

ten and a half and twelve-yearly periods into which the eleven-yearly period may perhaps be analysed, may be in reality beat periods for shorter disturbances? Is it not therefore possible that a study of these shorter periods may give us information regarding the nature of the eleven-yearly period, whether for sun-spots or declination ranges, which the small series of actual observations is incompetent to afford?

We beg to take this opportunity of thanking Mr. William Stroud for the help he has given us in this investigation.

#### UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—At Trinity College the following distinguished graduates of the College have been elected Honorary Fellows:—Lord Rayleigh, M.A., F.R.S., Professor of Experimental Physics; Mr. Henry Sidgwick, M.A., Prælector in Moral and Political Philosophy, the author of "The Method of Ethics"; Mr. Edward Herbert Bunbury, M.A., author of "A History of Ancient Geography," &c.; and Mr. William Henry Waddington, B.A., Member of the French Institute, late President of the Council, and Minister of Foreign Affairs in France.

The Adams Prize is to be given in 1883 for a general investigation of the action upon each other of two closed vortices in a perfect incompressible fluid. In particular it is suggested that the case of two linked vortices should be fully discussed, with the view of determining (1) whether any steady motion is possible, and (2) whether any motion can occur in which there are periodical changes in the forms and dimensions of the vortices. Each essay should be accompanied by a full and careful abstract pointing out the parts which the author considers to be new, and indicating the parts which are to be regarded as of more importance than the rest. The competition is open to all graduates of Cambridge; essays must be sent in on or before December 16, 1882. Essays must not be written in the candidate's own hand. The successful candidate will receive about 170*l.* He must print the essay at his own expense. The examiners are the Vice-Chancellor, and Messrs. A. Freeman, W. H. Besant, and E. J. Routh.

VICTORIA UNIVERSITY.—The following summary of draft regulations on degrees, examinations, and courses of study has been issued:—1. These regulations are, with the exception of certain general proposals with reference to University Matriculation, confined to the subjects of Degrees, Examinations, and Courses of Study in the Faculties of Arts and Science. 2. According to the proposals in the Report any certified student of a College incorporated in the University may matriculate at certain times in the year, the definition of College studentship being left to the College or Colleges, subject in each case to the approval of the University. No University examinations leading to a degree will be open to any persons who are not matriculated students. 3. According to the proposals in the Report there are to be two distinct Faculties of Arts and of Science. The degrees in these faculties are to be those of B.A. and M.A., B.Sc. and M.Sc., and a Doctorate common to the two Faculties and varying as a Doctorate of Literature, of Philosophy, and of Science. 4. In consonance with a main principle of the University Charter, the degrees of B.A. or of B.Sc. are to be conferred upon students who have passed certain prescribed University examinations, and who have attended certain prescribed University courses of study in a College of the University. 5. In the examinations for the degrees of B.A. and B.Sc., and in the privileges conferred by these degrees, a distinction is to be drawn between the Ordinary B.A. or B.Sc. degree, and the B.A. or B.Sc. degree with Honours. 6. The regular period of study required of candidates for the degrees of B.A. and B.Sc. is to be three years, of which two shall be after the date of their passing the Preliminary Examination (see § 7 of this summary); but students who have passed the Preliminary Examination (see § 7 of this summary) next in date after their matriculation, and have been placed in the first division of the list of successful candidates, shall be allowed to proceed to their degree in two years. 7. All candidates for the degrees of B.A. or B.Sc. are required to pass a general examination called the Preliminary Examination, and to present themselves for this examination not later than two years from the date of their matriculation. Regular first year courses of study are arranged as preparatory for this Examination, to be taken by all students except those who pass it immediately after matriculation (see § 6 above), or who go through the first year's course of one of the Honours

Schools approved by the University. 8. The subjects of the Preliminary Examination are arranged in two groups (A and B), in one of which every candidate must pass. The essential difference between the two groups is that in A, Latin and Greek are compulsory, but that a choice is given between four subjects, including two modern languages and two elementary sciences; while in B a choice is given between the alternatives of two languages (ancient or modern) and one elementary science, or two sciences and one language (ancient or modern). In B the requirements in modern languages and mathematics are rather greater than in A. 9. The other examinations for the degrees of B.A. and B.Sc. will be open to such students only as have passed the Preliminary Examination, and as have attended the prescribed University courses of study in a College of the University. These further examinations will differ for students intending to present themselves for an Ordinary B.A. degree and for those desirous of a B.A. degree with Honours. 10. The degree of B.A. with Honours is to imply that a student has attended, during three years, prescribed courses of study (approved by the University) in a distinct branch of learning or science forming the subject of one of the Honours Schools of the Faculties of Arts and Science, and that he has passed a prescribed examination in such Honours School after attending its third year's course. The Honours Schools recommended in the Report for immediate establishment in the University are those of (1) Classics, (2) English, (3) History, (4) Philosophy, (5) Mathematics, (6) Engineering, (7) Chemistry, (8) Zoology, (9) Physiology, and (10) Geology, Mineralogy, and Palæontology. For all of these Honours Schools the Owens College is prepared to supply classes meeting the proposed requirements of the several Schools. 11. The Ordinary degree of B.A. or B.Sc. is to imply that a student has attended, during at least two years, prescribed courses of study (approved of by the University) forming a connected whole, and that he has passed an examination corresponding to the earlier year's course, to be called the Intermediate Examination, and an examination corresponding to the later year's course, to be called the Final Examination. 12. The courses of study, and the corresponding examinations, prescribed for the Ordinary degrees of B.A. and B.Sc., and open to the choice of candidates who have passed either group of the Preliminary Examination, vary according to the predominance in each course (with its examinations) of one branch of learning or science. This predominance is not however such as to warrant the maintenance of the designations given (for convenience' sake) in the Draft Regulations of "mainly Classical, Historical, English, Philosophical, Mathematical, Engineering, Experimental Science, and Biological." Candidates for an Ordinary B.A. or B.Sc. degree may choose any of these groups, but must go through the whole two years' course, and pass both the examinations of the group chosen. The examinations and classes however largely coincide in particular portions of the several groups. 13. With a view to encourage more advanced study in special branches of learning or science in students whose bent has been determined, or whose capabilities have been developed, at a later stage of their University career, students who have passed the Final Examination for an Ordinary B.A. or B.Sc. degree, are to be allowed to present themselves for examination for a B.A. or B.Sc. degree with Honours, after attending the third, or second and third, year's Honours Course, only in one of the Honours Schools. 14. The degree of Master of Arts or of Science is to be conferred upon Bachelors of Arts of three years' standing, after not less than six years from the date of their matriculation. B.A.s who have graduated with Honours are not to be required to pass any further examination for the M.A. degree; those who have taken the Ordinary B.A. or B.Sc. degree are to be required to pass an examination in some portion of one of the Honours Schools Examinations. 15. The Doctor's degree in the Faculties of Arts or Science is to be conferred upon M.A.s or M.Sc.s who have furnished evidence of special research or learning, to be supplemented when desirable by an examination test.

#### SCIENTIFIC SERIALS

*Bulletin de l'Académie Impériale des Sciences de St. Petersbourg*, t. xxvii., No. 1, February, 1881.—On the results of experiments on the resistance of the air and their application to the solution of problems of firing, by M. Mayevski.—On variations of the fur and on the geographical distribution of the sea-otter (*Enhydrys marina*), by M. Brandt.—On the integration of partial equations of the first order with several variables whose co-efficients are constant,



by M. Alexéeff.—On the rotation of Jupiter, by M. Kortazzi.—Crystals of beryl from a part of the Southern Ural, by M. Kokscharow.—On the formation of some nitrated derivatives of some hydrocarbons of the fatty series by direct action of nitric acid, by M. Konowalof.—On the variability of forms of *Lubomirskia Baicalensis*, and on the distribution of sponges of Lake Baikal, by M. Dybowski.—On universal time, and on the choice for this purpose of a prime meridian, by M. Struve.—Anatomy of the lactiferous glands during the period of lactation, by M. Saeffigen.—On the spectroscopy of hydrogen, by M. Hasselberg.

*Reale Istituto Lombardo di Scienze e Lettere. Rendiconti*, vol. xiv. fasc. 4 (February 24).—On a method of finding with the microscope the adulterations of the more common varieties of farina, by Dr. Cattared.—Experimental researches with the Crookes' apparatus, by Prof. Ferrini.—On a quadratic Cremonian correspondence between the elements of two fundamental forms of the fourth species, or ruled spaces, by S. Aschieri.—Considerations on new species of partial blindness in Arachnida, by Prof. Pavesi.

Fasc. 5.—Materials to serve for the study of *Peronospora viticola*, by Count Trevisan.—On primary and secondary psittis, by Prof. Sangalli.—The sanitary administration in Spain, by Dr. Quechi.—Determination of the maximum moments due to weights linked on a supported beam, by Prof. Clericetti.—On an abnormal case of fructification in Florideæ, by S. Ardissona.

*Revue Internationale des Sciences*, February, 1881.—Prof. Vulpian, physiological study of poisons, vii. Curare (end).—Prof. R. Lankester, embryology and classification of animals.—Fernand Latate, a few more words on the fecundation of the urodele batrachians.—Notices of learned societies.—Belgian Academy (abstract of Van Bambeke's paper on the formation of the embryonic lamellæ and the notochord in the urodele).—Paris Academy: on the appointment of M. Bouley to the Chair of Comparative Pathology at the Natural History Museum, Paris.

*Journal de Physique*, March.—On the division of instantaneous currents (continued), by M. Brillouin.—On the psychrometer, by M. Angot.—New tourmaline pincer, by M. Bertin.—Constitution of the flame of the Bunsen lamp, and some modifications in the construction of this lamp, by M. Terquem.—On some experiments in acoustics, by M. Neyreneuf.

*Atti della R. Accademia dei Lincei*, vol. v. fasc. 7 (March 6).—On solar observations at the Royal Observatory of the Roman College in 1880, by P. Tacchini.—Observations of comets and planets at the same college with the Merz equatorial, during 1880, by the same.—M. Janssen's solar photographs taken at Meudon Observatory, by the same.—Thermal laws of the exciting spark of condensers, by E. Villari.—On sodio-ammoniacal trimolybdate, by F. Mauro.—Studies on rotatory power, by R. Inasino.—On some compounds of the pyrolic series, by L. G. Ciamician.—On the electrophorus, by G. Govi.—On pathological bases, by F. Selmi.—On the causes of distinctness in solar photographs, by S. Respighi.—On experiments made at the Observatory of Campidoglio for determination of gravity, by the same.

*Sitzungsberichte der naturwissenschaftlichen Gesellschaft Isis in Dresden* (1880).—A modern investigation of the flora of Saxony, by Prof. Drude.—On the Pycnodontidæ, especially the genus *Gyrodus*, by Prof. Vetter.—The Nudibranchia of the sea, by Herr Blaschka.—On the determination of fixed points of normal mercury thermometers and the measurement of temperatures, by Prof. Neubert.—On various finds in the neighbourhood of Dresden, by Dr. Caro.—Hydroid medusæ or Craspedotes, by Herr Blaschka.—Progress of geological researches in North America, by Dr. Geinitz.—On plant-remains from the Tertiary formations of Liebolitz and Putschein, by Herr Engelhardt.—Observations on the growth of the leaf of *Victoria regia*, Lindl., in the Dresden Botanical Gardens in 1880, by Prof. Drude.—The Slav and German immigration into Saxony, by Prof. Meitzen.—The urn-field of Persia, by Herr Wiechel.

*Archives des Sciences Physiques et Naturelles*, No. 3, March 15. Swiss geological review for 1880 (continued) by M. Favre.—Considerations on the study of phyllotaxy, by M. de Candolle.—Notice of researches by Drs. Tenchini and Staurengi, on the anatomy of the human cerebellum.

*Rivista Scientifico-Industriale*, No. 5, March 15.—On Reese's fusing disk, by Prof. Bombicci.—Volta's pile rendered constant and depolarised, by Count Mocenigo.

## SOCIETIES AND ACADEMIES

LONDON

**Royal Society**, March 31.—On the coefficients of expansion of the iodide of lead, and of an alloy of iodide of lead with iodide of silver, by G. F. Rodwell, Science Master in Marlborough College.

The iodide of lead was examined by the special means described by the author in former communications to the Society, and was found to possess three coefficients of expansion. Between 0° and 205° C. the coefficient of cubical expansion for 1° C. is '00007614, increasing to '00008307 between 205° and 253° C.

Between 253° and 265° C. the mass expanded very rapidly, with a coefficient nearly eight times greater than the preceding, viz. '0006378. After the subsidence of this rapid expansion the coefficient became '000180. The volumes of the iodide between 0° and the fusing point (383° C.) are given, and are shown in a curve-table.

Iodide of lead was fused with iodide of silver in such proportions as to form an alloy containing one molecule of each constituent, viz.  $PbI_2, AgI$ . This contains 66.20 per cent. of iodide of lead, and 33.80 per cent. of iodide of silver. The melting-point of the alloy was found to be 350° C., the specific gravity 5.912. On heating it was found to expand under a very low coefficient between 0° and 118° C.; then it neither expanded nor contracted while heated through 6° C.; at 124° C. it commenced to contract, and underwent between 124° and 139° C. as much contraction as iodide of silver itself; again it was stationary for 5° C., and at 144° C. it began to expand again, with a much higher coefficient than it possessed between 0° and 118° C.

The following are some noticeable points about the alloy:—

1. It possesses similar densities at three different temperatures.

2. Although it contains only 33.8 per cent. of iodide of silver it contracts as much during heating as the iodide of silver itself.

3. While the iodide of silver commences to contract at 142° C., and terminates at 145.5° C., the alloy commences to contract 18° C. lower, and terminates its contraction 6.5° C. lower.

4. The harsh sounds emitted during the cooling of the alloy, and the tremors simultaneously propagated through its mass, prove that violent molecular agitation is taking place while the iodide of silver is passing from the amorphous plastic condition, into the brittle crystalline condition within the mass of, or surrounded by the molecules of, the iodide of lead.

5. The fusing-point of the alloy is 33° lower than that of the iodide of lead, which constitutes two-thirds of its weight, and 177° lower than that of the iodide of silver, which constitutes one-third of its weight.

6. And if this is due to the fact that similar particles of matter attract each other more powerfully than dissimilar, and hence that when the particles of two bodies are mutually diffused the attraction becomes less than that of the molecules of either one of them singly, and the molecular motion is hence more easily assimilated, the same cause may explain the commencement of the phase of contraction on heating the alloy at a temperature 18° C. lower than that of the iodide of silver to which it owes this property.

7. If we compare one of the chlorobromiodides of silver, before described by the author (*Proc. Roy. Soc.*, vol. xxv. p. 295) with the lead-silver iodide alloy, some curious anomalies present themselves. The alloy,  $AgI, AgBr, AgCl$  (latey also discovered as a mineral), contains 41.484 per cent. of iodide of silver, and 58.516 per cent. of the chloride and bromide of silver (which from an expansion point of view may be regarded as the same substance, because their co-efficients are practically the same). But although the mean coefficients of expansion of the chloride and bromide scarcely exceed those of the iodide of lead, and although the chlorobromiodide contains 8 per cent. more iodide of silver than the lead-silver iodide alloy, the amount of contraction by heat of the latter is more than twenty times greater than that of the former, although we must believe this effect to be solely due in each case to the presence of the iodide of silver.

**Mathematical Society**, April 14.—S. Roberts, F.R.S., president, in the chair.—The chairman briefly, but feelingly, alluded to the loss the Society had sustained by the recent death of Mr. T. Cotterill, M.A., formerly Fellow of St. John's College, Cambridge, who was for many years a member of the Council, and had always taken a warm interest in the Society.