



NOT A TOY

## ENGINEERING

## Electric Locomotives Modeled for Exhibition

**T**HE WORLD'S most powerful single-unit passenger locomotives have been modeled for the Century of Progress Exhibition which opens in Chicago on June 1.

When plans for the electrification of the Pennsylvania railroad between New York and Washington are completed, 90 of the full-size monsters will be put to work. They are designed to haul trains of 14 steel Pullman cars faster than the economical steam speed.

The model, which was machined with utmost precision to duplicate carefully the original, is only one foot high, eight inches wide, four feet two inches long and weighs seventy pounds. It is exactly one fifteenth the size of the big locomotives and was made in the shops of the Westinghouse Co., one of the concerns engaged in their manufacture.

Because of the density of traffic between New York and Washington, particularly from New York to Philadelphia, this project is attracting widespread attention. It is expected that eventually 136 passenger locomotives, 86 freight locomotives, 98 switching locomotives and 1,637 multiple unit cars will be operated.

The freight locomotives for this electrification are the first steam or electric freight engines to be equipped with roller bearings.

*Science News Letter, March 11, 1933*

## CHEMISTRY

## Element 87 Explosion Injures Finnish Chemist

**B**LINDED completely in one eye, with his other eye weakened, and with his hearing affected, Prof. Gustave Aartovaara of the Helsingfors Technical University, Finland, is a martyr to his search for a missing chemical element. In 1931, while engaged in the chemical concentration of the missing chemical element 87, Prof. Aartovaara was the victim of a laboratory explosion, the effects of which have prevented his continuance of research.

To Prof. Fred Allison of the Alabama Polytechnic Institute, Prof. Aartovaara sent specimens that he believed contained element 87 and Prof. Allison detected this element by his magneto-optical method of analysis.

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## ARCHAEOLOGY

## Mexico Yields Structure Surpassing Pyramid of Sun

### Research Also Reveals New Group of Tombs, Hitherto Unknown Pottery and Child's Grave at Monte Alban

**E**XISTENCE of a great Mexican pyramid, which outshines in size the famous Pyramid of the Sun near Mexico City, is reported by Alfonso Caso, Mexican archaeologist who is now exploring a little-known region in the Oaxaca mountains.

Mexico's new prehistoric pyramid is at an ancient city known as Tejuapan, in the southern part of Mexico associated with the old culture of the Mixtec Indians. The city has been known to exist, but has never before been reached by an archaeologist. Don Esteban Avendano, ranch owner who takes a great interest in archaeological remains in the countryside, explored the great pyramid. He found that it was built in five layers, in the old Mexican fashion of enlarging public structures.

Sr. Caso also announced that he has visited the Hill of the Virgin, an archaeological site brought to his attention recently by Miss Emma Reh, Science Service correspondent. The site is pronounced important because it is a place of Mixtec Indian tombs, about which archaeologists know almost nothing. The tombs, Sr. Caso said, are round and lined with stone, and they as-

cent like steps, at the same time encircling the cone-shaped Virgin Hill.

Sr. Caso will seek another ancient ruin which Indians described to Miss Reh, and which contains unique pottery decorated with hieroglyphics.

On her recent exploration journey, Miss Reh reached an Indian settlement called Telixtlahuaca, and there heard about the mounds of an "old town" six miles farther on. She pushed on toward the old town, but did not reach it. At an Indian hut, however, she found two pottery bowls dug out of a mound.

The two bowls will be placed in the Mexican National Museum. There are none of like shape in the vast pottery collections in Mexican museums. Each bowl has a small concentric bowl inside it, made as a part of it. The bowls have bases in the form of a two-headed snake.

The bowls are decorated with picture writing, pronounced by Sr. Caso to be of Mixtec Indian type. One bowl has pictures of four individuals, with symbols before their mouths, indicating speech. Other symbols before them represent day-names in the Mixtec calendar. The bowls are thus like pages of picture-writing. (*Turn to Page 157*)

## ASTRONOMY

# Dr. Shapley Suggests Galaxies Are Irregularly Distributed

THE DISTANT galaxies, those clouds of stars far beyond our own galactic system, which includes the sun and all the stars that we ordinarily observe in the sky, seem to be irregularly distributed in space. This is the opinion expressed by Dr. Harlow Shapley, director of the Harvard College Observatory, in the *Observatory Bulletin*. Furthermore, he suggests, these irregularities are the result of some evolutionary process in the higher system of which the galaxies themselves are the units.

These galaxies appear on the photographs taken through great telescopes as faint nebulae, and they show in greatest numbers in regions far from the Milky Way, for there the stars in our own galaxy, and the associated dark matter, obscure them. But even in the regions where they are most numerous, there is considerable irregularity in their distribution. The question was whether or not this is real, or whether they too are partly hidden by dark material in space. The nebulae studied by Dr. Shapley are those nearer than 25 megaparsecs. A megaparsec is the biggest unit of distance employed by astronomers. It is the distance that light will travel in 3,260,000 years.

Dr. Shapley's research was to determine whether there was any correlation between the distribution of these galaxies, and that of the faint stars. These stars are presumably the most distant in our own Milky Way system, and so, if the sparseness of the galaxies was the result of dark matter in our own system, the stars should be affected similarly. However, he finds that there is no correlation whatever. The stars are also distributed very irregularly, but in some regions where they are thick, the galaxies are very scarce, and vice versa. There are other cases where the two happen to be most numerous in the same regions.

"From these simple tests," states Dr. Shapley, "it appears that the distribution of external galaxies is wholly independent of the distribution of faint stars, and we deduce therefrom that if obscuring matter is involved it is external to our own galactic system. A

much more reasonable assumption, of course, is that the irregularities in apparent distribution are real and indicate groupings of external galaxies. The irregularities are obviously too pronounced to be attributed to chance; they are rather a demonstration of evolutionary tendencies in the metagalactic system."

### Fits Previous Researches

This idea would fit in with earlier researches by Dr. Shapley which indicated that distant space is reasonably transparent, in that it is not filled with a sort of mist. This was shown by a study of the relation of the size of the galaxies to their surface brightness. If space is transparent, the distant ones would be faint merely because they seem smaller than those which are nearer. If space were filled with some sort of obscuring fog, however, the brightness of a certain area of the distant galaxies would be less than that of a corresponding area in a nearer one. However he found that the average surface brightness was fairly constant regardless of distance. If there were actual dark clouds that obscured all the light if they obscured any, the surface brightness would not be affected. But in the absence of any evidence that there are such clouds beyond our galaxy, it is more reasonable to assume, as Dr. Shapley suggests, that the irregularities are real.

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Sr. Caso and his associates made their most important tomb discovery of the season at Monte Alban very shortly before they closed the work there. Seven feet under ground, they encountered this tomb. Inside, they found the skeleton of a girl nine or ten years old, with her toys and other possessions. There was a red tiger with a ruffled collar, a real-looking figure of a baby, a red owl whistle which still hoots when you try its note, and an animal-shaped vessel with human head, and other things. All these were of clay.

To the archaeologists, this is not merely a bright picture of child life in old Mexico. This "Tomb Thirty-Three" is the most ancient found in the graveyard and the first of its type. The contents shed light on a very early period of Mexican pre-history. The Indian child's simple possessions draw from the archaeologists the comment that this is the most important pottery yet found at Monte Alban.

The pottery, they pronounce, is a primitive Zapotec Indian type. They place it, historically, in transition between the archaic culture of Middle America, sometime over a thousand years ago, and the culture developed by Zapotec Indians. Over the grave ceiling the archaeologists discovered two archaic clay female figures and a large pot ornamented with the head of a man with a duck's bill.

The grave apparently corresponds in age to the mysterious Dancers' Temple at Monte Alban. On the temple are half-human carvings in grotesque poses which have puzzled archaeologists. The animal-shaped vessel with human head in the child's tomb reveals a posture like the weird temple carvings.

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