placement, on the direction of the current, the author is unable to account for satisfactorily; they cannot, he thinks, be due to inductive action.—Some researches by Dr. Neesen on attraction and repulsion by rays of light and heat are noticed in our "Science in Germany."—M. Soret describes the diffraction phenomena obtained with circular gratings, consisting of opaque discs with a series of openings in the form of concentric rings; and a paper of "Optical Notes," by Dr. Wolcott Gibbs, of the American Academy, treats of a new optical constant, and a method of measuring indices of refraction without employment of graduated instruments.—M. Fuchs shows how the electrometer may be used for determining intensity of current, polarisation, and resistance; and M. Mach describes a polarisation apparatus with rotating analyser.

Bulletin de l'Academie Impériale des Sciences de St. Petersbourg. (t. xix. Nos. 4 and 5; t. xx. Nos. 1 and 2).—From these publications we notice the following more important papers:—On the double star Σ 634 = Camelopardali 19, Hev., by Dr. O. Struve.—On the salts of parabanic acid, by N. Mentchutkine; the author considers the potash, soda, ammonia, and silver salts of this acid.—On oxalurate of potash and on the determination of potassium in the salts of the acids of the uric group, by the same.—On the velocity of irritation in the spinal marrow, by E. Cyon.—Researches on blood, by Heinr. Struve.—On carbon tetraiodide, by M. G. Gustavson.—On a simple evaporimeter, alike useful in winter or summer, by H. Wild.—Continued observations of the companion of Procyon, by O. Struve.—On dimethylisobutylcarbinol and the new heptylene obtained by means of this alcohol, by M. D. Pawlow.—On iodide of ethylidene, by M. G. Gustavson.—On the chemical structure of pinacoline, by M. A. Boutlerow.—Preliminary note on the elasticity of rarefied air, by M. D. Mendeleeff and M. Kirpitschoff.—Diagnoses plantarum novarum Japoniæ et Mandshuriæ, by C. J. Maximowicz.—Report on a new iron meteorite from the shores of the Angara river, in the government of Jenisseisk, by M. A. Goebel.—Observations of the planets at the Academical Observatory of St. Petersburg; determination of the longitude of the ascending node in the orbit of Mars, by A. Savitsch.—Results of measurements made on crystals of arragonite, copper, pyrites, and skorodite, by N. von Kokscharow.—On the doubts recently raised on the cosmical origin of the Pallas iron, and a refutation of the same, by M. A. Goebel.—Hydrological researches, by Prof. C. Schmidt, of Dorpat. The author treats of the Caspian Sea, the Sea of Aral, the Dwina, and the White Sea.—On a method to obtain a uniform exposure in photographing the sun, by Dr. B. Hasselberg.—On the existence of a resisting medium in celestial space, by Dr. E. von Asten.—Researches on the theory of the determination of orbits, by Fr. W. Berg.—Barycentric theorem, which gives a means to express the duration of any movement of a point, by relation of two straight lines; by J. Somoff.—A note on perowskite crystals, by N. von Kokscharow; the author describes the determination of perowskite forms by approximate measurements made with the ordinary reflexion goniometer of Wollaston, the nature of the perowskite crystals from the Ural Mountains, and the angles measured.—Results of exact measurements of sulphur crystals, by the same. Analysis of the observations made in the Caucasus on terrestial refraction, by M. Sawitch.—A note on mechanisms which retard reflex actions, by J. Setschenow.

SOCIETIES AND ACADEMIES

LONDON

Linnean Society, Nov. 4.—Dr. G. J. Allman, F.R.S., president, in the chair.—The following papers were read:—Observations on Bees, Wasps, and Ants, Part III., by Sir John Lubbock, Bart., F.R.S. An abstract of this paper appears in another column.—On the rate of growth of the female flower-stalk of *Vallisneria spiralis*, by A. W. Bennett, F.L.S. The peduncle of the female flower of this plant is remarkable for the rapidity of its growth, attaining a length of from three to four feet, and increasing, at its period of greatest energy, at the rate of half an inch per hour. The observations were chiefly directed to determine which portion of the peduncle displayed the greatest part of this energy; and this was found to lie in a portion at but a short distance below the flower-bud; a marked zone of two inches increasing ultimately relatively to the remainder of the flower-stalk about in the proportion of three to two. This displays a greater analogy to what has been hitherto observed in the case of roots than in that of aërial stems. The coiling up of the peduncle so as to bring the flower beneath the surface does not take place when the flower has not been impregnated.—On plants collected by Lieut. Cameron about Lake Tanganyika, by Prof. Oliver, F.R.S.—On a collection of North Celebes plants made by M. Riedel, by Prof. Oliver, F.R.S.

Chemical Society, Nov. 4.—Prof. Abel, F.R.S., president, in the chair.—First paper, On the decomposition of stearic acid by distillation under pressure, by Mr. G. Johnston.—Dr. C. R. A. Wright read a paper, by himself and Mr. G. A. Beckett, On Isomeric Terpenes and their Derivatives, being Part V. of their researches on this subject; also one On the Alkaloids contained in the Aconites, Part I.; after which Mr. F. J. M. Page gave an account of a simple form of gas regulator for maintaining a constant temperature in air-baths, water-baths, incubators, &c.—Communications were also read from Mr. R. W. E. M'Ivor, on the fluorides of arsenic, phosphorus, and iodine; and on the iodide of antimony.—The last paper, On Tolylphenyl, a new hydrocarbon, was by Mr. T. Carnelly.

Zoological Society, Nov. 2.—Dr. E. Hamilton, V.P., in the chair.—The Secretary read a report on the additions that had been made to the Society's Menagerie during the months of June, July, August, and September, 1875.—A letter was read from Signor L. M. D'Albertis, giving some account of several excursions he had made into Southern New Guinea from his present quarters in Yule Island.—A note was read from Mr. Walter J. Hoffman, describing a horn of an American Prong-horn (*Antilocapra americana*), with a double prong.—A letter was read from Capt. J. Moresby, R.N., giving the exact locality of the young *Casuarius uni-appendiculatus*, presented by him to the Society in August 1874.—A communication was read from Dr. P. von Bleeker, containing a description of a rare Central-Asiatic fish (*Elopichthys dahuricus*.—A communication was read from Mr. Edgar A. Smith, containing the description of a new species of *Carinifex* from California, which he proposed to name *Carinifex ponsonbii*.—A second communication from Mr. Smith contained remarks on the genus *Alaba*, with the description of a new species.—A communication was read from Mr. W. T. Blanford correcting certain errors in the figures of *Herpestes ferrugineus* and *Ovis polii*, in the Society's Proceedings.—Mr. P. L. Sclater, F.R.S., and Mr. O. Salvin, F.R.S., read a paper giving the descriptions of two birds from Medellin, State of Antioquia, U.S.C., which appeared to be new to science, and were named *Catharus phaopleurus* and *Automolus holostictus*.—Mr. A. H. Garrod read a report on the causes of death of the Indian elephant which died in the Gardens on July 7, 1875.—A communication was read from the Rev. S. J. Whitmee, of Samoa, on the habits of the fishes of the genus *Antennarius*.—A communication was read from Mr. G. E. Dobson, containing a monograph of the bats of the genus *Taphozous*, Geoffr.—A communication was read from Dr. Otto Finsch, containing notes on the pigeons of the genus *Chrysœna*.—A communication was read from Dr. J. S. Bowerbank, F.R.S., being the fifth part of his monograph of the siliceo-fibrous sponges.

Royal Microscopical Society, Nov. 3.—Mr. H. C. Sorby, F.R.S., president, in the chair.—A very interesting paper was read by the President, On a new method of measuring bands in spectra. It was first explained that by means of the ordinary quartz absorption band plate, the exact position of a spectrum line not coinciding with either of the absorption bands, could not be accurately determined; and the necessity for so doing having been shown, the author described and figured his new contrivance designed for the purpose. It consisted of a piece of quartz about 1¼ inches thick, and cut with parallel surfaces exactly at right-angles to the principal axis of the crystal, along the line of which there was no polarisation. This gave a series of seven dark bands when placed between two Nicol prisms and viewed through the spectroscope. By rotating the upper prism the position of the first band could readily be made to coincide with any given fixed line as D, and by the rotation of the lower prism the series of bands could be caused to traverse the entire spectrum, each half rotation moving them forward the precise amount of the distance existing between them. A graduated scale marked upon a circle attached to the lower prism enabled the position of the bands to be compared with great accuracy with that which they originally occupied, and of course also with that of any fixed lines shown in the comparison spectrum. A paper by Dr. J. J. Woodward (U.S.A.), on *Frustulia Saxonica*, was read by the Secretary.

CAMBRIDGE

Philosophical Society, Oct. 25.—Mr. J. W. L. Glaisher read a paper on Herwart ab Hohenburg's Tabulæ arithmeticæ προσθαφαιρεσεως universales, Munich, 1610. The book is a very large and thick folio, and contains a multiplication table up to 1000 × 1000, the thousand multiples of any one number being given on the same page. There is an introduction of seven pages, in which the use of the tables in multiplying numbers containing more than three figures, and in the solution of spherical triangles, is explained. Very little information with regard to the work is to be obtained from the mathematical bibliographers and historians, Heilbronner, Kästner, Scheibel, Marhard, Rogg, Montucla, Lalande, &c. De Morgan writes: "Herwart passes for the author, but nothing indicates more than that the manuscript was found in his collection. The book is excessively rare; a copy sold by auction a few years ago was the only one we ever saw." While preparing the report of the British Association Committee on Mathematical Tables, Mr. Glaisher had endeavoured without success to obtain some further information about this great multiplication table, which has never been exceeded, and which is only equalled by Crelle's Rechentafeln, which first appeared in 1820, and is now in general use. But recently he had found a correspondence of six letters between Herwart and Kepler, which are printed in vol. iv. (1863) of Frisch's complete edition of Kepler's works, and which throw light upon the table in question. In the first, dated September 13, 1608, Herwart mentions that he has been in the habit of using a special praxis for avoiding the labour of multiplication, and which his friends have recommended him to print. He adds that without it he should long ago have had to give up all mathematics which involved calculation, on account of his many occupations and because he was not a good computer. He encloses a page as a specimen. Kepler replies that he thinks the table will be useful, and he urges that its uses in the solution of spherical triangles should be noticed, pointing out its superiority in point of clearness to the "προσθαφαιρεσις Vitichiana," which is too complicated to be retained in the memory. Herwart replies that he had already thought of its application in prosthaphæresis; he suggests a title for the book, and asks for Kepler's opinion; and in the last letter of the correspondence Kepler proposes the title "Χειραχθεια sive Novæ Tabulæ, quibus Arithmetici debitis inextricabilibus multiplicandi et dividendi liberantur, ingenio, tempori, viribusque ratiocinantis consulitur." It is thus proved that the table was printed from a manuscript which Herwart used himself, and which very likely he had had made. As for the word prosthaphæresis, it is well known that the prosthaphæresis of the orbit is the angle subtended at the planet by the eccentricity, and De Morgan explained the use of the word on the title-page thus: "Prosthaphæresis is a word compounded of prosthesis and aphæresis, and means addition and subtraction. Astronomical corrections sometimes additive and sometimes subtractive were called prosthaphæreses. The constant necessity for multiplication in forming proportional parts for the corrections gave rise to this table, which had the name of its application on its title-page." But the prosthaphæresis referred to seems most likely a method of solving spherical triangles in which the product of two sines or of a sine and cosine is avoided by the use of formulæ such as $\sin a \sin b = \frac{1}{2}\{\cos(a-b) - \cos(a+b)\}$, and such a method is associated with the name of Wittich. This explains all Kepler's allusions, and why Herwart employed the word on his title-page, as he proposed to avoid the necessity of the transformation by rendering easy the operation of the simple multiplication. A copy of Herwart's work borrowed, through the kindness of Prof. Henrici, from the Graves Library at University College, London, was exhibited to the meeting.

MANCHESTER

Scientific Students' Association, Oct. 20.—Mr. Mark Stirrup gave a short account of a visit to the celebrated Chesil Bank, on the coast of Dorset, and exhibited some specimens of the pebbles therefrom. The source whence these pebbles were derived and their mode of accumulation, as explained by many writers on the subject, were referred to. All these explanations have failed to account satisfactorily for a deposit of such vast magnitude, and there is no doubt that the views recently enunciated by Prof. Prestwich, F.R.S. (see NATURE, vol. xi., p. 299), go far to clear up the difficulty.

PARIS

Academy of Sciences, Nov. 2.—M. Frémy in the chair. The following papers were read:—Determination of the class of envelope-curves which present themselves in questions of equality of size of two segments made on tangents of geometric curves, by M. Chasles.—On the steam carriage of M. Bollée, of Mans, by M. Tresca.—Fourteenth note on the electric conductivity of mediocre conductors, by M. Du Moncel. These experiments were with various metallic filings and the powder of metallic minerals, graphite, and retort charcoal, which were compressed into prisms between mica-plates. When heated, their conductivity at first diminishes somewhat, but it then increases very rapidly. When the heating ceases, it diminishes again, and after some time the intensity of the current becomes much less than it was at first. Thermo-electrical and chemical effects are also described.—On the useful effect of steam injectors (concluded), by M. Ledieu.—On the laws which govern reactions with direct addition (continued), by M. Markovnikoff.—On the unipolar electric excitation of nerves: comparison of the activity of the two poles during the passage of battery currents, by M. Chauveau. The subject was placed half in salt water, and a fine electrode applied to a point selected on the skin of the emergent portion; the other electrode was held in the liquid. Or the two electrodes were placed on two nerves sufficiently apart. M. Chauveau finds that for every healthy subject there is a certain moderate intensity of current, with which the contractions produced by the positive and negative excitation are equal in extent and duration; *below* this intensity the negative pole has the greater action; *above* it, the positive.—On the general arrangement of the nervous system in stylommatophorous pulmonate gasteropod molluscs, by M. Fischer.—Results obtained by means of sulphocarbonate of potassium on vines attacked by Phylloxera at Mezel. M. Dumas, summing up the testimony on this point, said the sulphocarbonates had everywhere proved effective (where used) in destroying the insect, and they rather improved than injured the quality of the vines.—On the method of Cauchy for the integration of an equation with partial derivatives of the first order, by M. Mansion.—M. Sainte-Claire Deville gave an extract from a letter by M. Fouqué, describing observations of volcanic phenomena in the island of Santorin.—The Perpetual Secretary called attention to a work of "Researches on the Combustion of Coal," by MM. Scheurer, Kestner, and Mennier-Dollfus; also to a memoir by MM. Marion and Borretzky, on the Annelids of the Bay of Marseilles. He further announced the publication, by M. Dummler, of a *résumé* of works of the Berlin Academy of Sciences from 1822 to 1872.

BOOKS AND PAMPHLETS RECEIVED

BRITISH.—Air and its Relations to Life: W. Noel Hartley, F.C.S. (Longmans).—The Princes of India: Sir E. Sullivan, Bart. (Stanford).—Inaugural Address of the West London Scientific Association and Field Club. Session 1875-6: Rev. G. Henslow, M.A., F.L.S.—Notes of Travel in South Africa: Chas. J. Anderson. Edited by J. Lloyd (Hurst and Blackett).—The Revised Theory of Light: W. Cave Thomas (Smith, Elder, and Co.)

CONTENTS