

PHYSICS

Huge Burning Glass May Give Maximum Sun Heat on Earth

Temperatures as High as 10,000 Degrees Fahrenheit Are Hoped for Through Use of Multiple-Lens Instrument

A HUGE "burning glass" made of nineteen lenses each two feet in diameter, as well as nineteen smaller ones, will soon be in operation at Pasadena at the new Astrophysical Laboratory of the California Institute of Technology. With its aid, it is hoped, temperatures as high as those in the sun-spots, around 10,000 degrees Fahrenheit, will be attained, and astronomers will be able to study at close range how various substances behave when so heated.

The new instrument has been developed by Dr. John A. Anderson, of the Mt. Wilson Observatory, who originated the general design of the lenses, and Russell W. Porter, who worked out the practical details of a mounting for the instrument, so that it can follow the sun as it moves across the sky. The sun's light and heat fall first on the nineteen two-foot lenses, which by themselves would bring the rays to a focus at points twelve feet away. A set of eighteen mirrors reflects each beam to the center, where it meets the other beams. Before reaching the center, however, each beam passes through a smaller lens, seven inches in diameter, which concentrates it still further. The beam from the center two-foot lens passes directly into the second lens without reflection from a mirror.

Size of Little Fingernail

At first, the large beam of sunlight which supplies the whole battery of lenses is ten feet in diameter, but at the final focus of the instrument it is reduced to an area the size of one's little fingernail, so that the energy is concentrated about 200,000 times. The material to be studied will be placed in an evacuated glass bulb, made large enough not to be melted by the intense heat. As the material vaporizes under the temperature—and no substance is known which will withstand it—it will give off light, which will pass into an adjacent dark room, where it can be analyzed by powerful spectroscopes.

The erection of the new astrophysical

laboratory, of which the solar furnace will be part, is one of the steps in a new program being undertaken at the California Institute of Technology, in studying the phenomena that occur in the heavens. The 200-inch telescope, double the size of any existing at present, which is now under construction, is part of the same program.

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ARCHAEOLOGY

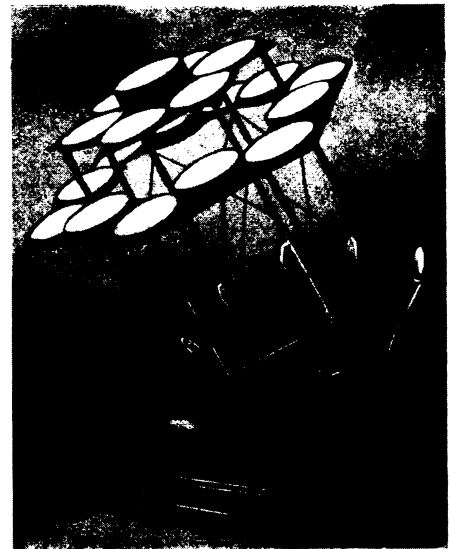
Prehistoric Cave Culture Proves Mystery to Scientists

BONES of twelve prehistoric Indians—and a dog—who lived in an Arkansas cave and were buried in a cave when they died, have been unearthed, and science finds itself faced by a new problem in American identities.

The cave dwellers do not appear to have been just like the prehistoric Pueblos of the Southwest, nor like the ancient Basket Makers who lived even before the Pueblos. Nor yet do the cave dwellers resemble the prehistoric Bluff Dwellers who took shelter under the overhanging bluffs of the Ozark hill country, nor are the cave dwellers like any other "type" of prehistoric Indian culture.

Winslow M. Walker of the Bureau of American Ethnology, who found the cave and its inhabitants in the Buffalo River region of Arkansas, says: "It seems to be simply an early cave culture. There is no way of dating it. It is prehistoric, that is all we can say now."

The twelve burials which Mr. Walker unearthed in the cave represent a strange assortment. There was an old man, a middle-aged man and woman, and the rest were babies. Some unknown agent of destruction, perhaps famine or disease, took heavy toll of the babies at one time. All of the skeletons were buried in a flexed position, knees close to



MODEL

Of the instrument which it is hoped will concentrate the sun's power 200,000 times.

chin, arms bent and held close to the body. Near one child lay the skeleton of a dog. The dog was accorded a proper burial, like his master, by having feet tied together and the head bent forward.

It is by studying the possessions of the people that Mr. Walker finds them "different." That is to say, the articles are so simple that they have little individuality. Everyday tools and weapons were of bone, stone, and shell. The crudity of the articles betokens a very low degree of culture. Many flint spearheads, arrowheads, and knives were buried in the cave. The pottery which the cave dwellers used for cooking and eating purposes was crudely fashioned. No basketry or any woven stuff was in evidence, and to the archaeologist this is one of the strangest features of the cave, for the Bluff Dwellers who lived nearest to these cave dwellers used many baskets.

The most puzzling object from the cave is a small piece of antler with a notch in it. This may be a piece of an atlatl, or dart thrower, one of the important weapons used by Southwestern tribes in early times. The Indian hunter would insert a dart in the atlatl notch. When he hurled the atlatl forward over his shoulder, the dart left the notch and

sped forward with greater force than if it had been thrown by ordinary methods. If the notched bone found in the Arkansas cave is not an atlatl, it may have been a needle for making nets, Mr. Walker says, though the absence of any fragments of net in the cave makes it uncertain that these people used nets. At present the evidence is not sufficient to allow of a definite verdict.

The types of tools and weapons used

by different Indian groups were distinctive, and it is by studying closely the objects at a prehistoric site that archaeologists are able to trace the migrations of ancient tribes and the blending of cultures and the influence of one upon another. Mr. Walker expects to return to the Arkansas cave country next summer to add to his evidence of this new, unidentified group of ancient Americans.

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VOLCANOLOGY

Sulphur to be Taken from Crater of Mexican Volcano

FOR the first time in twenty years negotiations are going forward for the privilege of taking sulphur out of the crater of Mexico's quiescent volcano, Popocatepetl, for commercial purposes. American interests are reported involved in the project.

The last important concession obtained from Mexican authorities for this purpose was granted during the administration of Porfirio Diaz and was held by his friend, General Gaspar Ochoa. Ochoa's operations were halted because of the revolution which broke out in 1910.

In the past the sulphur has been hauled up to the top of the crater in a large basket, which was accomplished by means of a rope and pulley. Usually it is carried from the crater to Tlamacas down the mountainside on the backs of Indians. Burros have been the means used to transport the sulphur, which is in the form of brimstone, from Tlamacas.

It has been found necessary to grant Indians working in the actual crater two days' leave between each two days of work, because of the stifling sulphur fumes. The crater is three-quarters of a mile wide and approximately five hundred feet deep. In the center is a small, emerald-green lake.

The brimstone which collects about the crater periodically catches fire. Only the surface of the brimstone burns, however. So-called eruptions of Popocatepetl within recent years have been proved by expeditions from the National University of Mexico to be nothing more than enormous amounts of smoke from the burning brimstone.

Sulphur has been taken intermittently from Popocatepetl since the time of the

ancient Aztecs, who used it for medicinal purposes. Two of Cortez' soldiers, in the sixteenth century, climbed to the crater and obtained sulphur for the purpose of manufacturing gunpowder.

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DENTISTRY

Eat Rather than Brush To Develop Sound Teeth

THE GREATER importance of food over cleanliness in prevention of tooth decay and the responsibility of the physician rather than the dentist for proper tooth formation were stressed by Dr. Edward Clay Mitchell of Memphis at the meeting there of the American Dental Association.

"Although we do not wish to discourage proper mouth hygiene, yet it has been definitely shown that a properly fed tooth will not become carious even in a dirty mouth," Dr. Mitchell said.

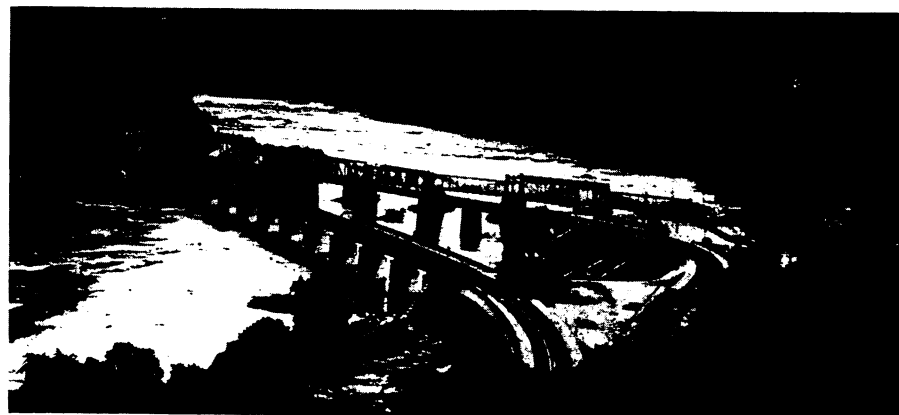
"The physician is equally if not more responsible than the dentist for proper tooth formation," he continued. "Teeth require feeding the same as any other structure in the body. It is the physician who must teach the mother to watch her own and later her baby's diet in order to insure healthy teeth for the child. Plenty of sunshine and a well-balanced diet, including milk, egg yolk, fresh vegetables, fruit juices and cod liver oil are needed by every infant. Early attention to these factors will result in much better teeth for the next generation, Dr. Mitchell observed.

Care of the teeth may be compared to care of a motor car, because a well-built dental organ has functions that resemble those of any machine, Dr. E. Melville Quinby of Boston pointed out at the same session.

A car to be efficient must be strongly built to stand stress; must have its units in alignment for smooth working; and must be cleaned and lubricated to prevent rusting or destruction. The factors to be stressed in the dental machine are therefore nutrition; occlusion, which is the contact of the teeth when the jaws are closed; and mouth hygiene. Dr. Quinby suggested the slogan: Balanced diet, clean mouths and better dental machines for everyone.

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The inheritance of harelip in mice has been studied by two scientists.



—Photo by courtesy of Baltimore and Ohio Railroad Co.

THREE GENERATIONS OF BRIDGES

At historic Harper's Ferry, W. Va., stands a remarkable trio of bridges. The three illustrate the evolution of bridge construction as well as reflect the changes in railroad operation. Each of the bridges was built at a widely different time during a period of ninety-four years. Farthest back in the picture is the oldest bridge, originally built in 1836 with wooden arches, subjected to raids of both Confederate and Federal troops during the Civil War, and permanently replaced in iron. The bridge in the middle of the group went into operation in 1894 to take care of increased traffic. Foreground shows the modern creation, wrought in steel.