Sydney University, New South Wales, has been placed on the list of recognised schools of medicine.

The Rev. T. Wiltshire has founded a prize to be awarded annually for proficiency in geology and mineralogy. The prize is open to members of the University who have passed Part i. of the Natural Sciences Tripos, and are not of more than ten terms' standing.

Prof. J. Ward and Prof. R. Adamson, of Glasgow, are appointed electors to the Gerstenberg studentship in philosophy, open to students of natural science.

PROF. LEON GUIGNARD has been appointed director of the Paris School of Pharmacy.

PROF. LUDWIG BOLTZMANN, of Vienna, has accepted the invitation to the chair of physics in the University of Leipzig.

THE *Chemist and Druggist* announces that Prof. Moissan has been elected a member of the Paris Superior Council of Public Instruction, in succession to the late M. Planchon, deceased. He has also accepted the important post of professor of chemistry at the Paris Sorbonne, in place of M. Troost, who retires on account of advancing age.

SCIENTIFIC SERIALS.

American Journal of Science, May.—Notes on the geology of the Bermudas, by A. E. Verrill. The present Bermuda Islands are the remnant of a very much larger island, covering an area of about 300 to 400 square miles. A subsidence of at least 80 to 100 feet took place at a comparatively recent period. The Greater Bermuda, as well as the present Bermudas, are composed of shell sand drifted from the sandy flats by the winds in former times into hills, and afterwards consolidated by infiltration and exposure into what is known as Aeolian limestone. The shell sand is constantly increasing in amount, chiefly by the annual growth and death of small shells, as in former periods, so that the total mass of the islands is probably still increasing beneath the sea. The "red soil" of Bermuda is mainly the residue left after the destruction and solution of the limestones. The islands rest on the hidden summit of an ancient volcano. —Some boiling point curves, by C. L. Speyers. The author shows that the equation

$$\frac{n}{N+n} = \frac{p-p'}{p}$$

accounts for the boiling point curves of every mixture for which the partial pressures of the constituents are known at some temperature not very far from the boiling point of the mixture under consideration.—Action of ammonium chloride upon natrolite, scolecite, prehnite and pectolite, by F. W. Clarke and G. Steiger. The authors show how the ammonium chloride reaction can be used for studying the chemical structure of these minerals, and that the orthosilicate formulæ for natrolite and scolecite must be discarded.—Siliceous calcites from the Bad Lands, Washington County, South Dakota, by S. L. Penfield and W. E. Ford. The calcites obtained from the new locality have a peculiar crystallisation, being steep hexagonal pyramids instead of rhombohedra.—Studies in the Cyperaceæ, by T. Holm. This paper deals with the segregates of *Carex filifolia*, Nutt.—Mineralogical notes, by A. F. Rogers. Describes various peculiar forms of gypsum and calcite. Twinned gypsum crystals from Lebo, Kansas, possess hemimorphic orthorhombic symmetry rather than monoclinic.—The Hayder Creek, Idaho, meteoric iron, by W. E. Hidden. This meteorite, weighing 870 grammes, was found at the bottom of a twelve-foot shaft. No companions have been found.—Explorations of the *Albatross* in the Pacific, by Alexander Agassiz. This is the author's fourth and last letter to the U.S. Fisheries Commissioner on the cruise of the *Albatross*. It describes the work in the Ellice, Gilbert and Marshall Islands, as well as the Carolines and Ladrones. The Truk Archipelago was perhaps the most interesting of the island groups of the Carolines, and it is the only group of the volcanic islands surrounded by an encircling reef which the author has seen in the Pacific, which at first glance lends any support to the theory of the formation of such island groups as Truk by subsidence. But a closer examination shows that this group is not an exception to the general rule thus far obtaining in all the island groups of the Pacific visited during this trip, that we must look to submarine erosion and to a multitude of local mechanical causes for our explanation of the formation of atolls and of barrier and encircling reefs, and that, on the contrary, subsidence has played no part in bringing about existing conditions of the atolls of the South and Central Pacific.

American Journal of Mathematics, vol. xxii. 2.—Remarks concerning the expansions of the hyperelliptic sigma-functions, by Oskar Bolza, are supplementary to two papers, by the same writer, in vol. xxi. pp. 107–125 and pp. 175–190.—On a certain class of groups of transformation in space of three dimensions, by H. F. Blichfeldt, is the carrying on of an investigation (by S. Lie) of groups of transformations in 3 variables, defined by the properties: two points have one, and only one, invariant; $s>2$ points have no invariants independent of such two-point invariants. This class belongs to a wider class in n variables defined by the properties: not less than $m>1$ points may possess invariants, while s points, $s>m$, may have no invariants independent of the m-point invariants. The wider class includes the group of Euclidean motions in space of 2 or 3 dimensions, the group of translations in space of n dimensions, the group of Euclidean motions and similar transformations in space of 3 dimensions, &c. Certain groups are discussed and their general properties stated.—Dr. L. E. Dickson, in a paper on the canonical form of a linear homogeneous substitution in a Galois field, gives a short proof by induction of a result which M. Jordan had previously obtained by a rather lengthy analysis.—Dr. E. O. Lovett writes on families of transformations of straight lines into spheres. If a plane σ containing two points E and E_1 moves upon a coincident plane σ_1 containing two straight lines g and g_1, so that E remains upon g and E_1 upon g_1, the two planes form a mechanism possessing the following well-known properties: Every point of σ traces an ellipse upon σ_1, and every point of σ_1 traces a limaçon upon σ (*cf.* Chasles, Aperçu, p. 49), a circle c of radius a in σ rolls upon the inner side of a circle c_1 of radius $2a$ in σ_1. Every point of c describes a straight line passing through the centre of c_1. Any two of these lines, with the points which generate them, can be taken for g, g_1 and E, E_1 in defining the movement. Mr. E. M. Blake's object, in his article on the Ellipsograph of Proclus, is to study (1) the curves generated by the points of σ and σ_1; (2) the ruled surfaces generated by any straight line carried by σ or σ_1 and not parallel to them; (3) the curves enveloped by any straight line of σ or σ_1; (4) the developables enveloped by carried planes (*cf.* Cayley, on the kinematics of a plane, *Q.J.* xvi. 1878; Schell, "Theorie der Bewegung und Kräfte," i. pp. 227–230, and articles by Burmester).—Mr. N. J. Hatzidakis, in displacements depending on one, two, . . . k parameters in a space of n dimensions, extends to the general case results obtained for 4 dimensions by Prof. Craig (vol xx. 2) and M. Darboux.—The main object of Dr. G. A. Miller on the product of two substitutions is to prove the following theorem:—If l, m, n are any three integers greater than unity, of which we call the greatest k, it is always possible to find three substitutions (L, M, N) of $k+2$ or some smaller number of elements, and of orders l, m, n respectively, such that $LM=N$.

Annalen der Physik, No. 4.—Temperature and potential gradient in rarefied gases, by G. C. Schmidt. When a vacuum tube is heated, the positive light becomes stratified. The stratifications increase in breadth as the temperature increases. Eventually, the positive light retires towards the anode, so that the discharge becomes dark. At the kathode, on the other hand, an increase of the temperature produces an extension of the glow light, such as is produced by an increase of the current strength. When the dark discharge has set in, the potential gradient is greatest at the anode, and is proportional to the distance from the kathode.—Mechanical motions under the influence of kathode rays and Röntgen rays, by L. Graetz. Rotations similar to those produced by Quincke in liquids may be produced in air ionised by X-rays, by mounting light dielectric bodies provided with agate caps on needle points in the space between two condenser plates exposed to the rays. The sense of the rotation depends upon the initial tendency, except when the rotating body contains a metallic substance, in which case the direction of rotation depends upon the direction of the rays and the electric field. The rotations are explained by the electrostatic forces between the wall of the tube and the parts of the body charged by the ions. The author believes that these rotations furnish an explanation for the rotations under the influence of kathode rays first observed by Crookes.—Atomic and molecular magnetism, by S. Meyer. Special investigations of the magnetic susceptibilities of copper compounds have shown that there is no essential difference between cupric

and cuprous compounds. Wherever the formation of a molecule out of its constituent atoms leads to a considerable contraction of volume, the molecular magnetism is increased, so that the result may even be a paramagnetic compound. Where, on the other hand, there is expansion, the diamagnetism increases.—Energy of kathode rays, by W. Cady. The author discusses the various methods of determining the energy of kathode rays. The thermopile and the bolometer have undoubted advantages as compared with the calorimeter, but it is necessary to know how much of the energy incident upon them is reflected, and how much energy is lost in the process of reflection. The author bases his calculations upon the supposition that 40 per cent. of the kathode energy is reflected, and that the amount of energy lost during reflection is 30 per cent.—Electric arc between metallic electrodes in nitrogen and hydrogen, by L. Arons. The electromotive forces necessary to produce an arc between metallic electrodes depends upon the nature of the surrounding gas. In air, silver electrodes give a fine arc, but no arc can be produced with them in nitrogen. Iron electrodes, which require a high voltage in air, require only a very low voltage in nitrogen.—Electrolytic records of electric currents, by P. Gruetzner. The author gives details of the method of recording alternating currents of high frequency with the aid of iodine paper, and shows that for low voltages it offers decided advantages over the dust-figure method.—Change of volume of rubidium during fusion, by M. Eckardt. The fusing point of rubidium is 37·80°. During melting, 1 gramme of rubidium expands by 0·01657 c.cm.

Symons's Monthly Meteorological Magazine, May.—Meteorological extremes: wind-force. This is the third of a valuable series of articles; the first two referred to pressure and temperature. The difficulties are far greater than in the other cases, as in determining wind-force observations no homogeneity exists either as regards the instruments employed, or the units of the various scales in which the results, either instrumental or estimated, are expressed. The instrument most generally used is Dr. Robinson's cup-anemometer, the few others being chiefly Osler's or Dine's pressure anemometers. In the velocity instruments the factor for obtaining the true velocity of the wind depends upon the length of the arms and the size of the cups. Until recently the factor used has been 3, but more recent experiments have shown that the speed at the cups should be multiplied by the factor 2·2, so that some very high velocities formerly recorded should be reduced by nearly one-third. Among the highest velocities recorded in this country (reduced by the new factor 2·2), we may mention a severe gale in the Irish Sea in January 1899, in which a rate of 90 miles per hour was recorded in one gust; the maximum mean force for an hour at Fleetwood was 75 miles. The highest recorded velocity in a gust was recorded by Dines's anemometer at Rousdon, in South Devon, in March 1897, viz. at a rate of 101 miles per hour. At Greenwich a pressure of 51½ lbs. on the square foot was recorded on January 18, 1881, which is equivalent to a velocity of about 130 miles per hour, but there is good reason for believing that in strong winds the records of these pressure plate anemometers are occasionally much too high. It is still a moot question, what is the strongest force that the wind attains, and whether the force in some of the gales which visit our exposed shores from the Atlantic is much exceeded in tropical cyclones.

Bollettino della Società Sismologica Italiana, vol. v. 1899–1900, No. 7.—List of earthquakes observed in the East, and especially in the Ottoman Empire, during the year 1896, by G. Agamennone. An extract from a paper noticed in NATURE, vol. lxi. p. 400.—The Etnean earthquake of May 14, 1898, by A. Riccò. The epicentre was at S. Maria di Licodia on the south-west slope of Etna, and the focus must have been shallow, for the shock was strong enough to damage many buildings near the centre of a small disturbed area.—Notices of earthquakes recorded in Italy (October 11–November 19, 1898), by A. Cancani; the most important being earthquakes in Sicily on November 1, 2 and 3, Dalmatia on November 8, the Ionian Sea on November 9, and distant earthquakes on October 12 and November 17.

No. 8.—The Modena-Bologna earthquake of the night of February 1–2, 1900, by G. Agamennone. A slight shock, with a disturbed area of about 60,000 sq. km., but recorded by a seismograph at Lubiana (330 km. from the epicentre).—On an electrothermic phenomenon in electrical contacts with slight pressure, by A. Cancani.—Latian earthquake of July 19, 1899, by A. Cancani, a paper noticed in NATURE, vol. lxi. p. 573.—Notices of earthquakes recorded in Italy (November 21–December 31, 1898), by A. Cancani, the most important being distant earthquakes on December 1 and 3.—On a new form of multiplication applicable to seismic movements and on a new seismoscope founded on the same, by G. Pericle.

Bulletin de la Société des Naturalistes de Moscou, 1899, No. 1.—Meteorological observations at Moscow in 1898, by E. Leyst.—On the development of green algues under conditions excluding the assimilation of carbon-dioxide, by Dr. A. Artari.—On the *Hedysarum* species (15) found in European Russia, Crimea and Caucasia, by B. Fedtschenko.—On the Hydrachnids of the neighbourhood of Moscow, by A. Croneberg (plate). Forty-nine species, several of which are new, are described.—On the iron-ores (*turjit*) of the South Urals, by J. Samoiloff. All these articles, with the exception of the last one, are in German, or contain German *résumés*.—Notes on Coleoptera of European Russia and Caucasia, by A. Semenoff.

Memoirs of the Mathematical Section of the Novorossian (Odessa) Society of Naturalists, vol. xix.—Foundations of a theory of analytical functions, by J. Timtchenko, continued from vols. xii. and xvi. This part contains the history of certain special questions, the discussion of which has mainly contributed to the development of the theory of these functions.

Memoirs of the Kazan Society of Naturalists, vols. xxxii. and xxxiii.—Materials relative to the flora of the northern boundaries of the black-earth region, by S. Griegorieff.—The corals of the Devonian deposits in the Urals, by N. Bojartsen (one plate). Fifty-six species are enumerated, several of these, as also one genus (*Nicholsonia*), being new.—On the saliva glands of *Periplaneta orientalis*, by A. Lebedeff (plate).—The Ranunculaceæ of Russian Turkestan, by Olga and Boris Fedtschenko. One hundred and fifty-eight species are enumerated, forty-three species being endemic, and thirty-eight species belonging to the Alpine region. A suggestion for the determination of the Turkestan species is given. All articles are summed up either in French or in German.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 10.—"On Certain Properties of the Alloys of Gold and Copper." By Prof. Sir W. C. Roberts-Austen, K.C.B., F.R.S., and T. Kirke Rose, D.Sc.

The alloys of gold and copper, which are of great industrial importance owing to their use in coinage, have not been subjected hitherto to systematic examination. It has been assumed that they differ widely from the silver-copper series, which has been studied from different points of view, but there is very little evidence on which this view can be based.

Examination with the aid of a thermo-couple and autographic recorder shows that the freezing-point curve of the gold-copper series consists of two branches setting out from the points of solidification of the pure metals and meeting at a point, which is the freezing point of the eutectic. The eutectic contains about 82 per cent. of gold and 18 per cent. of copper, or about 60 atoms of gold to 40 of copper, and solidifies at 905°. The general shape of the curve therefore resembles that of the silver-copper series when the abscissæ give the relative number of atoms.

Under the microscope, alloys containing more than 82 per cent. of gold show a minutely granular structure in which it is not certain that two constituents can be distinguished. The section of standard gold containing 91·6 per cent. of gold bears a close resemblance to that of standard silver prepared in the same way. The alloy with 80 per cent. of gold shows the characteristically-banded eutectic structure almost exclusively, and the alloys with less gold consist of crystals of copper set in a matrix of the eutectic.

Another point of similarity between the gold-copper and silver-copper series is that both the eutectics are brittle and show scarcely any extensibility; they differ in these respect from most other eutectics. Analysis of various portions of ingots of standard gold reveals the fact that liquation takes place as definitely as in standard silver, the difference in composition between the centre and the outside of similar ingots being, however, three or four times greater in standard silver than in standard gold. In the latter case, the centre contains from 0·3 to 1·0 part per 1000 less gold than the outside.