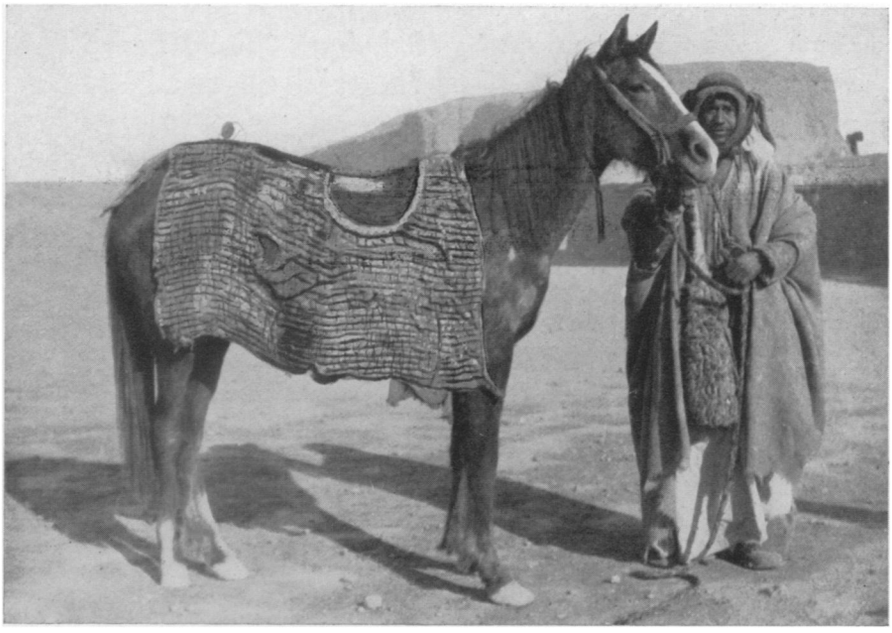

WHAT A WELL-DRESSED ROMAN HORSE WORE TO BATTLE

This modern horse, cautiously held by an Arab lest he revolt at his unaccustomed burden, is dressed in bronze armor that archaeologists have unearthed at Dura on the Euphrates. The armor was worn by a horse of Roman heavy cavalry, when Rome defended Dura against attacking Sassanians, 256 A.D.

ENGINEERING

Powerful Diesel Locomotives May Revolutionize Railroads

GIANT diesel-electric locomotives drawing swiftly and more economically standard passenger and freight trains of America's railroads were foreseen when Charles F. Kettering, leading research brain of General Motors, finished talking about diesel engines to the National Academy of Sciences at their Cleveland meeting.

Nearly ready to emerge from the Winton Cleveland shops are 3,600 horsepower diesels, which have four times the power of a similar engine in the now famous Union Pacific streamlined train. They will operate with an efficiency of 36 per cent., which makes the steam locomotive of today very uneconomical by comparison.

"Ket's" new diesels are travelling power plants that equal in efficiency the steam turbines used in large stationary electric generating stations.

With large diesel-electric locomotives capable of replacing steam engines and running without any changes in trackage upon existing railroad lines, the question arises as to whether this will make unnecessary the further electrification of American railroads and even economically obsolete the existing electrifications.

The principal trick in making such large diesels lies in the method of injecting the oil fuel into the cylinder where the heat of compressing the mixed vaporized fuel and air explodes the mixture without the aid of a spark, necessary in the gasoline engine. Kettering uses injection pressures fivefold those used in other diesels, 25,000 instead of 5,000 pounds per square inch. The injector is built close into the cylinder so that friction losses are few, and small charges of oil can be handled. No matter what the viscosity of the oil used, enough pressure can be applied to break it up into fine vapor through ten-thousandth-inch holes.

Science News Letter, December 8, 1934

It is estimated that there were about 50 million buffalo in North America at the beginning of the seventeenth century.

ARCHAEOLOGY

Find Temple of Mithras, Rival of Christian Faith

IN the ruins of Dura on the Euphrates, archaeologists from Yale and the French Academy have unearthed a temple to the great Persian god Mithras, favorite deity of the Roman legions, and one time rival of the Christian God in popular esteem.

"The importance of the discovery of the sanctuary of Mithras cannot be exaggerated," declared Dr. M. I. Rostovtzeff of Yale, one of the scientific directors of the expedition, announcing the latest revelations from the Mesopotamian city.

"Mithras was the greatest rival of Christ in the third century, A. D. In his pointed manner, the great E. Renan once said that were Christianity prevented from spreading by some accident, the religion of the modern world would be that of Mithras."

The temple, excellently preserved, is still decorated with bas-reliefs showing Mithras killing the bull, and engaged in other exploits of his career. The room where the soldiers of the Roman garrison at Dura once gathered to worship still contains two of the benches customary in Mithras' temples. On these benches the soldiers lay to partake of the sacred meals and to witness the sacred ceremonies performed by the magi.

In the Jewish synagogue, where previous digging revealed Bible paintings of the third century A.D., new scenes of the Old Testament have come to light. To this art gallery of Bible characters are now added Moses in the bulrushes, Queen Esther watching the triumph of Mordecai, Samuel annointing David, the Exodus of the Israelites, the story of Elijah, and other frescoes showing how people of 245 A.D. thought of these characters and incidents.

Dura's career lasted only five centuries, from about 280 B. C. to about 256 A.D. But in that time the city bore the imprint of five civilizations. Two more houses of worship have been found in this city of many religions. These are a Roman temple to Zeus and a temple of the Phoenician god Adonis and his consort Astarte.

Mines and counter-mines, evidence of the warfare when the Sassanians came to capture Dura from Rome, have been discovered. Bodies of the dead Roman defenders still with their armor and

weapons, have been unearthed. Opposite the Romans lay one Sassanian with his hand still raised and his sword near him.

"European scholars call Dura the Pompeii of the Euphrates," said Dr. Rostovtzeff, "and it deserves this name."

Science News Letter, December 8, 1934

METEOROLOGY

May Base Long-Range Weather Forecasting on Sea Warmth

POSSIBLE use of ocean temperatures, in conjunction with other factors, in forecasting air temperatures and precipitation along the middle and northern Atlantic seaboard has been suggested by Dr. Charles F. Brooks, director of the Blue Hill Meteorological Observatory of Harvard University, and Ernest M. Harwood of the Blue Hill research staff.

"It seems possible," says Dr. Brooks, "that the coastal waters may give indications of the air-temperatures of the following month along the Middle and North Atlantic seaboard, low sea-temperatures being followed by high air-temperatures, and vice versa. Furthermore it seems likely that the precipitation stands in inverse relationship to the general sea-temperature of the preceding month."

The data studied covered a five-year period during which sea temperatures were recorded on sea-water thermographs installed on commercial steamships in the western Atlantic, chiefly those sailing between New York and Bermuda. The land temperature and precipitation recordings were made at Boston and Baltimore, Md.

"The sea should have both a direct and an indirect influence on the coastal weather. The direct one should simply make the coast warmer and moister, when winds blow onshore off a sea warmer than usual, and vice versa," Dr. Brooks says.

The indirect effect works through the changes in general atmospheric pressure-distribution favored by departures of sea-temperature. When the sea is above normal in temperature it will not only heat the air but will also give it more vapor than usual. Such heated and humidified air is lighter than the average, and so the atmospheric pressure is lower. The lower pressure over the sea favors northerly land-winds, both cool and dry, on the coasts to the northwest. So a warm sea should favor subnormal temperature and precipitation, Dr. Brooks believes.

Conversely, with sea-temperature below normal the air would be denser, the pressure higher, and the wind consequently onshore from the south, bringing warmer and moister weather to the coasts. On the Atlantic seaboard, where the winds are prevailingly offshore, the direct influence must obviously be minor, therefore, the indirect should dominate.

"The sequences of departures of weather and sea-temperature do not show any striking opposition, so we cannot say that the problem of seasonal weather-forecasting from ocean-temperatures is solved," Dr. Brooks warns. "On closer examination, however, the expected inverse relationship is found to predominate rather consistently."

Science News Letter, December 8, 1934

PHYSICS

Two Automatic Instruments Facilitate Light Analysis

EXPECTED to be of tremendous assistance in the analysis of light, two new instruments are being developed at the Massachusetts Institute of Technology by Prof. George R. Harrison, director of the spectroscopy laboratory. Light analysis, or spectral analysis, is one of the most powerful of modern scientific weapons.

One of Prof. Harrison's instruments automatically measures and computes the wavelengths of spectrum lines, which are the separate bands that appear when a beam of white light is spread out by a prism or grating into an artificial rainbow. The other instrument, called an interval sorter, determines the energy of atoms and molecules from the spacing of these spectrum lines.

In measuring a spectrum by previous methods, the scientist observed by eye the distances of the spectrum lines from some standard line, using a delicate machine known as a comparator. For a spectrum photograph containing many of these lines the task might easily require days or even weeks. To avoid errors caused by temperature changes in the mechanism, each plate had to be measured several times and the results reduced by complex calculations.

Although the new machine for measuring wavelengths is still in the process of development, it makes measurements twenty times faster than by the conventional methods, and the results are twice as accurate. Further development is expected to make it 200 times faster than the old method. A beam of light supplants the human eye in recording the measurements by means of a photoelectric hookup. (*Turn Page*)