

South Australia): Gold Medal, Frank Herman Becker, Dulwich College; Silver Medal, Sydney Charles Farlow, Harrow School. Honourably mentioned: Robert Galbraith Reid, Dulwich College.

### SCIENTIFIC SERIALS

*Journal of the Franklin Institute*, February.—On the behaviour of steam in the steam-engine cylinders, and on causes of efficiency, by R. H. Thurston.—What is the most economical point of cut-off for steam-engines, considered as a question of finance? by W. D. Marks.—Contribution to the history of the link motion, by J. L. Whetstone.—A new theory of the suspension system with stiffening truss, by A. J. Dubois.—Steamship performance, by J. W. Nystrom.—Radio-dynamics; atomic phyllotaxy and kindred harmonies, by P. E. Chase.

*Bulletin de l'Académie Royale des Sciences de Belgique*, No. 12, 1881.—On the probable cause of variations of latitude and terrestrial magnetism, by F. Folie.—Remarks on the electric phenomena which accompany variations of the potential energy of mercury, by G. Van der Mensbrugge.—On compound ethers of hyposulphurous acid, by W. Spring and E. Legros.—On the action of chlorine in sulphonic combinations, and on organic oxysulphides, by W. Spring and C. Winsinger.—On the action of chlorine on tertiary butylic alcohol, by Baron d'Otreppe de Bouvette.—On the structure of gemmiform pedicellaria of *Sphaerichinus granularis* and other Echinida, by A. Foettinger.—Researches on the organisation and development of Orthonecetes, by C. Julin.—On the respiratory oscillations of the arterial pressure in the dog, by L. Fredericq.—On the delimitation and constitution of the lower coal-formation of Belgium, by J. C. Purves.—On the oscillations of blood-pressure called Periods, of Traube-Hering, by L. Fredericq.—A page of the history of a whale, or cetology fifty years ago: lecture by P. J. Van Beneden.—History of astronomy in Belgium: lecture by F. Folie.

*Reale Istituto Lombardo di Scienze e Lettere. Rendiconti*, vol. xv. fasc. iii.—Meteorological résumé of the year 1881, calculated from observations made in the Royal Observatory of Boera, by E. Pini.—On the achromasia of aphaneria (*i.e.* colourlessness of certain minute organisms), by L. Maggi.—On the toxic action of hydroxylamide, by C. Raimondi and G. Bertoni.

*Atti della R. Accademia dei Lincei*, vol. vi. fasc. 6.—On Hieratite, a new mineralogical species, by A. Cossa.—On monobromopyridine, by L. Danesi.—Observations in addition to the memoir entitled "On an Organ of some Vegetable Embryos," by G. Briosi.—On the extraordinary atmospheric pressure of January, 1882, by L. Respighi.

*Bulletins de la Société d'Anthropologie de Paris*, tom. iv. fasc. iii., 1881.—M. Thulié concludes his paper on the differences between the true Bosjesmans and Hottentots, the former of whom he regards as survivors of an aboriginal, and once predominant race.—M. Topinard's report of his observations on the indigenous races of Algeria during a brief sojourn in that province, has given occasion—through his disregard of his own rules of ethnological inquiry, and his hastily formed views based on mere appearance—to the most interesting of the papers and discussions reported in these *Bulletins*. Among these are the comprehensive expositions which M. Topinard gave at a subsequent meeting of his "Méthode d'observation sur le vivant à propos de la discussion sur l'Algérie," and the description of his own modification of "Broca's Goniometer for measuring Cuvier's facial angle on the living subject."—M. Sabatier, in a paper on the different appellations used by the ancients to designate the peoples of Africa, endeavours to prove the existence of close analogies between Sanskrit, Greek, and the Berber dialect, as shown in the names of leading African peoples, which he derives either from their predominant occupations, or the nature of the region in which they dwelt.—M. Ameghino describes the result of his recent explorations of the Chelles beds, in which no human remains have been found, while those of the elephant, rhinoceros, and cave-bear are numerous, together with an abundance of aqueous, but no terrestrial shells.—M. Cavaroz reports his discovery of an atelier of flint implements in the Jura, near Salines, which appears to belong to the Neolithic age.—M. le Baron presented his report on prehistoric osseous lesions, which forms the subject of his inaugural thesis, and is based on a study of the specimens contained in the Broca, and the Society's,

Museum. The list of diseases includes most of the modern forms, common in infancy and advanced age, while the numerous instances of trepanning, and the not infrequent cases of well consolidated fractures show that primæval man was not wholly negligent, or unskilled in regard to surgical methods.—A new case of so-called hermaphroditism reported by M. Magitot, gave rise to considerable discussion, in the course of which it was agreed that the use of the term was not in harmony with the present state of physiological inquiry, and that the abnormalities in question ought to be included under the general head of malformations, or embryonic arrest of development.—We have further to notice papers by Madame Clemence Royer, on "Le Bien et la loi Morale"; by M. Zaborowski on the memory and its disturbances; by Mr. Foley, on the relations between the mode of life and character of tropical peoples, and the humid climate in which they live; and finally, two highly important communications, received from M. de Ujfalvy, on the craniometric and other measurements made by him while travelling in the Thibetian, Kashmir, and other Indian territories. His observations on the Baltis, Lhassas, Ladakis, Koulous, and Lahoulis—the two last-named of which practise polyandry, and follow a degraded form of Bouddhism—supply highly interesting, and hitherto unknown materials towards our better acquaintance with the ethnological and sociological history of these tribes.

### SOCIETIES AND ACADEMIES

#### LONDON

**Royal Society**, March 9, 1882.—"On the Spectrum of Carbon," by G. D. Liveing, M.A., F.R.S., Professor of Chemistry, and J. Dewar, M.A., F.R.S., Jacksonian Professor, University of Cambridge.

Angström and Thalén, in their memoir "On the Spectra of the Metalloids" (*Nova Acta Reg. Soc. Upsal.*, Ser. iii. vol. ix.), give a map and table of wave-lengths of the lines due to carbon in the visible part of the spectrum, as distinguished from the fluted spectra given by compounds of carbon, namely, carbonic oxide, cyanogen, and acetylene. These lines, they state, always appeared when very powerful induction sparks were passed through the vapour of any compound of carbon, or between carbon electrodes. This line-spectrum is remarkable for simplicity, consisting of eleven lines, of which the single line in the yellow, followed by a triple group in the green, and a very strong line in the blue, recall vividly the spectrum of magnesium; and as we know two modifications of the spectrum of magnesium which seem to be due respectively to the oxide and a hydride, the parallel between the behaviour of the two elements is the more striking.

The authors figure the ultra-violet spectrum of carbon to a scale of wave-lengths within the range of the rays transmitted through calcite. The lines figured have been observed in photographs of the spark of a large induction coil, having a large Leyden jar in connection with the secondary coil, between poles of purified graphite in air, carbonic acid gas, hydrogen, and coal-gas. The same lines have been observed in photographs of the spark between iron, and between aluminium poles in carbonic acid gas. By comparing the photographs taken under these different circumstances, they have, they believe, eliminated the air-lines, which are numerous and strong in the region between H and T, and also the metallic lines which graphite, purified with the utmost care, still exhibited.

The graphite was purified by being stirred in fine powder into fused potash, and subsequent treatment with aqua regia, by prolonged ignition in a current of chlorine, and by treatment with hydrofluoric acid. The well-washed powder was afterwards compressed into blocks by hydraulic pressure between platinum plates, and from these blocks the electrodes employed were cut. Notwithstanding the purification, the photographs of the spark between these electrodes still showed very distinctly lines of magnesium and iron.

The wave-lengths of the strongest carbon lines were determined by means of a Rutherford diffraction grating having 17,296 lines to the inch. The measures were made in the following way:—A small photographic slide, containing the sensitive plate, fitted the telescope in place of the eye-piece, and so could easily be turned about an axis coincident, or nearly so, with the optic axis of the telescope. In taking a measurement of the position of a line the approximate wave-length was first found by interpolating between the nearest cadmium or other lines of known wave-length in photographs taken with calcite prisms.

The telescope was then set to the angle corresponding to this approximate wave-length for the spectrum of the fourth order. The lower half of the slit was closed by a shutter, and the photographic slide having been adjusted for level, the plate was exposed to the light which came through the upper half of the slit, and gave an image of the lines in the lower half of the field. When this exposure was completed, the photographic slide was turned round through  $180^\circ$  about the axis of the telescope, so as to bring to the top that part of the sensitive plate which had been before lowest. It was then exposed a second time, and thus two images of the same line were impressed on the plate, which were necessarily at equal distances on either side of the point where the axis of the telescope met the plate. By a subsequent measurement with a micrometer under a microscope of the distance between the two images, and the conversion of this distance into angular measure, a correction was found, which was added to, or subtracted from, the reading of the circle to get the exact deviation of the ray producing the line under observation. Another photograph of the same line was next taken in the same way as before, except that the telescope was placed at the corresponding angle on the other side of the collimator. From the two angles thus found, the wave-length of the line was calculated. The process was repeated three or four times for each line, and the mean wave-lengths thus found for carbon lines were 2296.5, 2478.3, 2509.0, 2511.9, 2836.3, and 2837.2. The wave-lengths of the remaining lines were obtained by interpolation from measures of photographs on which the iron as well as the carbon lines were shown. The wave-lengths of the iron lines used in the interpolations were deduced from photographs taken with the grating in the same way as that above described for the carbon lines. The wave-lengths thus formed for the remaining carbon lines are given in the table below.

Table of Carbon Lines

Authors.	Colour.	Wave-length.	Intensity.
Ångström and Thalén	Red ...	6583.0	2
		6577.5	1
	Orange.	5694.1	4
		5660.9	4
		5646.5	3
	Yellow ...	5638.6	5
		5379.0	6
	Green	5150.5	4
		5144.2	3
	Indigo ...	5133.0	5
		4266.0	1, diffuse
Livinge and Dewar	Ultra-violet.	3919.3	2, diffuse
		3876.5	4, "
		2995.0	4, very diffuse
		2968.0	5, " "
		2837.3	2
		2836.3	2
		2746.5	3, very diffuse
		2733.2	6, " "
		2640.7	4, " "
		2541.5	6
		2528.2	5
		2523.6	5
		2518.7	5
		2515.8	4
		2514.0	5
2511.9	2		
2509.0	3		
2506.6	5		
2478.3	1		
2296.5	3		

They have also examined the spectrum of Swan's incandescent lamps. So long as the carbon thread is unbroken, it emits a continuous spectrum, on which neither bright nor dark lines are visible. By gradually increasing the number of cells in the battery, until the thread gave way, they found at the instant of fracture, for a small fraction of a second only, that a set of flutings in the green appeared. In some of those lamps, when

the current was nearly as much as the carbon thread would bear without rupture, a sort of flame appeared in the lamp. On examining the spectrum of this flame, it gave the flutings of carbonic oxide very distinctly. Closer examination showed that this flame was strongest about the junction of the carbon thread with one of the conducting wires, and that, on reversing the current, it shifted from one wire to the other, and the wire about which it appeared was always the positive electrode. In fact, the flame was the glow of the positive pole attending a discharge in rarefied gas; when the resistance of the carbon thread became too great in proportion to the intensity of the current, the discharge began to occur through the rarefied atmosphere within the envelope of the lamp. The spectrum showed that this atmosphere contained carbonic oxide.

By interposing different flames between the incandescent lamp and the slit of the spectroscopy, they have made some comparisons of the probable temperatures of the flames and filament. When the flame was that of a Bunsen burner, in which was a platinum wire with sodium carbonate, the yellow sodium lines were seen bright above and below the continuous spectrum of the carbon thread, but reversed where they crossed it. When lithium was substituted for sodium in the flame, the red lithium line was also seen bright above and below the continuous spectrum, but reversed where they crossed it. When an oxyhydrogen jet was substituted for the Bunsen burner, and sodium carbonate held in it, the yellow sodium lines were not only bright above and below the continuous spectrum of the carbon, but showed as bright lines where they crossed it; in fact, they were conspicuously brighter than the carbon. When coal-gas was substituted for hydrogen in the jet, the same appearance presented itself, only the sodium lines were not so much brighter than the carbon as they were before. Fifty Grove's cells were used with the incandescent lamp, which were as many as could be used without danger of rupturing the threads. When barium chloride was held in the hydrogen flame fed with only a little oxygen, the bright green line of barium (wave-length 5534) was well seen above and below the continuous spectrum, but could not be traced either bright or dark across it. When a flame of cyanogen burning in air was interposed, the bright bands of that flame could be seen above and below the continuous spectrum, but could not be traced either bright or dark across it. When sodium carbonate was held in this flame, the yellow sodium lines were seen feebly reversed where they crossed the spectrum of the incandescent lamp. They infer from these experiments, that the emissive power of the carbon thread for light of the refrangibility of the D lines is nearly balanced by that of sodium in the flame of cyanogen burning in air, but is sensibly less than that of sodium, at the temperature of a jet of coal-gas and oxygen, much less than that of sodium in the oxyhydrogen jet. This seems to render it probable that the temperature of the incandescent thread is not far different from that given to sodium by a cyanogen flame burning in air, but is less than that of an oxyhydrogen flame, though this does not necessarily follow from the experiments, inasmuch as the radiation of the sodium is so much more limited as to range than that of the carbon. When a Bunsen burner or a gas blowpipe flame was interposed between the lens and slit, no reversal of the hydrocarbon bands could be seen. When magnesium was burnt between the lens and slit, the magnesium lines (*b*) were seen bright, eclipsing the carbon. Possibly the smoke of magnesia may have considerably helped to eclipse the light of the carbon.

**Chemical Society, March 16.**—Prof. Roscoe, president, in the chair.—The following papers were read:—On valency, by Dr. Armstrong. The bulk of this paper is taken up with a consideration of the valency of carbon in the hydrocarbons, and especially with the formulæ proposed by Kekule and others for benzene. The author concludes that a simple hexagon in which carbon acts practically as a triad, agrees best with the various reactions of benzene.—Contributions to the chemical history of the aromatic derivatives of methane, by R. Meldola. The author investigates the action of benzyl chloride upon diphenylamine, and the action of oxidising agents upon the product. The substance thus produced is a green dye, "viridin," which by the action of strong sulphuric acid forms sulphonic acids, the alkaline salts of one of these acids dyes woollen fabrics from an alkaline bath. This colour is the chloride of a base which the author has proved to be diphenyl diamidotriphenyl carbinol.—On some constituents of resin spirits, by G. H. Morris.—The lower fractions of resin spirit yield on standing a crystalline substance. This body has been examined by the author. It has the formula

$C_7H_{14}O_9H_2O$ ; it is formed from a hydrocarbon heptin  $C_7H_{12}$ , boiling at  $103^\circ - 104^\circ$ , contained in resin spirit. The author has also studied the action of nitric acid, permanganate, &c., on heptin.—On pentathionic acid, by Watson Smith and T. Takamatsu. The authors reply to criticisms advanced by Lewes, Spring, Curtius, &c., on their previous work, and give further experiments on the subject.—On the preparation of diethyl naphthylamine, and the action thereon of sulphuric acid at high temperatures, and of phosgene gas, by B. E. Smith.

**Chemical Society, March 30.**—Anniversary Meeting.—The president, Prof. Roscoe, F.R.S., gave his annual address, and congratulated the Fellows on the satisfactory condition of the Society, both numerically and financially: 1175 Fellows are now enrolled on the register.—A ballot was then held for the election of Officers and Council, and the following were duly elected:—President, Dr. J. H. Gilbert. Vice-presidents: F. A. Abel, Warren De La Rue, E. Frankland, J. H. Gladstone, A. W. Hofmann, W. Odling, Lyon Playfair, H. E. Roscoe, A. W. Williamson, A. Crum Brown, J. Dewar, P. Griess, A. V. Harcourt, J. E. Reynolds, E. Schunck. Secretaries: W. H. Perkin, H. E. Armstrong. Foreign Secretary, Hugó Müller. Treasurer, W. J. Russell. Ordinary Members of Council: E. Atkinson, W. de W. Abney, F. D. Brown, F. R. Japp, H. McLeod, G. H. Makins, E. J. Mills, L. O. Sullivan, C. Schorlemmer, J. M. Thomson, W. Thorp, T. E. Thorpe.

**Meteorological Society, March 15.**—Mr. J. K. Laughton, F.R.A.S., president, in the chair.—The following gentlemen were elected Fellows of the Society:—T. H. Baker, J. T. Barber, W. H. Jackson, Capt. J. Simpson, R. F. Sturge, and Sir B. J. Sullivan, K.C.B.—The president (Mr. J. K. Laughton) gave a historical sketch of the different classes of anemometers. He remarked that anemometers are instruments for measuring the strength of the wind; they are of different classes, according as the strength is estimated by the pressure on a surface, or by the velocity, by its power of suction, or by its cooling effects. Those that measure pressure may do so either by causing the plate which receives the wind to swing backwards along a graduated quadrant, or by bridling, that is, restraining that motion, and observing the resistance called into play; or by receiving the wind on a plate which can only move backwards, against either a spring, a lever attached to a weight, or a column of liquid. Others, again, receive the wind on the surface of the liquid, and show the pressure by the disturbance of the equilibrium in a siphon tube. At the present time, and in this country, instruments that measure velocity are more generally preferred, the type now commonly adopted being that known as Robinson's cups, in which four hemispherical bowls placed at the arms of a horizontal cross cause it to rotate freely as the wind blows against them. But many very different instruments have been used for measuring velocity, the most primitive of which was a disc of cork, fringed with light feathers—a species of shuttlecock—travelling freely along a considerable length of fine wire stretched in the direction of the wind. Rotation has, however, been the favourite way of bringing the motion of the wind within reach of the observer, and to get that rotation almost every conceivable form of wheel or fan would seem to have been tried. What are known as suction anemometers depend on the hydraulic principle of the lateral communication of motion by a stream. A current of air blowing across the open end of a pipe draws the air out of that pipe, causing within it a partial vacuum, which, by various arrangements, can be measured, the relative vacuum depending on the strength or velocity of the wind which gives rise to it. Several different methods have been adopted for measuring this vacuum; but, though anemometers constructed on this principle take hold of the imagination by their neatness and simplicity, the unknown amount of disturbance due to friction, or—when long pipes are used—to vibration, prevent their being received at present as satisfactory gauges of the wind's velocity. Other anemometers have been made on the principle that the evaporation of water, or the cooling of a heated surface—other things being equal—goes on at a rate proportional to the velocity of the wind; but, in practice, it has been found difficult to insure the equality or uniformity of conditions, or to make correct allowance for their difference, and at least one very ingenious instrument, by receiving the air into different pipes, opening different valves according to its varying strength, causes them to give out two simultaneous but distinct musical notes, the one of which answers to a definite direction, the other to a definite velocity. Such things can, at present, only be considered as pretty and ingenious toys: they can, undoubt-

edly, mark a difference between one wind and another, but are quite unequal to giving any exact measure of relative and still more absolute force. Even the more generally recognised types of anemometer, the very commonly used pressure plates of Mr. Osler, or the revolving cups of the late Dr. Robinson, are by no means entirely satisfactory. The action of stream lines in front, or of the partial vacuum behind the exposed surface, leads to curious vagaries, difficult to understand, and as yet impossible to correct. But till they are understood and corrected, anemometry, as a science, stands on a very uncertain basis. The President, in conclusion, said that what we want is not so much new and improved apparatus for registering or recording; for though those we have are not perfect, they are far superior to the anemometers they are applied to. What we want is rather some radical improvement in the instrument itself or in the theory which translates its action. It is to this that we would wish more especially to call the attention of all meteorologists.—In connection with this meeting there was an exhibition of instruments, consisting of anemometers and new meteorological apparatus, &c. The anemometers exhibited were forty-five in number, and included, among others, those of Beckley, Biram, Cator, Hagemann, Howlett, Lind, Lowne, Osler, Oxley, Robinson, Ronalds, Somerville, Whewell, and Wild. There were also photographs and drawings of old forms of anemometers, damage caused by whirlwinds, &c.

**Zoological Society, March 21.**—Prof. W. H. Flower, F.R.S., president, in the chair.—Mr. J. E. Harting, F.Z.S., exhibited and made remarks on a mummified bird of the genus *Sala*, and some eggs from the guano-deposit of an island off the Pacific coast of South America.—Mr. Sclater made some remarks on "lipotypes"—a new term which he considered convenient, in order to designate types of life, the absence of which are characteristic of a particular district or region. Thus, *Cervus* and *Ursus* were "lipotypes" of the Ethiopian region.—Dr. A. Günther exhibited and made remarks on the skin of a pale variety of the Leopard from the Transvaal. Dr. Günther also exhibited and remarked upon a specimen of a new Turtle (*Geomyda*) from Siam.—Mr. R. Bowdler Sharpe exhibited a specimen of a Goldfinch from Hungary, sent to him by Dr. J. von Madarasz, of the Museum of Buda-Pest, which that gentleman had described as *Carduelis elegans albicularis*. Mr. Sharpe observed that a white-throated variety of the Goldfinch was by no means unknown in England.—Dr. Hans Gadow, C.M.S., read a paper on some points in the anatomy of *Pterocles*, with remarks on its systematic position. Detailed descriptions of the alimentary organs and of the muscles were given. The author took the opportunity of discussing the classificatory or systematic value of the cæca in birds. Then, after pointing out the difficulties of placing the Sand-Grouse in the Avian system, he came to the conclusion that the *Pterocles* (Sclater) should be considered as a group co-ordinate to the *Rasores*, *Columbæ*, and *Limicolæ*, between which they formed a connecting link.—Mr. W. A. Forbe read a note on a peculiarity of the trachea in the Twelve-wired Bird of Paradise (*Seleucides nigra*) as observed in a male specimen that had recently died in the Society's Gardens.—Mr. Bowdler Sharpe read a note on the *Strix oustaleti* of Hartlaub, and pointed out that this bird was none other than the Grass-Owl (*Strix candida*).—Capt. G. E. Shelley gave the descriptions of some new species of birds which had been obtained in the neighbourhood of Newcastle, Natal. These the author proposed to name *Anthus butleri* (a very interesting Yellow-breasted Pipit), *Sphenacacus natalensis* (the Natal representative of *S. africanus*), and *S. intermedius* (an intermediate form from Kaffraria).—Messrs. Godwin and Salvin read a paper, in which was given the descriptions of some new species of Butterflies of the genus *Agrias*, from the valley of the Amazons.—Mr. E. J. Miers read an account of a collection of Crustaceans which had been made by M. V. de Robillard, at the Mauritius. The author called special attention to a fine Spider-crab dredged up from a depth of eighty fathoms, which he proposed to name *Naija robillardii*.

**Geological Society, March 22.**—J. W. Hulke, F.R.S., president, in the chair.—William Brown, George Thomas Parnell, and Edwin Alfred Walford, were elected Fellows of the Society.—The following communications were read:—On a fossil species of *Camptoceras*, a freshwater mollusc, from the Eocene of Sheerness, by Lieut.-Col. H. H. Godwin-Austen, F.R.S.—Note on the os pubis and ischium of *Ornithopsis eucamerotus* (synonyms—*Eucamerotus*, Hulke; *Bothriospondylus* (in part), R. Owen; *Chondrosteatosaurus*, R. Owen), by

J. W. Hulke, F.R.S., Pres.G.S. In this paper the author reviewed the various contributions to the knowledge of this Dinosaur, for which he adopted Prof. Seeley's generic name *Ornithopsis*, and employed the name *eucaerolotus*, originally applied by him to the genus, as the specific name. He also discussed the affinities existing between *Ornithopsis* and certain other Dinosaurs, such as *Celeosaurus* and the American genera *Camerosaurus*, *Atlantosaurus*, and *Brontosaurus*. He then described the pubis and ischium which have recently been acquired by the British Museum from the collection of the late Rev. W. Fox, by whom they were purchased, together with the finest typical thoracic vertebrae of *Ornithopsis*.—On *Neusticosaurus pusillus* (Fraas), an amphibious reptile having affinities with the terrestrial Nothosauria and with the marine Plesiosauria, by Prof. H. G. Seeley, F.R.S. These remains come from the Lettenkohle, a stratum between the Upper Muschelkalk and Keuper, and were obtained at Hohenack, about 9 miles north of Stuttgart. They have been already noticed by Dr. Fraas under the name of *Simosaurus pusillus*; but the palate differs much from that of this genus, and from all others that are known. *Neusticosaurus* is the smallest representative of the Plesiosauria yet known, and has a special interest as exhibiting hind limbs with the characteristics of a terrestrial animal, while the forelimbs are modified into paddles.

Victoria (Philosophical) Institute, April 3.—A paper on materialism was read.

## PARIS

Academy of Sciences, March 27.—M. Jamin in the chair.—The following papers were read:—Double decompositions of haloid salts of silver, by M. Berthelot.—On the velocity of propagation of explosive phenomena in gases, by MM. Berthelot and Vieille. Small detonators (of fulminate) had been used, breaking circuits as the waves passed; and the velocity observed is now shown to be independent of these. It is also found independent of the diameter of the tubes beyond 5 mm.—Instantaneous photographs of birds in flight, by M. Marey.—On the variations observed in the herring fishery on the Norwegian coasts, by M. Broch. These variations, long recorded at Bergen, seem to depend on the movements of large banks of animalculæ, which are the herring's food, towards or away from the coast; and these displacements are probably due to variations in marine currents and dominant winds, which require investigation.—First succour to the wounded on the battlefield, by M. Fournier. He indicates, in photographs, means that may be used, where ambulance-aid cannot be had.—Comet discovered in America, on March 19, 1882; observations at Marseilles Observatory, by M. Coggia.—Observations of the comet at Paris Observatory, by M. Bigourdan.—Observations of solar protuberances, faculae, and spots at the Observatory of the Roman College during the fourth quarter of 1881, by M. Tacchini. *Inter alia*, the protuberances diminished in number, from a maximum in September; but they were nearly twice as numerous as in the same quarter of 1880. Their height and extent had increased very little. Spots and faculae showed, as before, two maxima between  $\pm 10^\circ$  and  $\pm 30^\circ$ .—On hypercycles, by M. Laguerre.—On Pfaff's problem, by M. Darboux.—On a group of linear substitutions, by M. Picard.—On discontinuous groups, by M. Poincaré.—On the application of the resistance of materials to the pieces of machines, by M. Léauté.—On the compressibility of gases, by M. Sarrau. Clausius' formula represents, with much exactness, the compressibility of six gases studied.—On the relation  $\phi(v, p, t) = 0$  relative to gases, and on the law of dilatation of these substances at constant volume, by M. Amagat.—On a certain class of equipotential figures, and on M. Decharme's hydraulic imitations, by M. Guébbard.—Telephonic indicator of the torsion and velocity of rotation of the motor-axis of machines, and consequently of the work, by M. Resio. This enables a single observer to make the measurements at a distance. The principle is that of the induction balance.—Action of telephonic currents on the galvanometer, by M. de Chardonnet. Sounds of uniform intensity do not affect a sensitive galvanometer, but the needle is deflected when the intensity varies, the direction being opposite in increase and decrease. This is easily explained.—On the absorption-spectrum of ozone, by M. Chappuis. The spectrum is more characteristic than any other properties; the author specifies the wave-lengths of the bands, and describes their appearance and order of occurrence under varying conditions.—Researches on ozone, by Abbé Mailfert. This relates to action of ozone on organic matters,

on several metallic oxides and sulphides, and on salts whose bases are susceptible of suroxidation.—Action of alkaline solutions on protoxide of tin, by M. Ditte.—Experimental researches on the constitution of cements and the theory of their hardening, by M. de Chatelier. He examined thin plates of Portland cement with the polarising microscope, and indicates the substances present and those produced in hardening.—On campholurethane, by M. Halles.—Action of cyanogen on sodised menthol, by M. Arth.—Preparation of pure carbon for electric lighting, by M. Jacquelin. The method is, directing a current of dry chlorine for thirty hours on several kilogrammes of crayons of retort-carbon heated to a bright red, and afterwards letting carburet of hydrogen vapour circulate slowly among them for five or six hours; another method, action of fused caustic potash or soda; a third, action of hydrofluoric acid. The author also prepares directly pure graphitoid carbon by decomposition of organic substances through heat. A photometric table of different carbons is given.—Intestinal digestion, by M. Duclaux.—The microzymas of the stomachal glands and their digestive power; reply to the question, Does the stomach digest itself? by M. Béchamp. The stomachal mucous membrane is digested by the microzymas, but the production of new cells is superior to the consumption.—Researches on pancreatic albuminose, by M. Béchamp.—On trichinæ in salt meat, by M. Colin. American salt meat, as now imported, may, only in rare cases, transmit trichinosis where the pieces are recent, or large and badly-impregnated.—Similarity of effects of central and cortical lesions of the brain, by M. Couty.—On the reproductive apparatus of star-fishes, by MM. Perrier and Poirier.—Development of the ovum of *Podocoryne carnea*, by M. de Varenne.—On the present state of monetary and note circulation, with some indications as to modifications following on extension of the metric system, by M. de Malarce. England uses relatively the fewest monetary instruments (metallic or note money); France much more. The total for the former is 4,800 million francs, for the latter 8,600 million.

## VIENNA

Imperial Academy of Sciences, March 30.—L. I. Fitzinger in the chair.—J. Barrand, "Système silurien du centre de Bohême" (vol. vi., containing the Acephala, with 361 tables).—M. Kovatsch, on the sand covering of Venice and its causes.—H. John, on the vapour density of bromine.—On the knowledge of amine bases of secondary alcohols, by the same.—F. Reinitzer, studies on the reaction of acetates of chromium, iron, and aluminium.—An analysis of a vegetable fat, by the same.—T. Pultj, on radiant electrode-matter (ii.).—E. Tangl, on the division of nuclei of Spirogyra cells.—F. Berwerth, on the chemical composition of amphiboles.—Dir. Steindachner, batrachological contributions.—G. Tschermak, on the meteorites that fell near Mocs (Transylvania).—E. Weiss reported on the elements and ephemeris of the comet discovered by Mr. Wells at Boston (U.S.A.) on March 18, computed at the Vienna Observatory by E. Holetschek.

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