SCIENCE NEWS

AN ANCIENT MAYA CITY IN YUCATAN

Science Service

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, as reported by Dr. Sylvanus G. Morley, leader of the archeological expedition of the Carnegie Institution of Washington, at this site in Yucatan, Mexico.

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 to-day, 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 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 45 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 scheme. The southern end of the gateway has the same treatment.

"Directly above each end of the gateway there was a large round shield or 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.'"

THE EFFECT OF TEMPERATURE ON THE HUMAN BODY

Science Service

THAT the human body, in a state of rest and in still air, can not endure indefinitely a temperature higher than 90 degrees F. with 100 per cent. relative humidity has been determined by Department of the Interior investigators at the Pittsburgh experiment station of the Bureau of Mines, cooperating with the American Society of Heating and Ventilating Engineers. In the course of the tests, it was noted that the heavier and stouter men of the experiments, when subjected to uncomfortably hot temperatures, lost more weight than the lighter and thinner men, but as a rule could endure such temperatures for a longer period and complained less of the exhaustion which followed. Loss of weight in the subjects experimented with gradually increased with an increase in atmospheric temperature. Whenever the subject drank ice water he immediately gained in weight, and in all cases the subject, within 24 hours, usually regained the entire weight lost. Subjects who drank ice water freely after exposure to high temperatures felt no ill effects, tending to disprove the assumption that such action develops severe cramps.

It was found that the exhaustion and weakness following subjection of human beings to a very high temperature and humidity for a short period is not so severe as

subjection to a moderately high temperature and humidity for a longer period.

The pulse rate, rather than the rise in body temperature, apparently determines the extent of the discomfort experienced by the subject. Subjects became very uncomfortable after the pulse rate exceeded 135 pulsations per minute, and complained of unbearable and distressing symptoms when the pulse exceeded 160 per minute. The highest pulse rate recorded was 184 per minute. Subjection to high temperatures and humidities produced no marked change in the respiratory rate.

The health, comfort and efficiency of men engaged in the mining industry may be impaired, in some instances very seriously, by abnormal physical conditions of the mine air or by variations in its composition. This is true in some of the metal mines of the west where high temperatures with varying humidities are encountered. Physiological studies have been made by the Bureau of Mines in some of these mines showing the effects of various temperatures and humidities. As it is difficult to carry out studies on many controlled temperatures, it was thought best to make the present experiments in a laboratory and apply the results to the mining industry insofar as practicable. The experiments were part of a general cooperative study of the physiological effects of heat and humidity being conducted by the Bureau of Mines and the United States Public Health Service, cooperating with the American Society of Heating and Ventilating Engineers, at the Bureau of Mines experiment station, Pittsburgh, Pennsylvania.

The experiments were conducted in two fully equipped chambers, insulated by cork board, designed to maintain air conditions at a desired temperature and humidity. The temperature, humidity and air motion of each room may be controlled independently of each other. The air conditions are controlled by apparatus outside of the chambers and entirely separated from them. Instruments for observing the body and surface temperatures of the subject, also for recording the rate of respiration and of heart pulsations, and the apparatus for basal metabolism work are located in an adjoining room.

THE AMERICAN GEOGRAPHICAL SOCIETY'S SCHOOL FOR EXPLORERS

Science Service

IN order to produce explorers able to find where they are in a strange country and to accurately locate the finds which they make, the American Geographical Society of New York has established a school for explorers in that city. Specialized training in geographical surveying and field astronomy will be given.

"Exploring and surveying expeditions must obtain the services of surveyors with initiative, practical experience and all-around knowledge of the subject if they are to take full advantage of the time and money at their disposal," said Dr. Isaiah Bowman, director of the society, in explaining the purpose of the school.

"Such men should be able to make a simple compass traverse or accurate determinations of latitude and longitude with equal ease. They should be skilled in the art of sketching in detail on a plane table or in the execution of a triangulation in all its details, from the initial reconnaissance to the computing of the geographical coordinates of its trigonometrical stations.

"Not only must they be able to do these things, but they must be able to adapt themselves to whatever surrounding they find themselves in, and to choose the surveying methods most suitable to the occasion."

Dr. Hamilton Rice, the distinguished South American explorer, instigated the scheme and is director of the school. The whole course, which is comparable with post-graduate work at a university, should be accomplished in from a year to two years.

Individual instruction, practical work in the field and facilities to handle first-class and up-to-date instruments are features of the instructional methods of the school. Students begin the course at any time and may take all or any part of it.

The practical work in the field includes the mapping of an area of eight or nine hundred square miles on a scale of 1 : 125,000 or thereabouts. From the initial triangulation reconnaissance to the inking in of the finished map, all must be executed by the student himself. The area selected for mapping is the country on either side of the Hudson river between Dobbs Ferry and Newburgh, and for so small an area affords a great variety in topographical detail.

A NEW AIRPLANE CATAPULT

Science Service

A NEW type of airplane catapult in which a powder charge is used for giving the plane its initial start, instead of compressed air, has recently been tested by the U. S. Navy with satisfactory results.

In the new type, the catapult gun contains a piston which is connected through a series of multiple purchases or pulleys to a small wheeled car. The car on which the airplane is placed runs on tracks which are fifty feet long and are secured to a platform located on the top of a battleship turret. When the powder charge is fired in the gun, the piston, being forced to move, acts through the pulleys, thus pulling the car suddenly forward along the tracks at a speed of sixty miles per hour, carrying the plane with it.

When the car reaches the end of the track, it is stopped by means of hydraulic and spring buffers. The plane, with its engine going at full speed, is automatically released from the car and continues under its own power.

In the test made at the Naval Air Station a single seater scouting monoplane of the hydroplane type was used. The plane left the catapult car and continued its flight without any drop in altitude below the level of the tracks, which is unusual. This fact was particularly pleasing to the officials, since heretofore it has been necessary to have the tracks at such a height above the water that catapults were impracticable for several types of ships on which it was desired to have them installed.

The principal advantage of the gun type catapult over the compressed air type lies in the speed and facility

with which a number of planes may be catapulted from a plane carrier. In using compressed air, it is necessary to recharge the air tanks after each shot, which takes considerable time. By the use of the gun type, the enormous space and weight of the air compressing machinery will be obviated.

All airplane carriers and other types of ships carrying airplanes will be equipped with the gun type catapult as soon as the Navy Department can build and install them.

FOSSIL DIATOMS AS AN AID TO THE LOCATION OF OIL

Science Service

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, according to a geologist working with one of the oil companies.

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 all have 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 to further a 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.

ITEMS

Science Service

AN Arctic expedition largely undertaken by Oxford University is about to start on an exploration of North Eastland, a large island, 90 miles square, which lies to the northeast of Spitzbergen. Two previous attempts have been made to explore it. The first in 1873 was by the Norwegian, Nordenskiold, and was only partially successful. A German expedition in 1912 perished in the attempt.

DETERMINATION of the amount of carbon dioxide gas in the flue gases from blast furnaces is an important method of furnace control, but it has always been a difficult job to get samples of the hot gases for analysis. A German firm has now invented a method of using electricity to make continuous analyses of the flowing gas. Different gases have differing powers of heat transmission. Electrically heated wires are passed through an air chamber and through one filled with flue gases. Electrical resistance of the wires changes with the temperature, and since the relative heat losses measure the amount of carbon dioxide in the flue gas, that percentage can be easily measured by determination of the electrical resistance.

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.

THE first application in America of the process for hardening railway rails after they have been laid is reported from Toronto, according to the *Electric Railway Journal*. A blowpipe is mounted on wheels and passed over the surface of the rail at a speed that gives a temperature of 850 degrees Centigrade to all points heated. Immediately after heating, a jet of water is played upon the rail, the effect being to harden the surface and prolong its wearing qualities. The process is effective to a depth of from two to three tenths of an inch, according to the pressure used in the blowpipe.