

SCIENCE NEWS

Science Service, Washington, D. C.

EINSTEIN'S THEORY OF GRAVITATION

DR. GEORGE D. BIRKHOFF, professor of mathematics at Harvard University, before a scientific audience at the University of Cincinnati in a lecture which is also to be delivered before local chapters of the honor society Sigma Xi throughout the country, stated that Einstein's theory of gravitation, although it provides a satisfactory explanation of gravitational phenomena is "essentially unworkable." Dr. Birkhoff pointed out that all the newer theories of quantum physics are found inadequate as they can not be fitted into a satisfactory explanation of the universe.

To the physicist, this larger view of nature seems unnecessary. It is sufficient if he can by means of his theory calculate results that can be verified by scientific experiment. The mathematician, on the other hand, wants to understand how each theory fits into his whole knowledge of nature. When the theories were not developed from the simple aspects of nature—objects, sequences of events, or geometric forms that can be recognized—but have been created by the human mind, then the mathematician wants to be able to build a physical model to fit the theory.

It is not possible, according to Professor Birkhoff, to build any such tangible model from the modern theories of quantum mechanics. It may be true, he said, in some mystical sense that God thinks multi-dimensionally whereas men can only think in a series of logical steps along a line. We need a satisfactory mathematical theory to remedy our deficiency in this respect.

The way mathematical concepts and theories have been developed from simple experiences of nature was described: "A child puts its hand too near the fire and is burned, and thereafter remembers that this A (touching fire) will bring about this B (pain and burn). The chain of association fixed in his memory is essentially of the propositional type 'A implies B.' He has learned a physical fact!" This is the basis of logic. "The boy playing with a pile of pebbles on the seashore is dealing with a universe of distinguishable objects just as was the shepherd in ancient times who counted his flock by means of stones. In this simple process of one-to-one correspondence lies a basic difference between man and all other animals." This is the basis for the concept of number.

Geometry arises from the idealization of physical bodies which are taken to be rigid forms and is practiced by the use of such simple "rigid bodies" as the ruler and protractor.

With only these three examples before them, mathematicians have set out to generalize and to modify. More recently they have added the concepts of time and a system of forces. From these have been built the framework of the universe of space and time.

FOOD PRODUCTION IN FRENCH NORTH AFRICA

AGRICULTURAL North Africa may this year produce

foods to take care of its native population and to feed the Allied troops in the area if crops can be planted during the next month or two. Seeds, fertilizers, and farm machinery and repair parts are the essential needs. Irrigation systems must be restored. Drainage and soil improvement are necessary. Fuel for tractors and farm trucks must be supplied.

American and British food in large quantities is now being shipped to French Morocco, Algeria and Tunisia. The Allied troops, American, British and French, must be fed. The starving civilian population must have food if full cooperation is to be obtained. Considerably over a million tons of grains, meats and other foodstuffs were taken out of these countries in 1941 to feed the Axis, including Rommel's forces in Africa. Large quantities were taken again last year. Little was left for the home people.

In the past these French North Africa countries produced much more food than was needed locally. During the four-year period beginning in 1934 they exported each year approximately 2,500,000 tons of food and nearly 1,500,000 tons of wine. Wheat, barley, oats and corn made up the principal grain exports. The meat was mutton and lamb. Potatoes, dry legumes, fresh vegetables, oranges and olive oil were the other leading exports.

The agricultural lands of North Africa lie between the Mediterranean and the northern Sahara desert. Most of it is rough, hilly and mountainous. It resembles in topography and climate much of central California. Included is timber land, farm land, and grazing land on which sheep and goats are the common stock. Oranges, grapes and olives are raised on the coastal lands. The grains are grown along the rivers and on the plateaus in the hilly areas.

Small, primitive farms and large up-to-date mechanized farms lie side by side. These large farms use machinery similar to that used in America, and it is from them that surplus crops may be expected if the necessary help is provided.

A food production program for French North Africa has been set up by the United States, Great Britain and local authorities, working together. The program, if successful, will produce enough food to feed all civilians and troops in the area, and perhaps supply Allied forces in southern Europe. It will save American food for Americans and the starving peoples in Nazi-conquered countries. Much shipping space will also be saved.

The associate director of the Office of War Information, Milton S. Eisenhower, has recently returned from a trip to these countries, where he studied the program and learned conditions at first hand. He was long associated with the U. S. Department of Agriculture. He sees no reason why French North Africa can not produce this year crops equal to those produced in pre-war days if the necessary assistance is given. He believes that in future years much larger crops can be produced by extending irrigation systems, bringing new lands into production and adopting better farming methods. French North

Africa may become one of the larders for an impoverished Europe.

LEND-LEASE TO CHINA AND INDIA

LEND-LEASE is working both ways in equipping American, British and other Allied armed forces in India and China. The great natural resources of India are being converted into fighting equipment and accessories with machinery, instruments, drugs, chemicals and other essentials from America.

Textile machines sent from America are weaving cloth for uniforms, blankets and tents for Allied troops. American sawmills, shipped and reassembled, are cutting lumber for army uses. American-built locomotives are moving Indian products to army camps. A single boat-load of sawmill machinery will manufacture as much material in a year as could be brought over the same route by the same boat in five years. Lend-lease with India is paying its way.

Lend-lease aid to India now amounts to some \$300,000,000. Two thirds of this was for finished munitions, tanks and other vehicles. One third was for machinery and tools with which India will soon be producing finished products of the kinds shipped from America at the beginning of the program.

A considerable amount of American steel has been sent to India. But India is the second largest producer of iron ore in the British Empire. Machinery sent to India will greatly expand to present activities in steel manufacturing to meet all fighting and civilian needs. Manganese and molybdenum will still be sent, as no local supply is available, and without them India can not make steel.

India has 40,000 miles of railroad, a mileage exceeded only in the United States, Canada and Russia. But it is badly in need of rolling stock, particularly locomotives, and of wheels, boiler tubes, axles, and signal and telegraphic equipment. Much of these can be turned out in India if the needed machinery is supplied.

Approximately 400 textile mills in India, weaving textiles for the use of the Allied forces, are using native cotton and other fiber. This is lend-lease in reverse without a dollar of American money being paid for the finished product. Twenty projects for the manufacture of munitions have been started with machinery and supplies sent from this country. Soon most if not all the munitions needed by the Allied armies will be available without the thousands of miles of water transportation now necessary.

A recent report of an investigator of the Office of Lend-Lease Administration who visited India late in 1942 says that country can produce supplies for the entire Burma-China-India front if properly developed. It has the needed manpower and much of the raw material. It lacks machinery and skills. America and England are helping to supply both.

ITEMS

THE weather, abnormally cold two weeks ago, reacted to the opposite extreme last week, according to the seven-day survey of the U. S. Weather Bureau. Over most the

country, temperatures have ranged well above normal from the season. Highest "plus departures" were in the region between the upper Mississippi and the Rockies, reaching 12 to 20 degrees Fahrenheit above normal. Despite high temperatures and continued fair weather, however, fields in the great interior valley are proving slow about drying out. For the most part, the soil is too wet for early farm work.

WINTER, which has just ended according to the weatherman's reckoning, was near average in temperatures in the eastern half of the country, somewhat warmer than average in the West, according to data compiled by the U. S. Weather Bureau. To be accurate, it was a little colder than average east of the Plains region, but only a little—two degrees Fahrenheit or less. Western temperatures averaged from four to six degrees above normal. The Weather Bureau notes a marked contrast to last winter, which was abnormally warm in the northeastern quarter of the country and relatively cold in the South. The past week's weather is another record of ups and downs, with warm weather succeeded by another cold wave, which wrought additional damage to the truck-growing regions in the South.

EXCELLENT clinical results in the treatment of empyema (a serious chest infection) have been achieved by a combination of the disinfectant azochloramid, and the synthetic wetting agent, sodium tetradecyl sulfate, was reported by Dr. Orville Wyss, of Wallace and Tiernan Products, at a meeting of the New York Bacteriologists' War Research Projects Group. Synthetic wetting agents or detergents are generally known to the layman as soap substitutes. Their effectiveness against bacteria, or germs, is due to their property of concentrating around the bacterial cells and bringing about a disturbance of the electric charge distribution on the cell wall. This disastrously upsets the vital chemical processes of the germs. The wetting, penetrating and pus-dispersing properties of these soap substitutes or synthetic detergents can be used in the treatment of infected wounds by combining them with antiseptics.

ELECTRIC power lines can be boosted more than two thirds in capacity by adding small steel boxes crammed with sheets of aluminum and paper, is indicated by experiments conducted by R. D. Evans, Westinghouse consulting transmission engineer. A miniature power system was set up to simulate the power demands of a typical community. The small steel boxes, called capacitors, were installed to increase current-carrying capacity and meters checked the results. From the experimental work, Mr. Evans estimates that a regular 250-mile power line of 175,000 watts would supply enough extra power to supply a city of 350,000 population if 7,200 of the capacitors were added, together with necessary generating equipment. About \$3,300,000 would be saved as compared with the cost of the usual method of installing additional transmission wires. Several thousand tons of copper and steel would also be saved by this method.