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ANCIENT MAYA CITY YIELDS ITS SECRETS

Chichen Itza, a thriving Maya metropolis before the time of Columbus but now a ruin shrouded by tropical forest, has begun to yield its secrets, reports from Dr. Sylvanus G. Morley, leader of the archeological expedition of the Carnegie Institution of Washington, at this site in Yucatan, Mexico, reveal.

During the course of the excavations that inaugurated the ten year program of research in cooperation with the Mexican government, an elaborate sculptural mosaic flanking a gateway into the "Court of the Thousand Columns" was discovered.

The part of the city chosen by the Carnegie Institution for its first excavations is the Group of the Thousand Columns, a large assemblage of temples, colonnaded halls and pyramids surrounding a great plaza of more than five acres in extent.

Chichen Itza, when it was a flourishing city of the "New" Maya Empire, about 1000 A.D., covered an immense extent. The civic and religious center, that part seen today, containing the temples, palaces, pyramids, market-places, ball-courts, terraces, tombs and plazas alone covers an area two miles long by a mile wide; but beyond this in every direction for miles and miles formerly stretched the houses of the humbler folk, with sides of saplings covered with white lime plaster and roofed with a thatch of the golden hued leaves of the guano palm. Of these not a trace may now be seen, the great forest of Yucatan has, one and all, laid them low, destroyed them, obliterated them, so that now they are as much a part of the earth as the thousands of ~~Maya~~ who reared them so long ago.

"The great plaza of the 'Group of the Thousand Columns' is bounded on its west and north sides by two long colonnaded halls," Dr. Morley's report says. "The south and east sides of this plaza are of a more complicated nature.

"The east side is dominated by a pyramid ascended by a broad stairway with the two balustrades carved in the likeness of two great plumed serpents, Ku Kulcan, The Feathered Serpent, the patron deity of the city, the two immense heads carved from single blocks of stone with gaping mouths and protruding tongues, forming the two lower newel-posts of the stairway.

"Above there is a magnificent temple with feathered serpent columns at the entrance and beautifully carved square columns on the inside. This pyramid-temple is flanked by colonnaded halls on both sides and other edifices with elaborate sculptures.

"Nor does the foregoing by any means exhaust the buildings of the Group of

the Thousand columns, for on every side there are flanking temples, pyramids, colonnaded halls, courts, platforms, terraces, etc., the whole of which vast architectural complex rises from an artificial platform, itself more than ten feet above the level of the surrounding country in some places, which covers more than forty-five acres.

"Excavations were commenced on the two principal entrances to the great central plaza of this group, which has been named the Court of the Thousand Columns for obvious reasons.

"The principal entrance from the other parts of the city would appear to have been through a gateway in the West Colonnade. The gateway beneath the North Colonnade, however, proved of more interest.

"Both ends, it was found, had the same decoration. Flanking the northern end on the left side there is a jaguar crouching upon its haunches facing the gateway, with its forepaw extended and tongue lolling from its mouth. Flowers and scrolls surround this figure. The opposite or right side has a macaw with extended talons, flowers and scrolls again forming part of the decorative treatment scheme. The southern end of the gateway has the same treatment.

"Directly above each end of the gateway there was a large round shield of disc divided into eight sections. The association of a jaguar and a shield recalls another edifice in the city, the famous Temple of the Jaguars, so named because of a frieze on it which represents a series of stalking jaguars alternating with round shields.

"It has been thought that an appropriate name for this entrance to the Court of the Thousand Columns might be 'The Jaguar and Macaw Gate'."

Archaeological Jig-Saw

A gigantic picture puzzle, sculptured by a forgotten race and scrambled by nature, has also been unearthed at Chichen Itza, by the Carnegie Institution's archaeological party.

A colonnade near the Court of the Thousand Columns, was once decorated by a great stone mosaic. Now the pieces of stone, each weighing several hundred pounds, are scattered about in indescribable confusion.

"Imagine a jig-saw puzzle composed of several thousand pieces, instead of several scores," says Dr. Morley. "Imagine a jig-saw puzzle ninety feet long and eighty feet wide with pieces several feet long, instead of the usual kind, perhaps a foot or two square, with pieces not more than an inch or two long. Imagine these great pieces to be blocks of stone instead of bits of wood and cardboard, and raise this vast mosaic to the top of a front row of square columns, and then you have a picture of what the front of this colonnade formerly looked like.

"The central element of this great mosaic seems to have been an elaborately dressed ruler, warrior, or priest, which probably occupied the space over the central doorway. In his right hand is a spear, held upright, ornamented with tassels and streamers of feathers; from his left hand hangs a bag embroidered with a face. He wears sandals, a loin-cloth, jade anklets, wristlets, and a necklace.

and above his head rises a gorgeous head-dress of sweeping feathers, falling down behind his back. Almost all the pieces of this figure have been recovered except, unfortunately, the head. This could have been only about a foot high, and, it is feared, could have easily been carried off by some curio-hunter.

"Other elements of this great picture-puzzle are jaguars, birds, feathers, and the so-called masked panels. These last are large stone faces with long curling noses, deep eye-sockets, filed front teeth, and jade earrings, representations of the patron deity of Chichen Itza."

READING REFERENCE - Hammerton, J. A. Wonders of the Past. New York, G. P. Putnam's Sons, 1923.

PLANT JEWELS SAVE MONEY FOR OIL COMPANIES

Oil companies operating in the fields of southern California are making use of the fossil skeletons of diatoms, microscopic plants which lived in the oceans ages ago, to help them determine where they will find oil. These jewel-like fossils, each so small that it can only be seen through a microscope, are helping the drillers to locate the wealth of the vast underground pools of oil. Thousands of dollars have been saved through applying the knowledge gained by scientists concerning these ancient dwellers in the seas, a geologist working with one of the oil companies said today.

Southern California is rich in deposits of diatom skeletons which have accumulated during many geologic periods, and diatoms are still living in countless numbers in all the seas and lakes and rivers from the North Pole to the South Pole. The deposits often cover several square miles of surface and are in some cases hundreds of feet thick. The diatom, although only a one-celled plant, has, like other plants and animals, developed many new species, numbering over 7,000, because their environment of land and sea, the water depth, temperature, and chemical composition of the salts in the water have all had their effect. Consequently the diatom deposits write geological history.

It is this fact which the geologist has learned to put to profitable use in southern California; for by studying the form and structure of these minute fossils he can often tell the oil men just about how far their drills are from the precious oil bearing sand or whether they are above or below it. The position of the oil sand has a definite relation to that of the other geological formations which frequently may be identified by a microscopical examination of the diatoms and other minute fossils found in them.

Because of the value to the oil business of this knowledge of diatoms in the formations through which the oil wells are drilled, the oil companies are cooperating a further study of these minute fossils, each a jewel-like shell of silica which ages ago incased its tiny one-celled occupant. Seen under the microscope they are among the most beautiful objects in nature, yet they are of great practical value, not only to the oil companies but in other ways. Diatomaceous earth, as the deposits of their accumulated skeletons is called, is put to many valuable uses.

But diatoms do not have to be dead a million years to be of use. They are the chief vegetations of the sea upon which ultimately depends the life of all the creatures therein, many of which are in their turn valuable food for man. They still live in countless numbers in the seas and lakes and streams, and alive or dead they have their use. Those which died millions of years ago are now one of the most valued aids to the world of today in locating new sources of energy, secured, not by eating the diatoms or the animal life that feeds upon them, but by burning the oil to which they are such a helpful index and which, like them, has laid dormant under the earth for ages of time.

ALL LIFE RADIOACTIVE SAYS FRENCH SCIENTIST

Animals and plants while living give off rays similar to those emitted by the metal radium, according to reports made to the French Academy of Sciences by Albert Nodon. In his most recent experiments he used three photographic plates, placing on one of them a particle of a radioactive mineral, on another a living insect, and on the third plate a green leaf. A coarse cloth was laid between the object and the emulsion side of the plate. On developing the plates he found that not only had the mineral made a strong impression but that the insect had made a weaker impression and the leaf a slight impression. He calculates that the insect has a radioactivity per unit of weight from 8 to 13 times that of the uranium standard of radioactivity, and the green leaf 2 to 3 times. Dead organisms on the contrary exhibit no appreciable radioactivity.

M. Nodon concludes that radioactivity due to decomposition of atoms is a common accompaniment of living processes and may be regarded as a measure of the degree of vitality.

On the contrary, Daniel Berthelot reported to the French Academy of Sciences that many experiments were made in 1909-10 to discover if plants and animals were radioactive but no such effect was found.

READING REFERENCE - Russell, Bertrand. The A.B.C. of Atoms. New York, E. R. Dutton & Co., 1923.

WOOD DURABILITY

Why are some woods more durable than others? That is a question which has apparently been answered for the first time by investigators at the Forest Service laboratory at Madison, Wisconsin. They have found that woods that endure contain substances that when extracted by water are poisonous to the forms of bacteria and wood destroying fungi responsible for wood decay. These toxic substances are more abundant in the heartwood than in the sapwood, explaining the superior durability of wood taken from that part of the tree. The presence of these substances in the wood prevents the growth of the organisms which, if unchecked, would rapidly destroy it.

SIMPLE SCIENCE

By WOW

PERFUMES

These are odoriferous substances used mainly by the fair sex for various purposes. Society ladies now endeavor to have special scents that express their personalities. This is especially noticeable in the case of many of the newly rich who use an odorless scent.

The original function of perfumes was for the use of plants and animals. It is still used by them to attract the attention of the opposite sex and, in the case of plants, to entice insects for the purpose of fertilization. Certain plants and animals also use it to ward off possible enemies by making the atmosphere disagreeable. With humans some of the same results are often accomplished, although quite often they succeed in warding off possible friends as well as enemies.

Natural perfumes consist of distinct chemical substances which are sufficiently volatile to permeate the air, and thus reach the organs of smell. These materials are usually of the nature of resinous gums, balsams or oils. They occur in various locations in the plant or animal, especially in the blossoms and leaves of plants, and in certain glands of animals.

The use of perfumes seems to have originated in the far Eastern countries, later creeping westward into Egypt, Italy, France, etc. Cleopatra was very fond of using them, and it is probable that much of her attraction was due to this fact, although it is scarcely fair to her to speak thus in her absence.

Perfumes were greatly prized by the early kings and other wealthy personages. They were very high in price and hence great luxuries. Today parlor-maids and shop girls bathe themselves in perfume and still have money left for the movies.

Most of our natural perfumes are extracted from blossoms grown in Turkey, Bulgaria, Sicily, and France. They, however, have now a strong rival in synthetic perfumes. These are made by chemists and are used either alone or mixed with the natural ones. Strange to say, coal-tar, which is a black evil smelling material obtained by distillation of coal, furnishes much of the materials from which synthetic perfumes are made.

Men, as a rule, do not employ such methods of advertising, but there seems no good reason why they should not advantageously do so. Farmers might employ "coumarin" quite nicely, for that is the active odoriferous principle of new-mown hay; brokers might use bear oil, golfers sulphur to match their language, and plumbers would naturally be expected to diffuse the odor of leeks.

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

A quartz crystal when heated expands faster sidewise than lengthwise.

EDUCATION ESCAPING FROM THE SCHOOLROOM

By Dr. Edwin E. Slosson

Once upon a time a country school teacher rang her bell after recess but none of the children came in. She went outdoors to see what was the matter and found them all gathered along the roadside. "Oh, teacher," cried the children, "Can't we stay out a minute longer? There is a circus coming by and we want to see the elephant." The teacher hesitated a moment but she was a conscientious woman and knew her duty. "No, children," she said, "Work must come before play." So she gathered them all in and shut the door and set them at their reading lesson, which was on "The Elephant, Its Appearance and Habits".

Now like all fables this is capable of being interpreted in various ways. It may be argued that moral training is of greater value than informational acquirement, that it was more important that the children should acquire the habit of obedience and be able to resist the temptation to distraction of attention by passing events than that they should learn how an elephant looked. Put to the pragmatic test who of us can say that his conduct or happiness in life has been materially affected by his knowledge that the elephant is distinguished by the possession of two tusks and a trunk?

But if we consider the question from a purely pedagogical point of view and assume that the teacher's duty was that prescribed by the curriculum, namely the imparting of information about the elephant, then we must admit that she did not adopt the best plan for the purpose, that she adhered too closely to methodology, that she failed to recognize that there are different ways of getting at the same thing, in short that she allowed the means to obscure the end, which is a common fault of ordinary people as well as of school teachers.

Science has produced so many new ideas in recent years that they have burst through the walls of school room and laboratory and escaped into the open. No professor can now maintain a monopoly of his own profession. He will often meet with men who know as much as he does about his science and yet have no title in front of their names, nor degrees trailing after them. Day by day in every way it is getting harder and harder for the teacher to keep ahead of his students. More and more the students are learning science out of school. I fancy it would have taken many years for the theories of electricity to have been incorporated into the common mind if the radio had not come along to help out the teacher. But now we have kids talking about electron streams and metric wave lengths as they skate along the streets. And they know what they are talking about as they can demonstrate by making radio receivers that work.

I fancy more physics has been taught to the present generation by the automobile than by the professors. The automobile is autocratic in its methods. It has the habit of stopping suddenly in the middle of the highway or on a railroad crossing and giving the chauffeur a quiz on the chemistry of combustion or the laws of mechanics. And the chauffeur is not allowed to pass until he has given a practical demonstration of his knowledge. Seventy per cent of book learning will not suffice

This spread of science to the outside world is scary to the teacher who is secretly unsure of his own knowledge and therefore prefers to cling closely to his textbook. But the competent and confident teacher will welcome the new opportunities it offers for extending his influence outside his class room and awakening more interest within.

NAVIGABLE RIVERS FURNISH POWER

Eight power projects on the navigable rivers of the United States have been completed since the American Government inaugurated its policy for the development of the navigable waters under its control, Col. Charles Keller of the U. S. Army said in addressing the World Power Conference at London recently. Among the great power developments upon rivers in the United States mentioned were the Hudson river at Troy, N.Y., the Black Warrior River, Alabama, the Mississippi River above Minneapolis and St. Paul, and Muscle Shoals, on the Tennessee River, Alabama, not yet fully developed. All of these are U. S. Government operations, involving an expenditure of \$50,000,000. The power plant at Keokuk, Iowa, is an example of successful private development built at a cost of nearly \$20,000,000. This plant produces cheap electric power and substantially benefits river traffic in that part of the Mississippi River.

This development of river power is not rapid, Colonel Keller stated. The rights of navigation in early days were very carefully guarded; later the diminishing importance of river traffic encouraged plans to develop power at the expense of the public interest. Undue encroachment was checked by presidential veto during the administration of Theodore Roosevelt. Since the passage of the Federal Water Power Act in 1920, and the better adjustment of navigation and water power interest a progressive utilization of the power resources of our navigable streams is to be expected, Colonel Keller said:

STUDY HEALTH OF WHOLE SWEDISH NATION

The complete investigation of personal health records extending back through several generations and covering a whole nation has been undertaken by the Swedish Institute of Racial Biology, the first government institution of its kind in the world, which has just turned in the report of the second year of its work.

Under Prof. H. Lundberg, who organized the Institute, anthropological statistics have now been gathered concerning 83,427 persons. Stature, head measurements, colors of eyes and hair, diseases, especially hereditary diseases, causes of death, etc., are among the things observed by the investigators. In the northern provinces of Sweden, where Lapps, Finns, and Swedes have intermarried, the death rate is relatively high. special genealogical studies have, therefore, been undertaken in this region in order to ascertain, if possible, what effect race mixture has on longevity. In three villages, for example, genealogical histories have been drawn up for the entire population covering a period of 125 years. In another community the histories of 1,200 families have been traced during the period 1781-1851. Another subject that at present occupies the attention of Prof. Lundberg and his assistants is the ancestral history of twins and triplets. During last year the genealogies of 137 pairs of twins were drawn up and studied.

Research into the histories of families is greatly facilitated by the unusually accurate parish registers which have been kept and preserved for hundreds of years, and also by the fact that the entire history of any given family is usually confined to Sweden. There has been almost no increase of the population through immigration, and the Swedes are said to have preserved greater racial purity than any other Teutonic people. Incidentally, it is shown by archaeology that the history of the present inhabitants of Sweden goes back 5,000 years in the same place.

The accumulation of data regarding hereditary disease, the development of

criminal instincts, and other traits is only a part of the program of the Swedish Institute of Racial Biology. It is also conducting research work into the elimination of racial taints through eugenic measures. Research is also being directed into the field of eugenics and the development of individual talent and genius.

MERCURY BOILERS LIVING UP TO EXPECTATIONS

The value of boilers using mercury vapor in the place of steam in power plants is justifying all expectations, declared Dr. W.L.R. Emmet, consulting engineer of the General Electric Company, addressing the World Power Conference at London. The efficiency of mercury vapor for developing power lies in its use of extremely high temperatures without excessive pressure and its adaptability to turbine engines. Also the heat of condensation can be used for making steam for auxiliary power or for other purposes.

The continued operation of a mercury boiler and turbine at the Dutch Point Station of the Hartford Electric Light Company has suggested modifications and improvements without developing additional difficulties, Mr. Emmet explained. Special boilers and fittings must be used suitable to the temperatures used. Leakage of mercury and mercury poisoning appear to be entirely avoided. Repeated measurements of the fuel used and the energy delivered show a saving of 50 per cent. in fuel with the mercury engine, together with other advantages of reduced space occupied and amount of water required. Mercury power is well adapted to locomotives and boats. The studies indicate a saving of 60 per cent. in fuel with improvements based upon the experience acquired at Hartford.

The supply of mercury for the increased demand which may follow a more general use of mercury for power purposes does not seem to be limited, Mr. Emmet said. Abundant sources of mercury are known and require only a slight rise in price to bring it upon the market, and other sources of supply will doubtless be revealed.

NEW MACHINE IMPROVES DISTANCE BROADCASTING

The world's largest direct current high-voltage generator has been developed by S.R. Bergman, consulting engineer of the General Electric Company, and is expected to make clearer the programs broadcast long distances by radio. It is also claimed that by the use of this machine for electric railroad work the number of sub-stations now required can be reduced one-half.

Rectified high voltage alternating current is now used for distance broadcasting. Rectifying alternating current, however, produces ripples which affect the clearness of the transmitted sound. Direct current generators give current that is perfectly smooth.

Heretofore, attempts to build high-voltage direct current generators have failed, direct current machines being successfully built with ranges of only from 3,000 to 4,000 volts per machine. The Bergman machine is built up to 15,000 volts per unit, and the inventor sees no reason why direct current machines cannot be built up to 200 or 300 kilowatts at voltages up to 20,000 volts.

UNITED STATES LEADS WORLD IN CHEMICAL RESEARCH

Leadership in chemical research, captured from Germany during the world war, is still held by scientists in this country, figures compiled for the Journal of Industrial and Engineering Chemistry by Prof. E. J. Crane of Ohio State University show.

Germany, France, and Belgium have come back strong; but have not yet regained their pre-war productivity. Austria and Russia have been slower in recovering from the setback. British chemists have maintained a steady productivity and made a slight gain, while Japan is becoming an increasingly important country in chemical investigation.

Czechoslovakia, Poland, Roumania, and China, have recently taken a place among the producers of chemical research.

Prof. Crane's figures are based on the number of articles appearing in chemical journals of the various countries. In 1913 the German journals published 6512 chemical articles and the American 3940. In 1923 the relation was reversed; the American journals publishing 6014 and the German 5064

SCIENCE CLUBS URGED FOR HIGH SCHOOLS

Science clubs should be encouraged in junior high schools, J. T. Shriner of the Latimer Junior High School of Pittsburgh told members of the National Educational Association meeting in Washington. Citing the interest in radio and automobiles among boys and girls of the seventh to ninth grades, Prof. Shriner said that it is in these grades that amateur scientists are developed.

The Science club gives the pupil an opportunity to develop and play with scientific hobbies and toys and rapidly leads to more constructive thinking, he said.

Boys taking the science course at the Pittsburg high school learn to sew on buttons, mend tears in their clothing, press and clean clothing, and darn stockings as a part of their practical study.

AMERICAN SCHOOL CHILDREN EXCEL EUROPEAN IN SCIENCE

Elementary science is more thoroughly mastered by pupils in American schools than by those in corresponding grades in France, Switzerland, and England, Dr. Elliot R. Downing, associate professor of natural science of Chicago University, told members of the National Educational Association meeting at Washington recently.

"Science is quite as commonly studied in grades one to five in this country and is better done," he said. "Physics in French lycees and the corresponding schools of Switzerland is much more thoroughly mastered, particularly in its mathematical phases than in our high schools, but our pupils certainly do as well as theirs in chemistry and much better in the biological sciences. Enrollment in science in the English secondary schools is very light, the work is poorly done, the equipment very meager. In the technical schools, especially in Switzerland,

the science work is admirably done with excellent laboratory and shop equipment for individual work, and such schools are so related to the academic schools as to facilitate the movement of pupils into them in accordance with the pupils' aptitudes. Teachers of science as of other subjects are well prepared, as far as mastery of subject-matter is concerned, in excellent normal schools or in the universities, but the courses in pedagogy are short and elementary, and there is almost no scientific study of the problems of teaching. The French and Swiss universities are on a par with our own average state universities as far as teaching staff and equipment is concerned, but the buildings are often poorly adapted to educational purposes. There are no universities in these countries that compare with our great universities in point of buildings and equipment. The science work in the universities is very like that in our own schools."

PREDICTS INJECTIONS INTO VEINS WILL REVOLUTIONIZE MEDICINE

Rapid strides in the development of intravenous therapy may soon relegate the old-fashioned bottle and spoon, former indispensable elements of the sick room, to the oblivion of the air-tight sick chamber.

"In view of the progress made by this branch of medical science within the last ten years, I believe it will revolutionize the practice of medicine from a therapeutic standpoint," Dr. W. Forest Dutton, medical director of the Hospitals of the University of Pennsylvania, graduate school of medicine, declared. "I have been experimenting with intravenous therapy for twenty years. It is now known to be safe, efficient, accurate, and speedy in obtaining results. Formerly the treatment was used in two or three diseases only and limited to four or five drugs.

"Now it may be applied in about 130 diseases. About 140 drugs are used. When injection is made in the veins with the needle the medicine reaches every portion of the body in less than 60 seconds. The medicine in the ampoule does not come in contact with the air before being injected."

Dr. Dutton cited some recent cases to illustrate the speed with which results were obtained through the vein treatment as compared with giving medicine through the stomach. In pneumonia, diphtheria, and other infectious cases medicine injected in the veins brought results in one hour, while in the stomach the same medicine required three to four hours.

BEEF CATTLE FATTEN ON SHORT RATIONS

More beef for less food is the possibility held out by the National Research Council's committee on animal nutrition in a report just issued. Ten selected beef cattle whose ration of protein, the tissue building food, should average a little over two pounds per day, and whose average daily gain should be about seven-eighths of a pound, according to standard tables in general use, were fed an average of $1\frac{1}{2}$ pounds of protein each day with a corresponding gain of $1-1/7$ pounds.

Thus feeding 61 per cent less protein produced 129 per cent. of the normal gain. The ten animals experimented upon were in four different states, and the results, the committee concludes, suggest either that great saving in cost of feeding may be made, or that improvement in breeding will produce cattle with superior fattening qualities.
