foretell the hidden location of gravel and rock deposits which might provide a cheap and easily accessible source of this valuable road material.

Another way that modern research aids highway building is in the use of thermocouples to determine the temperatures inside the concrete after it has been poured and is setting to its final rock-like nature. Moreover, thermocouples tell how much a large slab of concrete in a highway will expand or contract in the temperature range from torrid mid-summer to frigid winter in the various climes of the nation.

The special, full-sized concrete road at the Arlington Experiment Farm of the U. S. Bureau of Public Roads contains many of these thermocouples.

Some magnitude of the research program on this special test section of highway is obtained from the knowledge that 65,000 measurements of slab expansion and contraction and 30,000 temperature measurements have been taken, as well as 30,000 strain determinations and 25,000 deflection observations.

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between ships and shore, aircraft and ground and directional signals upon which human lives depend can be seriously interfered with by "sky waves" of considerable intensity set up by the short wave diathermy and artificial fever devices now employed by many physicians.

Dr. H. B. Williams of New York City warns physicians of the nation through the *Journal of the American Medical Association* (Nov. 28) that they must take prompt steps to abate this nuisance. Otherwise, he declares, relief through legislation will be sought, with a possibility of undesirable restrictions being placed on the use of therapeutic machines.

The council on physical therapy of the American Medical Association is expected shortly to alter its requirements for acceptance of electrical equipment such as is known to have caused interference. Manufacturers will be asked to submit evidence that the construction and installation specifications are such as to prevent interference.

Even when not a menace, the physician's and surgeon's diathermy machine may be a nuisance, causing static in every radio receiving set that derives power from the same line, Dr. Williams points out.

The chief instance of radio interference from this cause came last winter when important activities of the Naval Research Laboratory at Washington, D. C., were subjected to interference so serious as to stop the work completely.

After great trouble and expense, the disturbance was eventually traced to a diathermy unit located in a hospital at Cambridge, Mass.

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CHEMISTRY

Pre-Shrunk Paint Helps Prevent Surface Weathering

"PRE-SHRUNK" paint has become a reality. Contrived with the help of soybeans and tung nuts, this latest product of industrial research in new farm crops has had two results. It has altered previous knowledge of how paint should be made and further bears promise of solving the problem of weathering in this commodity.

"Pre-shrunk" paint is another of those curious unforeseen accidental discoveries which give constant zest to the life of the research chemist. This one happened in the laboratory of a South Bend manufacturing plant where tung oil's possibilities as a "vehicle" for paint were under investigation.

For use in paint tung oil requires a delicate high temperature treatment. The process, however, is often marked by failure because if the heat goes too high the liquid will change to a solid within a matter of seconds. For thirty years chemists have known how to control that trouble so the tung oil can be used in varnish. But, until recently use of tung oil in paint has been limited.

How the trouble was overcome and pre-shrunk paint evolved was revealed by M. F. Taggert, director of research for the South Bend concern.

"After trying all practical mixtures of oil," Mr. Taggert stated, "we found that a mixture of 45 per cent soybean oil with 55 per cent tung oil was the best combination to prevent solidification in the high temperature treatment required to make the tung oil usable in paint.

"In one particular trial we started with 775 pounds of the oil mixture which is equivalent to 100 gallons. This was raised to the suitable temperature with no difficulty, but in measuring up we discovered that although our mixture still weighed 775 pounds we only had 97 gallons of the liquid. Somehow there had been a shrinkage of three gallons, this being indicated by an increase in specific gravity exactly equivalent to the seemingly missing portion.

"Inasmuch as raw oils shrink during weathering, this pre-shrinking of the soybean-tung oil combination contributes to a longer life of the paint."

This accidental discovery, Mr. Taggert continued, immediately caused the scrapping of all previous knowledge of how paint should be made. Another problem arose, however, involving the question of what type of pigments and in what proportion of those pigments the new oil combination would work best.

Using the new "vehicle" with its peculiar "pre-shrunk" property, the chemists then went to work on hundreds of paint formulae. One pigment at a time was at first used, then pairs of pigments, and so on through the gamut of available pigments until eventually the one formula was determined in which the "pre-shrunk" quality of the oil can be utilized to the best advantage.

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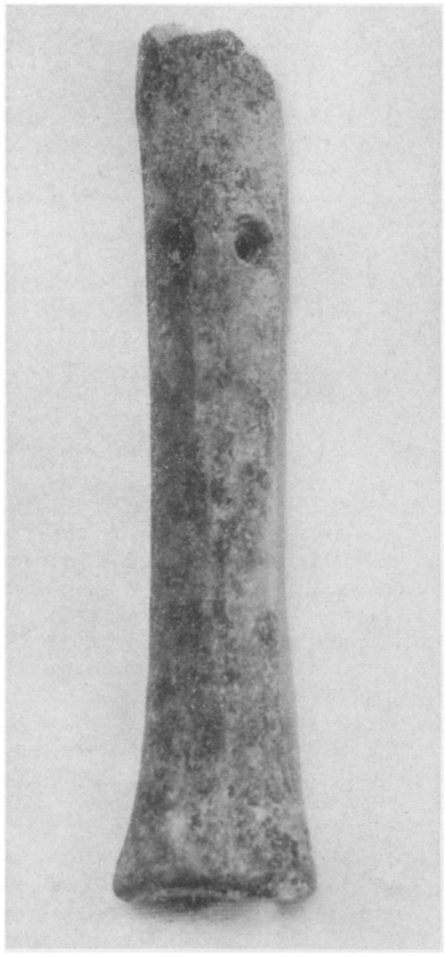
ARCHAEOLOGY

Pipe Played in Stone Age Found in Oldest City

WHAT is believed to be the oldest musical instrument known to man has been discovered at ancient Tepe Gawra, Mesopotamia, it was stated by Prof. Millar Burrows, Yale Divinity School, President of the American Schools of Oriental Research.

The instrument, part of a double pipe of bone, dates from the Chalcolithic Age, when man was shifting from the Stone Age to the Age of Bronze. Tepe Gawra, famed as the world's oldest known city, is being excavated by a joint expedition of the University of Pennsylvania Museum and the American Schools of Oriental Research, under direction of Prof. E. A. Speiser of the University of Pennsylvania.



PIPE FROM OLDEST CITY

Another discovery from the Chalcolithic Age, of great importance to art history, is a large bowl decorated with red paint in panels showing sections of landscape, including mountains, rivers, animals and even a hunting scene.

From a higher level of the mound at Tepe Gawra, about 3000 B. C., comes a carnelian bead of a kind characteristic of the ancient Indus Valley culture, one of the many illustrations of the commercial contacts between India and Mesopotamia in the Early Dynastic Period.

To determine the date of a remarkable Round House discovered toward the end of the last season's campaign, the expedition is carrying the whole excavation down to a level previously reached in a small segment of the mound. When this has been done the lower levels will be investigated in order to establish the sequence of the ruins and of the prehistoric painted pottery, Prof. Burrows said.

The bone musical pipe played at Tepe Gawra some 6,000 years ago is very old, but it has a strong rival for the title of "world's oldest musical instrument."

The rival is a pipe made of a lion's tooth, found in the mountains of Czechoslovakia in 1934, and considered to have been made and played by cave men of Europe 30,000 years ago. The lion-tooth pipe still signals its two notes —D and G—so Prof. Karel Absolon of Brno University reported, when he tried out the sound.

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MEDICINE

New Yellow Fever Vaccine Promises Better Protection

AN IMPORTANT improvement in vaccination against yellow fever is imminent, it appears from the report of Dr. Wilbur A. Sawyer of the International Health Division of the Rockefeller Foundation, to the American Society of Tropical Medicine.

A new vaccine against the dreaded yellow jack is expected as a result of isolation of a new, safer strain of yellow fever virus. The vaccine which Dr. Sawyer and associates developed some years ago, and which can only be made in limited amounts, had to be used with serum from blood of individuals immune to the disease as a result of recovery from a previous attack. The new virus, it is confidently expected, can be safely used for vaccination without this protective immune serum.

Vaccination is not yet in the stage where it can be used for entire populations. Protection of a whole country or continent from the disease is being sought by other methods. Recent developments in Brazil, Dr. Sawyer pointed out, have taught scientists that they must learn new methods for the control of this dangerous disease.

Following the discovery by Walter Reed and his associates, that the disease is spread by a particular kind of mosquito, and the demonstration by Gorgas in the Panama Canal Zone that anti-mosquito measures could check the disease, scientists thought they could wipe it completely from the face of the earth. Campaigns in one country after another were undertaken, with apparent success. The method was to eliminate mosquito breeding in key locations, the cities and towns and other centers of population. Just as scientists thought they were nearing victory, investigators for the Rockefeller Foundation discovered that the goal was nowhere near in sight. The reason is that a form of yellow fever has been discovered in forest regions of South America. Anti-mosquito measures effective in cities will not work in these forest and jungle regions and new methods will have to be found. A further complication is the discovery that yellow fever can be carried by more than one type of mosquito. The newly-discovered yellow fever mosquitoes have different breeding habits and will require new and different methods of control.

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By removing the protein in rubber before processing it, chemists find that they can produce rubber that has lower water absorption and better electrical properties than ordinary rubber.