

product that the powerful radiation will be useful in the treatment of cancer and possibly put to other medical uses. They expect that the radiations will give new knowledge of the earth's magnetism and how it is caused. This latter possibility was the starting point of the whole investigation and the reason for its support by the Department of Terrestrial Magnetism of the Carnegie Institution directed by John A. Fleming. Incidentally, there will also come a better understanding of radio because physicists feel sure that the radio reflecting Kennelly-Heaviside layer above

the earth is affected by natural radiations that come from the sun and outer space.

Dr. John C. Merriam, president of the Carnegie Institution, expressed delight at the award of the American Association prize to the three members of his institution and explained: "Their work represents a long continued intensive study of this problem and it is a great pleasure to know of the recognition of the work at this stage of the investigations."

Science News Letter, January 10, 1931

BIOPHYSICS

"Artificial Cells" Point Way To Greater Knowledge

Famous Physiologist Thinks Creations of Cleveland Surgeon Will Aid Understanding of Living Matter

By DR. D. T. MacDOUGAL

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EDITOR'S NOTE: At the Cleveland meeting of the American Association for the Advancement of Science, Dr. George W. Crile, famous surgeon of Cleveland, announced the making of "autosynthetic cells" out of non-living extracts and mineral salts, and showed specimens under the microscope. This critique of Dr. Crile's work is written especially for the SCIENCE NEWS LETTER by one of the world's foremost students of plant physiology.

TO THE biologist concerned with the form and architecture of the living cell, the announcement of the results of Dr. Crile's researches on masses of stuff which show some of the properties of living matter will come as something of a shock.

The physiologists, however, especially the group who are engaged in studying the properties and the ultimate arrangement of particles in protoplasm, find in Dr. Crile's results many things of absorbing interest. Furthermore, there is a growing belief among workers that we may within the near future be able to set up small masses of material in the condition of a jelly in which many of the activities characteristic of living matter may take place.

Thus, for example, I have definite recollection that Jacques Loeb, whose researches are well known to all biologists, expressed high hopes that some-

thing like living matter would be compounded within the laboratory within a very few years.

Many of the experimental attempts in this direction have gone no further than the making of minute blobs of colloids which on the glass slide and under the microscope gave resemblances to the indefinite and constantly changing forms of the amoeba. The physiologist is primarily concerned with the energetics, performances or processes which go on unceasingly in living matter. In my own experiments in this direction, begun in 1922 at the Desert Laboratory of the Carnegie Institution, in Arizona, I went no further than taking capsules of cellulose, lining them with mixtures of jellies made up of the materials which enter into the composition of the plant cell.

Although the intimate arrangement of these materials could not be said to have been identical with that in living material, except in a general way, yet these experimental devices displayed two forms of activity quite similar to that of the absorbing hairs of roots. In an often-repeated series of experiments the permeability of these jelly layers was found to be similar to that of the tissues of living plants. The common mineral nutrient elements sodium, potassium, magnesium and calcium entered these "artificial cells" at the same relative rates as in a piece of living tissue.

The second performance in which the

activity of living stuff was imitated was one in which these "artificial cells" maintained their acidity for days at a time when immersed in an alkaline solution, after the manner of the protoplasm of a plant growing in an alkaline soil.

What the Cells Do

Some of these experiments were shown to Dr. Crile at the Desert Laboratory. I have therefore viewed these exhibits of Dr. Crile's results at the Cleveland meeting of the American Association for the Advancement of Science with considerable interest.

Dr. Crile brings together proteins, lipoidal brain extracts and mineral salts in small cavities on glass slides. Masses of material resembling unicellular organisms of various types appear in a few seconds.

The chief interest, however, lies in the fact that when quantities of this material sufficient for chemical and physical tests are accumulated, with characteristic electric potentials, stainability and other physical properties are readily measurable, and respiration data similar to those of masses of living tissue are secured. The transformation of energy indicated is at a rate which changes and runs through a cycle after a manner shown only by living organisms.

Only the worker who has engaged in experiments of this kind is in position to appreciate the enormous amount of wearisome labor necessary to secure the most meager results. It may be regretfully said that the difficulties attending a repetition of Dr. Crile's experiments will delay a checking-up of his results by other workers, which is so highly desirable in all scientific research.

Neither Dr. Crile nor anyone else makes the claim that he has actually "created life" in the laboratory. But the way is indicated along which we must travel in the endeavor to gain a fuller understanding of the nature of living matter.

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CHEMISTRY

Substitute for Sulfur Vulcanizes Rubber

A FIRST cousin to the TNT of wartime, a chemical called trinitrobenzene, will make possible rubber that can be used next to shiny silver and other metals without fear of causing tarnishing, discoloring and corrosion of the metals.

This important development in rubber chemistry was announced through an exhibit of the U. S. Bureau of Standards at the meeting of the American Association for the Advancement of Science in Cleveland. The trinitrobenzene is used as a vulcanizing agent in rubber in place of the sulfur which is the chemical usually used to keep the rubber from being sticky.

The possibility of using trinitrobenzene to harden rubber during its manufacture was first suggested by a Russian chemist, Dr. Ivan Ostomislensky, of Moscow, who did his research during the World War in 1915. The chemists of the Bureau of Standards have now put this discovery to practical application and proved that the benzene compound produces rubber just as durable and strong as rubber using sulfur, with the added advantage that it is non-corrosive.

It is expected that the new benzene rubber will find important use in the manufacture of electrical cables and wire coverings in which the sulfur vulcanizing agent has caused some trouble in the past. It may also be possible to make rubber films or sheets to be used as protective coverings of metals that are attacked by sulfur.

Science News Letter, January 10, 1931

GENETICS

High-Yielding Corn Bred From Runts

HIGH-YIELDING, new varieties of corn, the hybrid offspring of parents inbred until they often look like runts, were described before the meeting of the American Association for the Advancement of Science in Cleveland by Prof. R. J. Garber, of the University of West Virginia. By breeding corn on its own pollen for generation after generation, it has been made possible to sort out many of the complex hereditary factors that make for high yield, and then by crossing the various pure-bred strains to combine the desired "ingredients" for more bushels per acre, just as a housewife assembles a cake.

Science News Letter, January 10, 1931

PHYSIOLOGY

Effect of Glandular Secretions On Sex Discussed by Scientists

Extract is Found to Correct Feminine Underdevelopment; Operation Makes Cockerel of Pullet in Appearance Only

THE latest information on sex, as it is influenced by glands, was exchanged by scientists engaged in many different institutions when they gathered in Cleveland at the meeting of the American Association for the Advancement of Science.

Underdevelopment of the essential physical basis of femininity may be corrected by an extract from a small gland located under the brain, researches by a University of Wisconsin team of three workers indicate. They are Dr. H. L. Fevold, Dr. F. L. Hisaw and Dr. S. L. Leonard. An extract from the front part of the hypophysis, a small ductless gland whose function was for many years a riddle, was found to promote very powerfully the development of the female sex glands in rats. Immature females less than four weeks old were brought to sexual maturity in three days by a series of injections of this extract. Continued injections after this point proved too much of a good thing; they provoked a great overgrowth of the ovaries.

At the University of Chicago, experiments by Prof. Carl R. Moore and Dr. Dorothy Price on the same glandular hook-up indicated that the Steinach hypothesis of an antagonism between the hormones, or active principles, of the male and female sex cells will not stand up. It is true that male extract injected into the veins of a female animal will set back the sexual development of that animal, and female glandular extract will affect male animals similarly. But the Chicago experiments produced evidence that this effect comes about indi-

rectly. The sex-gland extract affects the front lobe of the hypophysis, and this in turn affects the sexual development of the subject of the experiment.

Although removing the sex gland from a pullet will cause her to assume an external appearance much like that of a cockerel, and even produce within her body the development of what looks very much like a male sex gland, the luckless fowl thus transmuted is still not a real male. This is indicated by experiments reported by Dr. L. V. Domm, of the University of Chicago.

Dr. Domm took part of the contents of such an artificially induced "male" sex gland and attempted to fertilize the developing eggs of hens with them, but obtained no positive results. He also transplanted into the developing "male" glands of operated pullets pieces of real sex glands from cockerels, and allowed the transplants to grow. Later he removed the composite glands, and found motile sperm cells in them; but the fowls were nevertheless unable to function as males.

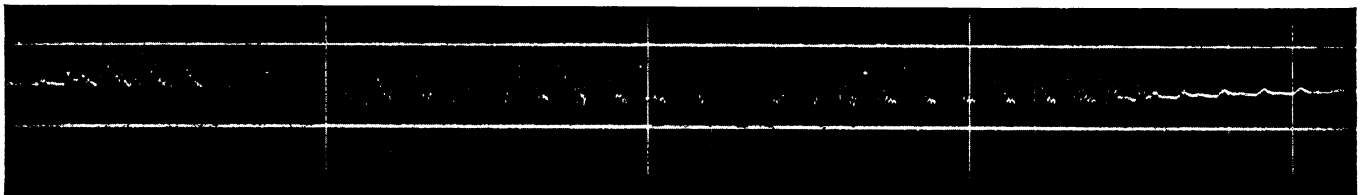
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PHYSICS

Photograph of Human Voice Produced in One Minute

A PHOTOGRAPH of the human voice is produced in one minute by a new rapid record oscillograph exhibited by the Bell Telephone Laboratories of New York at the American Association for the Advancement of Science in Cleveland.

This machine can be plugged into a



THE PICTURE OF THE WORD "SCIENCE"

As it is photographed by the rapid record oscillograph of the Bell Telephone Laboratories, demonstrated for the first time at the Cleveland meeting of the American Association for the Advancement of Science. Each little sound in the word has its own effect on the shape of the curve which is made by the vibrating sound waves acting on an electrical circuit.