also for their twelve million patients. The friendly societies, in short, have appealed to a law of economics which is certain to be invoked against many of their members in days to come.

The doctors, we understand, are to be advised by their leaders to refuse the terms offered to them, though there is, of course, no question of a "strike," as that term is understood by many of their patients. In other words, they may contest the view of the minister of health and the friendly societies that their value has been correctly assessed. Their right to enter on such a struggle will scarcely be disputed. They have declared that a willing and efficient service can not be given for a smaller sum than 9s. 6d. per head per year, and no one in his senses desires an unwilling doctor who is professedly incapable of doing justice to the case. On the other hand, it may be that the doctors' arithmetic is less sound than that of Sir William Joynson-Hicks and the friendly societies. This is the real question for the public. The minister of health has made a clear and very detailed statement; it is for the profession of medicine to answer him. If he has erred, if his arguments are not sound, and if, consequently, the capitation fee proposed is not adequate to its purpose, public support will assuredly be with the doctors. If, on the contrary, the case for reduction is a good one, the doctors will begin their battle at a disadvantage.

It is, however, possible that the doctors may decide to have done with the panel system altogether on other than financial grounds. It is admittedly rather late in the day to make such a change, yet there are and always have been weighty objections to the present system of contract practice. If it is to degenerate, as seems now to be possible, into the control of a learned profession by a group of benefit societies, the objections to it will be enormously enhanced. A doctor can not lose his freedom of action in relation to his patients and at the same time retain his self-respect. He may not suffer dictation in the conduct of his practice; if his patients object to his methods they possess their own remedy. It is, of course, possible that, if resignations from the panel occur, the vacant places may be filled. But we believe that this contingency should not be suffered to bias the minds of those physicians who, whether rightly or wrongly, regard the present situation as intolerable. The public will always hold in sincere regard those men who make sacrifice for the public welfare. The decision which the doctors must now take is one of the most important in the history of their profession in this country. Let them balance all the issues and, putting personal motives aside, act as the good servants of their fellows, which, in past years, they have in the vast majority of instances proved themselves.—London *Times*.

SPECIAL ARTICLES

ON THE INFLUENCE OF A ROTATING MAGNETIC FIELD UPON GROWTH

WHETHER magnetism has any effect upon biological activities has long been a source of speculation and experimentation. The types of magnetic fields used so far for investigation have been the constant unidirectional field and the alternating field; and the result of these studies has been that the unidirectional field has no physiological effect, while the alternating field if sufficiently powerful seems to have produced visual sensations.[1]

Because of the newer ideas regarding the constitution of matter, especially with reference to the work of Thomson and of Bohr on the character of the atom, it was decided to apply the magnetic field in a different manner than heretofore. From the premise of Bohr the electrons composing the atom are in a state of stable dynamic equilibrium except during light emission and absorption; and since the electronic orbits are subject to the influence of a magnetic field it was believed that a constant, uniformly rotating magnetic field, rather than a unidirectional or alternating magnetic field, would alter the dynamic equilibrium of the atom by affecting the configuration of the electrons. Based on this hypothesis the possibility existed of changing the character of the atom, thus secondarily affecting the molecule, and thereby causing changes which could possibly be observed in the study of growth.

A constant, uniformly rotating magnetic field was obtained by a three-phase winding upon a uniform iron coil displaced in the usual manner. The coil was operated upon the service of the local power company at a frequency of 62.5 cycles per second. The strength of the field, 1,410 gausses maximum, was measured by a small exploring coil in conjunction with an electrostatic voltmeter. The inside diameter of the coil was 14.25 cm. Care was taken that the field within the coil was not distorted by the presence of iron.

The first observations were made on the rainbow trout (*Salmo irideus*). In the center of the coil eighty eggs of this species were placed in a glass vessel on a single layer of gauze through a constant stream of water passed continuously from below. A similar vessel containing the same number of eggs and situated two feet from the coil was used as a control. But since this receptacle was separated from the coil by a piece of sheet-iron one eighth of an inch thick, the magnetic field in the control area was reduced virtually to zero. The magnetic field was applied con-

[1] Drinker, C. K. and Thomson, R. M., "Does the magnetic field constitute an industrial hazard"? *Jour. Indust. Hygiene*, 1921, III, 117.

tinuously for forty-five consecutive days and at the end of this time all the eggs had hatched. However, no difference either in the time of hatching, or in the general appearance and activity was observed between the fish hatched in the magnet and those in the control.

Observations were also made under the same conditions on eggs of the species *Amblystoma punctatum* which were placed in vessels similar to those used for the rainbow trout: in order to guard against any stray currents, the receptacle containing the control specimens was placed in an iron box in an adjoining room. Under these circumstances the magnetic field was applied continuously for twenty-six consecutive days, and again no difference between the specimens in the magnetic field and those in control vessel was observed.

Further experiments were carried on with rapidly multiplying organisms. Strains of a small bacillus, *B. coli communior,* as well as of a large bacillus, *B. megatherium,* were placed within a small incubator in the center of the coil. Control specimens, at the same temperature, were placed in the thermostat. Culture and staining of the bacteria were done in a uniform manner; but here also no difference in growth or morphology was observed.

These results are in accord with the conclusions of previous experimenters. All these investigations seem to infer that in the case of growth, matter is composed of atoms of which the electrons are in a state of static equilibrium. This evidence supports Thompson's conception of the nature of the atom as conceived for the solid or liquid state. On the other hand, had any changes been observed due to the influence of the magnetic field, growth would then follow more as a gaseous phenomenon, and involve the consideration of Bohr's concept of the atom. One would not be justified in concluding that growth involves only matter in the solid or liquid state; but as gases are involved also in the process of growth, it would seem that they either suffer a change in their atomic configuration and reach a state of static equilibrium, or that they are not assimilated in a state of stable dynamic equilibrium by the organism.

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THE LOS ANGELES MEETING

II

WESTERN SOCIETY OF SOIL MANAGEMENT AND PLANT NUTRITION

THE Western Society of Soil Management held its second annual meeting in Los Angeles on September 20 and 21, immediately following the meeting of the Pacific Division of the American Association for the Advancement of Science. The papers were grouped into four sections, each occupying a half-day's session, according to the following program:

Thursday Morning, September 20

THE SOIL SOLUTION

The nature and promise of the soil solution: JOHN S. BURD.

The relation between the soil solution and the water extract of alkali soils: P. L. HIBBARD.

Secular changes in the soil solution: JOHN S. BURD.

The autotaxic curve as a means of studying soil colloids: A. E. VINSON.

Can we predict the crop producing power of soils from chemical analyses? W. F. GERICKE.

Thursday Afternoon, September 20

SYMPOSIUM ON ALKALI

Replaceable bases in relation to alkali soils: W. P. KELLEY.

The rôle of calcium carbonate in soil alkalinity: A. B. CUMMINS.

The relation of certain alkali salts to the growth of plants: A. R. DAVIS and D. R. HOAGLAND.

The alkali tolerance of plants considered as a phenomenon of adaptation: J. F. BREAZEALE.

The effects of sodium chloride on young orange trees and their recovery: H. S. REED and A. R. C. HAAS.

Thursday Evening, September 20

Paulais Hotel.

Business meeting and banquet.

Friday Morning, September 21

SYMPOSIUM ON SOIL MOISTURE

Comparison of established laws in hydraulics to recent investigations concerning the movement of soil moisture: O. W. ISRAELSON.

The variability in the composition of the ground water of alkali soils: E. E. THOMAS.

Soil moisture conditions above a ground water table and its relation to alkali: W. W. MCLAUGHLIN.

The movement of soil moisture: T. J. VEIHMEYER.

Friday Afternoon, September 21

THE USE OF SULFUR IN AGRICULTURE

The supply of sulfur in soils: D. S. JENNINGS.

Further studies of the gains and losses of soil sulfur: J. S. JONES.

Field experiments with sulfur as a fertilizer: W. L. POWERS.

The present status of the problem regarding the utilization of sulfur as a treatment for alkali soils: C. D. SAMUELS.

The effect of sulfur on soils: J. L. ST. JOHN.

Saturday, September 22

Visit to the Citrus Experiment Station, Riverside, California.

The society was organized at Salt Lake City in June, 1922, as the result of an "Alkali Conference" held with the Pacific Division. It was soon realized from the diversity of papers offered and interest shown that although alkali was the central theme, its