related compounds together with other toxic amines.

The Leprosy Department under Dr. Muir extended its observations on the pathology and bacteriology of that disease. The intradermal method of giving hydracarpous injections has been found to be more effective than the intramuscular or the subcutaneous treatments. The lack of correlation between the lesions and the number of *M. leprœ* was the subject of careful research and the evidence so far obtained suggests that there is a minute form of the parasite which has not yet been recognized microscopically and that this germ is the usual cause of at least early nerve lesions. The nature of this virus and the possibility of its being filtrable are discussed, analogy being drawn to a filtrable virus in rat leprosy and tuberculosis stated to have been demonstrated by some workers. Although claims have been made by workers in other countries that the leprosy organism has been isolated, yet repetition of their experiments has invariably led to negative results. The department has also conducted extensive propaganda and issued the quarterly Journal, *Leprosy in India*.

In the Diabetes Research Department, Dr. J. P. Bose carried out studies on the distribution of sugar in the blood of diabetic and non-diabetic subjects as the result of which it has been concluded that (1) in normal healthy subjects the plasmic sugar is only slightly higher than the corpuscular sugar, while in diabetic subjects the plasmic sugar is always much higher than corpuscular sugar, and (2) the high plasma and the low corpuscular sugar is due to the inability of the corpuscles to take in sugar from the surrounding plasma.

The Filariasis Research Department under Dr. S. Sundar Rao investigated problems relating to (*a*) longevity and (*b*) different modes of infection with *Wuchereria bancrofti*. Several methods of treating the infection with compounds of copper, bismuth, tin, zinc and lead were tried but without success.

The report of Respiration Diseases inquiry (Lt.-Col. Acton) relates to a survey of different diseases affecting persons engaged on tea gardens or jute mills. Since a large number of mill hands suffer from asthma, considerable attention was directed to the early diagnosis of the different types of that disease. In the tea gardens, pneumonia is responsible for many deaths and a study of the nature of the organisms has shown that it belongs mostly to Type IV. The observation is now being extended with a view to producing a correct type of anti-serum for general use in India.

Radiology and Electric-therapeutic Department (Lt.-Col. J. A. Shorten) records several interesting clinical observations. The Superintendent of the Pasteur Institute (Dr. M. J. Nicholas) reports a number of cases of treatment for dog bite though for some unknown reason, many of the patients did not attend the full course of treatment. The general results show, all the same, a high percentage of success as a result of the anti-rabies treatment, the failures being, on an average, only 0.38 per cent of the total number of cases treated. The appendices include a report of the Secretary to the Endowment Fund of the Calcutta School of Tropical Medicine and lists of articles and books published or read by members of the staff during the year under report. Publications relating to the various subjects under review have been issued frequently chiefly through the columns of *Indian Journal of Medical Research* or the *Indian Medical Gazette*.

The U. P. Academy of Sciences.

THE *Bulletin of the U. P. Academy of Sciences*, Vol. 2, No. 4, May 1933, contains a report of the Proceedings of the Annual Meeting of the Academy held in the Vizianagaram Hall, Muir College Buildings, Allahabad, on Friday, Jan. 13, 1933. The Hon'ble Mr. J. P. Srivastava, M.Sc., (Tech.), Education Minister to the Government of the United Provinces, presided.

The Secretary's Report showed that the Academy had 102 Members on its roll of whom 19 were non-resident. Pandit Madan Mohan Malaviya was elected Honorary Fellow of the Academy in recognition of his eminent services in the cause of science and education in the Provinces. Dr. R. Samuel, R. F. Hunter and Dr. P. L. Srivastava were elected Fellows of the Academy. During the year, 43 papers were read before the Academy and its Bulletin received 53 Journals in exchange.

Dr. M. N. Saha, the President of the Academy, delivered his Presidential Address on the "Present Crisis in Dynamics". After reading a message from H. E. Sir Malcolm Hailey, Governor of the U. P., conveying his well wishes to the Academy, Dr. Saha referred briefly to important events of the Academy for the year and then proceeded to the main text of his address.

The Science of Physics is now passing through a great crisis. To be able to appreciate the present crisis, it would be interesting to recapitulate that the sciences created or inherited by the Greek and Hindu savants were all static, *viz*,, Geometry, Algebra, Trigonometry and Arithmetic; they had no science to describe motion. Although they realized and saw around them Nature full of motion, the difficulties in arriving at its correct principles were almost insuperable. It was Galileo who, hemmed in and persecuted by an intolerant clergy, formulated his famous laws of motion. He gave a mathematical expression to 'mass', 'force', 'acceleration' and 'velocity'. But while in the sphere of physics and astronomy, these laws met with almost unlimited success, metaphysicians like Berkley and Hume objected strongly to Galileo's picture and propounded that the human mind must be taken into consideration in any world picture, a fact that Galileo's laws overlooked. To-day Berkley's ideas are found to be more correct than they appeared at his time. For 350 years the science of dynamics held supreme, for it provided an explanation of all known forms of motion and other physical phenomena. But when at the end of the last century it was found that electricity was more fundamental than matter, the first rift in the lute appeared.

It is curious that while classical dynamics led to the foundation of Einstein's 'Theory of Relativity', the theory itself shattered some fundamental concepts of classical physics. Classical dynamics assumed mass as an inherent property of matter, that space can be measured according to the principles of Euclid, and that time is a sort of uniform flux. The historic experiment of Michelson and Morley on ether drift led Einstein to postulate a four-dimensional space where time was continuous with space and points became events. Time ceased to be absolute and distance had no logical meaning. Mass was not an inherent property of matter and the coarser concepts of classic dynamics were replaced by the finer and more accurate principles of relativity; space was not infinite nor possibly time.

In the sphere of intra-atomic physics, Planck's postulation of the quantum theory, which in the beginning was considered by many as an illusion, proved to be the *elan vitale*. But the ignorance of the actual value of the constant angular momentum of the H. proton was a great obstacle in the application of the quantum theory to the solution of atomic physics till Niels Bohr solved the difficulty. This then formed the basis of the explanation of all physical and chemical properties of atoms. According to this theory, the electron can occupy and move only in certain number of orbits; also when the electron occupies one of the higher orbits, after some time it has to jump back into one of the lower orbits although it cannot be precisely stated to which orbit the electron would jump. This can be defined in terms of only probability. This brings us into conflict with the most fundamental concept of classical dynamics, *viz.*, the law of causality. The whole of classical physics is built on the principle that every effect has a cause and, if we deny this principle, we are going back to the days of the ancient philosophers who attributed everything to a Divine Will, and then no need for scientific enquiry exists. Bohr's idea shattered the theory of cause and effect by unwittingly endowing the electron with free will to jump from any one orbit to any other orbit.

The remarkable researches of the physicists replaced the original conception of the electron—the fundamental unit of matter—as something that occupies a Euclidean space point at a definite instant of time, by a minute solar system of a proton surrounded by orbits of revolving electrons. But the matter did not stop there. De Broglie went a step further and replaced the particle of negative electricity by a train of waves. This conception is in direct conflict with classic dynamics where the state of motion of a particle can be defined by its location, position and momenta coordinates. A train of waves cannot be defined in these terms and Heisenberg showed that this indefiniteness was inherent in the nature of things. A little reasoning will show that we observe a particle only by illuminating it with light and if the particle be of the order of the magnitude of an electron, the light itself will impart momentum to it as shown by A. H. Compton. Hence we can never perceive any electron in its natural state and consequently we cannot define its state. Schrodinger replaced De Broglie's wave train by a spherical vibrating elastic membrane and tried to bridge the difference between the classic and modern physics and retain the principle of Causality; but there are many weak points in his theories that cannot be easily explained.

Repeated attempts have been made therefore by physicists to co-ordinate the various conflicting theories which have resulted in the formulation of a variety of symbols like Heisenberg's Matrices, Sixteen-Dimensional Geometry, Spinor-Analysis, etc. In many cases, one is left with the sensation that a mountain has laboured to bring forth a mouse and that too an indefinable one. Thus at present physics is full of speculations which need a mathematical Messiah to clear up. The Messiah is not yet in sight and the physicist, uncontrolled by any sobering influence, finds himself dazed by his own discoveries and inability to interpret his results.

The Hon'ble Mr. J. P. Srivastava congratulated the Academy on its successful working and its usefulness in the development of the Province. He hoped that the Academy would exert its influence in a greater application of science to everyday life which was the immediate need of the country. The average man may not take that interest in science if it were only theoretical as he would if it were more practical. The scientists can really offer a solution to the grave problem of unemployment facing everybody. He wished the Academy a long career of uninterrupted usefulness.

The following were elected office-bearers for the current year:—

President:—Prof. K. N. Bahl, D.Phil., D.Sc. *Vice-Presidents:*—Prof. M. N. Saha, D.Sc., F.R.S., F.A.S.B., F.Inst.P., P.R.S.; Prof. B. Sahni, D.Sc., Sc.D., F.L.S., F.A.S.B.; *Hony. Treasurer:*—Prof. D. R. Bhattacharya, M.Sc., Ph.D., D.Sc., F.Z.S.; *General Secretaries:*—Prof. P. S. MacMohan, B.Sc., M.Sc., F.I.C.; Prof. A. C. Banerji, M.A., M.Sc., F.R.A.S., I.E.S.; *Foreign Secretary:*—Prof. N. R. Dhar, D.Sc., F.I.C., I.E.S.; *Other Members of the Council:*—Prof. K. C. Mehta, Ph.D., M.Sc.; Dr. S. S. Nehru, M.A., Ph.D., I.C.S., M.L.C.; Prof. Ch. Wali Mohammad, M.A., Ph.D., I.E.S.; Prof. K. K. Mathur, B.Sc., A.R.S.M.; Dr. P. L. Srivastava, M.A., D.Phil.; Prof. Robert F. Hunter, D.Sc., Ph.D.; Dr. S. M. Sane, B.Sc., Ph.D.; Prof. C. Maya Das, B.Sc., M.A., I.A.S.; Prof. K. C. Pandya, D.Sc.