

physicists and astronomers alike are involved in this problem, but it is evidently an elusive one. Curiously enough, as Fowler has proved by comparison with other spectra, general series relations would permit us to assign the disputed series to hydrogen or to helium impartially, and it seems possible that both elements may give the same spectrum under appropriate conditions. Bohr has also concluded from the formula derived from the assumption of the return of an electron to a lithium atom which has lost three electrons, that lithium would emit lines close to the Balmer series. Bohr has not yet succeeded in applying his method to the case where an electron returns to a singly charged helium or lithium atom, and hence has not been able to account for the known helium lines, which are assigned by Stark to singly charged atoms. Nor has he taken account of atomic magnetic fields, which, as Humphreys, Allen, and others have shown, may exercise an appreciable influence.

One of the most fascinating fields of research is that of fluorescence and resonance spectra, in which much work has recently been done, particularly by Wood. He has found that white light will excite the complete band and line resonance spectrum of sodium or iodine, but that a single exciting line will cause the emission of a line of the same length, and also of a number of lines approximately equally spaced which may not always coincide in position with one of the absorption lines. Thus the vapour is caused to emit forced vibration, giving a spectrum not its own. As Wood has suggested, this method enables us to strike one key of the complex vibrating system of the atom, instead of the whole keyboard at once. Time does not permit a detailed account of this remarkable work, but it is evident that it may render great service in the study of the mechanism of the atom. Nor is there time even to mention any of the results obtained in the field of absorption spectra.

After reviewing the work of the past decade, we may feel encouraged by the progress that has been made both in the perfecting and application of spectroscopic methods of research and in the discovery of new phenomena. Some of these discoveries have led to fundamental revisions of our notions of atomic structure. The Rutherford atom has definitely displaced that of Thomson. In some respects this has seemed to make the problem more difficult, but it has at least defined it more precisely. Many attempts have been made to represent an atomic structure which would satisfy the necessary mathematical conditions, most of them so impossible as to be absurd or so speculative that they suggest no experimental tests of their validity. The great merit of Bohr's hypothesis is that it does lend itself to such tests, and it is for that reason that I have paid special attention to the methods of experimental attack which seem to give the most concrete results in this connection. Hesitant as we may be to accept in all its details a theory which asks us to abandon laws upon which we have pinned our faith, this theory, and the quantum theory as well, may be the flashes of genius which reveal incompletely the outlines of the truth towards which we struggle along a dimly lighted path. Fuller knowledge may resolve some of our difficulties and reconcile apparent contradictions. Ptolemy's theory of epicycles would appear wholly irrational to one acquainted with Newton's laws but ignorant of Kepler's conclusions, yet it correctly described the facts as Ptolemy saw them. Some day the Kepler and the Newton of the atom may appear, but their task will not be an easy one. If the astronomer is baffled by the problem of three bodies which he can see, how can we expect to define the exact laws determining the motions of the invisible hosts of

electrons and positive charges in an atomic system? How can we hope to picture correctly the mechanism which emits radiations of almost infinite complexity, or account for the additional complications called forth by external forces? We may be almost tempted to accept the pessimistic view expressed by Planck in his Columbia lectures, that nothing in the world entitles us to believe that it will ever be possible to represent completely through physical formulæ the inner structure of the atom. And Kayser has said: "A true theory must assume a complete knowledge of electrical and optical processes, and therefore is a Utopia."

But even if we never reach the goal, who can set a limit to our approach to it? We may never set foot upon the promised land, but some day we may perceive its shadowy outlines dimly from afar.

#### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE Joint Matriculation Board of the Universities of Manchester, Liverpool, Leeds, Sheffield, and Birmingham has revised its regulations for entrance to the faculties of medicine, and no longer requires that Latin should be taken as an obligatory subject. The conditions imposed by the board for entry to the faculty of medicine are now identical with the general conditions for entrance to the several faculties of the Universities.

WE learn from *Science* that the library of the late Prof. Hugo Münsterberg has been given to Harvard University by a group of his friends. The library consists of about 10,000 books, pamphlets, manuscripts, charts, and other papers. Among the 3000 books in the collection are the latest and most valuable on experimental and applied psychology, especially those bearing on aspects of the subject to which Prof. Münsterberg had devoted his time.

ACCORDING to a recent article in the *Frankfurter Zeitung* and an interview with a prominent librarian at Frankfort plans are being considered for the establishment of a general technical library at Frankfort-on-Main, to be open for public use. One of the leading city libraries has become interested in the project, and a beginning has already been made. A demand exists for a library which will be of service to all the numerous branches of the industry and trade in and about Frankfort, the most important industrial centre in South and West Germany. In this manner a broader spirit of scientific and technical investigation will be fostered. An attempt will be made to furnish technical information which will have a historical as well as a purely scientific value. Technical libraries have existed previously, but they have not been open to the general public. Such libraries have been the property of scientific societies, technical associations, and the larger industrial concerns. The service rendered by these scattered collections was comparatively small, as it was limited to members of the respective organisations owning them. These were usually hampered by lack of means and lack of facilities for organising and arranging to the best advantage. The plan that is now under way would combine these private and semi-private libraries and put them under the control of one of the established city libraries at Frankfort-on-Main. The library chosen for the purpose is the *Friedherrliche Carl von Rothschildsche Öffentliche Bibliothek*. In addition to technical books, it is stated that the chief technical magazines of Germany and of the world are to be placed at the disposal of the public. A special feature will be the department for patent publications. Not only will

the important German patent publications be provided for the library, but an attempt will be made also to furnish as broad an international list as possible.

THE South-Eastern Agricultural College has organised a research and advisory department, which is distinct from the teaching side of the college, and is governed by a separate representative committee under definite terms of reference from the governing body. This committee is composed not only of the chief research workers at the college, but also of prominent scientific men who have been co-opted to serve in advancing this side of the college activity. This seems to be an admirable arrangement. The Wye College has recently issued a very interesting memorandum outlining the work in progress and contemplated by the research department. The researches referred to are: (i) Problems connected with the general practice of fruit-growing; (ii) problems connected with the treatment of fungous diseases and insect pests by spraying; (iii) the biological study of fungous diseases and insect pests; (iv) flax experiments; (v) problems connected with the conservation of fruit and vegetables; (vi) pasture studies; (vii) investigations in diseases of sheep; and (viii) hop-breeding. The Wye College Fruit Research Station is situated in the centre of the most important fruit- and hop-growing district in the country, and it is clear from the memorandum that the main lines of research are concerned with these industries, although in almost every instance the other researches referred to have some special interest in the college area. With regard to fruit-growing, special attention is being given to the selection and classification of fruit-tree stocks, with the object of obtaining "pedigree" strains of well-known varieties, and afterwards it is proposed to investigate the relationship between "stock" and "scion." The study of fruit-growing includes the problem of combating the many fungous diseases and insect pests which become prevalent in intensively cultivated fruit areas. For the purpose of these researches the college enjoys quite a unique opportunity, being the only horticultural research station which is actually surrounded by a large fruit-growing district.

THOSE who desire to see the study of physical science receive its due proportion of school time, of prizes and scholarships and other forms of encouragement, as well as social distinction equal to that traditionally allotted to scholars brought up on purely literary fare, will rejoice to notice the newly developed liberalism of some of the classical leaders. Mr. A. C. Benson's paper at the Royal Society of Arts on December 20 last was noticed in *NATURE* of February 1, and now we find, in the *Fortnightly Review* for April, an article by Lord Bryce entitled "The Worth of Ancient Literature to the Modern World" (annual presidential address to the Classical Association). This article concedes almost everything fundamental which has been demanded for many years past by the advocates of educational reform. It is no doubt true, as stated by Lord Bryce, that the present popular desire for more science has been created, not as a result of any appreciation of its educational value or of pride in the achievements of the human intellect, but as a consequence of the association in the minds of the people between a knowledge of applied science and material prosperity. This is no ground for refusing to satisfy the demand, which, for other reasons, is fully justifiable. The time has come, we are told when everyone should approach the subject, not as the advocate of a cause, but in an impartial spirit. Then Lord Bryce goes on to inquire, What is the chief aim of educa-

tion? And the reply is: First, teaching the child how to observe, and from the beginning directing his attention to external Nature. Along with this he must be taught how to use language so as to be able to convey accurately what he wishes to say. An article by Mr. H. G. Wells follows that of Lord Bryce, and the subject is a review of Mr. R. W. Livingstone's recent book entitled "A Defence of Classical Education." It supplies interesting and amusing reading, which will be relished probably by everyone except the author of the book.

## SOCIETIES AND ACADEMIES.

### LONDON.

**Royal Microscopical Society, March 21.**—Mr. E. Heron-Allen, president, in the chair.—K. W. Goadby: The bacteriology of war wounds. With the aid of lantern slides and photomicrographs, prepared by C. F. Hill, the chief bacteria peculiar to the septic wounds encountered in the present war were demonstrated and described in connection with the lesions they produced.

### MANCHESTER.

**Literary and Philosophical Society, March 6.**—Prof. S. J. Hickson, president, in the chair.—Dr. H. Wilde: An Egyptian meteorite. Capt. Cyril Norbury, of the 7th Manchester Regiment, observed the fall of this meteorite in August, 1916, while engaged in military operations in Egypt at the extreme north of the Sinai Peninsula. The fall occurred in the early afternoon, and was attended by a loud whizzing, followed by a great thud. It was at once decided that the sounds were caused by an enemy bomb that had failed to explode, but on further search with a spade of the spot where the body had disappeared it was unearthed. Capt. Norbury noticed that a portion of the meteorite was missing, but although a careful search was made the missing portion could not be found. He also mentioned that a similar occurrence took place at the same time fourteen miles away, though the meteorite in that case was never found, but the 6th Manchesters heard a similar buzzing through the air. The weight of the meteorite is nearly 3.5 lb., and the missing parts would be about the same weight. The thin pellicle on the surface of the stone (0.02 in. deep) through which it becomes vividly incandescent during its passage through the atmosphere is indubitable evidence of its identity with those in the collection of similar meteorites in the British Museum. The Egyptian meteorite is an amorphous silicate, grey in colour, and contains microscopic particles of iron, which are diffused throughout the mass and cause a magnetised needle to adhere to any part of its surface.—Dr. A. D. Imms: Remarks on "castration parasitaire" in insects, with special reference to Termites. The author referred to the occurrence among diverse groups of insects of the phenomenon termed by Giard "castration parasitaire." The most striking examples are afforded by the parasitism of bees of the genus *Andrena* by the aberrant insect *Stylops*, of *Bombus* by the Nematode *Sphærolaria*, of leaf-hoppers by the dryinid *Aphelopus* and the pipunculid *Chalarus*, and of the ant *Pheidole* by the Nematode *Mermis*. In Termites, Grassi and Sandias (1893) pointed out that vast numbers of parasitic Protozoa occur in the hind-intestine of the sterile castes, but not in the sexual forms. They concluded that in the former castes the degeneration of the gonads and the production of soldiers and workers are correlated with the presence of Protozoa. In the primitive Himalayan Termite *Archotermopsis*, Dr. Imms stated that the gonads of the so-called sterile castes are as well developed as in the sexual forms, though abundant Protozoa occur. In species of the genus *Eutermes* the gonads are extremely degenerate or