

latter process can only begin at about type B. This agrees exactly with Campbell's discussion of spectroscopic binaries.

In an actual star internal ionisation and pressure of radiation must be considered, so that a star of sufficient mass can break up before B-type is reached, and there can be "giant" double stars.

The results obtained fit in well with observation and suggest a simple view of stellar cosmogony.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

BIRMINGHAM.—Mr. G. H. Holcroft has presented to the University a valuable collection of fossils and recent shells which belonged to the late Sir Charles Holcroft.

Dr. J. W. Russell has been elected joint professor of medicine to succeed Prof. Saundby, whose resignation takes effect on September 30 next. The council has resolved to recommend the court of governors at its next meeting to confer the title of "Emeritus Professor" on Prof. Saundby, "in recognition of his conspicuous services to the University and his eminence in the general field of medicine."

Messrs. A. W. Nuthall and J. T. Hewetson have been reappointed honorary curators of the Pathological Museum, in the sections of surgery and gynaecology respectively, for a term of three years from October next.

OXFORD.—On June 12 the honorary degree of D.Sc. was conferred on Prof. Arthur Schuster, who afterwards delivered the Halley lecture. In presenting Prof. Schuster, the Public Orator (Mr. A. D. Godley) spoke of his eminence in various departments of physical research, deploring the inadequacy of the Latin language for dealing with the technical details of the professor's work in the subjects of electricity and magnetism. He alluded also to Prof. Schuster's services as secretary of the Royal Society, and to the value of his labours to the nation at large.

THE Gilchrist Studentship for Women, of the University of London, has been awarded to Miss B. J. Schlumberger, an internal student, of University College.

PROF. J. G. ADAMI'S course of Croonian lectures at the Royal College of Physicians of London begins to-day, and will be continued on June 19, 21, and 26, at 5 o'clock. The subject of the course is "Adaptation and Disease."

A FUND of the value of 2000*l.*, to be known as the Osler Testimonial Fund, has been raised by the medical and chirurgical faculty of Maryland; the income will be devoted to the purchase of books for the library of the faculty and for the upkeep of the Sir William Osler Hall.

THE Prime Minister has informed Mr. Fisher that the urgent demand for further accommodation for war staff which must be housed in the immediate vicinity of the War Office and Admiralty necessitates the removal of the offices of the Board of Education. The new quarters of the Board are to be at the Victoria and Albert Museum, South Kensington. A sufficient number of rooms in Whitehall will, however, be retained for the use of the President, Parliamentary Secretary, and Permanent Secretary of the Board and for conferences, deputations, and interviews.

DR. T. BRAILSFORD ROBERTSON, professor of biochemistry and pharmacology in the University of California, has given to the regents of the University of California his patents for the growth-controlling substance tetelin, isolated by him from the anterior lobe of the pituitary body and used to accelerate repair in

slowly healing wounds. The proceeds which may accrue from the sale or lease of these patents are to constitute a fund which will be entitled "The University of California Foundation for International Medical Research," and will be expended in the furtherance of medical research, preferably research in the physiology, chemistry, and pathology of growth.

WE have received a letter from the Rev. A. J. Ashley, hon. secretary of the Church Esperantist League, in reference to the paragraph which appeared in this column in our issue of May 31. Mr. Ashley writes:—"Ido stands now about where Esperanto stood in the eighties of last century; it has no literature worth mentioning, while many of the finest works of every great literature can now be obtained in Esperanto." Mr. Ashley is of opinion that Esperanto, having thousands of societies and being used daily by tens of thousands of people, is continually spreading, and that such popular acceptance should be a preliminary condition of any Government support. As regards the teaching of a universal language in schools, Mr. Ashley says that in the Patricroft Council School in Eccles Esperanto is being taught as a regular school subject with great success. An account of this experiment will be found in the June-July issue of the *Esperanto Monthly*, which may be obtained from the secretary of the B.E.A., 17 Hart Street, London, W.C.1.

THE new chemical laboratories at University College, London, have been planned and designed so as to meet the requirements of modern chemical teaching and research, including provision for physical chemistry, in which branch immediate and rapid progress is urgent. The funds for these laboratories have been raised by a committee, of which H.R.H. Prince Arthur of Connaught is the president, and Capt. the Hon. Rupert Guinness the chairman and treasurer. The total cost of the site, building, and equipment will be 120,000*l.* One hundred thousand pounds has already been raised, leaving 20,000*l.* still to be found. In order to facilitate the immediate provision of this 20,000*l.*, Sir Ralph C. Forster, Bt., who has already subscribed generously to the cost of these laboratories, has promised 5000*l.* on condition that the remaining 15,000*l.* is raised speedily. Upwards of 700*l.* has already been raised towards the 15,000*l.* required. Those who are anxious to see chemical science in London adequately equipped are invited to assist in completing the sum needed. An appeal has been issued by a sub-committee formed by Lord Glenconner and Capt. the Hon. Rupert Guinness for this purpose. Further particulars may be obtained at the college. Subscriptions should be addressed to Lord Glenconner at the college.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 24.—Sir J. J. Thomson, president, in the chair.—Prof. A. Dendy and Prof. J. W. Nicholson: The influence of vibrations upon the form of certain sponge-spicules. It has been suggested recently by one of the authors that the positions of the whorls which appear on certain siliceous spicules in the genus *Latrunculia* may be determined by vibrations to which the spicule is subjected at a certain stage of its development, corresponding, in fact, with the nodal points of a vibrating rod. The object of the present communication is to describe a similar case in a closely allied, but hitherto undescribed, genus, and to subject it to mathematical analysis with the view of testing this vibratory theory. The problem was to determine the

degree of coincidence between the actual positions of the whorls on the spicule and the positions which would be occupied by the nodes in a vibrating free-free rod of shape similar to that of the shaft of the spicule at the moment when the nodes are beginning to develop (*i.e.* at the critical stage). The general problem is that of the nodes in a rod composed of two equal portions, each formed by the rotation of the curve $y \propto x^n$ between $x=0$ and $x=l$ about its axis, and the positions of the nodes are expressed as functions of the index n by the interpolation formula. All the spicules examined correspond very closely with this law of shape for values of n between $\frac{1}{2}$ and 1. Details of ten cases at or near the critical stage are given in the paper, and the conclusion is arrived at that the positions of the whorls, although subject to slight individual variations due to various disturbing factors, agree so accurately with the theoretical positions of the nodes as to leave little doubt as to the influence of transverse vibrations in determining them. An efficient cause of such vibrations may be found in the water currents which circulate with considerable force through the canal system of the sponge.—Prof. J. W. Nicholson: The lateral vibrations of bars of variable section. The paper contains a discussion of the lateral vibrations of a bar composed of two equal halves and free at each end. Each half consists of a portion of the solid generated by the revolution of the curve $y=Ax^n$ about its axis, and the fundamental frequencies and positions of the corresponding nodes are investigated for various values of n between 0 and 1.

Physical Society, May 25.—Mr. W. R. Cooper, vice-president, in the chair.—C. C. Paterson, J. W. T. Walsh, and W. F. Higgins: An investigation of radium luminous compound. The paper contains the results of measurements made on various samples of radium luminous compound during the last two years. Determinations of the brightness of the compound in powder form and when made up into paint, and also after the application of the paint to instrument dials, were carried out; and curves are given showing the rates of decay of luminosity. The radium contents of the compounds were determined by comparison of their γ -ray activities with that of a preparation of pure radium bromide, which is periodically compared with the British radium standard. The various precautions which have to be observed and the corrections which have to be applied in making the various determinations are explained, and the considerations which should govern the proportion of radium employed for practical purposes are discussed.—F. J. W. Whipple: The resistance to the motion of a lamina, cylinder, or sphere in a rarefied gas. The investigation is carried out on the assumptions that the free-paths of the particles of the gas are long compared with the dimensions of the moving body, and that the motion, relative to the body, of the particles which rebound from it depends only on its temperature. It is shown that if v , w be the components of velocity perpendicular to the surface of a lamina and parallel thereto, the corresponding components of the resistance are

$$(4+\pi) \sqrt{\frac{3}{2\pi}} \frac{v}{V} \rho \text{ an} \quad \sqrt{\frac{3}{2\pi}} \frac{w}{V} \rho,$$

where V is the standard (root-mean-square) speed of the gas-particles and ρ is the gas-pressure. The resistance to the motion of a cylinder or a sphere is found to differ very slightly from the resistance to a lamina occupying the central section. The formulæ are applicable to the problem of the damping of the oscillations of a system suspended in a rarefied gas.—Prof. C. H. Lees: The effect of stretching on the thermal conductivity of wires.

PARIS.

Academy of Sciences, May 21.—M. A. d'Arsonval in the chair.—G. A. Boulenger: Batrachians belonging to the genus *Euproctus*, their ethological and phylogenetic relations.—M. P. A. Dangeard was elected a member in the section of botany in the place of the late R. Zeiller.—P. Fatou: Rational substitutions.—L. Décombe: The influence of temperature on electrocapillary phenomena. An application of the second law of thermodynamics to electrocapillary phenomena, utilising the numerical results obtained by W. A. Vining and by M. Gouy.—M. and Mme. A. Laborde: Remarks on a note of MM. Debierne and Regaud on the use of the radium emanation condensed in sealed tubes. For clinical work MM. Debierne and Regaud have proposed to express the energy given out in terms of the quantity of emanation destroyed during the application. The authors suggest that the mean quantity of emanation present in the sealed tube during the time of application gives an equally exact measure of comparison between the two methods of utilising the energy of radium. Actual cases are worked out according to both modes of expression.—MM. Massol and Faucon: The absorption of the ultra-violet radiations by the iodine derivatives of methane. Details of the absorption bands produced by tetraiodomethane, iodoform, methylene iodide, and methyl iodide.—Ed. Chauvenet: The zirconyl bromides. The only definite compounds isolated were $ZrBr_4 \cdot ZrOBr_2 \cdot 8H_2O$ and $ZrOBr_2 \cdot 3.5H_2O$.—A. Valeur: An anomaly in the solubility of sparteine. An aqueous solution of sparteine becomes turbid when the temperature is slightly raised, and this effect is still more marked in dilute solutions of sodium carbonate. In the latter case the relation between the concentrations in sparteine and the temperature of turbidity formation has been determined, and between certain limits of concentration the curve expressing the results is a straight line. A method for determining this alkaloid can be based on these experiments.—J. Bougault: Acidylsemicarbazides and acidylsemicarbazic acids. The author attributes the constitution, $C_6H_5 \cdot CO \cdot NH \cdot NH \cdot CO \cdot NH_2$, to the product obtained by the action of sodium carbonate and iodine on the semicarbazone of phenylglyoxylic acid, whilst for the isomer produced by the action of benzoic anhydride upon semicarbazide chlorohydrate the formula $C_6H_5 \cdot C(OH) : N \cdot NH \cdot CO \cdot NH_2$ is suggested as most probable.—G. Mouret: The existence of a zone of crushed rocks, about 200 kilometres long, in the western region of Central French massif.—Ph. Glangeaud: The elements of the relief of the volcanic massif of the Monts-Dore.—L. Ballif: The determination of the density of air as a function of the altitude. The method is based on the measurement of the rate of ascent of a free balloon, which need not be recovered. The heights are estimated by simultaneous observations by two observers on the ground.—C. Sauvageau: A new type of alternation of generations in the brown alga (*Dictyosiphon foeniculaceus*).—Em. Bourquelot, M. Bridel, and A. Aubry: The crystallisation and properties of a β -monoglucoside of glycerol obtained by biochemical synthesis. The synthesis of this glucoside has been described in an earlier paper (1915). By solution in absolute alcohol, and partially precipitating with ether and then allowing to stand at a temperature below 6° C. for twenty-one months, the substance has been obtained in the crystalline state. Details are given of its rotatory power and chemical and biochemical hydrolysis. This is the first glucoside of glycerol to be obtained in a crystallised state.—M. Lièvre: Stereoradioscopy. The apparatus described has been used with success in the Army Medical Service.—J. Amar: The origin and prophylaxy of heat stroke. Heat stroke

is regarded as an intoxication caused by fatigue and favoured by bad oxygenation of the blood.—R. Dalimier: Chemical vaccination of arsenical reactions.

May 29.—M. A. d'Arsonval in the chair.—H. Douvillé: The Orbitoids of Trinity Island.—J. Bergonié: The advantages from the hygienic, economic, and social points of view of a change in the number, time, and importance of meals. It is argued that the main meal of the day should be taken at 7.30 a.m., and a second and smaller meal at 6 p.m. The advantages of such a reduction of meals are set out.—S. Lefschetz: The multiple integrals of algebraic varieties.—N. Kryloff: Generalisations of the method of Walter Ritz.—J. K. de Férlet: The formation of integral equations admitting hyper-spherical functions as fundamental solutions.—F. Schrader: A map of the massif of Gavarnie and of Mont-Perdu.—G. Sizes: The intervals in Hindu and Arabian music.—Ed. Chauvenet: The combinations of zirconium with sulphuric acid. Twelve compounds of zirconium with sulphuric acid have been described; the author has only obtained evidence of six of these.—G. Bourguignon: Normal chronaxy of the muscles of the lower limb in man. Functional and radicular classification by chronaxy.—Ch. Dhéré and G. Vegezzi: Helicorubin. This red pigment is found in the bile of the snail. Details of the changes in the absorption spectrum under the influence of various chemical reagents. In slightly acid media it is easily oxidised and reduced, and in the intestine of the snail behaves as a respiratory pigment.—H. Vincent and G. Stodel: The influence of traumatism on experimental gas gangrene and on the recrudescence of this infection. *B. perforans* may be injected into healthy tissue without visible effect, but it does not immediately disappear; it is latent for a certain period, and may reappear as the result of a contusion.

June 4.—M. A. d'Arsonval in the chair.—J. Bousinesq: The equilibrium of a given homogeneous sandy mass under certain conditions.—P. Montel: Conformal representation.—W. Sierpinski: Some problems which imply non-measurable functions.—G. Fayet and A. Schauvasse: Elements of the comet 1917b (Schauvasse). The elements are calculated from observations made on April 25 and May 8, 14, and 22.—MM. Portevin and Garvin: The influence of the velocity of cooling on the transformation temperature and structure of carbon steels.—G. Arnaud: Some Microthyriaceae.—M. Amar: Remarks on meal times. A destructive criticism of the proposals of M. Bergonié (see above), the main point of which is that food is not necessarily utilised immediately after it has been eaten. Two main meals at noon and 8 p.m. are regarded as justified from the point of view of experimental hygiene and the laws of human energetics.—L. Camus: The time necessary for the appearance of the anti-virulent property of serum is a function of the quantity of vaccine inoculated.

BOOKS RECEIVED.

- A Psychic Vigil in Three Watches. Second edition. Pp. xi+233. (London: Methuen and Co., Ltd.) 5s. net.
- The Mothercraft Manual. By M. L. Read. Pp. xviii+440. (London: G. G. Harrap and Co.) 5s. net.
- A Pocket Book for Chemists, Chemical Manufacturers, etc. By T. Bayley. Eighth edition. Edited by R. Ensoll. Pp. xvi+425. (London: E. and F. N. Spon, Ltd.) 7s. 6d. net.
- Cotton Spinning. By W. Scott Taggart. Vol. ii. Fourth edition. Pp. xxviii+462+illustrations. (London: Macmillan and Co., Ltd.) 10s. net.

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DIARY OF SOCIETIES.

- THURSDAY, JUNE 14.
 ROYAL SOCIETY, at 4.30.—Some Cases of Wave Motion due to a Submerged Obstacle: Prof. T. H. Havelock.—The Propagation of Sound in the Free Atmosphere and the Acoustic Efficiency of Fog Signal Machinery: Prof. L. V. King.—The Behaviour of Scattering Media in Fully Diffused Light: H. J. Shannon, F. F. Renwick, and B. V. Storr.—The Theory of Decay in Radio-active Luminous Compounds: J. W. T. Walsh.
 MATHEMATICAL SOCIETY, at 5.30.—Some Theorems on the Multiplication of Series: A. E. Jolliffe.—Certain Trigonometrical Series and their Applications to the Theory of Numbers: S. Ramanujan.
 OPTICAL SOCIETY, at 8.—Aeroplane Compasses: S. G. Starling.—An Optical Method for Accurately Dividing a Circle into Degrees: Dr. R. S. Clay.
- FRIDAY, JUNE 15.
 INSTITUTION OF MINING ENGINEERS, at 11 a.m.—The Spontaneous Firing of Coal: Dr. J. S. Haldane.—The By-product Coking Process, its History, Development, and Application: E. Bury.—Acetylene Mine Lamps: W. Maurice.
- MONDAY, JUNE 18.
 ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—The Zambezi-Congo Watershed: Major E. A. Steel.
 VICTORIA INSTITUTE, at 4.30.—Annual Address: The Distances of the Stars: Sir F. W. Dyson.
- TUESDAY, JUNE 19.
 ROYAL STATISTICAL SOCIETY, at 5.15.—Statistical Aspects of Inflation of the Currency: Prof. J. Shield Nicholson.
 MINERALOGICAL SOCIETY, at 5.30.—The Problem of Sartorite: Dr. G. F. Herbert Smith.—Note on a Curious Case of Devitrification: Dr. A. Scott.—The Meteorites of Simondium, Eagle Station and Amana: Dr. G. T. Prior.
- WEDNESDAY, JUNE 20.
 ROYAL METEOROLOGICAL SOCIETY, at 5.—The Reduction of Temperature Observations to Mean of 24 Hours, and the Elucidation of the Diurnal Variation, in the Continent of Africa: C. E. P. Brooks.—Autographic Records of the Air-wave from the East London Explosion, January 19, 1917: F. J. W. Whipple.—Some Aspects of the Cold Period, December, 1916, to April, 1917: R. C. Mossman.
 GEOLOGICAL SOCIETY, at 5.30.—The Inferior Oolite and Contiguous Deposits of the Crewkerne District (Somerset): L. Richardson.—The Pre-Cambrian and Associated Rocks of the District of Mozambique: A. Holmes.
 ROYAL MICROSCOPICAL SOCIETY, at 8.—*Nouria rugosa*, a New Species of Foraminifera from the Farøe Channel: E. Heron-Allen and A. Earland.

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