SCIENCE NEWS

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A RADIATION RECEIVER

A SIMPLE signaling device, a possible mechanism for detecting the presence of enemy ships off a fog-bound coast and a highly sensitive apparatus for use in atomic research are among the potentialities of a new receiver of radiation invented by Dr. Hammond Vinton Hayes, of Boston, who was formerly chief engineer of the American Telephone and Telegraph Company.

Dr. Hayes, made cautious by a lifetime of experimental research, makes none of these claims for his new invention with the exception of the possibility of the signaling. But the implications of the discovery are clear. Dr. Hayes goes back to a phenomenon first noted by the inventor of the telephone, Professor Alexander Graham Bell. Before the meeting of the American Association for the Advancement of Science in 1880, Professor Bell told how incident radiation sets up compression waves in the air.

Using this fifty-six-year-old knowledge, Dr. Hayes has built a receiver of invisible heat rays which appears to be much more sensitive than highly delicate thermocouples. It can be used by almost any one, as contrasted with the specialized technique required to perform experiments with thermocouples. It looks like an oversized tomato-can in its physical appearance. The receiver's opening is placed at the focus of a concave mirror which collects the radiation energy and reflects it on the receiver. From the back end of the receiver runs a snake-like, electrically shielded cable connected to a radio-type amplifier. The amplified current can be read on a milliammeter.

The rugged receiver operates by having the incident radiation produce compression waves in air within the apparatus. These waves move a thin disk which is part of the electrical circuit. The disk movement changes the electrical capacity of the circuit and thus varies the amount of current flowing in it. After amplification this minute change of current actuates the measuring meter. Facing the ray-gathering mirror is the window end of the receiver, made of rock salt or other material capable of transmitting infra-red rays. The radiation, passing through this window, enters a small chamber containing a carbonized material which Dr. Hayes—for want of a better term—calls "fluff." Fluff is made by treating a pappus of a flower so that it yields a light, porous black substance that resembles soot.

Trapped by this porous material, the rays cause the fluff to liberate gas and set up compressional waves in the chamber. The waves move a thin aluminum diaphragm which is part of a standard telephone receiver. And the diaphragm's slight movement varies the capacity of the circuit as already mentioned.

Reporting his invention in the current issue of the *Review of Scientific Instruments*, Dr. Hayes says: "The receiver is more sensitive than a photoelectric cell for waves of radiation longer than the visible (region of the spectrum) and is not affected by background light or heat, except when the background change is rapid. Moreover, it it insensitive to background noise." For wartime signaling, it can be realized, such freedom from intense sounds in the background is a highly desirable attribute. For use in signaling the method might well be to set up a source of invisible heat rays such as an electric heater which need not even be glowing at its ordinary cherry red temperature. Rays from this source would be focused by a concave mirror and transmitted as a narrow beam to the receiving equipment. Interruption of this invisible beam with the hand or metal shield could be used to send messages in code. Movements in the recording electrical meter follow the on-and-off shutter motions. "It is of interest to note," concludes Dr. Hayes in his report of the invention, "that the new receiver responds affectively when a body colder than the ambient temperature is substituted for the radiation source."

COTTON MOWN LIKE HAY AND CHEMICALLY DIGESTED

AT the meeting in Detroit, on May 12, of the Second Dearborn Conference of Agriculture, Industry and Science, Dr. Frank K. Cameron, of the University of North Carolina, put forth a proposal to grow the cotton thick in the field, forcing the largest possible number of bolls to maturity at the same time, and then cut and dry the whole business, as prosaically as so much hay.

These whole dried cotton plants are to be ground down to a powder. This mass will then be put through a double chemical treatment. The first step will extract the oil, the second will digest both the cotton and the cellulose of the stalks into alpha cellulose, basic material in the manufacture of rayon and other modern products of chemical industry.

Dr. Cameron has been carrying on fairly large-scale experiments for several years and is anxious to see his method tested out in other cotton-growing sections. He is convinced that for his own part of the South, where cotton was first grown in this country, that it is the only possible agricultural and economic salvation. The land there is too hilly for the use of tractors, cotton-picking machines and other types of "cotton field artillery" that have come into action on the flatter terrain of the western Gulf States.

OILS FROM THE ORIENT

AT the meeting at Dearborn an afternoon was devoted to discussion of three Oriental oils and what they can do.

One of them is the now familiar soybean. Once known to city dwellers only as the source of the dark, salty sauce provided in hair-tonic bottles on chop-suey restaurant tables, soybeans have in just about a generation reached the position of a major American crop. Unlike most other crops, they can be grown with profit in practically all parts of the country, and have a wide range of uses, from stock feed to paint.

Less familiar, and as yet little cultivated in this country, is perilla oil, the product of seeds of several related species of Japanese and Chinese plants. Dr. H. A. Gardner, of Washington, D. C., told of methods of cultivation of the plant and of its advantages in paint and varnish manufacture. Perilla oil is what is known as a "drying oil"; that is, it absorbs oxygen from the air and rapidly forms a tough, wear- and weather-resisting coat. It is not used "straight" in paints, but added to slower-drying oils like soybean oil. It is an annual, like wheat or potatoes, and can be sown in fields and harvested by machinery.

The South's new oil plant from the Orient, the tung oil tree, was described and shown in motion pictures by one of the largest of American tung oil growers, Lamont Rowlands, of Picayune, Miss. Mr. Rowlands journeyed to China to get seeds of the tree and information about Chinese methods of extracting the oil.

The seeds he planted, for trees that are now growing; but the information about Chinese tung-oil technique served mainly as suggestions how not to do it. Chinese gather seeds from the wild tung trees only; they never cultivate groves. Their methods of extraction are of the crudest and most primitive, yielding oil filled with dirt and as dark as molasses. Improved American methods produce a much superior honey-clear oil.

There is a large demand for tung oil in this country, by linoleum manufacturers as well as paint makers. The American yield, however, does not yet supply as much as two per cent. of the domestic market.

ALLERGIC DISEASES

THE prevailing idea that allergic diseases such as hay fever, asthma, hives and eczema are inherited was refuted by Dr. Bret Ratner, clinical professor of children's diseases, New York University College of Medicine, at the meeting in Kansas City of the Association for the Study of Allergy.

Dr. Ratner concluded from investigations covering a period of fifteen years that susceptibility to these diseases is not transmitted through the germ plasm, or the genes which are the carriers of hereditary traits. The allergic diseases are acquired by the individual under certain circumstances from the inhalation of pollens, animal or vegetable dusts, or contact with them, or from the ingestion of foods.

Dr. Ratner studied 250 allergic children and 315 normal children and their respective families. Allergy was found about as often in the families of allergic children as in the families of the normal children. Only rarely, Dr. Ratner found, is there a so-called allergic family in which a large proportion of the members suffer from hay fever, asthma, hives or other allergic disorders.

The development of allergy is to a large extent a matter of chance. It depends on the amount of protein to which a person is exposed, the state of permeability of the mucous membranes of nose, breathing and digestive tracts which ordinarily act as a barrier, the ability of the body to rid itself of invading protein substances, and the intervals at which such exposures occur.

This idea of how allergy develops is borne out by research in which Dr. Ratner and his co-workers actually produced asthma in the guinea-pig. They also showed that a child may become sensitized during the period before birth.

The hope held out by the studies, Dr. Ratner indicated, is that since susceptibility to hay fever and other allergies is not inherited through the germ plasm, proper preventive measures can be instituted to control and to a large extent eradicate this common ailment, which is present in every tenth person.

Allergy or sensitivity to certain foods apparently is one cause of a serious and puzzling blood disease known as thrombocytopenic purpura, Drs. T. L. Squier and F. W. Madison, of Milwaukee, reported at the same meeting. Patients suffering from this condition bleed easily, and show black and blue spots of hemorrhage on very slight bruising. The condition is something like hemophilia, but it is not confined to males. Some patients get the disease from certain drugs to which they are peculiarly sensitive. Among such drugs are some of the sedatives and headache remedies and even quinine. In the cases reported by Drs. Squier and Madison sensitivity to certain foods was the cause of the disease.

One little girl was found sensitive to strawberries, wheat, potatoes, coca, beets, walnuts and a number of fruits. She had been in bed for a year, but within one month after the offending foods had been discovered and omitted from her diet, she was able to be out of bed and the purple spots on her skin, from hemorrhage under the skin, had almost entirely disappeared. Food allergy, Dr. Squier emphasized, is only one of many possible causes of this serious blood disease, but he urged doctors to look for this cause in their purpura patients, because in such patients there is a much more hopeful outlook than in some of the cases due to still unknown factors.

Patients who have food allergies do not always dislike the foods to which they are sensitive. Sometimes the very food that causes trouble is one which the patient is particularly fond of. Drs. Warren T. Vaughan, of Richmond, Va., and David M. Pipes, of Shreveport, La., investigated this matter in a large series of patients suffering from major and minor food allergies. About one patient out of five, they found, disliked the foods to which he was sensitive. The only exception to this is in the case of patients who have severe stomach upsets after eating the foods to which they are allergic. These patients generally dislike such foods.

Food allergy may be the cause of unexplained fever that persists in some patients for no apparent cause, according to Dr. L. P. Gay, of St. Louis. He told of one patient, for example, who had been told she had tuberculosis and who spent eight years in bed in a sanatorium. Studies of her blood, following the new test devised by Dr. Vaughan, showed that she was allergic. When the foods had been identified and eliminated from her diet, she became perfectly well and was able to return to work.

THE ELECTROGRAMS OF IDENTICAL TWINS

IDENTICAL twins not only have similar features, coloring and size, they also have identical patterns of brain

activity. This has been discovered by study of brain electrograms, the so-called brain waves which give scientists information about brain activity much as the electrocardiogram gives information about heart activity. The study and its far-reaching implications were presented by Dr. Hallowell Davis and Dr. Pauline A. Davis, of the Harvard Medical School at the Kansas City meeting of the American Medical Association.

Because they found identical patterns of brain activity in the brain electrograms from eighteen sets of identical twins, it appears that the similarities are not due to chance. The patterns apparently follow a biological law and may be an inborn characteristic.

The studies open up possibilities of learning much about inborn patterns of nervous and mental activity. As the authors express it, "Here is a key, fashioned by physiology out of radio. Has neurology a lock which the key can open?"

A characteristic brain electrogram for epilepsy was reported at the same session by Drs. F. A. Gibbs, William G. Lennox and Erna L. Gibbs, also of the Harvard Medical School. These investigators have found that the frontal lobe of the brain is most concerned in epilepsy and they predict that it is only a matter of time until the exact spot in the brain where epileptic seizures start will be found.

A new vitamin D with rickets-preventing power has been obtained from plants, Dr. Charles E. Bills, of Evansville, Ind., reported at a special session on vitamins. This vitamin D was obtained by irradiating a provitamin from sitosterol, the substance in plants which corresponds to cholesterol in animals. Hitherto vitamin D has been obtained from irradiation of cholesterol and ergosterol of animals, particularly fish. Dr. Bills stated that there are now eight forms of vitamin D. Some are more active rickets-preventives in human children, while others are more effective for chickens.

ITEMS

WORD received at Washington by the U. S. National Park Service indicates that Mount Lassen, America's one "live" volcano, continues to show signs of activity. During the first ten days after the new steam jets began to spurt from its slopes, 124 distinct earth tremors have been felt, and have recorded themselves on the seismographs maintained at headquarters in Mount Lassen National Park.

THE death-rate is higher for 1936 in all but 17 of 130 major cities of the nation than it was in 1935, according to figures released by the Bureau of Census of the Department of Commerce. The comparison period is the first 18 weeks of each year. Deaths from motor vehicle accidents are appreciably less for the 18-week period than they were last year, however. The figures for 1935 are 2,949 deaths in vehicle accidents while for the same period in 1936 only 2,503 motor vehicle deaths have occurred.

THE fire loss of the nation for 1935 was $259,000,000, according to preliminary estimates made at the meeting in Atlantic City of the National Fire Protection Association. This is the smallest loss by fire since 1916 and $16,500,000 less than in 1934. Since September, 1935, the fire losses per month have gradually been increased, bearing out previous predictions that increased business activity would bring fire loss. Encouraging, said the NFPA report, was the fact that while business activity has reached 80 per cent. of 1927–29 levels, fire losses are only about at 60 per cent.

THE first new comet to be discovered this year, visible through small telescopes as it rides slowly through the northern heavens near the pole, has been sighted by Leslie C. Peltier, of Delphos, Ohio, thirty-two-year-old garage employee who has become one of the world's amateur astronomers. The comet, the fifth to be discovered by Peltier, has been photographed at the Harvard Observatory, where Dr. Harlow Shapley, director, announced the find. The body has a tail about one degree long and is in the northern constellation Cepheus. Its position is given by Dr. Shapley as declination plus 73 degrees, right ascension 23 hours 45 minutes. The comet is of the ninth magnitude at present and Dr. Shapley expects it to remain that bright for some time. It is moving south and east. The discovery has also been confirmed, Dr. Shapley said, by observations communicated to him by Dr. George van Biesbroeck, of the Yerkes Observatory.

LIKE many truck farmers, Charles J. Gault, near Magnolia, Ark., has worried about pre-season competition from the warmer Rio Grande area. Now his problem is solved by the use of an electrical hotbed capable of growing 1,000,000 plants and having a total area of one tenth of an acre. Eight thousand feet of soil-heating cable are used in eight covered beds. Temperatures of from 50 to 60 degrees Fahrenheit can be maintained in the ground when outside temperatures are as low as 15 or 20 degrees. The air temperature of the beds ranged from 40 to 60 degrees. First planting in the beds, it is reported in the forthcoming issue of *The Electrical World*, occurred on January 27. Capacity of the heating cable is 50 kilowatts of electrical power. The heat released is 6,500 b.t.u. per hour for each of the eight sections. Installation cost was $3,000.

Two stone knives, hidden deep, have come to light and are pronounced evidence that man roamed forests of Oregon over 17,000 years ago. Estimate of the age when the knives were made by human hands and used in the American wilderness has been reached by Dr. L. S. Cressman, professor of anthropology at the University of Oregon. Dr. Cressman made excavations at the spot where the knives were found by U. S. Reclamation Bureau survey workers. No additional objects have been found, he reports, but the examination satisfies him that the stone knives were not buried from above, but belonged to the stratum of earth which came in time to be covered by two feet of pumice and three feet of yellow soil and gravel. "The knives are made of obsidian which has become highly devitrified. They show a primitive quality of workmanship roughly approximating late Mousterian or early Aurignacian."