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FOSSIL IMPLEMENTS IN PLIOCENE DEPOSITS

HAS Nebraska produced the most ancient evidence of the existence of man yet known to science? This question is raised by Dr. Henry Fairfield Osborn, president of the American Museum of Natural History, in a report to the American Philosophical Society in which he describes investigations conducted by him in collaboration with Albert Thomson, of the American Museum staff. Fossil bone implements in geologic strata have been unearthed that may be some 4,000,000 years old, an age known to geologists as Pliocene.

Since past opinion has been that the most ancient evidences of man were to be found in the Old World, and since claims of the discovery of man in America antedating the Indians, some 25,000 years ago, have been received heretofore with skepticism, the announcement of Dr. Osborn, one of the world's leading authorities on the antiquity and evolution of man, will create great scientific interest.

Over 300 implements of forty different types have been discovered. They are made of the bones of extinct animals that lived in Pliocene times, but time has caused them to be turned into stone. These are the first completely fossilized bones to be discovered. Among the animals whose bones are represented in the collection are extinct horses, camels, deer, elephants and mastodons.

The exact locality in which the discovery was made has not yet been announced with further detail than to state that it is in western Nebraska. Dr. Osborn explained that he desired to protect the site from curiosity seekers who might interfere with the scientific investigations. The first of these artifacts were discovered about two years ago and since that time tractors and other modern machinery have been used in excavating the area. Two localities about 75 feet apart have produced most of the implements.

The fossilized implements are described by Dr. Osborn as of undoubted human origin and of symmetrical shape. Among them are skin dressers for cleaning animal hides, pointed awl-like implements evidently used in sewing, neck ornaments made of strung bones and a kind of comb that seems to be a tattooing implement. Eighteen of the types of tools have been matched with counterparts found in the ruins of cliff dwellers of the arid regions of the Southwest and one type can be nearly duplicated by a much more recent implement from the shell heaps of eastern America. Dr. Osborn stated that the fossilized bone implements he has found are just as real artifacts of human handiwork as are the famous worked flints of Europe. But unlike the implements of Europe which are usually weapons and hunting tools, the Nebraska artifacts are nearly wholly related to the peaceful arts. Further investigations are to be carried on this summer.

The discovery of evidences of ancient man in Nebraska, the native state of William Jennings Bryan, recalls that a fossil tooth found there several years ago by Harold Cook was ascribed by Dr. Osborn to a new type of ancient man, who may have been the maker of the tools and ornaments now unearthed. Dr. Osborn's discoveries also lend added interest to the recently reported discovery by investigators at the Colorado Museum of Natural History of evidences of ancient man in Pleistocene deposits in three widely separated localities in the West.

CHEMICAL ANALYSIS OF THE TUBERCULOSIS GERM

CHEMICAL analysis of the germ that causes tuberculosis has led to the discovery of a new type of compound, a phosphorus-containing fat, which has peculiar biological properties, according to Professor R. J. Anderson, of the department of chemistry at Yale University.

The tuberculosis bacterium is unique among single-celled organisms in being the possessor of a waxy covering which renders it highly resistant. This is why it can defy the phagocytes which police the body, for instead of being dissolved by them and destroyed, the T. B. organism survives and may multiply after being engulfed. The waxy sheath is so thick that it makes up one fifth to two fifths of the weight of the dried bacteria.

Professor Anderson extracted eight pounds of the germs with a mixture of alcohol and ether to dissolve out this waxy coating. He obtained a pound of wax, half a pound of fat proper, and half a pound of phosphatide or phosphorus-containing, fat-like substance. The last material, to which he has given the name phosphosucride, is the most unusual constituent of the germs. It has been shown to contain phosphoric acid, a sugar and fatty acids. This compound differs from all other known phosphorized fats, according to Professor Anderson, and it may be expected to have peculiar biological properties.

While the biochemist is busy probing the formula of the phosphosucride, other investigators are studying it biologically at the Rockefeller Institute for Medical Research, to determine to what extent the destructive powers of the tubercle bacillus are due to this element in its make-up, and whether once identified, it will be of service in the treatment or prevention of the disease.

Other chemists in an analogous way have obtained specific chemical compounds from pneumonia bacteria, which show promise when applied clinically.

THE EUROPEAN FISH TAPEWORM

THE dangerous fish tapeworm of Europe, the largest of the parasites that commonly attack human beings, has become established in the United States, and is to be the object of special study this summer by a group of investigators backed by the National Research Council and under the immediate direction of Professor H. B. Ward, of the University of Illinois, foremost authority on internal parasites. They will go to the extreme northern part of Minnesota, which is the center of the

threatened area in this country, and spend the summer tracing the connections of the infestation, which is complicated by the fact that the worms live part of their lives in fish and the rest in human beings and other warm-blooded creatures.

Fish tapeworms is a relatively common affliction among the peoples around the Baltic Sea, and is said to occur also to some extent in Switzerland. In some cases it does relatively little harm, while in others it induces an extreme condition of pernicious anemia, which sometimes ends in death.

Professor Ward states that the infestation was introduced by immigrant laborers in the iron and lumber industries, who not only carried the parasites internally but also imported their favorite dried and salt fish from the homelands. Salting does not kill the pest, and imperfect smoking also leaves it alive. There is evidence now, however, that the native fishes in some of the northern lakes may have become infested, and it is to ascertain the truth or falsity of these reports and to work out methods of keeping the infestation from spreading that the expedition under Professor Ward is to take the field this season.

THE MISSISSIPPI FLOOD AND FLOOD PREDICTIONS

THE greatest flood in Mississippi River history, now raging, gave the first grim warning of its approach eight months ago.

"The present flood began late in August when heavy rains set in, raising the waters of one or two rivers in Kansas and Oklahoma," according to the following statement by H. C. Frankenfield, head of the division of rivers and floods of the U. S. Weather Bureau.

"In October there was flood in the Arkansas and Neosho rivers with damage of $40,000,000, or perhaps more. Last fall, I saw mud clots on ten-foot corn stalks, out in the prairie. Then, the rains drifted eastward, over Missouri, Illinois, Ohio, Tennessee, Kentucky and the Cumberland. And all this was at a time of the year when the rivers of the Mississippi system should have normally been at their lowest level.

"We know then that if the rains of the coming winter and spring were much above normal, we were going to have a big flood. But we can not forecast rains, and of course we could not predict the volume of the present torrent.

"Late in December rains swept Tennessee and Kentucky, and the next report was that all records were broken in the Cumberland River and there was a high flood in the Tennessee, and these are the two largest tributaries of the Ohio River. Heavy rain put the Ohio in flood in January, and then the rains became more widespread. During March, every tributary of the Mississippi, from the Des Moines southward and eastward, was in flood.

"There is no question that the present flood is the greatest that has ever covered the Mississippi. The flood of 1922 was the next greatest, and that of 1882 ranks third."

Flood warnings are sent out from the U. S. Weather Bureau every day in the year to some parts of the United States, sometimes four weeks in advance, sometimes only 18 hours. The Mississippi flood waters gather from such distant streams and have been studied so long and carefully that height and speed of the spring flood in the lower Mississippi can usually be estimated by bulletins several weeks before it sweeps through Louisiana.

"The prediction of floods is perhaps the most exact forecasting that we do," said Dr. Charles F. Marvin, chief of the U. S. Weather Bureau. "The prediction side is far ahead of the prevention measures that can be taken."

The bureau's flood warnings are instantly heeded by the people of the region involved, even though the country at large hears very little about a flood until the water reaches an alarming state. Engineers and levee boards organize their workers and get out their equipment. The dykes are strengthened, inhabitants are notified. But along the lower Mississippi many thousands of the people are Negro farmers and laborers and their families, people who often stick to their homes and trustingly climb up to the rooftops when the river menaces them, rather than escape when warned.

Many of these river dwellers, even if they have escaped with their lives, have now seen their homes wrecked. They have lost their best chance to plant their cotton or other crops, and unless the weather favors them, they may fail to get a crop in at all.

So long as men try to hold the Mississippi and its contributing streams within narrow bounds, so long men will have to keep close watch on the flood hazard, according to Dr. Marvin. In past ages, the river handled the problem in its own way, and made huge drainage areas. But men have built over 2,000 miles of levees to guide the river within a convenient channel. The levees are supposed to stand the strain of the torrent and they hold up remarkably, but if the water seeps in through a small leak in the wall, the rift may grow and the flood may force its way through, as it did at Dayton in the famous flood of 1913. Even though the walls of the levees are built higher and higher, and though they are pushed back from the river bank, even two miles in some places, the river may in emergencies demand and take more room.

Several hundred dollars spent in a laboratory study of floods would prevent millions of dollars loss, John R. Freeman, former president of the American Society of Civil Engineers and the American Society of Mechanical Engineers, said recently in commenting on the floods.

"The Federal Government and the states have spent hundreds of millions of dollars in trying to solve the Mississippi's problems, but it is still possible for one break in a levee to lay waste 5,000 square miles of as fertile land as the sun shines on, with a loss of $25,000,000 almost overnight," said Mr. Freeman, who accompanied President Roosevelt on his official inspection of the completed Panama Canal in the capacity of expert adviser. He was also consulting engineer for the Chinese Government, and has studied flood and river problems in that country.

"A week's work with a model, in which changes of shape and position can be readily made, at a total cost of

a few hundred dollars, may tell more than six months' effort and $10,000 spent on an experimental dike or groyne in the field. Coefficients of the relation between model and full size original can soon be established and after the variants have been determined on the model, one can go ahead with great confidence in the field.

"The experiments by Froude on towing ship models in a long laboratory tank were at the very foundation of progress in the design of naval and merchant vessels, and it is entirely within reason that similar improvements in the art of training rivers to maintain navigable channels without frequent expensive dredging and in making them carry their floods to the sea more safely and quickly, may come from the laboratory."

INDIAN MOUNDS AS FLOOD REFUGES

THE thousands of terror-stricken people who have taken to Indian mounds to escape the flooding Mississippi waters are showing scientists how the Indians probably used these earthworks which they built in pre-Columbian days.

Each of these mounds, very frequent in this section, can take care of some 500 persons. Sturdily built of earth, they have resisted the onslaught of the waters for generations, and are now pinnacles of safety to the refugees.

The situation to-day, according to Dr. Alfred Kidder, the well-known American anthropologist, is strong evidence in favor of the theory that the mounds were originally built by the Indians a thousand years ago for this very purpose—to afford refuge from floods. Undoubtedly the Indians experienced floods of considerable magnitude and had to find some method of protecting themselves.

"In all probability," said Dr. Kidder, "it was for this purpose that they toiled for years to build these high mounds. It was a gigantic task since they had only their baskets in which to carry the tons of earth necessary to make them.

"It was at first thought that these mounds might be funeral piles like other smaller mounds in this section and in the Ohio valley, but excavations unearthed no human remains. However, post holes were discovered where the framework of buildings had evidently been erected. Baked clay was also discovered. This clay had plastered the log and twig structure of the building and was hardened into enduring form when the buildings caught fire.

"Were these mounds erected merely as high places for temples as in the case of the Aztec and Toltec pyramidal structures? was the conjecture. Against this theory arose the remote possibility that the mounds were places of refuge from floods—a theory substantiated by the present situation.

"The buildings were probably temples, altars and the habitats of chieftains," said Dr. Kidder. "In time of flood a mound could accommodate the entire tribe, most of the members of which probably lived in the inundated area."

Pyramidal in structure, but with a flat top to permit erection of buildings, the mounds are about 150 feet in diameter and some fifty feet high. They are largely confined to the flood area of the Mississippi. A number occur, however, in areas in the valley which are not completely inundated in flood time. These were probably built later, Dr. Kidder said, in the manner of primitive peoples, after the erection of such mounds had become a custom. The funeral mounds, on the other hand, are much smaller and lower and occur frequently in both the Mississippi and Ohio valleys.

ITEMS

A SCALY monster of the pre-human ages of the earth, surviving into modern times in the almost unvisited swampy fastnesses of southern Java, is reported to the scientific journal, *Die Umschau*, by Dr. P. Vageler. It is described as a one-horned rhinoceros, related to a form already known elsewhere in the East Indies, but differing from it in that its almost naked hide is closely covered with small, hard, horny scales. It also has enormous front teeth, like those of a hippopotamus. It has often been described by the natives, but Europeans were incredulous, regarding these reports as folklore. A few professional hunters among the whites had killed specimens; but they could obtain such high prices from the Chinese, who use the hide and horns of rhinoceroses in medicine, that they were secretive about the business and did not share their knowledge with scientists. Finally, however, photographs were brought out of the jungle, showing very clearly that the animal is new to science. Now that its existence has been authenticated it is expected that efforts will be made to secure living specimens for zoological gardens.

G. K. NOBLE and M. E. Jaeckle, of the American Museum of Natural History, confronted with the troublesome fact that frogs and toads and spotted salamanders and all manner of other interesting but non-fur-bearing creatures can not be successfully stuffed and mounted by the ordinary methods of taxidermists, have solved the problem by pickling them in solid paraffin wax. They first remove all trace of water from the specimens by appropriate chemical means, arrange the little animals in natural positions, and soak them for several days or weeks in melted paraffin, until every tissue is thoroughly impregnated. By this method reptiles and amphibians can be worked into naturalistic museum groups and made as "alive" looking as birds and fur-bearing animals, instead of being pallid corpses pickled in jars of alcohol. They keep their natural colors indefinitely, except that sometimes their eyes need to be touched up with a little gold paint.

A GERMAN artist-inventor has devised a new technique for turning plaster statues into metal ones, by means of an ingenious "extrusion pistol" which projects a fine stream of melted bronze or other metal against the inside of a hollow plaster cast with such force that it carries on through the porous substance and comes out as a thin film, hardening on the outer surface. The process is said to be rapid, five minutes' operation of the pistol being sufficient to metallize a plaster cast the size of a man's hand.