MISSISSIPPI FLOODS A LAWN

Here is the turbulent Father of Waters at flood stage, in miniature, from below Greenville, Miss., to the mouth of Old river. This reproduction of the Mississippi in reduced size at the U. S. Waterways Experiment Station, Vicksburg, Miss., has been called the largest river model ever built. It is used under the direction of Lieut. Herbert D. Vogel, of the Corps of Engineers of the U. S. Army to study the effect of structures designed to improve the river channel. The model is approximately 400 feet wide at the lower end and 120 feet wide at the upper end in the foreground. Twenty-four hundred feet of horizontal distance have been reduced to one foot and 120 feet of vertical distance to one foot. Notice the men in the background.

tion of one or the other. None of the recent work here or abroad shows a considerable effect of this character. Dr. Millikan has a great deal of data on this point. There are small and irregular variations but not of the sort which would result if the sun were the origin of the rays. Since they are, moreover, not produced on the earth they must come from the space outside.

The situation is in a very desirable state, Dr. Millikan pointed out. The leading experimenters everywhere are practically in complete accord as to the direct facts of observation. There are differences of opinion with regard to the interpretations to be applied to these facts. But in this matter of interpretation all physicists can join in the discussion. It will not be long before a generally acceptable conclusion will be reached as to the fundamental nature of the cosmic rays. The result will have consequences of most intense significance to theoretical physicists as well as to our notions of the structure of the universe.

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GEOGRAPHY

Heat Wave Aids Small Boat to Sail "Impossible" Arctic Seas

THE "IMPOSSIBLE" feat of sailing around Franz Josef Land, in the North Polar regions, has been achieved by Russian explorers. They were aided by a heat wave from Florida which started in the Gulf Stream four years ago and moving slowly northward warmed the Polar Sea this year.

Experienced navigators have thought it impossible to sail a ship safely through the fickle seas north of Franz Josef Land, which lies far up toward the Pole. The leader of the Russian expedition, Prof. N. N. Subov, believed this uncharted polar region should be visited, and oceanographic data gathered.

The voyage was made in a small motor sailing craft of only 100 tons displacement and 125 horsepower.

"It was not luck but careful planning that made our success possible," said Prof. Subov, telling of the difficulties and how they were met.

So closely was the trip planned, that the little boat was loaded with only 30 days' fuel and 40 days' provisions, and no winter equipment. Prof. Subov had prepared maps, and had surveyed the temperature conditions of the region for past years. He predicted that the seas northeast of Franz Josef Land and towards Novaya Zemlya would be found free of ice, owing to the fact that a large volume of warm water from the Gulf Stream has been moving for four years slowly northward, and has had a marked effect on icebergs and sea temperatures along its route.

So strong was Prof. Subov's confidence that he could travel around Franz Josef Land on the crest of this warm wave this year, that he refused to turn back when confronted by a great ice-pack blockade east of Graham Bell Island. Warmer water must be present farther to the northeast, he was convinced. And moving in that direction, 25 miles, a passage to the south was found. The boat had a narrow escape on one occasion, being caught in an ice pack which nearly closed upon it.

September 20, thirty-four days after the little boat sailed from its starting point, Murmansk, it was back there again. Its fuel supply was down to a mere two-hour reserve. The food stores had been eked out by two white bears, shot toward the latter part of the voyage.

One discovery announced by Prof. Subov is that the islands which Nansen named Eva and Liv after his wife and his daughter are in reality a single piece of land. The two ends are joined by a low stretch of land, the Russian explorers found.

"We charted it," said Prof. Subov, "and changed the name to Evaliv."

Describing the scientific observations made, Prof. Subov said:

"During our expedition we made 400 wire soundings at five-mile intervals. We made 38 full oceanographic stations at which temperature, salinity, oxygen, hydrogen ion concentration, phosphates, and nitrates were determined. We also investigated the distribution of plankton and benthos—forms of animal life at the sea bottom—and made the usual meteorological observations."

One practical application of the Arctic oceanographic studies is in the fishing industry of northern countries, which is directly affected by temperatures and other conditions of the Polar seas.

The most important results of the expedition, however, in Prof. Subov's opinion, is that it proved his ideas of forecasting Polar climatic conditions to be workable. The expedition also showed, he pointed out, that small boats can be very useful for oceanographic work in the high latitudes if climatic conditions are known beforehand.

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PHYSICS

Conservation of Energy Law Declared Unnecessary

THE LAW of conservation of energy which has been the cornerstone of physical theories for several generations may have to be discarded when dealing with certain atomic transformations. The conservation of energy is now doubted because identical radioactive atoms give off electrons of different energy and apparently continue to be identical so far as their energy is concerned.

Dr. Niels Bohr, the (*Turn Page*)

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Danish physicist, was the first who expressed doubts concerning the validity of the principle of conservation of energy in subatomic phenomena.

At the recent meeting of the British Association in York and again at a physicists' conference in Leningrad, leading scientists discussed this momentous question.

"If we ignore the limitations placed upon us by the unnecessary conservation law, we are led to very interesting developments not only in the case of nuclear phenomena but also when dealing with the origin of solar energy," Dr. G. Gamow, young Russian physicist of the physical institute of the Academy of Sciences of Leningrad, said in an interview.

"The heart of a star," continued Dr. Gamow, "may be likened to one large atomic nucleus, a few inches or a few miles in diameter. Like the nucleus of the atom this central portion of the star can give off energy continuously, without thereby having its own store of energy or matter reduced. At the same time the star's central core, by breaking up into particles of different size, gives rise to the nuclei of all known elements. I am at present engaged in calculating upon a probability basis the relative abundance of the different elements originating in the central portion of the star. The final proportion of elements which should be present in a star depends upon other factors as well, for instance upon the lesser stability of the nuclei of the lighter elements under the bombardment of high velocity protons.

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DENTISTRY

Irregular Teeth To Be Subject of Research

IRREGULARITIES of the teeth are to be the subject of special research at Columbia University. This condition is scientifically known as malocclusion. A common form is seen in people with buck teeth. Malocclusion is found in all races and at all levels of society. Confusing theories as to its cause and results are held by both dentists and physicians, and even the present methods of treatment are unsatisfactory. Investigation of the subject at Columbia will be under the direction of Dr. Milo B. Hellman who has just been appointed professor of dentistry at the University.

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THE "THUNDER-BEAST" OF THE ANCIENT WEST

There were giants on the earth in the earlier days of the Age of Mammals, when streams of animal migration met and crossed on the Bering land bridge between the New World and the Old. Some of them were so weird and unwieldy that paleontologists have been put to it to find appropriate names for them. They have hit it off pretty well, however, in the case of the Titanotheres, "Titan-beasts," one of which, a Brontotherium, or "thunder-beast," is here shown as it appears in a restoration-drawing made for the Smithsonian Institution Series, based on a skeleton in the U. S. National Museum.

PUBLIC HEALTH

Hard Times Disease Routed Even During Depression

DEATHS from pellagra, "hard times" disease, have unexpectedly decreased enormously during the present depression. Vegetable gardens and yeast seem to have effectually routed the former specter of economic depressions.

These two factors, together with education in pellagra-preventive measures, seem to have reduced the pellagra death-rate by about one-third in the face of the country's worst depression, it was shown in a discussion of the subject by Dr. William DeKleine of the American Red Cross at the meeting of the Florida Public Health Association at Ocala.

Dr. Joseph Goldberger of the U. S. Public Health Service showed before his death that pellagra is caused by lack of a certain factor in the diet. This factor is now called vitamin G. It is found in fresh vegetables, in lean meat and abundantly in dried yeast.

When the great flood of 1927 devastated large portions of the Mississippi Valley, the American Red Cross undertook to apply Dr. Goldberger's findings. Dried yeast was distributed on a large scale. The residents of the area were encouraged to start home vegetable gardens, and more than 120,000 packages of seeds were distributed in 1927 and 1928. This action reintroduced gardening in many sections of the flood area where the farmers had previously depended on a cash crop, buying their own food at the stores and commissaries. Under this system, when the cash crop failed, they were unable to buy adequate food and having raised none themselves, fell victims to the hard-times disease, pellagra, Dr. DeKleine reasoned.

The introduction of the gardening in the flood areas was continued in other Southern states until 1932. In addition, housewives were shown how to can and preserve the garden foods for winter use. Dr. DeKleine believes it is this gardening and canning, in addition to the distribution of yeast and other health foods by the Red Cross and other relief agencies, which have caused the drop in pellagra deaths despite the depression.

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