

to visiting students. Means must be adopted to attract the research student, aided, if necessary, by research scholarships from home. The station should have sufficient Imperial support to avoid the hampering of its utility by local prejudice or ignorance. The permanent staff should include a mycologist and a skilled gardener.

Finally, I should like to suggest the holding of an Imperial Botanical Congress at which matters of general and special interest might be discussed. The visit of the British Association to Australia was, I think, helpful to the Australian botanists; it was certainly very helpful and of the greatest interest to those coming from home. Many of the addresses and papers were of considerable interest and value, but of greater value was the opportunity of meeting with one's fellow-workers in different fields, of conversation, discussion, and interchange of ideas, the better realisation of one's limited outlook, and the stimulus of new associations. A meeting which brought together home botanists and botanical representatives from oversea portions of our Empire to discuss methods of better utilising our vast resources would be of great interest and supremely helpful. Let us transfer to peace purposes some of the magnificent enthusiasm which has flowed homewards for the defence of the Empire in war.

In this brief address I have tried, however imperfectly, to indicate some lines on which botanists may render useful service to the community. To a large extent it means the further development and extension of existing facilities added to an organised co-operation between botanists themselves and between botanists and the practical and commercial man; this will include an efficient, systematic cataloguing of work done and in progress. We do not propose to hand over all our best botanists to the applied branches and to starve pure research, but our aim should be to find a useful career for an increasing number of well-trained botanists and to ensure that our country and Empire shall make the best use of the results of our research. Incidentally there will be an increased demand for the teaching botanist, for he will be responsible for laying the foundations.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

By invitation of the college authorities, the next annual meeting of the Association of Public School Science Masters will be held at Eton on Wednesday and Thursday, January 3 and 4, 1917, under the presidency of Prof. H. H. Turner. After the president's address the main subjects of discussion and their openers will be as follows:—Science for the rank and file, Prof. R. A. Gregory; Technical bias in science teaching in schools, Mr. E. R. Thomas; The place of the text-book in science teaching, Mr. G. N. Pingriff. There will be the usual exhibition of apparatus, but it will consist chiefly of exhibits by members of the association.

THE current issue of the *Fortnightly Review* contains an article by Dr. R. Brudenell Carter on "Science and Education." The subject is made interesting to the general reader from the variety of aspects under which it is viewed, and the interest is enhanced by literary style and historical illustration. The importance of early sense-training is emphasised, and attention is directed to the value of a pocket magnifying-glass as a child's possession. The author's views on the development of intelligence, individual and racial, appear at times to challenge orthodox genetic psychology, but this may be due to the difficulty of popular exposition in a short article. However this may be,

NO. 2455, VOL. 98]

general assent will be given to the proposition that instruction in science should "change the view taken by the pupils of the events around them, and produce a conviction of ignorance of many forces and conditions by which the lives of nations, as well as of individuals, are liable to be powerfully or overwhelmingly influenced." Dr. Carter's proposals for science instruction in schools will scarcely be accepted as adequate, even as part of the all-round instruction of those who do not intend to pursue a scientific career, since they depend upon lectures alone, a course which teaching experience has proved to be ineffective unless a period of practical and more intensive study is added. But science teachers will welcome the general trend of the article, and all readers will gain by the freshness and vigour of the essay. Even now our legislators need to be reminded that "wisdom is hardly to be expected from men who regard its highest manifestations with the unseeing eyes of the scientifically ignorant."

THE Mathematical Association has now expressed its agreement with the Classical, English, Geographical, Historical, and Modern Language Associations in the view that any reorganisation of our educational system should make adequate provision for both humanistic and scientific studies; that premature specialisation should be avoided; and that technical preparation for a particular profession should be conceived in such a spirit that it misses none of the essentials of a liberal education (see *NATURE*, September 7, p. 23). The Mathematical Association submits that from a school course of mathematics the pupil should acquire (1) an elementary knowledge of the properties of number and space; (2) a certain command of the methods by which such knowledge is reached and established, together with facility in applying mathematical knowledge to the problems of the laboratory and the workshop; (3) valuable habits of precise thought and expression; (4) some understanding of the part played by mathematics in industry and the practical arts, as an instrument of discovery in the sciences and as a means of social organisation and progress; and (5) some appreciation of organised abstract thought as one of the highest and most fruitful forms of intellectual activity. This statement is signed by Prof. A. N. Whitehead, president of the Mathematical Association, and by Mr. A. W. Siddons, chairman of the Teaching Committee. It will be remembered that the Association of Public School Science Masters has also expressed agreement with the resolutions adopted by the associations representing humanistic studies, and has emphasised the needs which natural science meets in the direction of the search for truth and of a comprehension of the part played by science in modern civilisation (see *NATURE*, October 26, p. 162).

To *Science Progress* for October Sir Ronald Ross contributes an essay dealing with the question whether our public-school education is in need of reform, and, if so, how much, from the point of view of parents. The discussions which have taken place in the House of Lords and elsewhere would seem to lead one to believe that there is general agreement as to some reform being necessary, but not as to its amount. Unfortunately there is a tendency for the modern educationist to believe that he alone should decide the nature of the curriculum, and many people besides the parents of public-school boys think that boys are taught what the schoolmaster is able to teach rather than what they should be taught. Lord Desborough's Committee for Public-School Reform sent to the parents of boys at Eton and other public schools a memorandum (published in *NATURE* of June 8) urging reform, and requesting replies for or against it. The response indicated that the parents are overwhelmingly in

favour of reform. Sir Ronald Ross urges that early education should be wide rather than deep, and suggests a long list of outdoor qualifications, arts, languages, and knowledges which should be the possession of an ideally trained young man of twenty. He refers to many amazing arguments which have been urged in favour of grammatical education (e.g. that to it is due the success of voluntary recruiting in Britain), and from the discussion draws the conclusions:—(1) That the first elements of Greek and Latin are necessary for every intellectual employment; (2) that a complete classical education is necessary for very few intellectual occupations; (3) that an exclusive classical education is insufficient for any such occupation; (4) that a knowledge of one or more modern languages is more useful than, and just as educative as, similar knowledge of a dead language; and (5) that a man who is entirely ignorant of science can scarcely be considered educated.

COMPULSORY Greek in university entrance examinations received little support at the meeting of the Hellenic Society on Tuesday, when the subject of "The Future of Hellenic Studies" was under discussion. Dr. Walter Leaf, who was in the chair, declared himself against this condition of entrance at Oxford and Cambridge, which are the only two Universities where Greek is made compulsory for all students; and this was also the view of most of the speakers who followed him. The discussion was intended to exhibit the claims of classical studies to continued attention as against the demands made by the advocates of the natural sciences at a meeting held last May, but the impression received from most of the speakers was that which Balak expressed after he had asked Balaam to assist him in stopping the advance of the Israelites: "I called thee to curse mine enemies, and behold thou hast altogether blessed them these three times." Prof. Conway stated that Greek need not be essential in preparatory schools or in the public schools, and could be studied very successfully by interested students after entering the university. He rightly pointed out that boys working for scholarships are not given time for science in preparatory schools or opportunity in public schools. Other speakers agreed that the knowledge of classical languages acquired by most pupils was insufficient to enable authors to be read with intelligence, and that from the point of view of influence upon life and character it would be better to devote time to the reading of translations. There was, indeed, little said at the meeting with which reasonable advocates of scientific studies would be disposed to differ, and nothing upon which a conflict between classics and science could be based. What is wanted most of all is joint action to change the attitude of the public in general towards all knowledge of which no direct commercial advantage can be seen. When this has been accomplished, and obscurantists of all kinds have been removed, it will be possible to contemplate courses of study apart from traditional or other interests, and to construct them with the sole aim of promoting the development of all that is best in the body and mind of the pupil.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, November 2.—Sir J. J. Thomson, president, in the chair.—Sir William Crookes: The photographic spectra of meteorites. Thirty rare earthy meteorites, mostly acquired through the courtesy of the British Museum Trustees, have been examined. The examination has revealed the presence of unexpectedly large traces of chromium in all the specimens, a condition quite different from that found in

the siderites or meteoritic irons, where chromium is practically absent. The proportion between chromium and nickel remains constant in twenty-six out of the thirty aerolites, and is clearly shown in the photographs. In three only nickel is almost absent. From the experience gained it has been possible to make a mixture containing known quantities of nickel and chromium, which, with the addition of iron, produces a spectrum in the neighbourhood of the chromium group that is practically identical with that produced by the aerolite Aubres.—Prof. H. Lamb: Waves in an elastic plate. The theory of waves in an infinitely long cylindrical rod was discussed by Pochhammer in 1876. The somewhat simpler problem of two-dimensional waves in a solid bounded by parallel planes was considered by Lord Rayleigh and by the author in 1889. The main object in these investigations was to verify, or to ascertain corrections to, the ordinary theory of the vibrations of *thin* rods or plates, and the wavelength was accordingly assumed to be great in comparison with the thickness. It occurred to the author some time ago that a further examination of the two-dimensional problem was desirable for more than one reason. The period-equation is, however, at first sight rather intractable, and it is only recently that a method of dealing with it has suggested itself. The result is to give a fairly complete view of the more important modes of vibration, together with indications as to the character of the higher modes which are of less interest.—Prof. W. H. Young: Multiple integrals. This note gives certain results and formulæ fundamental in the theory of multiple integration with respect to a function $g(x, y, \dots)$ of bounded variation (integrator). For simplicity the discussion is confined to two variables. The integrator may, without loss of generality, be taken to be a positive monotonely monotone ascending function—that is, one the monotone increase of which with respect to either of the variables has an increasing rate as the other variable increases.—Prof. W. H. Young: The order of magnitude of the coefficients of a Fourier series.—T. C. Sutton: A determination of the heat of vaporisation of water at 100° C. and one atmosphere pressure in terms of the mean calorie.—G. H. Livens: The mechanical relations of the energy of magnetisation. The usual mathematical formulation of the relations of the magnetic field leads to the same expression, viz. $\mu H^2/8\pi$, for the density of the energy associated with the field, whether this arises from rigid magnets or from steady currents; but as in the first case the energy is treated as potential energy, and in the second as kinetic energy, the apparently consistent result in the two cases really involves a discrepancy. In the present paper a new formulation of the relations is given which overcomes the difficulty of interpretation in the two cases. The fundamental change made in the work consists in the choice of the magnetic induction vector B , instead of the more usual magnetic force H , to denote the conditions in the æther.

Zoological Society, October 24.—Dr. A. Smith Woodward, vice-president, in the chair.—S. Maulik: Cryptostome beetles in the collection of the Cambridge University Museum. The collection is a representative one, containing species from all parts of the world. Three new genera, one new subgenus, and two new species are described.—H. G. Newth: Investigations into the early development of the Echinoderm Cucumaria. The larval life is very short as compared with that of the Auricularia. It takes place at the expense of the yolk, and is complete in about five days. Formation of the coelomic vesicles occurs by the bending and constriction of the archenteron. No separate anterior coelom appears. The hydrocele ring closes in the left dorsal interradius, and the radial canals and five