T. B. Effects from Germless Compound

Medicine

The characteristic tubercles or clumps of changed cells caused by the germ of tuberculosis can be produced by the injection of a chemical compound containing no germs at all, Dr. Florence R. Sabin of the Rockefeller institute for Medical Research, New York City, reported to the National Academy of Sciences. Associated with Dr. Sabin were Drs. Charles A. Doan and C. E. Forkner. Dr. Sabin is the only woman in the Academy.

Dr. Sabin's achievement is revolutionary. By it the most characteristic change produced in the body by a germ-borne disease has been obtained without the germ entering the body. This is the first time this has been done for any disease and introduces a new technique in the study of disease.

Dr. Sabin's discovery is one of the latest and startling results of the campaign for the investigation of the causes of tuberculosis in which about a hundred bacteriologists, chemists, physicians and pharmacists in all parts of the country are now engaged. This plan for cooperative research was organized by a committee of the National Tuberculosis Association, of which Dr. William C. White of the U. S. Hygienic Laboratory is chairman.

Hundreds of pounds of microbes are being grown in flasks containing the necessary nutrients and are turned over to the chemists of Yale University and other laboratories for analysis. The various fractions into which the material is separated are then tested on normal animals to discover the physiological effects of the different constituents. By this novel method of attack it is hoped to discover what the microbes are made of and what stuff it is that the creatures excrete which (*Turn to next page*)

Fly-Wing Measures Stars

Physics

Using bits of the wing of a fly, hung on a thread spun out of a rock, to measure the radiation of a star billions of miles away, sounds like a fantastic mediaeval fairy-tale. But it is sober, twentieth-century scientific fact. It is actually being done.

Dr. Charles G. Abbot, secretary of the Smithsonian Institution, told how it is being done. Light is a form of energy, and therefore can push things. Most things do not feel the push because they are too heavy. But we can see light pushing a fairly solid object pretty rapidly in the little whirligig-things in an optician's window. It takes full sunlight to do this, and full sunlight is millions of times as strong as the faint, twinkling ray from a distant star or planet.

But the fly-wing apparatus is built on essentially the same principle as the radiometer—that's the real name of the whirligig-thing in the optician's window. Bits (*Turn to next page*)

Scientists' Bodies Strong

Anthropology

The old idea of an eminent man of science as a person whose mental development is offset by a frail or neglected body is discredited by physical measurements taken on 100 of America's most distinguished scientists. These 100 men, all members of the National Academy of Sciences, have been measured by Dr. Ales Hrdlicka, noted anthropologist of the U. S. National Museum. The Academy heard Dr. Hrdlicka's report on the physique and strength of its members.

Instead of finding strong minds in weak bodies, (*Turn to next page*)

CO_2 May Help in Pneumonia

Medicine

A new method of treating pneumonia, using carbon dioxide inhalations, may result from experiments reported by Dr. Yandell Henderson of Yale University. Dr. Henderson and his associates, Prof. H. W. Haggard, G. L. Birnbaum, P. N. Coryllos and E. M. Radloff, found the treatment valuable in a certain stage in experimental pneumonia. Inhalation of carbon dioxide has recently become widespread in the treatment of patients overcome by carbon monoxide gas poisoning.

In patients after surgical operations, the collapse of the lung is a stage or factor in the development of pneumonia, which sometimes complicates recovery after operations. Dr. Henderson and his colleagues found that the same collapse is a stage in the development of pneumonia experimentally produced in animals by introducing pneumonia (*Turn to next page*)

New "Mike" Has No Diaphram

Physics

A new type of microphone, in which nothing moves except the sound waves of the speaker's voice, may eventually confront broadcasters and public speakers. The new invention, still in the experimental stage but regarded as promising, was described by Prof. Arthur L. Foley of Indiana University.

One of the favorite types of "mikes" in present use is what is known as the condenser microphone. In this a thin diaphram of metal is hung in front of a metal plate, with an air space separating them. Electrical charges accumulate on both diaphram and plate, and as the diaphram is pushed and pulled a minute fraction of an inch by each sound wave, its approach and recession causes a fluttering in the electrical charge of the plate opposite. These electrical flutterings, amplified and cast into the ether, are picked up and translated back into sound by the receivers' radio sets.

The difficulty with any microphone employing a diaphram is that the diaphram does not (*Turn to next page*)

Onion Acid Halts Disease

Plant Pathology

An acid in an onion which kills a parasitic fungus when it attempts to prey upon it, thus playing the part of a vegetable antitoxin, has been isolated and chemically identified by three Universtiy of Wisconsin scientists, Dr. J. C. Walker, Dr. K. P. Link and Dr. H. R. Angell. This discovery is believed to be the (*Turn to next page*)

Multiplication by Division

Biology

Cut most animals up and they simply die. Cut up *Lineus,* a sea-worm common along the Atlantic coast, and it merely turns into a family of little Lineuses. How it survives this terrible surgery was told by Prof. W. R. Coe, of Yale University.

Slices cut clear across the body, at any place back of (*Turn to next page*)

T. B. Effects from Germless Compounds—*Continued*

causes sound flesh and blood to degenerate into a cheesy mass of tubercles.

When the secret of the pestilential activity of these parasites of the cell is found out, the doctors will be in a position to devise methods of counteracting it, for they will no longer have to work in the dark as they do today.

The compound used by Dr. Sabin is one of the fractions extracted from the tuberculosis bacilli by Prof. Treat B. Johnson and Dr. R. J. Anderson of Yale. It consists of an oil containing phosphorus, and is a compound hitherto unknown to chemistry, although similar in composition to the fats in our foods. After twelve doses of this compound, each dose containing as much of the substance as is contained in a gram of the dried "bugs", the tissue shows lesions closely resembling those of the disease. If the injections are not continued the lesions become gradually absorbed and almost disappear in a few months.

Other fractions from the chemical analysis of the cultivated bacilli consist of fats and waxes that have a similar effect in stimulating and disintegrating the cells of living tissues. This action of this substance is similar to that of the unknown cause of cancer, since this likewise excites the cells to abnormal multiplication and later results in their destruction. The tubercle bacillus invades the living cells and there lives and multiplies. This causes the cells to enlarge to an abnormal size and shape and these clumping together form the nodules known as "tubercles". This disastrous effect is perhaps due to some substance such as these that are now being isolated, excreted by the living microbe or coming from the decomposition of their dead bodies.

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Pneumonia—*Cont'd*

germs into the lungs. Inhalation of carbon dioxide inflates the collapsed lung, thus preventing the development of pneumonia.

Dr. Henderson showed X-ray pictures of lungs that had been so collapsed. The picture also showed the rapid inflation or redistention of the lung when the experimental animal had been put into a chamber containing 5 to 7 parts of carbon dioxide in 100 parts of air. The inhalation of the carbon dioxide induces deep breathing which redistends the lung.

Dr. Henderson emphasized that the results of his experiments are not to be interpreted as promising similar relief in the cases of pneumonia which the physician meets in his practice. But the discoveries that collapse is a stage in the development of the disease and that this treatment counteracts the collapse and reinflates the pneumonic lung indicates that here is a possible new means of controlling pneumonia, which is now a big cause of death.

Science News-Letter, April 27, 1929

"New Mike"—*Cont'd*

vibrate faithfully according to the speaker's voice or the player's instrument. The diaphram has a vibration period of its own, which it constantly tends to fall into, thus distorting the sound it is supposed to be transmitting most faithfully.

Prof. Foley's microphone has no diaphram at all, but instead solid metal plates with the usual air space between them. The sound waves of the speaker's voice are directed between these plates, causing alternating condensations and rarefactions of the air. Since the air is acting as a dielectric or insulator between the plates, these rapid changes in its density permit corresponding electrical surges to cross the space. This sets up the electrical flutter that is needed to carry the sound waves out into the ether as radio waves.

Professor Foley stated that his invention is still far from the stage where it will begin to be seen in studios. At present it lacks the sensitivity of the microphones in commercial use. But, he added, the new microphone is as good now as the present types were a few years ago, and he and his graduate students are working out improvements.

To protect the device from premature exploitation, a patent has been applied for.

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Multiplication—*Cont'd*

the creature's brain, turn into little replicas of the original worm, regenerating such organs as the cutting deprived them of.

Queer things begin to happen if a transverse slice is partly split lengthwise, leaving the pieces attached to each other by one edge. If the free ends are toward what was the head of the original worm each piece will develop a new head, but all of the pieces will keep the same tail.

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Onion Disease—*Cont'd*

first of its kind ever made.

The first clue was given by the fact that white onions were susceptible to the disease, while certain strains of colored onions were not. A search was made for some substance presest in the colored onions and absent in the white ones that would stop the growth of the fungus. This was eventually found, and upon analysis was shown to be an acid of the phenol series, known to chemists as proto-catechuic acid.

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Fly-Wing—*Cont'd*

of the wings of common flies, about one-twenty-fifth of an inch high and one-seventy-fifth of an inch broad, formed the basis of the apparatus. Three of these bits were joined together, forming a T-shaped figure. A second T was hung opposite this, with an air-space of one two-hundredfiftieth of an inch between them. They were suspended on a thread spun from melted quartz finer than a spider's web, and offering almost no resistance to twisting.

Light permitted to fall on one side of the apparatus, which had been blackened like the vanes on the optician's radiometer, made it swing round. How much it swung could be measured by a tiny light-beam reflected from a mirror mounted with the vane, to a graduated scale twenty feet distant.

With this almost unimaginably delicate apparatus it has been possible to detect the force and analyze the variety of light received from the planets, and from stars as small as 3.5 magnitude—among the smaller stars visible to the naked eye.

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Strong Bodies—*Cont'd*

Dr. Hrdlicka declared that he found strong minds linked with strong constitutions. The head, and hence presumably the brain of the Academy members, is on the average larger than the head of the average American. Intensive mental work evidently does not tend toward a shortening of the life of the worker, the ages of the scientists showed.

Altogether, far from being inferior in physique, strength, and development of the head as compared with the American population at large, the greatest scientists of the country are proved to be superiors in these matters, the anthropoligist reported.

Science News-Letter, April 27, 1929