Following up his studies of the triple structure of the kathode light, the author finds that the third kathode layer consists of rectilinear rays, which, however, do not proceed from the kathode itself, but from every point along the path of a ray of the second layer. They are produced, so to speak, by a diffused reflection produced at the surfaces of the gaseous particles. If K_2 rays impinge upon a solid substance, reflected kathode rays are produced. If the solid is thin enough, some of the rays penetrate it, and we have Lenard rays on the other side.—Measurement of very small induction coefficients, by H. Martienssen. The method used depends upon the phase displacement produced by the self-induction in question upon an alternating current. Coefficients down to a few thousand cm. are thus easily measured, the inferior limit hitherto attained having been 10^6 cm.—Air resistances determined by means of a new rotation apparatus, by O. Mannesmann. Discs are mounted at the end of a horizontal arm, and are turned about a vertical axis by means of a water-power or electric motor. The air resistance encountered by them is indicated by enabling the disc to slide backwards in its mounting, in a direction contrary to the direction of motion. In sliding back it pulls a string which passes over a pulley on the axis of rotation, and supports a weight which is thus pulled up. The amount of raising is indicated by an aluminium pointer on a scale. Thus the amount of air resistance can be read off at any instant. The author finds that warm air offers, if anything, a greater resistance than cold air. The resistance encountered by a perforated surface is smaller in proportion to its remaining surface than an unperforated surface. This fact has a practical application to sailing practice.—A new type of volumenometers, by A. Oberbeck. Two parallel glass tubes ending in glass vessels are fixed side by side on a board which can be tilted to any desired angle. The vessels have ground edges, and can be hermetically closed by means of greased glass plates. The tubes join at the other end and communicate with a reservoir of mercury. On closing the vessels and lowering the other end, the mercury columns descend by equal amounts in the two tubes. But if the body whose volume is to be determined is previously inserted in one of the vessels, the mercury in the corresponding tube does not descend as far as before. The author shows how to calculate the volume of the body from the data thus obtained.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, January 26.—"On the Nature of Electrocapillary Phenomena. 1. Their Relation to the Potential Differences between Solutions." By S. W. J. Smith, M.A. Communicated by Prof. A. W. Rücker, Sec. R.S.

The discrepancy between the Helmholtz theory of the capillary electrometer and the Nernst-Planck theory of the potential differences between solutions is discussed in this paper. A detailed examination of the relation between the phenomena from which the discrepancy arises, shows that these phenomena serve to corroborate the Nernst-Planck theory, and that they further throw considerable light upon the nature of electrocapillary phenomena.

It is shown that if the Nernst-Planck theory be true, the surface tension variation in the "descending" branches of the capillary electrometer curves is not solely due to an electrostatic effect of the kind discussed by Helmholtz; but that there is a further effect, dependent upon the nature and concentration of the solution employed in the electrometer.

The extent to which the Helmholtz theory may be true is discussed. It is concluded that this theory only suffices, in general, to give the variation in the potential difference at the capillary electrode. Whether the assumption is ever true, that the potential fall at the capillary electrode is zero when the maximum surface tension is reached, will depend upon whether there is any case for which, when the potential difference between the solution and the capillary electrode is very small, the non-electrostatic effect upon the surface tension can be neglected.

The non-electrostatic effect in the "descending" branch would appear to be practically independent of the nature of the anion, while that in the "ascending" branch is probably for the most part independent of the nature of the kation. Experiments have been made with the object of determining quantitatively the manner in which the surface tension variation depends upon the chemical nature and concentration of the solution, and the conditions under which such dependence may become negligible. The nature of these experiments is indicated in the paper.

February 2.—"On the Effects of Strain on the Thermo-Electric Qualities of Metals." By Magnus Maclean, M.A., D.Sc. Communicated by Lord Kelvin, F.R.S.

1. Seebeck (*Pogg. Ann.*, 1826) discovered the great effect that hardness, or softness, or crystalline structure, has on the thermo-electric properties of metals. Magnus made a number of experiments by winding a hard-drawn wire on a reel. Parts of this wire were softened and annealed. When heat was applied to the parts of the wire which were between unannealed and annealed, a thermo-electric current was obtained. In this way Magnus found that the current passed from soft to hard through the hot junction for silver, steel, cadmium, copper, gold, and platinum; and that it passed from hard to soft through the hot junction for German silver, zinc, tin, and iron.

2. Lord Kelvin describes, in vol. ii. of his "Mathematical and Physical Papers," a number of qualitative experiments to determine the direction of thermo-electric currents in the same metal when one part of it is left unstrained, and the other is—

(1) Permanently affected by application and removal of longitudinal stress;
(2) Permanently affected by application and removal of lateral pressure;
(3) Under a longitudinal stress (*a*) within its limits of elasticity, and (*b*) beyond its limits of elasticity;
(4) Hardened by twisting;
(5) Annealed.

3. He showed that for iron and copper permanent longitudinal extension gave the same effect as permanent lateral contraction; and that this effect for both was opposite to that experienced by them when under a stress which caused a temporary strain. Thus for a copper wire under a longitudinal stress the current was from the strained copper to the free copper across the hot junction, and the magnitude of the current increased with the increase of the longitudinal stress. If the stress were removed and the wire left with a permanent strain, the current was now from the free copper to the strained copper through the hot junction. Similar results were got with iron, only the direction of the current was in each case opposite to the direction of the current in the corresponding case for copper. The highest temperature used in these experiments was about 100° C.

4. To determine the *magnitude* of the thermo-electric effects obtained from any one metal, strained and unstrained, was the object in view in these experiments.

The metals so far tried are:—

(1) Copper wire from Messrs. Johnson and Matthey. This was pure electrotype copper wire with no impurity detected except an unweighable trace of iron.
(2) Copper wire, ordinary commercial, from Messrs. Johnson and Matthey. This was analysed [1] in the chemical laboratory of the University, and was found to contain:—

Copper	...	...	99·4 per cent.
Arsenic	...	...	0·44 per cent.
Lead	...	...	0·08 per cent.
Bismuth	...	...	trace.
			99·92 per cent.

(3) Copper wire, used for alloying with gold and silver, from Messrs. Johnson and Matthey. This also was analysed, and it contained 99·85 per cent. of copper.
(4) Copper wire from Glover. Chemical analysis showed that it contained 98·35 per cent of copper.
(5) Copper wire of Glover's manufacture, and supposed to be soft, and to have a very high conductivity. It contained 99·08 per cent. of copper and 0·22 per cent. of lead.
(6) Copper wire used in laboratory experiments. It contained 98·51 per cent. of copper.
(7) Lead wire, commercial. It contained 98·9 per cent. of lead.
(8) Lead wire, pure.[2] It contained 98·97 per cent. of lead.

[1] All the chemical analyses stated in this paper were given by Mr. Anderson, of the Chemical Laboratory of this University.

[2] These specimens of commercial and pure lead wires were obtained from Messrs. Baird and Tatlock of Glasgow. Other specimens have been ordered elsewhere for a fresh determination.

(9) Platinoid wire obtained from Messrs. Glover.
(10) German silver wire obtained from Messrs. Glover.
(11) Reostene[1] wire obtained from Messrs. Glover.
(12) Manganin wire obtained from Messrs. Glover.

5. The size of the wire used, except for (5) (7) (8) above, was about No. 18 standard gauge. A piece of the wire was taken and drawn through a draw plate till it was reduced to about No. 24 standard gauge. This process of wire drawing subjects the wire to longitudinal extension and to lateral compression. Lord Kelvin in his experiments ("Mathematical and Physical Papers," vol. ii., and section 3 above) showed that thermo-electric differences were in the same direction for longitudinal extension and transverse compression. For drawn and undrawn wires the direction of the current through the hot junction is from *undrawn to drawn* for copper, reostene, and lead, and from *drawn to undrawn* for platinoid, German silver, and manganin. The magnitude of the thermo-electric difference per degree difference of temperature is given in the following table :

Metal	Resistance in international ohms of 60 cm. of wire		Total resistance external to galvano-meter	Total resistance in circuit	Thermo-electric difference in mikrovolt per degree of difference of temperature up to 100° C.
	Undrawn	Drawn			
Copper, Johnson & Matthey, No. 1 ...	0·0086	0·0462	0·0548	1·555	0·0089
Ditto, No. 2 ...	0·0239	0·1254	0·1493	1·649	0·0460
Ditto, No. 3 ...	0·0095	0·0536	0·0631	1·563	0·0163
Copper, hard, Glover	0·0091	0·0523	0·0614	1·561	0·0106
Copper, soft, Glover	0·0155	0·0417	0·0572	1·557	0·0483
Copper, laboratory	0·0089	0·0431	0·0520	1·552	0·0675
Lead, pure ...	0·1088	0·5043	0·613	2·113	0·0184
„ commercial .	0·1123	0·5517	0.664	2·164	0·0273
Reostene	0·4058	1·831	2·237	3·737	0·6463
Platinoid	0·2186	1·052	1·271	2·771	1·477
German silver ...	0·1673	0·845	1·013	2·513	0·2638
Manganin... ...	0·212	1·008	1·210	2·720	0·0843

6. The effect of hardening by twisting has been partially tried. Thus two pieces of laboratory copper wire were taken, and one was in successive experiments twisted 1 turn, 3 turns, 5 turns, 7 turns, 8½ turns per cm. The wire with 8½ turns per cm. got quite brittle, and broke when an attempt was made to put more twists into it. The twisted wire was then heated red-hot by an electric current, and allowed to cool. This partially annealed it.

The results are given in the following table :—

Number of turns in twisted wire per centimetre.	Thermo-electric difference between untwisted and twisted copper wire in mikrovolt per degree.
1	0·0054
3	0 0223
5	0·0262
7	0·0419
8·5	0·0594
8·5 and partially annealed ...	0·0345

7. The effects of twist on the drawn copper wire were also tried, and it was found that 1, 2, 3 turns per cm. in the drawn wire slightly diminished the thermo-electric difference obtained between the undrawn wire and the drawn wire ; but that 4 and 5 turns per cm. in the drawn wire gave the same thermo-electric difference as was found between the undrawn wire and the untwisted drawn wire.

8. The drawn and twisted copper wire was annealed by putting a gradually increasing current through till it got red-hot, and then, without breaking the circuit, the current was gradually reduced till the wire was at the temperature of the laboratory. Trying it in this condition along with the undrawn and untwisted copper wire, the current through the hot junction was found to be reversed, being from the drawn twisted and annealed wire to the undrawn wire. The thermo-electric difference was 0·0081 mikrovolt per degree.

9. Similar experiments on platinoid wires as those described in Section 7 on copper wires gave similar results. Thus 1, 2, 3 turns per cm. in the drawn platinoid wire diminished the thermo-electric difference obtained between the drawn wire and the undrawn wire ; but 4 and 5 turns per cm. in the drawn wire gave the same thermo-electric difference (1·477 mikrovolts per degree) as was found between the untwisted drawn wire and the undrawn wire.

10. The drawn and twisted platinoid wire was partially annealed, and the thermo-electric difference between it and the undrawn platinoid wire was thereby reduced from 1·477 mikrovolts per degree to 0·567 mikrovolt per degree.

11. A beginning has been made of determining the thermo-electric differences between free wires and wires previously permanently elongated 1, 2, 3, &c., per cent. by a simple longitudinal stress ; also wires while (*a*) under stress, stretching them within their limits of elasticity ; and (*b*) under stress, stretching them beyond their limits of elasticity.

[1] Reostene belongs to the nickel steel group, with certain other metals as an alloy.

February 9.—"On the Recovery of Iron from Overstrain." By James Muir, B.Sc., Trinity College, Cambridge (1851 Exhibition Science Research Scholar, Glasgow University). Communicated by Prof. Ewing, F.R.S.

It is known that iron which has been overstrained in tension —that is to say, strained beyond the yield-point so that it suffers a permanent stretch—possesses different elastic properties from the same iron in its primitive condition. Ultimately, the material is "hardened" by stretching, its elastic limit being raised and its ductility diminished ; but first of all very imperfect elasticity is exhibited, and the elastic limit may be found to be reduced to zero. The material, in fact, assumes a semi-plastic state ; so that a stress-strain curve obtained from a recently overstrained bar of iron or steel, shows a marked falling away, even for small loads, from the straight line which would indicate obedience to Hooke's law.

It is the recovery from this semi-plastic state induced by overstrain to a condition of perfect or nearly perfect elasticity with raised elastic limit, that is referred to in the title of this paper. Such recovery is known to be effected by mere lapse of time.

This slow recovery of elasticity with lapse of time is first illustrated in the paper by means of stress-strain curves obtained at succeeding intervals of time. Recovery under continued stress is next considered, and the marked hysteresis in the relation of extension to load, exhibited by overstrained iron, is illustrated by means of a closed cycle. It is then shown that by exposing an overstrained specimen of iron or steel for three or four minutes to a temperature of 100° C , a very perfect restoration of elasticity is effected ; in the case of semi-mild steel, a more perfect restoration than was brought about by a fortnight's rest at the normal atmospheric temperature. So moderate a temperature as 50° C. is also shown to have a large influence in hastening recovery from overstrain.

It is next shown that by striking a recently overstrained specimen with a hammer so as to make it ring, the material of the specimen becomes less elastic. That is, the effect of mechanical vibration is opposite to that of increase of temperature.

The influence of magnetic agitation was also tried, but with a coil giving a field strength of 140 C.G.S. units at its centre, no effect was found to be produced on the elastic condition of recently overstrained material ; the process of recovery seemed to be neither accelerated nor retarded.

Compression experiments are also described in the paper ; an instrument specially designed by Prof. Ewing having been employed to measure the small compressional strains. The semi-plasticity of recently overstrained iron is thus shown, and the effect of moderate temperature in restoring elasticity demonstrated, by means of compression curves. The lowering of the compression yield-point which accompanies the raising of the tension one (due to tensile overstrain) is also indicated.

Physical Society, February 24.—Prof. Perry, F.R.S., Vice-President, in the chair. —A paper by Mr. E. F. J. Love, on the Joule-Thomson effect and its connection with the characteristic equation, and some of its thermo-dynamical consequences, was read by Mr. Watson. The author points out that the results of the original Joule-Thomson investigation of the thermal effects of fluids in motion has been utilised hitherto almost exclusively for the one purpose of determining the relation between various gas-thermometer scales and the absolute scale of temperature. He proceeds to deduce further consequences from those results, indicating the relation between the formula assigned to the Joule-Thomson effect, regarded as a

function of temperature, and the particular form adopted for the characteristic equation of a gas. He further attempts to supply a theoretical basis to the various formulæ of Van der Waals, Rose-Innes, and others, at the same time insisting upon a very high degree of accuracy for the original experimental work of Joule and Thomson. Then follows a discussion of the relation between the intrinsic energy of a gas and its volume, and a method is given for calculating the ratio of the principal two specific heats of a gas. Lastly, the author considers some points in the thermodynamics of substances at their temperature of maximum density. It is shown that (1) the Joule-Thomson effect for every substance at maximum density is zero ; just as it is, though for a different reason, in the case of an ideal perfect gas. And (2) that the infinite number of specific heats possessed by every substance are, at the temperature corresponding to maximum density, reduced to one specific heat. Mr. Rose-Innes congratulated the author on having written an interesting paper on a difficult subject. At the same time he felt bound to acknowledge that he was out of sympathy with the general idea contained in the paper. The experimental difficulties that occurred in carrying out the Joule-Thomson investigation were so enormous, that it was better to rely on them as little as possible, notwithstanding the great skill of the experimenters. The Joule-Thomson results could not be disregarded altogether, since they were necessary for the establishment of the thermodynamic scale ; but once that scale had been set up, it was better to have recourse as much as possible to such experiments as those of M. Amagat on the compressibility of gases. He also pointed out that one of the deductions given in the paper from Van der Waals's formula, had already been given by Van der Waals himself.—Mr. Watson replied, and the Vice-President proposed a vote of thanks to the author for his valuable paper. —The meeting then adjourned until March 10.

Chemical Society, February 16.—Prof. Dewar, President, in the chair.—The following papers were read :—On the absorption spectrum and constitution attributed to cyanuric acid, by W. N. Hartley. The author attributes his previous observation of an absorption band in the spectrum of cyanuric acid between wave-lengths 2747 and 2572 to impurity in the specimen examined. — A study of the absorption spectra of isatin, carbostyril and their alkyl derivatives in relation to tautomerism, by W. N. Hartley and J. J. Dobbie. A very close resemblance is observed between the molecular absorption curves of carbostyril and methyl- and ethyl-pseudocarbostyril, and also between those of isatin and methylpseudoisatin ; this indicates that all these substances have the lactam constitution. The absorption spectra of methylcarbostyril and methylisatin differ greatly from those of carbostyril and isatin respectively.—The estimation of nitrites and nitrates by means of ferrous chloride, by A. W. Blyth. On addition of ferrous chloride, solutions of nitrites immediately yield nitric oxide ; with solutions of nitrates, however, one to two minutes elapse before nitric acid is evolved. Applying these facts the author has devised an apparatus for estimating nitrites and nitrates, either singly or together, as nitric oxide.—Estimation of boric acid mainly by physical processes, by A. W. Blyth. The author uses the well-known increase of the specific rotation of tartaric acid which occurs on adding boric acid, in estimating the latter. On boiling boric acid with sodium carbonate solution, reaction occurs in accordance with the following equation :—

$$Na_2CO_3 + 4H_3BO_3 = Na_2B_4O_7 + CO_2 + 6H_2O ;$$

on employing certain precautions the reduction in electrical resistance yields the necessary data for estimating the boric acid used.—The interaction of ethylic sodiomalonate and mesityl oxide, by A. W. Crossley.—On Lössner's benzoylethyloxysulphocarbamic acid and the formation of pseudoureas, by A. E. Dixon. It is shown that the substance regarded by Lössner as benzoylethyloxysulphocarbamic acid COPh.NEt.CO.SII, has the constitution COPh.NH.CS.OEt ; the supposed benzoylethylurea COPh.NEt.CO.NH_2 obtained from it is a pseudourea of the constitution COPh.N:C(OEt)NH_2.—On certain isomeric tertiary benzylthioureas, by A. E. Dixon.—Is camphene unsaturated, by J. E. Marsh.—Formation of α-pyrone compounds and their transformation into pyridine derivatives, by S. Ruhemann.

Entomological Society, February 15.—Mr. G. H. Verrall, President, in the chair.—Mr. B. A. Bower exhibited perfectly black, melanic examples of *Boarmia abietaria*, Hb., bred from ova laid by a female of the ordinary Box Hill form, which was captured on July 9, 1897. They were part of a brood of seventeen, seven of which were of the black aberration ; and for comparison with them, he showed specimens from Box Hill, South Devon and the New Forest. Mr. Blandford exhibited some small lumps of common salt burrowed by larvæ of *Dermestes vulpinus*, to which he had incidentally referred in a letter appearing in NATURE. He had on various occasions called attention to depredations of *Dermestes vulpinus*, arising from a habit the larvæ had of burrowing through different materials in order to find a shelter in which to undergo pupation, though this was the first time that salt, as a substance attacked in that way, had come under his notice. Mr. J. J. Walker said he believed one of the earliest references to injuries caused by *Dermestes* was to be found in "The Last Voyage of Thomas Candish," where there was an interesting account of certain worms which, bred from a stock of dried penguins, proceeded to devour the whole of the ship's stores and then to gnaw into the timbers, creating great alarm lest the ship should spring a leak. This voyage took place in the year 1593 ; and the worms, he thought, could only have been the larvæ of *Dermestes vulpinus* or some closely allied species. —Dr. T. A. Chapman read a "Contribution to the life-history of *Micropteryx* (*Eriocephala*) *ammanella*, Hubn."

CAMBRIDGE.

Philosophical Society, February 6.—Mr. J. Larmor, President, in the chair.—On the inheritance of variation in the corolla of *Veronica Buxbaumii*, by Mr. W. Bateson and Miss D. F. M. Pertz. In a former paper (*J. Linn. Soc.*, xxviii.) it was shown that in *Veronica Buxbaumii* there is commonly a high percentage of variation in the form of the corolla. Certain symmetrical forms having two posterior petals, two anterior petals, or three petals, respectively, are especially abundant. The frequency of these forms and of other forms of corolla has since been observed continuously in the case of certain chosen plants during the period of flowering. The statistics thus obtained are given in the present paper. A special attempt was made to determine whether any difference occurs between offspring raised from seed produced in normal and abnormal flowers borne by the same plant, both being alike self-fertilised. So far as the experiments went there was no evidence that such a difference exists. There is very great difference in the percentage of abnormal corollas borne by different individuals raised from the same self-fertilised capsules ; and after the self-fertilisation had been continued for four generations the same absence of uniformity persisted. But in the offspring both of normal and abnormal flowers the percentage of abnormality found in the family to which the parent belonged was on the whole maintained.—On the anatomy of a supposed new species of *Coenopsammia* from Lifu, by Mr. J. Stanley Gardiner. The skeletoglœa, or structureless lamella, is directly attached to the corallum at the bases of the mesenteries and of the dividing walls of the cœnosarcal canals by fibrillated bundles. These were shown to be identical with the calicoblasts of von Heider, and it was contended that the corallum is formed completely outside the animal. It was further contended that the stomodœum together with the mesenterial filaments is homologous with the whole gut of the Triploblastica, and that the so-called endoderm is homologous with the mesoderm. The Actinozoon polyp then must be regarded as a Triploblastic form.

DUBLIN.

Royal Dublin Society, January 18.—Prof. G. F. Fitzgerald, F.R.S., in the chair.—Mr. J. Holms Pollok read a paper on the large deposits of kieselguhr, or diatomaceous earth, in the county of Antrim. They occur on both banks of the lower Bann, and are of exceptional purity just at the point where the Bann emerges from Lough Neagh. Analysis shows the kieselguhr to be of good quality and suited for many industrial purposes. It is seen under the microscope to be composed of little cubical box-shaped diatoms, with a few of radial and elongated shapes. It is not suited for making dynamite, but it makes an excellent non-conducting lining for safes and refrigerators, and could be used for covering boilers and steam-pipes. As kieselguhr is made up of the siliceous remains of low forms of aquatic plants, it is in the highest degree probable that the whole bottom of Lough Neagh is covered with such a deposit ; and if this be the case, it would be a very valuable addition to the economic resources of Ireland.—Sir Howard Grubb, F.R S., read a paper in which he suggested

the utilisation of the "Marconi" system of wireless telegraphy for the control of public and other clocks, and explained how this could be effected. He also communicated a note upon the results that may be expected from the proposed monster telescope at the Paris Exhibition of 1900.—Prof. T. Preston, F.R.S., made a communication upon the perturbations suffered by the spectral lines in a strong magnetic field. The various types of effect were explained by theory, and a general law, which appears to govern all the phenomena, was laid before the Society.—Prof. J. Emerson Reynolds, F.R.S., exhibited the new Geissler tube, illustrating the beautiful colour-effects obtained under the kathode rays, and Prof. T. Johnson showed a series of specimens of rubber-producing plants and their products in various stages of manufacture.

EDINBURGH.

Royal Society, January 23.—Sir Arthur Mitchell, K.C.B., in the chair.—Lord McLaren presented a communication on the symmetrical solution of the ellipse-glissette elimination problem.—Prof. Cossar Ewart read a second instalment of his experimental contributions to the theory of heredity, in which facts and theories of reversion were taken up in considerable detail. The question was as to how far the resemblance of offspring to a recent or remote ancestor was a mere coincidence, or due to chance, or governed by what may be termed the law of reversion. Instances were very familiar in which the offspring, instead of displaying characteristics intermediate to those of the parents, strongly resembled one or other, or some grandparent, or even a more remote ancestor. Thus, it was a notorious fact that the children of mulattoes varied greatly, some being almost white, while others were darker than their parents. This was clearly a case of reversion. The mental, moral and physical peculiarities of many half-castes might also be explained as being due to reversion, to which there was a strong tendency when the parents belonged to two distinct types of race.

February 6.—Lord Kelvin in the chair.—Prof. Crum Brown, in a note on Nernst's "osmotic experiment," in which a water septum fixed in bladder separates pure ether from a solution of benzol in ether, gave what seemed to him the simple explanation of the phenomenon in terms of diffusion as determined by the gradient of concentration, and described and exhibited a new form of experiment in which the semi-permeable septum moved up as osmosis proceeded. A sufficiently dense solution of calcium nitrate was separated from a solution of phenol in water by a layer of phenol. As the water diffused through from above, the layer of phenol gradually rose. Basing on his view of the action, Prof. Crum Brown gave a new definition of osmotic pressure which had the merit of being purely experimental without any reference to molecular theories. This definition was to the effect that if two solutions of a given substance are formed at different pressures, they will be of the same concentration when this difference of pressure is equal to the osmotic pressure. Prof. Crum Brown also gave an account of an old proposal of the late Prof. Andrews as to the nomenclature of the anhydrides of acids. The proposal was to use carbonica, sulphurosa, sulphurica, as the ordinary every-day names of CO_2, SO_2, SO_3, which are often erroneously called *acids*, and have other more technical but less convenient names. These names would fall into line with such old familiar words as silica, soda, lithia, &c.—Lord Kelvin read a paper on the application of Sellmeyer's dynamical theory to the dark lines D_1 D_2 produced by vapour of sodium. It was suggested by Becquerel's recent discovery of anomalous dispersion in sodium vapour, the broadening out of the D lines being indicated by Sellmeyer's theory when worked out for a dynamical system of two concentric spherical atoms enclosed in an ether sheath.—In a second communication Lord Kelvin gave some additional theorems on the motion of liquid in an ellipsoidal hollow—a continuation of his paper on the same subject of 1885. One result referred to the great force required to keep the prolate ellipsoid fixed in position when the axis of molecular rotation was inclined at an angle of 45° to the principal axis of figure.—Messrs. A. J. Herbertson and P. C. Waite read a paper on the mean annual rainfall of Australia, being Part I. of a series of papers on the rainfall of Australasia. The results, which cover a period of fifteen years from 1881–95 inclusive, were shown on charts. In years of drought (*e.g.* 1888) about three-quarters of the whole continent had a rainfall of less than 10 inches per annum; but in years of heavy rainfall (such as 1893–94) this region was much diminished in area. The 10-inch line was the limit of sheep-rearing; the 15-inch line, of wheat-growing; the 25-inch line, of maize; and the 40-inch line, of sugar-cane.—Dr. Thomas Muir presented a communication on the multiplication of an alternant by a symmetrical function of the variables.

February 9.—Prof. Copeland in the chair.—At the request of the Council, Vice-Admiral Makaroff, of the Imperial Russian Navy, gave an address on some important oceanographic problems and novel modes of research. He exhibited his own forms of hydrometer and thermograph for ocean work, and described some of the more important results he had obtained in regard to temperature and salinity of the ocean. For example, the isotherms of the surface waters in Formosa Channel run parallel to the mainland, and in certain months the change of temperature is so rapid as we pass across the strait that a seaman could use temperature readings as a guide for steering his craft. A large model was exhibited of the Admiral's "ice-breaker," *Ermack*, which has just been completed to his design by Armstrong, Whitworth, and Co., of Newcastle. There were three screw-propellers in the stern, and also a screw in front for "breaking" the ice. There were special arrangements for moving 150 tons of water from one end of the ship to the other, and for moving 100 tons of water from one side to the other, thus enabling the navigator to change the lie of the ship at will. One of the practical ends for which the ship had been designed was to clear the Kara Sea of ice in early summer, so as to facilitate approach to the Obi and Yenisei Rivers. If this were successfully accomplished, then in all probability a trip to the North Pole would be attempted.

Mathematical Society, February 10.—Dr. Morgan, President, in the chair.—The following papers were read:—The eight queens' problem, by Dr. Sprague; on a problem of Lewis Carroll's, by Prof. Steggall.

PARIS.

Academy of Sciences, February 20.—M. van Tieghem in the chair.—The work of the soil, by M. P. P. Dehérain.—An experimental study of the relations existing between the state of aeration, and capacity of holding water possessed by a soil and plant growth.—Heat effects produced by stretching india-rubber, under conditions which may be realised for the elasticity of a muscle under contraction, by M. A. Chauveau.—Estimation of carbon monoxide, by M. Armand Gautier. A reclamation of priority in reply to some remarks by MM. Schlagdenhauffen and Pagel.—Some remarks on the claim to priority by M. J. Winter on the cryoscopy of urine, by M. Ch. Bouchard.—On the growth of functions defined by differential equations, by M. Émile Borel.—On divergent series and functions defined by a Taylor's series, by M. Le Roy.—On some forms of differential invariants, by M. Émile Cotton.—On the coefficient of expansion characteristic of the perfectly gaseous state, by M. Daniel Berthelot. From a comparison of the results of Amagat and Regnault, the author concludes that the limiting value of the coefficient of expansion of hydrogen is ·0036625 when the pressure is indefinitely reduced, and hence that the absolute zero is −273°·04 C.—On the complex oxides of the rare earths, by MM. G. Wyrouboff and A. Verneuil. Although the ceroso-ceric oxide is quite insoluble in nitric acid, it dissolves very easily when mixed with a certain quantity of lanthanum or didymium oxides. In the present paper the authors have investigated the limits between which the foreign oxides possess this peculiar property, and find that the percentage may vary between 10 and 43 per cent. These results are attributed to the formation of complex oxides of the type $Ce_3O_4.MO$.—Action of oxidising agents upon some amides, by M. Œchsner de Coninck.—On the law of dilution of electrolytes, by M. P. Th. Muller. The difference between the molecular conductivity μ and that at infinite dilution μ_∞ was shown by Oswald to be a function of the volume only. According to the author, if $\delta = \mu_\infty - \mu$, then when the volume $v = 2^n$, the expression for δ is of the form $\delta = A\,(\frac{3}{4})^n$, A being a constant. From this is deduced a formula for molecular conductivities of neutral salts formed of monovalent ions, $\mu = \mu_\infty - 52{\cdot}72\ v^{(0{\cdot}41504)}$.—On a new method of preparing mixed alkyl-phenolic phospheric ethers, by M. Albert Morel. The mixed ethers are prepared by acting upon $PO(OC_6H_5)_3$ with sodium ethylate.—Action of fermentation amyl alcohol upon its sodium derivative, by M. Guerbet.

In the use of boiling amyl alcohol and sodium as a reducing agent, it was found that the regenerated amyl alcohol had its boiling point raised. This was found to be due to the presence of a new alcohol, $C_{10}H_{22}O$, and its isovaleric ether. A second acid of the composition $C_{10}H_{20}O_2$ is also produced in the same reaction.—Distribution of carbon in humic materials, by M. G. André.—On the embryogeny of *Stoecharthrum Giardi*, by MM. Maurice Caullery and Félix Mesnil.—Contribution to the study of elements peculiar to the general cavity of the Phymosome, by MM. J. Kunstler and A. Gruvel.—On the earthquake at Triphylie of January 22, by M. D. Eginitis.

DIARY OF SOCIETIES.

THURSDAY, MARCH 2.

ROYAL SOCIETY, at 4.30.—Perturbations of the Leonids: Dr. G. J. Stoney, F.R.S., and Dr. Downing, F.R.S.—On Flapping Flight of Aeroplanes: Prof. M. F. Fitzgerald.—On Hydrogen Peroxide as the Active Agent in producing Pictures on a Photographic Plate in the Dark: Dr. Russell, F.R.S.

ROYAL INSTITUTION, at 3.—Toxins and Antitoxins: Dr. Allan Macfadyen.

LINNEAN SOCIETY, at 8.—On the External Nares of the Cormorant: W. P. Pycraft.—On the Irish *Carex rhynchophysa*: G. C. Druce.—On the Fertilisation of *Glaux maritima*, Linn.: Edward Step.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Wireless Telegraphy: G. Marconi.

CHEMICAL SOCIETY, at 8.—Bromomethylfurfuraldehyde: H. J. H. Fenton and Mildred Gostling.—The Action of Metallic Thiocyanates on certain Substituted Carbamic and Oxamic Chlorides, and a New Method for the Production of Thiobiurets: Dr. Augustus Edward Dixon.—Ethylic ββ-Dimethylpropane Tetracarboxylate: W. Trevor Lawrence.—The Action of Alkyl Iodides on Hydroxylamine: Prof. Wyndham R. Dunstan, F.R.S., and Ernest Goulding.

FRIDAY, MARCH 3.

GEOLOGISTS' ASSOCIATION, at 8.—Honeycomb and other Forms of Surface Weathering of Sandstone and Limestone: George Abbott.

QUEKETT MICROSCOPICAL CLUB, at 8.

SATURDAY, MARCH 4.

ROYAL INSTITUTION, at 3.—Mechanical Properties of Bodies: Lord Rayleigh, F.R.S.

MONDAY, MARCH 6.

SOCIETY OF ARTS, at 8.—Cycle Construction and Design: Archibald Sharp.

VICTORIA INSTITUTE, at 4.30.—The Nature of Life, Part II.: Prof. Lionel Beale, F.R.S.

TUESDAY, MARCH 7.

ROYAL INSTITUTION, at 3.—Morphology of the Mollusca: Prof. E. Ray Lankester, F.R.S.

ZOOLOGICAL SOCIETY, at 8.30.—Exhibition and Remarks upon Specimens of the *Medusæ* of Lake Tanganyika: J. E. S. Moore.—On the Chimpanzees and their Relationship to the Gorilla: Dr. A. Keith.—On the Myology of the Edentata: Dr. C. A. Windle and Prof. P. G. Parsons.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Water-Tube Boilers for Marine Engines: J. T. Milton.—Recent Trials of the Machinery of War-Ships: Sir. A. J. Durston, K.C.B., R.N., and H. J. Oram, R.N.—Monthly Ballot for Members.

WEDNESDAY, MARCH 8.

SOCIETY OF ARTS, at 8.—Cornish Mines and Miners: J. H. Collins.

GEOLOGICAL SOCIETY, at 8.—On the Evolution of the Genus *Micraster*: A. W. Rowe.—On a Sill and Faulted Inlier in Tideswell Dale (Derbyshire): H. H. Arnold-Bemrose.

THURSDAY, MARCH 9.

ROYAL SOCIETY, at 4.30.—*Probable Papers:* A Preliminary Note upon certain Organisms isolated from Cancer, and their Pathogenic Effects upon Animals: H. G. Plimmer.—On the Gastric Gland of Mollusca and Decapod Crustacea: its Structure and Functions: Dr. MacMunn.

SOCIETY OF ARTS (Indian Section), at 4.30.—Leprosy in India: H. A. Acworth.

MATHEMATICAL SOCIETY, at 8.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Subject announced at Meeting of March 2.

FRIDAY, MARCH 10.

ROYAL INSTITUTION, at 9.—Measuring Extreme Temperatures: Prof. H. L. Callendar.

ROYAL ASTRONOMICAL SOCIETY, at 8.

PHYSICAL SOCIETY, at 5.—(1) A Study of an Apparatus for the Determination of the Rate of Diffusion of Solids dissolved in Liquids; (2) Note on the Source of Energy in Diffusive Convection: Albert Griffiths.—An Exhibition of Dr. A. Wehnelt's Electrolytic Current Interruptor for Ruhmkorff Coils: A. A. Campbell Swinton.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Construction of the Elan Aqueduct, Birmingham Waterworks: H. Lapworth.

MALACOLOGICAL SOCIETY, at 8.

SATURDAY, MARCH 11.

ROYAL INSTITUTION, at 3.—Mechanical Properties of Bodies: Lord Rayleigh, F.R.S.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

BOOKS.—Telegraphy: W. H. Preece and J. Sivewright, 15th edition (Longmans).—The Tutorial Dynamics: W. Briggs and G. H. Bryan (Clive).—Matriculation Directory, January (Clive).—Verhandlungen der Deutschen Zoologischen Gesellschaft auf der Achten Jahresversammlung zu Heidelberg den 1 bis 3, Juni 1898: Prof. J. W. Spengel (Leipzig, Engelmann).—Calendar, &c., of the Department of Science and Art, 1899 (London).—The Science of Life: J. A. Thomson (Blackie).—Allgemeine Biologie: Dr. M. Kasswitz, Zweiter Band (Wien, Perles).—Practical Work in Physics: W. G. Woollcombe, Part 4 (Oxford, Clarendon Press).—Die Medial-Fernrohre: Prof. L. Schupmann (Leipzig, Teubner).—Vertebrate Remains from the Port Kennedy Bone Deposit: E. D. Cope (Philadelphia).—Cambridge Natural History. Vol. ix. Birds: A. H. Evans (Macmillan).—The Chemistry of Coke: O. Simmersbach, translated, &c, by W. C. Anderson (Glasgow, Hodge).—Practical Dictionary of Electrical Engineering and Chemistry: P. Heyne (Grevel).—History of the New World called America: E. J. Payne, Vol. 2 (Oxford, Clarendon Press).—L'Audition et les Organes: Dr. M. E. Gellé (Paris, Alcan).—La Céramique Ancienne et Moderne: E. Guignet and E. Garnier (Paris, Alcan).—Recueil de Données Numériques, Optique, Deux. Fasc. (Paris, Gauthier-Villars).—Lectures on Theoretical and Physical Chemistry: Prof. J. H. van 't Hoff, translated by Prof. R. A. Lehfeldt, Part 1 (Arnold).—Year-Book of the Royal Society, 1899 (Harrison).—Proceedings of the London Mathematical Society, Vol. xxix., 2 parts (Hodgson).—The Great Salt Lake Trail: Colonels Inman and Cody (Macmillan).—Volcanoes, their Structure and Significance: Prof. T. G. Bonney (Murray).—The Penycuik Experiments: Prof J. C. Ewart (Black).—*Electrician* Electrical Trades Directory, 1899 (*Electrician* Company).—The Story of the British Race: J. Munro (Newnes).—Researches into the Origin of the Primitive Constellations of the Greeks, Phoenicians, and Babylonians: J. Brown, jun., Vol. 1 (Williams).—Under the African Sun: Dr. W. J. Ansorge (Heinemann).

PAMPHLETS.—Regeneration und Entwicklung: Dr. H. Strasser (Jena, Fischer).—Die Lehre vom Organismus und ihre Beziuhung zur Sozialwissenschaft: O. Hertwig (Jena, Fischer).

SERIALS.—American Journal of Science, February (New Haven).—Astrophysical Journal, January (Chicago).—Zoologist, February (West).—American Naturalist, February (Boston).—Botanische Jahrbücher, &c, Sechr Band, 3 and 4 Heft (Leipzig).—Plantæ Europeæ: Richter and Gürke, Tomus ii. Fasc. 2 (Leipzig).—Physical Review, January (Macmillan).—Journal of the Franklin Institute, February (Philadelphia).—Engineering Magazine, February (222 Strand).—Annales de l'Observatoire Météorologique, &c., du Mont Blanc, Tome 3 (Paris).—Brain, Part 84 (Macmillan).—National Geographic Magazine, January (Washington).—Le Monde Moderne, February (Paris).—Popular Astronomy, February. Northfield, Minn.).—Memoirs of the Geological Survey of India, Ser. xv. Vol. 1. Part 3 (Calcutta).—Chambers's Journal, March (Chambers).—Journal of the Chemical Society, February (Gurney).—Good Words, March (Isbister).—Sunday Magazine, March (Isbister).—Century Magazine, March (Macmillan).—Journal of the Royal Microscopical Society, February (London).—Photogram, March (Dawbarn).

CONTENTS.