SCIENCE NEWS

Science Service, Washington, D. C.

THE RELATIVISTIC UNIVERSE

PROFESSOR ALBERT EINSTEIN drove the final scientific rivet in the relativistic universe which he began to build more than two decades ago to replace the edifice erected by Newton. In a report presented at the Princeton meeting of the American Physical Society he announced the final development of his gravitational theory at the Institute for Advanced Study, where he almost lives and does his work.

Previously, Einstein had been able to prove his gravitational theory only for certain special cases. Now the structure is completed by a perfectly general and rigorous mathematical proof that it applies in all cases.

In his paper, it is rigorously proved, from the equations of the theory of general relativity, that there do not exist any gravitational fields of finite total mass which are free from singularities (*i.e.*, which are finite at every point). Until now this was proved only for fields with certain symmetry properties.

Scientists have ceased to discuss whether relativity is true or not. It is accepted and applied in all branches of physical science. Especially in atomic physics, its triumphs have been great. The conversion of mass into energy accounts for the heat of the sun and the long life of the stars. The hope of atomic power rests on the same basis. These are but two of its accomplishments.

Albert Einstein, now sixty-two years of age, proud of his American citizenship, is the world's most distinguished refugee from Nazi Germany. He was in New York early in 1933, on his way back to Germany after a visit to California, when Hitler swept into power. Since then he has remained, and we hope will long remain, our Einstein.—MORTON MOTT-SMITH.

THE KODACOLOR FILM

SPEAKING at the Franklin Institute, Philadelphia, Dr. C. E. K. Mees, research director of the Eastman Kodak Company, described a new Kodacolor roll-film produced by the company.

Home picture takers are already familiar with color pictures. But for the most part they have had to be content with color movies or transparencies which can be shown only when projected onto a screen. Color prints could be made from these only at considerable expense and some uncertainty of the outcome. The film would fit only some cameras, usually expensive ones.

Now even the small boy or girl with a box camera can snap pictures with the new Kodacolor film, which will be available in six standard sizes. The film must be returned to the manufacturer for processing. When it comes back to the photographer, he will have a set of color negatives —not color transparencies as in the Kodachrome now available for 35 mm. cameras. Light areas of the subject will appear dark in these negatives, and dark areas, light. The colors also will be in reverse—that is, they will be complementary to those in the actual subject. With these color negatives, the photographer receives full color prints on paper.

The new Kodacolor film, like its predecessor the Kodachrome, is a sort of photographic layer-cake of color-sensitive emulsion layers. In the Kodacolor process, however, the "couplers" in which the color image is formed are not dissolved in the emulsion layers themselves, but in particles of organic materials of microscopic size which protect them from the gelatin and, at the same time, protect the silver bromide from any interaction with the couplers. When the film is placed in the developer, the oxidized developer penetrates the particles and there reacts with the coupler to form the dye. There are three of the emulsion layers and also a yellow filter layer on the film. The developer in which it is processed acts simultaneously on all three couplers, producing a dye image in each layer. When the finished negative is printed on a paper coated with a similar set of emulsions, the resulting color print has the colors of the original subject.

SULFANILAMIDE

How sulfa drugs can overcome one of the worst horrors of war casualties, germ infections in wounds, was described in reports at the Baltimore meeting of the Society of American Bacteriologists.

Sulfanilamide itself is the best of the sulfa drugs for this purpose, in the opinion of Dr. Roy G. Klepser and Dr. J. Ross Veal, of Gallinger Municipal Hospital, Washington, D. C. They reported on their use of sulfanilamide in treating more than 500 infected wounds. Other sulfa drugs are more effective in test-tube experiments, but have no advantage in actual wound treatment and are as much as eight times as expensive.

After three or four days, sulfanilamide powder checks the healing of wounds, probably because of its drying effect and the substitution on the third or fourth day of treatment is advised of an ointment containing a lower concentration of sulfanilamide and also containing allantoin. This chemical is the substance from fly maggots which the late Dr. William S. Baer, of Baltimore, found to be good treatment for infected wounds.

Wounds can be about two thirds sterilized within three or four days, Dr. Klepser said, provided the wound is draining adequately and the sulfanilamide is in contact with the germs. Dead tissue must be cleaned away or it will interfere with the action of the drug. The sulfanilamide does not kill the germs in the wound directly, but starves them out by combining with their food supply.

Sulfanilamide is effective against all kinds of germs which get into wounds and burns. It must be put directly on the wound in order to get a high enough concentration. When the drug is given by mouth the dosage is calculated generally to give a concentration in the blood of about eight milligrams per 100 cubic centimeters, but by putting the drug directly on the wound, a concentration 100 times as high can be reached in the fluid in the wound tissues.—JANE STAFFORD.

GERM CHEMICALS FROM THE SOIL

FROM germs living in the earth itself and from common molds like those that spoil bread, nearly a dozen new weapons for fighting disease have been obtained. Some of these new chemicals are powerful enough to rival the sulfa drugs in stopping germ invasion of the human body, according to reports presented before the Society of American Bacteriologists.

Dr. Selman A. Waksman and Dr. H. Boyd Woodruff, of the New Jersey Agricultural Experiment Station, stated that some of these germ chemicals can kill other germs outright. Others, unable to kill germs, can nevertheless stop their growth. Gramicidin, already being used in treating patients, is most specific, acting primarily on tiny round germs labelled gram-positive micrococci. Penicillin, another of these germ chemicals which has already reached the stage of practical use, and two other substances from different microorganisms, pyocyanase and pycanin, are similar in their action over the whole range of germs in the tests. Some germs are killed by penicillin and some only stopped by it, according to Dr. Gladys L. Hobby, Dr. Karl Meyer, Dr. Martin H. Dawson and Dr. Eleanor Chaffee, of Columbia University.

In tests at the Mayo Clinic, reported by Dr. Dorothy Heilman and Dr. Wallace E. Herrell, gramicidin was more effective than penicillin against one kind of streptococcus and a pneumonia germ, but penicillin was more effective against another streptococcus and a staphylococcus organism.

From these and other studies will come knowledge needed for using effectively these new chemical weapons against disease.—JANE STAFFORD.

RUSSIA'S GRAIN VARIETIES

THE United States Government has offered to aid in rescuing from destruction Russia's important grain varieties, to keep them alive for the time when scorched earth can spring up green again.

Responding to a suggestion by Sir John Russell, of the Rothamsted Experimental Station in England, who feels that the need is urgent, the U. S. Department of Agriculture stands ready to receive and plant special Russian grains in United States areas suited to them, or to aid in any other way practicable.

British scientists are expected to salvage Russia's important fruit tree varieties. Very little material is needed and it can be carried by air. British varieties of fruits would not be at all suitable, he emphasizes.

To lessen hunger and suffering, agricultural reconstruction will be tremendously important in fought-over areas, deliberately burned by Russian peasants to prevent enemy use. Russian plant breeders have successfully produced many varieties of crops suited to specific regions, particularly drought-resistant varieties. Years of labor would be lost if seed for future planting is not saved from the chaos of war.

ITEMS

PROTECTION against some of the ailments called 'flu, grippe or colds, may be achieved through development of a discovery announced by Dr. Rene J. Dubos, of the Hospital of the Rockefeller Institute for Medical Research. A toxin or poison from the influenza bacillus has been obtained by Dr. Dubos in the form of a dry powder. A tiny speck (one tenth of a milligram) of this powder when injected into rabbits kills them within a few hours. But this lethal stuff can be used to protect rabbits against both the poison and the living germs which produce it. The blood of immunized rabbits will in turn protect other rabbits from either the poison itself or the living germs.

THE germs which are believed to cause trench mouth, so-named because it was a serious ailment of soldiers in World War I trenches, have now been examined under the electron microscope, which uses particles of negative electricity to peer into secret places of matter that can not be seen with microscopes using light and optical lenses. Pictures of these and of the syphilis germ and other germs were shown at the meeting of the Society of American Bacteriologists by Dr. Katherine A. Polevitzky, Dr. Thomas F. Anderson and Dr. Harry E. Morton, of the University of Pennsylvania and RCA Manufacturing Company. Tiny hairs, heretofore seen only with difficulty, were clearly visible at the ends of thin, spiral germs from human mouths. The syphilis germ was found to be frequently surrounded by a slime sheath which occasionally formed thin tendrils projecting from the organism.

THE old fable that dogs pant because they can not sweat has been "shattered" by discovery of sweat glands in their skins, according to the editor of the *Lancet*. J. G. Speed, of Edinburgh, has found sweat glands in the skin of the lips, head, back, thorax, shoulders, thighs and pads of the feet, a finding previously reported by numerous other investigators but apparently not generally known. Nevertheless, the dog does pant, and it would be interesting to know how effective the skin sweating is and whether all breeds of dogs are equipped with sweat glands in their skin. Absence of visible moisture on the skin may be due to efficient evaporation while the probability of water vapor enmeshed in the hairs suggests the reverse.

SULFATHIAZOLE, one of the sulfa drugs, appears to be the means of an effective, broad-scale attack on gonorrhea, according to a study by Drs. J. F. Mahoney, C. J. Van Slyke and R. R. Wolcott, of the U. S. Public Health Service, according to a report on the results of sulfathiazole treatment of 360 patients at U. S. Marine Hospital, Staten Island, N. Y. The gross rate of cure for the 360 patients was 85.4 per cent. None of the patients was severely poisoned by the drug, and even mild symptoms were infrequent.

DAMAGE to body organs due to heavy insulin dosage required in shock treatment for the mental disease, dementia praecox, may be avoided by lesser insulin doses, it appears from studies reported by Dr. Frank N. Low and Dr. H. Ward Ferrill, of the University of North Carolina, in the current issue of *Endocrinology*. Five successive generations of white rats were given insulin doses just under amounts necessary to cause shock. Examination of the rats after death and study of their organs under the microscope showed no damage directly traceable to the insulin. Some psychiatrists believe that results in dementia praecox treatments with insulin are just as effective if shock is not produced.