

PHYSICS

Fifth Dimension Invented

► A FIVE-DIMENSIONAL WORLD, in which space and time have been broken up into chunks so small that they cannot be divided any further, has been invented by a British mathematician.

This new geometry adds a new "uncertainty dimension" to length, breadth, thickness and time. It is described by Prof. H. T. Flint, of the University of London, as necessary to take account of that paradoxical offspring of quantum mechanics, the "uncertainty principle," in explaining the behavior of subatomic particles.

"There have been indications during the past 20 years," Prof. Flint reports to the American Physical Society in *Physical Review* (July 15), "that existing physical theories break down when applied to the microscopic phenomena of physics."

In the subatomic world, distances below a certain definite length have no physical meaning. Prof. Flint therefore suggests a geometry based on these smallest units of length.

The result is a mathematical system which adds one more dimension to the four space-time coordinates of the Einstein theory of relativity. This new dimension expresses the strange fact, long accepted by atomic physicists, that a particle such as an electron cannot be exactly located or

"pinned down," but measurement of its position involves a definite uncertainty. Scientists can say for sure that the electron is somewhere within a given region, but they can't say exactly where. The amount of uncertainty is closely related to the mass of the particle.

Since space and time are tied together by the theory of relativity, an error in locating the particle in space also means an error in locating it in time. Both these "necessary errors" can be calculated by five-dimensional mathematics. Although no new physical principle is involved in the world of five dimensions, a neater mathematical technique is suggested for describing the behavior of the smallest particles in the universe.

Over 2,000 years ago Euclid invented the first geometry, using only two dimensions, and describing only figures that can be drawn on a flat surface. Until 42 years ago mathematicians were certain that space had only three dimensions, but at that time Einstein first presented to the world his revolutionary space-time continuum, with time as the fourth dimension. Now it appears that non-mathematicians, already groggy from trying to comprehend the fourth dimension, will have to assimilate a fifth.

Science News Letter, August 7, 1948

ENTOMOLOGY

Mosquitoes Survive Cold

► MOSQUITO-BITTEN mortals who console themselves with the thought that the first cold weather will be the death of all these pests are being cruelly deceived: not all of their blood-thirsty tormentors will die. Some are likely to survive in sheltered spots, and in the spring will lay their eggs to produce another pestiferous generation.

Egg-laden female mosquitoes can survive a surprising degree of cold, states Charles O. Masters of Cleveland, a graduate stu-

dent who is making a special investigation of the ecology of mosquitoes.

In one forested area which he has under observation there is a long culvert, seven feet in diameter. Into this he has made weekly trips through two winters, walking 200 feet or more into the darkness and observing, by means of a flashlight, hundreds of mosquitoes clinging to the walls, mostly overhead.

As the weather becomes colder more and more of them lose their hold and drop into the water flowing along the bottom. Practically all of these are washed outside and so perish. Some, however, fall on dry ground and remain there until warmer weather "unstiffens" them and permits them to crawl up the wall again.

Spiderwebs, paradoxically enough, are the salvation of a few insects. They fall upon old webs, and when they revive they escape and crawl to safety.

The severe winter of 1947-48 was much harder on the mosquito population of the culvert than was the milder winter of 1946-47, Mr. Masters states. As night temperatures dropped to 10 or 15 degrees Fahrenheit throughout most of January, the insects were still able to hold on; but a sudden drop to five degrees below zero

wiped out almost the entire population. An hour's search in the culvert turned up only one mosquito, and that a member of a malaria-bearing *Anopheles* species, still clinging to the wall.

Mr. Masters carried home 24 mosquitoes of another and more abundant species which he found lying numbed above the water-line. Most of them revived when taken indoors.

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BIOCHEMISTRY

X-Raying Mold Boosts Production of Penicillin

► PENICILLIN PRODUCTION can be greatly increased through treatment of the molds that produce it with X-rays. This is disclosed in newly-issued U. S. patent 2,445,748, taken out by Dr. M. Demerec, head of the genetics department of the Carnegie Institution of Washington, whose laboratory is at Cold Spring Harbor, N. Y.

X-ray doses of from 50,000 to 150,000 roentgen units are applied to mold spores. Most of them are killed, but among the survivors are newly induced, mutated strains which produce larger "crops" of penicillin than those currently in use. The same technique can be applied to other molds producing other compounds, states Dr. Demerec, and if desired atomic fission radiations and even cosmic rays may be employed instead of X-rays.

Since Dr. Demerec's discovery was made in the course of federally supported war-time research, the patent is assigned to the government.

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CHEMISTRY

Advanced German Method For Oxygen Determination

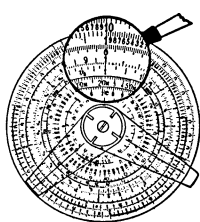
► AN ADVANCED METHOD for the direct determination of oxygen in a compound, developed and widely used in Germany, is reported by British investigators and is now available to American technicians.

In this method the compound is decomposed in a stream of nitrogen, and the products passed over heated charcoal. The oxygen is thus converted to carbon monoxide which is then passed into iodine pentoxide. The determination is completed either by weighing the carbon dioxide produced after absorption in Ascarite, a sodium hydroxide-asbestos preparation particularly developed for carbon monoxide absorption, or by titration of the liberated iodine.

A report of the complete method, together with other German developments of interest in the field of organic micro-chemistry, is available from the Office of Technical Services, U. S. Department of Commerce, for \$7.50 in photostat form, or \$2.75 in microfilm form.

Science News Letter, August 7, 1948

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