, while in other tasks which were continuous and uniform there was from 36.8 to 39.4 per cent. loss from the maximum working capacity.

The findings indicate to Dr. Baumberger "that men working at alternating occupations have an output more closely approaching their maximum work capacity than do men in processes studied in which the same occupation was continued throughout the day.

"Many industries could easily apply this finding", Dr. Baumberger says. "Workers could be trained to operate two machines and exchange places at regular intervals of time. I feel convinced that this plan would lead to increase of output and decrease in fatigue on the part of the men."

OILING DRIFTING SANDS

Oil is being used to prevent sand from being drifted by the wind across the tracks of the Oregon-Washington Railroad and Navigation Co., and impeding or even preventing traffic. Dunes near the tracks in the Columbia River valley are sprayed sprayed with crude petroleum which has been heated so as to secure the required fluidity. A thin layer of asphaltic material then forms on the sand, and so prevents the drifting of the surface. One application serves for at least a year and in some locations for as many as two or three.

TRAFFIC SIGNALS SAVE DINERS

The hitherto helpless prey of after dinner speakers has found a weapon of defense. Miniature traffic towers, modeled after the famous ones on Fifth Avenue are being used on speakers' tables in New York to curb the flow of oratory that begins after the cigars are lighted and the waiters retire. Amber and green lights warn the speakers that their time is about to expire, while a red light is a signal for a full stop.
