264–273), is a fresh treatment of the problem by methods of the theory of invariants.—On certain properties of symmetric, skew-symmetric, and orthogonal matrices, by W. H. Metzler (pp. 274–282) proves in another way properties of these matrices which have been obtained by Dr. Taber (*L. Math. S. Proc.* vol. xxii.), and Mr. Buchheim (*Messr. of Math.* vol. xiv.). The number closes with a deduction and demonstration of Taylor's formula, by W. H. Echols (pp. 283–4).

Symons's Monthly Meteorological Magazine for September contains an interesting climatological table for seventeen selected stations in the British Empire, for the year 1892. This valuable summary has now been published for several years, and corresponding monthly tables with remarks have been also regularly printed since July, 1881. The highest temperature in the shade was 110°·8 at Adelaide on January 20. This station also recorded the highest temperature in the sun, and had the lowest mean humidity. The lowest shade temperature was 44°·4 at Winnipeg, on January 18; this station had also the greatest yearly and daily range, and the lowest mean temperature. The dampest and most cloudy station was Esquimalt. The greatest rainfall was 95·1 inches at Bombay, and the least, 21·3 inches at Jamaica. Attention is again drawn to the fact that the Australian stations record higher temperatures both in shade and in sun than occur at the East Indian stations. A table is given of the absolute maximum temperature in shade and sun for each of the ten years 1883–92, at Adelaide and Calcutta, and shows an average excess at Adelaide of 5°·2 in shade, and 6°·4 in sun; but the heat is more prolonged in India, and in the hottest months the average maxima in the shade are always higher at Calcutta.

Wiedemann's Annalen der Physik und Chemie, No. 9.—Luminous phenomena in vessels filled with rarefied gas under the influence of rapidly alternating electric fields, by H. Ebert and E. Wiedemann. Gas vessels without electrodes were placed between the condenser plates of a Lecher wire combination. The luminous phenomena were investigated and discussed from the point of view of tubes of electric force undergoing displacement. It was shown that the portion of energy dissipated by radiation is perfectly commensurable with that occurring in the field generally. The glowing of a gas is therefore a sufficient cause for diminution of pressure in tubes of force, and hence for the displacement of tubes in the field, leading to a dissipation of the energy contained in them. Experiments were also made with tubes fitted with electrodes, one or both of which were attached to an end of the Lecher system. It was shown that any metal plate in contact with a rarefied gas and exposed to slightly damped electric oscillations, shows all the phenomena of a kathode. Also, that at every wall suitably crossing a gaseous space filled with electric oscillations a kathode is produced.—Vapour pressures of aqueous solutions at 0° C. by C. Dieterici.—Thermo-electric studies, by E. Englisch.—Concerning the physical interpretation of thermo-electricity, by F. Braun.—Density of dilute aqueous solutions, by F. Kohlrausch and W. Hallwachs.—Solubility of some "insoluble" bodies in water, determined by the electric conductivity of the solutions, by F. Kohlrausch and F. Rose. The determination of small quantities of "insoluble" substances in a large amount of water is subject to many experimental errors due to the necessity of evaporating large quantities of water at the boiling point, whereby the solubility of the material of the dish becomes a disturbing factor. As the laws governing the relation between concentration and electric conductivity are fairly well known, it is possible to arrive at an estimate of minute quantities of dissolved matter by a determination of the electric conductivity of the solution. This method has proved to be very simple, expeditious, and accurate.—On heat generated by dielectric polarisation, by A. Kleiner.—Experiments on the generation of electricity by small drops, by A. L. Holz. A jet of mercury was projected upon an amalgamated copper plate, whence it rebounded in small globules on to a glass plate, and thence to the electrometer. The increase of potential was found to be proportional to the sectional area of the jet, the pressure and height of fall of the mercury, and the size of the saturated glass plate.—Dielectric constants of liquid bodies as dependent upon temperature and the Mossotti-Clausius formula, by A. Franke.—Experiments on the interference of electric waves in air, by I. Klemencic and P. Czermak.—Notice on secondary heatings of galvanic cells, by H. Jahn.

SOCIETIES AND ACADEMIES.

LONDON.

Entomological Society, October 4.—Henry John Elwes, President, in the chair.—Mr. F. Merrifield exhibited specimens showing the effects of temperature in the pupal stage on several species of Lepidoptera. *Vanessa polychloros* was much darkened, especially towards the hinder margin, by a low temperature. *Vanessa c-album* showed effects on both sides, especially in the female; they were striking on the under side. Some *Vanessa io* showed the gradual disintegration, by exposure to a low temperature, of the ocellus on the fore wing, which in the extreme specimens ceased to be an ocellus, and was a remarkable confirmation of Dr. Dixey's views of the origin of that ocellus, as exemplified in the plate attached to his paper in the Entomological Society's Transactions for 1890. Mr. Goss stated that in his experience of *V. c-album* in Northamptonshire, Gloucestershire, Herefordshire, and Monmouthshire, the form with the pale under side was the first brood, occurring in June and July; and that the specimens of the second brood, occurring from the end of July to October, were invariably dark on the under side.—Mr. A. H. Jones exhibited Lepidoptera collected in Corsica in June last, including dark forms of *Polyommatus phlæas*, *Lycæna astrarche*, in which the orange marginal band is very brilliant on upper and under sides of both wings, *Lycæna argus*, the females of which are much suffused with blue, probably var. *calliopis*: a series of *Vanessa urticæ* var. *ichnusa*, bred from larvæ, *Argynnis elisa*, *Satyrus semele* var. *aristæus*, *Satyrus neomiris*, *Cœnonympha corrina*, both spring and summer brood, and many others.—Mr. G. C. Champion exhibited for Mr. G. A. J. Rothney, a number of *Methoca ichneumonoides*, Latr. (female), taken at Bexhill, Sussex, showing great variation from the usual large black and red form.—Dr. D. Sharp, F.R.S., exhibited a pupa of *Galleria mellonella*, on which the eggs of a parasitic Hymenopteron had been deposited while the insect was in the cocoon. He also exhibited the hitherto unique *Asprostoma planifrons*, Westw.—Mr. J. J. Walker exhibited specimens of the following species, viz. *Halobates sericeus*, from the Pacific; *H. sobrinus*, and *H. wüllerstorffi*, from Marquesas Islands; *H. princeps*, from the China Sea; and a female of *H. wüllerstorffi*, with ova attached.—Mr. W. H. B. Fletcher showed a variable series of 75 specimens of *Cymatophora or*, bred in 1893 from larvæ from Sutherland, a series of about 40 *C. ocularis* bred in from stock from Oundle; also a series of 33 moths, all females, supposed to be hybrids between *C. ocularis* male and *C. or* female, from the above stock in each case, bred as a second brood in August and September, 1893. He stated that he placed the reputed parents in a muslin sleeve on a branch of *Populus nigra*, and did not open the sleeve until the resulting larvæ required fresh food. The supposed hybrids resembled the female parent, except that both orbicular and reniform stigmata were very conspicuous, being pure white filled up slightly with black.—Mr. F. J. Hanbury exhibited a specimen of *Leucania vitellina*, taken at Brockenhurst on August 24, 1893, and another taken at Freshwater, Isle of Wight, on September 7; also an extraordinary *Gonepteryx rhamni*, showing red blotches at the tips of the fore wings, taken at Walthamstow, Essex.—Mr. C. G. Barrett exhibited a gynandrous *Argynnis paphia* recently taken in the New Forest by Mr. Cardew.—Mr. J. M. Adye exhibited a specimen of *Deilephila livornica* recently caught at Christchurch, Hants.—Mr. Elwes exhibited and described two species of the genus *Œneis* (*Chionobas*, Bdv.) *Œ. beani* and *Œ. alberta*, from North America, which had not been previously described, and stated that he had prepared a revision of this very difficult genus, which would be read at the November meeting.—Mr. Osbert Salvin, F.R.S., exhibited a new genus and species of Papilionidæ (*Baronia brevicornis*). He also communicated a paper entitled "Description of a new genus and species of Papilionidæ from Mexico."—Dr. Sharp read a paper entitled "On the Cost and Value of Insect Collections." Mr. W. F. H. Blandford, Mr. McLachlan, F.R.S., Mr. Jacoby, Mr. Waterhouse, and the President took part in the discussion which ensued.—Prof. Auguste Forel communicated a paper entitled "Formicides de St. Vincent, récoltées par Mons. H. H. Smith."—Mr. Blandford read a paper entitled "Description of a New Subfamily of the Scolytidæ." The President, Mr. Jacoby, and Mr. Waterhouse took part in the discussion which ensued.

PARIS.

Academy of Sciences, October 9.—M. Lœwy in the chair.—On the theory of pyro-electricity and piezo-electricity, by Lord Kelvin.—On a class of new transcendentals, by M. Emile Picard.—Theorem on triple orthogonal systems, by M. Lucien Lévy.—Circles or spheres derived from a plane or solid envelope of any class, by M. Paul Serret.—On the aperture fringes, in the experiment with parallel gratings, by M. Georges Meslin. These fringes are independent of the form, the size, and the orientation of the slit; they do not require a particular position of the screen or the slit, and the use of a lens is not indispensable. Their essential characteristic is that of exhibiting alternate colorations, which are sensibly complementary. In other respects they present the same aspect as those produced by one slit illuminating one grating. But the black fringes, which are very fine in the first case, are less sharply defined; the second phenomenon does not reproduce the delicate portions of the first, but shows only those bands which have a certain breadth. If the periods of the gratings are identical, the bands are sharply defined. If the illuminating grating has a number of slits per mm. equal to half that of the second, the colorations are the same, but less brilliant. On reversing the positions, the fringes become achromatic, owing to the superposition of the red and green bands of the two systems.—On the relation between the precipitation of chlorides by hydrochloric acid and the lowering of the boiling point, by M. R. Engel. To precipitate one molecule of a chloride from its saturated solution at 0° requires in the case of monovalent chlorides, one molecule of HCl, and in the case of divalent chlorides, two molecules. This is now proved also to hold good for temperatures other than 0°, and for double chlorides, like that of copper and ammonium, containing four atoms of chlorine and requiring four molecules of HCl. The molecular depression of the freezing point of solutions of the various chlorides was also investigated in its relation to the concentration. It was found that for the monovalent chlorides the molecular depression remains sensibly the same, varying between 35 and 40, but tends to reach twice that value for divalent, and four times that value for tetravalent chlorides. Hence at the freezing point of the saturated solution of alkaline chlorides, bromides, and iodides, there must be a relation between the atomic weights of the constituents of the molecule and the solubility.—On the variations of glycogeny in anthrax infection, by M. H. Roger. The glycogenic function remains intact during the first stages of anthrax infection. The amount of sugar contained in the blood is normal or slightly diminished. At the end of the disease, the hepatic glycogen rapidly disappears and a considerable hyperglycemia is produced.—Researches on the extension of the blastoderm and the orientation of the embryo in the ova of the Teleostea, by MM. R. Kœhler and E. Bataillon.—On the localisation of the active principle in the Capparideæ, by M. Léon Guignard. The existence of special ferment cells is general in the Capparideæ. By their morphological characteristics in the root and the stem they resemble those found in the corresponding organs of the Cruciferæ. In the leaf and especially the flower of the caper-tree their grouping is peculiar. All the reactions of their contents are those of myrosine. In the capers they are most numerous, and the glucoside is most abundant. The grains of all Capparideæ, however, are relatively poor in ferment and in glucoside, and of their two constituents the embryo alone contains the ferment.—Sexual reproduction of the Ustilagineæ, by M. P. A. Dangeard.—On plane-tree honey, by M. Edm. Jandrier. During dry summers an exudation of varying consistence and aspect may be found on certain planes (*Platanus Orientalis*). It is sometimes dry and bright, sometimes pasty and yellowish, and contains, besides a small quantity of reducing sugar, probably glucose, about 80 or 90 per cent. of mannite, which may be extracted with the greatest ease by means of boiling alcohol and crystallisation.—Observation of an Aurora Borealis, by M. le duc Nicolas de Leuchtenberg. This was observed from the camp at Krasnoe Selo in the middle of July, about 10h. 30m. p.m. Its apex was situated very near the zenith, and seemed based upon a cluster of light vapours from which regular and regularly spaced bands proceeded, passing from white to a delicate pink and green, with a vibration resembling that exhibited by rarefied gases in Geissler tubes. It was seen to last about a quarter of an hour.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

BOOKS.—Solutions of the Examples in the Elements of Statics and Dynamics: S. Soney (Camb. Univ. Press).—An Elementary Treatise on Theoretical Mechanics, Part 1, Kinematics: A. Ziwet (Macmillan).—Textbook of Geology: Sir A. Geikie, 3rd edition (Macmillan).—Eskimo Life: F. Nansen, translated by W. Archer (Longmans).—Key to Carroll's Geometry (Burns and Oates).—The Shrubs of North-eastern America: C. S. Newhall (Putnam).—Handbook of Public Health and Demography: Dr. E. F. Willoughby (Macmillan).—An Elementary Treatise on the Geometry of Conics: A. Mukhopadhyay (Macmillan).—A Treatise on Hygiene and Public Health, Vol. 2, edited by Dr. T. Stevenson and S. F. Murphy (Churchill).—Vorlesungen über Maxwell's Theorie der Elektricität und des Lichtes ii. Theil: Dr. L. Boltzmann (Leipzig, Barth).—Healthy Hospitals: Sir D. Galton (Oxford, Clarendon Press).—Sporozoen als Krankheitserreger, Erstes Heft: Dr. A. Korotneff (Berlin, Friedländer).—Zoological Record 1892 (Gurney and Jackson).—Everybody's Letter Writer (Saxon).—The Out-door World: W. Furneaux (Longmans).

PAMPHLETS.—Reports of the Director of the Michigan Mining School for 1890-92 (Lansing).—Anleitung zur Krystallberechnung: Dr. B. Hecht (Leipzig, Barth).—Report on the Present State of our Knowledge respecting the General Circulation of the Atmosphere: L. T. de Bort (Stanford).—History of Slavery in Connecticut: Dr. B. C. Steiner (Baltimore).—Merchant Venturer's School, Prospectus 1893-94 (Bristol).—The Interdependence of Abstract Science and Engineering: Dr. W. Anderson (London).

SERIALS.—Mind, October (Williams and Norgate).—American Meteorological Journal, October (Ginn).—Boletin del Instituto Geografico Argentino, tomo xiv. Cuadermos 1 to 4 (Buenos Aires).—American Journal of Science, October (New Haven).—American Naturalist, September (Philadelphia).—John Hopkins University, Baltimore, Studies from the Biological Laboratory, Vol. v. No. 4 (Baltimore).—Records of the Geological Survey of India, Vol. xxvi. Part 3 (Calcutta).—Botanische Jahrbücher, Siebzehnter Band, 3 and 4 Heft (Williams and Norgate).—Kryptogamen-Flora von Schlesien, 3 Band, 2 Hälfte, 1 Lief (Williams and Norgate).—Annals of Scottish Natural History, No. 8 (Edinburgh, Douglas).—Agricultural Gazette of N.S.W., August (Sydney).—Palestine Exploration Fund. Quarterly Statement, October (Watt).—Nyt Magazin for Natur videnskaberne, 34 ke Binds, 2 det Hefte (Christiana).—Proceedings and Transactions of the Nova Scotian Institute of Science, Halifax, 2nd series, Vol. i. Part 2 (Halifax, Nova Scotia).

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