these languages. Portuguese, Russian, and modern Greek are no longer optional languages. The maximum marks to be obtained in each subject are, as a rule, 500 or 600, but 1200 may be scored in each of the two extensive divisions of mathematics included.

Though candidates for the appointments in the Foreign Office and the Diplomatic Service may make a selection from the long list of subjects referred to, the number of papers taken must be such that the maximum of marks that can be obtained from the subjects chosen is limited to 4000. Under the new conditions, the man who attempts to train himself by attendance at a cramming establishment, for the sole purpose of succeeding in the competition, will have a much smaller chance of success than a candidate who has graduated in honours after a university course. The student who has made himself master of any of the great divisions of knowledge will be able to acquit himself with credit. For example, 2400 marks may be gained in science, 2400 in mathematics, 1200 in French and German, 1800 in Latin and Greek, 1000 in Greek and Roman history, and 1300 in English and general modern history, but in any case the total number of marks attainable in the subjects selected by a candidate must not exceed 4000. The underlying principle seems to be to obtain somehow students who have benefited by a thorough study of at least one department of knowledge, of whatever kind; apparently the intention is to secure men of high attainments, no matter in what subjects they have specialised, and to insist upon a good knowledge of French and German from all candidates.

The schedule of subjects is sufficiently comprehensive to afford all ordinary students a fair opportunity to distinguish themselves. The candidate who has made science the staple subject of his university course will compete on almost equal terms with one who has studied classics and classical history, while the candidate who has specialised in modern languages and history need be at no disadvantage.

The comprehensive subject of geography, however, which is at present obligatory, is not included among the subjects from which candidates may, after July 1, make their selection, and it is this omission which has given rise to much discussion and many protests. In reply to a question on the subject in the House of Commons, the Foreign Secretary said:—"Although a knowledge of geography is no doubt very useful, it is a subject with which men of general education are generally acquainted, and which is easily acquired after entry into the service." Distinguished geographers have since shown how far this is from being the case. Sir George Goldie, in an address to the Royal Scottish Geographical Society in Edinburgh, published in the *Geographical Journal* for the present month, relates a notable instance of the difficulties to which a want of geographical knowledge may give rise. "A good many years ago a territorial arrangement with France was in discussion, and I was invited to consider it. The French proposals appeared to the Foreign Office satisfactory; but I found that they were expressed, as might have been expected, in longitudes reckoned from the meridian of Paris, while the map with which our Foreign Office had considered these proposals was made in Germany and reckoned its longitudes from the meridian of Greenwich. The arrangement in question was never completed."

Mr. Douglas Freshfield, in his address last Friday to the Geographical Association, of which he is president, dwelt upon the same point, and said he could give similar instances to that related by Sir George Goldie. Mr. Mackinder has shown in a recent letter to the *Times* that Sir Edward Grey's description of geography is that of the subject as it was studied twenty years ago, and not as it is now understood and taught. Substantial reasons have, in fact, been given for the inclusion of geography among the other branches of science from which candidates may make their selection.

It is hardly necessary to remind readers of NATURE that geography has in recent years taken its place among those branches of knowledge which are studied on scientific lines. No geographical teaching is now recognised by the Board of Education as satisfactory in secondary schools unless it has a basis of practical exercises and follows scientific methods. The subject has obtained university recognition, and is now taught by practical work in the laboratory and the field. As Mr. Mackinder has pointed out, "geography has its own modes of thought and its own points of view which are not to be obtained in a hurry." Mr. Freshfield was able to point out in his address, to which reference has been made, that there is evidence that the Civil Service Commissioners are beginning to reconsider the matter, and that it will not be long before the claims of geography will be fully recognised by the inclusion of the subject, dealt with in accordance with modern scientific methods, as one of those in which candidates may present themselves for examination.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The natural science board has issued a certificate stating that the work submitted by Mr. G. F. Herbert Smith, New College, is of sufficient merit to entitle him to supplicate for the degree of Doctor of Science.

WE learn from *Science* that Columbia University and Barnard College will receive 2000*l.* each under the will of Mrs. Annie P. Burgess.

SIR W. T. LEWIS has promised 1000*l.* toward founding a chair of mining at Cardiff College, University of Wales, provided 30,000*l.* is raised in contributions from coal owners, royalty owners, and workmen.

PROF. OTTO BENNDORF, professor of classical archæology at the University of Vienna, died on January 2 at the age of sixty-eight years. He was well known owing to his works on archæological subjects, and to the excavations he conducted in Asia Minor.

ADDRESSING a gathering of science and art students at Gravesend on January 2, the Earl of Darnley is reported by the *Daily Chronicle* to have made the following confession:—"I place myself before you as an example of deficiency in education. I went through the ordinary public-school course, and received a university education. I found myself at twenty-two a B.A. of Cambridge, with a certain knowledge of Latin and Greek, which I have never found of any particular use, but without any knowledge of French, German, or science. From my example I hope you will glean some benefit by securing that knowledge which it is now too late for me to acquire."

PROF. A. SCHUSTER, F.R.S., has resigned the position as Langworthy professor of physics and director of the physical laboratories in the Victoria University of Manchester. Prof. Schuster's connection with the University dates from 1871, when he entered Owens College as a student. In 1873 he held the post of honorary demonstrator in physics under Prof. Balfour Stewart, and in 1881 he was appointed to the newly-created chair of applied mathematics, which he resigned to become professor of physics in 1888. Both the Council and the Senate have placed on record by formal resolutions their regret at Prof. Schuster's resignation, which is to take effect at the close of the present session, and their sense of the very great services which he has rendered to the University by his work as a teacher, his direction and administration of the physical laboratories, his contributions to the advancement of science, and the prominent part which he has taken in relation to the re-organisation of the University. A general hope has been expressed that Prof. Schuster may still remain in close connection with the University, and take an active part in its affairs generally, as well as specially in connection with scientific research.

PROF. E. RUTHERFORD, F.R.S., Macdonald professor of physics in the McGill University, Montreal, has been appointed to succeed Prof. Schuster as Langworthy professor and as director of the physical laboratories in the Victoria University of Manchester. Prof. Rutherford is a native of New Zealand. After a distinguished academic career in the New Zealand University he proceeded to Cambridge as an 1851 Exhibition scholar, and entered

Trinity College, prosecuting research in the Cavendish Laboratory. He was one of the pioneers of wireless telegraphy, and occupies a high position in the scientific world owing to his experimental work on the ionisation of gases, the discovery of the radium emanation, and the foundation of the now generally accepted theory of radio-activity. It is expected that Prof. Rutherford will arrive in Manchester early in the summer with the view of taking up the regular duties of the professorship at the beginning of the session in October next.

JANUARY has again brought with it conferences of teachers of all grades in various parts of the country. In London, large numbers of schoolmasters, schoolmistresses, and educational administrators have met under the auspices of the London County Council, and discussed for three days subjects as various as silversmith's work and the teaching of phonetics. In Bradford, the educationists of the north of England have, in well-attended meetings, ranged over the field of education. Associations of teachers of special subjects have also held meetings characterised by their enthusiasm. Such gatherings are to be welcomed as maintaining an active interest in education, and as likely to send teachers back to their work with renewed energy and broader knowledge. It is worthy of note that in none of the meetings has science or mathematics taken a prominent part. We have no reason to regard this as indicative of a falling off in the interest in these important parts of the school curriculum; it rather directs attention to the fact that in recent years questions concerning mathematical and scientific teaching have dominated the programmes of teachers' meetings, and much thorough discussion has led to improved teaching and obviated, for the present, the need for further argument. At the Bradford conference an important session had for its subject the development of technical education in a large manufacturing centre. Prof. Charnock, of Bradford, and Principal Reynolds, of the Manchester Technical School, read papers. Mr. Reynolds said we need more intelligence and more knowledge on the part of our working people. He suggested, first, the need for the extension of the age-limit in higher elementary schools to sixteen years. There is an advantage in selecting in each of suitable localities of a town one of the elementary schools, and giving it an extended curriculum, staffing and equipping it accordingly, such school being fed from the elementary department of the school and from neighbouring elementary schools, and supported by a scheme of scholarships. Secondly, the enactment of a law forbidding the employment of young people in working overtime until they reached their eighteenth year, so as to give full opportunity for attending evening classes. Thirdly, the establishment of one-day courses of specialised instruction in the technical school or college for selected apprentices in engineering and other similar important industries. He urged that the present need is a better appreciation of the requirements of general and secondary education so far as to secure a longer school life, and thus a more complete preparation for specialised training.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, November 15, 1906.—"The Effect of Temperature on the Activity of Radium and its Transformation Products." By Dr. Howard L. **Bronson.** Communicated by Prof. E. Rutherford, F.R.S.

A large number of investigators have attempted to alter the activity of various radio-active substances by subjecting them to very high and also to very low temperatures. Among all these attempts only two, so far as the present author is aware, have apparently given positive results.

The experiments now described show no evidence whatever of any change in the activity of the transformation products of radium when they are subjected to temperatures between −180° C. and 1600° C. If any change does take place it is very small, and cannot be more than 1 per cent. in the case of radium C for temperatures between −180° C. and 1600° C., nor more than 1 per cent. in the case of the emanation or radium B for temperatures between −180° C. and 1500° C.

There is thus removed the only known exception to the general rule, that the activity of radio-active substances is not affected by temperature.

"The Photoelectric Fatigue of Zinc." By H. Stanley **Allen.** Communicated by Prof. H. A. Wilson, F.R.S.

Hertz's observation that ultra-violet light can facilitate the passage of an electric spark led to the discovery of other photoelectric actions. In the earliest experiments on the photoelectric effect of metals it was noticed that the action was diminished by exposure to light. Thus Hallwachs, who found that a metal becomes positively electrified under the influence of ultra-violet light, states that "old surfaces no longer show the phenomenon. The radiation itself lowers the potential to which the plates can be electrified, so that with any succeeding experiment made with the same surface, the potential obtained is lower, while the rise to it takes place more rapidly, and the decrease is greater than when for the same interval of time between the experiments the plate was not illuminated." This diminution of the photoelectric action is spoken of as the "fatigue" of metals under the influence of light, and has received attention from many physicists.

The present paper deals with the manner in which the photoelectric activity of zinc diminishes when the metal is exposed to light.

The experiments described show that it is necessary to employ the sum of two exponential terms in order to obtain an adequate representation for the photoelectric fatigue curve of zinc. Just as Rutherford has explained the curves of decay for the excited activity of radium and thorium as a consequence of successive changes, so it is possible to explain the present results as due to two consecutive changes. The nature of the modifications thus suggested is left an open question.

It is also shown that the longer waves of light can bring about a change in the opposite sense, that is to say, they can produce a certain amount of recovery of photoelectric activity.

Entomological Society, December 5, 1906.—Mr. F. Merrifield, president, in the chair.—*Exhibits.*—A. W. **Bacot**: A specimen of *Catocala nupta*, taken at rest at Hackney, November 9, 1906, remarkable for having two well-developed tarsi on the left fore-leg. Also three ♀ specimens of *Lasiocampa quercus*, L., bred from larvæ from Cornwall in 1906. One of these larvæ had been submitted to a pressure of from 11 to 30 atmospheres (405 lb. to 450 lb. per square inch) on two occasions, a pressure which had proved fatal at once to a frog, used as a control experiment.—Dr. T. A. **Chapman**: A long series of *Hastula hyerana*, Mill., bred in 1906 from larvæ collected at Hyères, illustrating the spread of melanism in this species, and a diagrammatic map of the neighbourhood to explain its distribution in that area.—Dr. F. A. **Dixey**: Specimens of *Teracolus omphale*, Godt., bred by Mr. G. A. K. Marshall, to show that under arranged conditions of moisture and warmth the wet-season phase might be artificially induced.—*Papers.*—*Xanthorhoë ferrugata*, Clerck, and the Mendelian hypothesis: L. B. **Prout.**—The diaposematic resemblance between *Huphina corva*, Wallace, and *Ixias baliensis*, Fruhst.: Dr. F. A. **Dixey.**

Chemical Society, December 20, 1906.—Prof R. Meldola, F.R.S., president, in the chair.—A new laboratory method for the preparation of hydrogen sulphide: F. R. L. **Wilson.** If a current of hydrogen sulphide is passed over calcium hydroxide a hydrosulphide is formed which can be decomposed by carbon dioxide, a carbonate being produced and hydrogen sulphide evolved.—The affinity constants of aminocarboxylic and aminosulphonic acids as determined by the aid of methyl-orange: V. H. **Veley.** It is shown that the usual mathematical expressions hold good, namely, those of straight lines, $y=kx$ or $y=kx-b$, or logarithmic curves, $\log y=\log k+x\log a$. Acids which show irregularities in the Ostwald electric conductivity expression $\phi(k)=a^2/(1-a)V.(a=\mu/\mu_\infty)$ likewise show similar irregularities in the methyl-orange method.—Contributions to the study of the calcium phosphates, i., the hydrates of the calcium hydrogen orthophosphates: H. **Bassett,** jun. The author's experiments show that, in all probability, dicalcium phosphate can only form one hydrate.