

Russian explorer in the Central Asiatic steppe lands. A reindeer head is another art work by the mammoth hunters.

Most striking of the art exhibits is the statue of a mammoth complete. The prehistoric sculptor captured the characteristic form of the shaggy giant, the back drawn upward, its plump and heavy legs, all familiar to science from reconstruction of real mammoth remains.

The ancient hunters made "combination tools," Prof. Absolon's collection shows. One three-fold implement is a blunt stiletto at one end, a notched trowel at the other, while from beneath it is a chisel. A saw with serrated teeth is another tool of this Old Stone Age.

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GEOLOGY

Whetstones Contain Ancient Climate Record

WHEN a farmer leans upon his scythe while he whets its blade, he may be unconsciously sharpening his modern tool with a record-in-stone of an ancient climate. For the widely used banded whetstones made from a peculiar type of gritstone quarried in Orange and Perry Counties, Indiana, tell of alternating seasonal abundance and scarcity of rainfall during the early Pennsylvanian geologic age, a quarter of a billion years ago, when "slimy things did crawl with legs" out of the water and onto the land, laying the foundation of the since proud line of land-living vertebrates.

The dark bands in the stone indicate the presence of abundant organic matter, the light bands point to its scarcity or absence. There were good seasons and bad in those remote times, and their traces were left in the sands deposited under water, that have since turned into stone.

This is the story read in the banded stones of Indiana by Dr. David White, associate in geology of the U. S. National Museum.

Similarly layered under-water deposits of other geologic periods have been interpreted as showing series of mild and severe seasons in cyclic succession. Thus far, however, the banded gritstone material examined by Dr. White has been too scanty to justify any definite conclusions regarding seasonal cycles during the Lower Pennsylvania.

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ENGINEERING

Is One-Rail Train Next Step For Land Transportation?

THE VISION of a train or car rushing along on one rail, kept from falling over by a spinning gyroscope, has been pursued by a number of inventors and engineers since the turn of the century.

Now with railroads going modern, streamlining their locomotives, lightening their rolling stock, using single car trains diesel-electric propelled, it may be that serious thought will be turned to the monorail for land transportation. It may be a method of allowing the railroad to follow not too far behind the increasing speed of the passenger and freight carrying airplane.

Bicycle Shows Safety

The problem of using gyroscopic stabilization has been investigated by a British engineer, Dr. J. F. S. Ross, and his inquiry is reported in a book: "The Gyroscopic Stabilization of Land Vehicles." (Edward Arnold & Co. in London; Longmans, Green & Co. in New York.)

"To the sceptic who distrusts the practical safety of the monorail I would commend the object-lesson of the bicycle," Dr. Ross says. "Who now, apart from a small minority of invalids and eccentrics, regards the tricycle as a better means of locomotion than the bicycle, or casts aspersions on the latter as unsafe in itself and liable suddenly to flop over? So it may well be with the monorail; if once the arduous (and expensive) stage of experiment is successfully surmounted, we may look back upon double-rail traction as antiquated and clumsy, and marvel that people ever thought the monorail unnatural or unsafe."

Seems Contrary to Nature

Even the spinning top, which is a form of gyroscope with which all are familiar, gives a vague feeling of distrust, Dr. Ross observes.

To the ordinary, non-expert person, the behavior of a gyroscope is apt to seem contrary to the laws of nature. He cannot understand why, being top-heavy, it does not fall over, nor why, when pushed in one direction, it moves in a quite different direction. He can-

not quite believe that its behavior is perfectly normal and explicable, and he has a lurking suspicion that, if he were to rely on the gyroscope as a monorail mechanism, sooner or later it would let him down by suddenly ceasing its eccentricities and behaving in what he would consider a more normal way.

Though there are no good grounds for such views, in Dr. Ross' opinion, it must be admitted that there are considerations which may serve to excuse them. In the first place, no one has yet produced a large-scale monorail car which gives evidence of that complete reliability in all circumstances which is essential for commercial success; and, in the second place, the explanation of gyroscopic phenomena, and the calculations necessary in connection with gyroscopic apparatus, involve a certain amount of mathematics of a somewhat specialized character.

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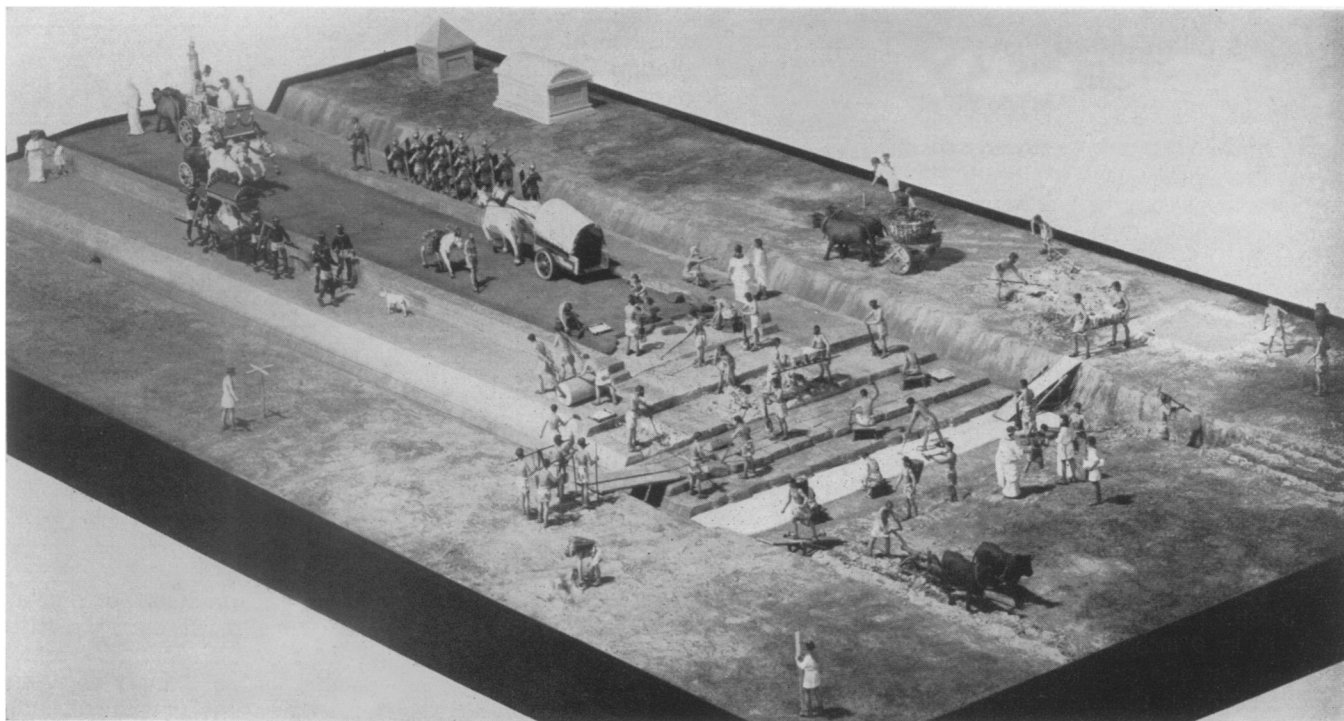
ENGINEERING—ARCHAEOLOGY

Model Shows Building Of Famous Appian Way

FAMOUS highway construction of a distant day and how the ancient road was used are illustrated with an elaborate model of the Appian Way which has been built by the U. S. Bureau of Public Roads for the National Museum. More than one hundred carefully designed figures of men and animals, with their tools and vehicles, are working on the highway or passing over the newly finished surface.

The chief difference between the ancient Roman road and the modern highway is that the present-day engineer relies upon the soil to bear the load; the pavement should act as a wearing surface and a roof to protect the supporting subgrade soil. The Romans relied solely on massive construction. Using modern ideas, the roadbuilder of today has been able to build more extensive highway systems at a small part of the cost of Roman roads.

This road, which endures after twenty centuries, was 16 feet wide with 2-foot



GLIMPSE AT ANCIENT HIGHWAY CONSTRUCTION

curbs 18 inches high on both sides, beyond which were 8-foot side roads. The Appian Way was of solid stone and concrete masonry 3 to 4½ feet thick, depending upon the soil on which it was laid. It was very straight, with steep grades and the curves widened as on modern roads.

In building the Appian Way, a bed of sand and gravel sometimes covered with a thin coat of lime mortar was used as a foundation for the four layers of masonry. The first masonry layer, from 10 inches to 2 feet thick, was composed of stones that would fit in a man's hand held together with lime mortar or clay. The second layer of smaller stones mixed with lime mortar was 9 inches thick. The third layer was of concrete made of small stones, sand and hot lime mortar 1½ feet thick in the center and a foot thick on the sides to give a crown to the road. The fourth or wearing layer was of polygonal stones about 3 feet in diameter and 6 inches thick laid with close joints. The upper surface of the wearing stones was dressed smooth and the joints fitted so tight as to be scarcely discernible.

These features of construction may be readily distinguished in the photograph. A detailed description of the model is available at the U. S. Bureau of Public Roads, Washington.

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ORNITHOLOGY

Eskimo Arrowhead Found In Duck Killed in California

THE HARDINESS of the mallard duck was dramatically demonstrated in a bird shot down over a lake near Bakersfield, Calif., recently. Postmortem examination of the duck resulted in the discovery of a 9½-inch triangular bone arrow head of the type used by the St. Lawrence Island Eskimo firmly imbedded in its breast.

The mallard was shot by a friend of L. C. Barnard of Los Angeles. Its projectile was declared by the Los Angeles Museum to be of undoubted Eskimo origin.

The arrowhead was triangular in cross section, was unbarbed and was fashioned of mammal bone, probably the leg bone of a caribou from the mainland. In type, the missile point checked closely with the bone and ivory arrowheads used by the natives of St. Lawrence Island in the Bering Strait off Alaska. The sinew wrappings on the head had been softened by the blood, and the wooden shaft had long since dropped free.

When discovered, the butt end of

the blade projected some two and a half inches from the breast of the duck. Judging from the position in which the arrowhead lay, the Eskimo hunter had released his shaft from the rear of the bird just as it cleared the water.

This is not the first instance of such projectile points being discovered in birds flying south from the Arctic. A few years ago a farmer in Nebraska reported the discovery of an ivory arrow point, likewise of Eskimo origin, imbedded in the flesh of a goose he had shot. Another report was made of the discovery of a barbed bone arrow head of Eskimo type found in the open in New Mexico. Perhaps some of the scattered instances of discoveries of similar artifacts of alien manufacture found thousands of miles from their original source may well be attributed to some such accident.

It does not take long for a protecting sheath of gristle-like material to form around alien objects in a bird's body, and once healed, the creature might live indefinitely.

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