tory and the United States Forest Service, which share equally in the expenses of the work. Engagements have been entered into which will bring the survey to a completion in 1910. Maps will be published showing the present and original distribution of forest areas in Illinois, and a report will be made, by counties, in detail, together with a description of the various types of forest, as to composition and condition, estimates of the standing timber in each county, means of maintaining the producing power of the forest lands of the state, and recommendations to private owners for the handling of their lands in a way to maintain and improve their forests.

AN Alabama Anthropological Society has been established. It is composed of twelve active members, residents of Montgomery, and of such associate and honorary members (an unlimited number) as may be hereafter elected. There are to be 12 meetings each year, each member submitting one paper. It is planned to issue from time to time publications of a scientific nature and a yearly bulletin containing the twelve papers submitted during the year. The first regular meeting will take place on July 22. The officers are: Thomas M. Owen, LL.D., president; Herbert B. Battle, Ph.D., vice-president; Peter A. Brannon, secretary; Buckner Beasley, treasurer.

UNIVERSITY AND EDUCATIONAL NEWS

MR. JOHN D. ROCKEFELLER has made a further gift of $10,000,000 to the General Education Board. Its endowment is now $53,000,000. Mr. Rockefeller has authorized the board to distribute the principal as well as the income for educational purposes should this at any future time appear to be advisable.

UNION COLLEGE has received $75,000 from Mrs. Katherine Spencer Leavitt, of Washington, for the endowment of the department of philosophy, the gift being in memory of her father, Rev. Dr. Spencer, of Brooklyn, N. Y., who was graduated from Union in 1824.

LORD STRATHCONA, Canadian high commissioner in London, has given half a million dollars to McGill University. Of this amount, $450,000 is to be used for completing the new medical building, and the balance for the augmentation of salaries of the faculty.

MESSRS. JOHN SWIRE AND SONS have promised a contribution of £30,000 towards the Hong Kong University endowment fund, the Taikoo Sugar Refining Company £5,000 and the Ocean Steamship Company £5,000, on condition that the whole amount required is subscribed.

THE University of Liverpool announces that the J. W. Garrett international fellowship in pathology and physiology of the value of £100 per annum, open to members of universities and medical schools in the United States, will be awarded in September. Applications should be addressed to the dean of the medical faculty, University of Liverpool.

DR. MILTON J. ROSENAU, director of the hygienic laboratories of the Public Health and Marine Hospital Service, has been appointed head of a newly established department of hygiene and preventive medicine in the Harvard Medical School.

PROFESSOR JULIUS STIEGLITZ, of the department of chemistry of the University of Chicago, has recently been made director of the laboratories of analytical chemistry in that institution.

STUDENTS who have been engaged in research work in the laboratory of physiological chemistry of Yale University and have received the degree of doctor of philosophy from the institution, have received appointments as follows: John Franklin Lyman, assistant professor agricultural chemistry, Ohio State University; Mary Davies Swartz, instructor in Teachers College, Columbia University; Israel S. Kleiner, demonstrator of physiological chemistry, medical department, of Tulane University; Warren W. Hilditch, instructor in physiological chemistry, Syracuse University; Victor C. Myers, adjunct professor of physiological chemistry, Albany Medical College; Arthur W. Dox, chemist, cheese investigations, Storrs Agricultural Experiment Station.

At Swarthmore College, Mr. Louis Fussell, instructor in electrical engineering and Mr. Ross W. Marriott, instructor in mathematics, have been promoted to assistant professorships. Mr. H. L. Ward, who has been assistant at Yale University, has been appointed instructor in chemistry.

Mr. George P. Paine, of Ripon College, has been made assistant professor of mathematics at the University of Minnesota.

Dr. Jonathan T. Rorer, of the Central High School, Philadelphia, has been called to the headship of the mathematical department of the new William Penn High School for Girls, of the same city.

The chair of botany at Birmingham, vacant by the retirement of Professor Hillhouse, has been filled by the appointment of Dr. G. S. West, who for the past four years has been lecturer in botany at the university.

Mr. James Colquhoun Irvine, Ph.D. (Leipzig), D.Sc. (St. Andrews), has been appointed to the chair of chemistry in the University of St. Andrews in place of Professor Purdie.

Discussion and Correspondence

The Fundamental Laws of Matter and Energy

To the Editor of Science: In a late number of Science (April 23, 1909) Professor Speyers has raised some objections to the system of non-Newtonian mechanics which I recently published.[1] While some of these objections are due to misunderstanding of the method employed in developing the new system, others of an *a priori* character are based apparently upon a certain feeling of repugnance to the view that the velocity of light in vacuo possesses a unique significance, as the limit of all possible velocities in a material system. This feeling, which has been expressed by numerous critics of non-Newtonian mechanics, I should like to discuss briefly. I will take this opportunity also to present in a new and perhaps simpler way, the principles involved in the development of the new system of mechanics.

[1] *Technology Quarterly*, June, 1908; *Philosophical Magazine*, 16, 705.

We may base our whole argument merely upon four empirical laws, of which the first two are universally accepted and form an essential part of the foundation of physical science. The other two are more specific in character, but it is hardly likely that their validity will be questioned by any one.

The first is the law of conservation of mass. If a system gains in mass, its environment must lose in mass by the same amount.

The second law states that if the center of mass of a given system is at rest, it can not be set in motion except through the agency of an external force; in other words, if the center of mass of an *isolated* system is at rest, it will remain at rest.

The third law was deduced by Maxwell from electromagnetic principles, by Boltzmann from thermodynamics, and has been accurately verified experimentally by Nichols and Hull. It concerns the mechanical impulse experienced during the absorption or emission of light. If a body emits a beam of parallel light, it acquires momentum in the opposite direction and the momentum acquired is equal to E/V; where E is the quantity of energy emitted, and V is the velocity of light.

The fourth law has always been tacitly assumed and I name it here only to show with particularity the whole empirical basis upon which the system of non-Newtonian mechanics rests. This law states that if a body suffers a mere loss of energy through radiation, and if then the same amount of energy is returned to it by thermal conduction, or by an electric heater, or by friction, or in any other such way, the system will return to its original condition.

Let us now consider, isolated in space, a body at rest. For an instant this body emits a beam of parallel light directly away from its center of mass. As a consequence of the pressure of the emitted light, the body begins to move in the opposite direction, acquiring momentum which is equal to E/V, E being the energy of the small quantity of radiation which is now traveling away from the original center of mass of the system with a velocity V.

If the velocity acquired by the body is v