a peptic ferment is very rare among invertebrates; a ferment similar to thrypsine, on the other hand, is met with among different classes of these animals.—M. Plateau communicates an account of experiments (with the graphic method and poisons of the heart), on the movements and innervation of the central organ of circulation in articulate animals. *Inter alia*, section of the cardiac nerve diminishes the number of pulsations (in vertebrates, it produces acceleration).—M. Renard describes the diabase of Challes, near Stavelot, in the Cambrian system.—Dr. Koninck continues his researches on Belgian minerals; and there are some papers on mathematical subjects.

THE *Bulletin de l'Académie Impériale des Sciences de St. Pétersbourg* (vol. xxv. No. 2) contains the following papers of interest:—On the occurrence of the musculus peroneo tibialis in Quadrumana, by Dr. Wenzel Gruber.—On a control barometer, by H. Wild (with plate).—On the reduction of Kirchhoff's spectral observations to wave-lengths, by Dr. B. Hasselberg.—On the observed ingress of Mercury upon the solar disc, at the transit of 1878, May 6, by O. Struve, of Pulkowa (with plate), —Catalogue of forty-two new red stars, by E. Lindemann.—On the Russian species of the mollusc *Clausilia*, Drap., by Dr. Oskar Boettger.—On the theory of curves of the shortest parameter on curved surfaces, by F. Minding.—On the hexylenes resulting from tertiary hexylalcohols and their polymerisation, by L. Jawein.—On the action of tertiary iodide of butyl upon isobutylene in the presence of metallic oxides, by J. Lermontoff. —On tetramethylethyl and its derivates, and on the chemical composition of pinacone, by D. Pawlow.

The Journal of the Russian Chemical and Physical Societies of St. Petersburg (vol. x. No. 6) contains the following papers of interest:—On tetramethylethylene and the chemical structure of pinacone, by M. D. Pavloff.—On the glucose derived from lactose, by M. Foudakovsky.—On the action of bromide of aluminium in the formation of the bromides of aromatic hydrocarbons, by G. Gustavson.—On the dextrogyrate terpene obtained from Russian terpentine, by F. Flavitzky.—On the chemical structure of terpenes, by the same.—On dibenzoyldinitrodiphenol, by M. Goldstein.—On some new mineral springs in the Caucasus, by E. Wroblewsky.—On the influence of the surrounding medium upon electrodynamical actions, by J. Borgmann.—On the determination of the magnetic function of liquids, by the same.

Verhandlungen der naturforschenden Gesellschaft zu Freiburg i. B. (vol. vii. part 2).—From the part we note the following papers: On organic cyanides and their decomposition, by A. Claus.—Note on wine analysis, by the same.—On the equilibrium of a system of expanded molecules and the theory of elastic after effects, by E. Warburg.—Observations on the torsion oscillations of an iron wire heated to redness, by Dr. Messer.—On the sensitiveness of alum crystals towards minute variations in the concentration of their mother-liquor, by F. Klocke.

SOCIETIES AND ACADEMIES

CAMBRIDGE

Philosophical Society, October 21.—Dr. Pearson read a paper on a series of lunar distances taken by him during the years 1875-77, mostly at Cambridge and at a place not far distant, the longitude and latitude of each spot being accurately known. He said that they entirely bore out the conclusions at which he had arrived some time back from a much smaller number of observations, and which were communicated by him to the Society in a paper read by him, March 13, 1876 (see *Proceedings*, ii. pp. 414-418), viz., that the errors are such as cannot be called errors of observation of any kind, and may probably arise from the solution of the spherical problem on which the result depends not being, as at present given, strictly accurate. It was mentioned that there is much to justify this conclusion; for example, this method of obtaining longitudes is not much resorted to now in practice (from which it may be argued that it is actually found inaccurate). It is not formally adopted in Germany, though it still is retained in the *Nautical Almanac*, and in the corresponding publication, the *Connaissance des Temps*, issued at Paris. Capt. Toynbee, F.R.A.S., in a paper in the *Nautical Magazine* for February, 1850 (of which there is an abstract in the *Monthly Notices* of the R.A.S.), distinctly states that lunars taken east of the moon give always a result thirty or forty seconds different from those taken west, though his mean result he says was entirely satisfactory; and until the early part of this century all East Indian longitudes were in error nearly 3m. to the east, a result which very nearly agrees with the errors resulting from these observations, supposing them to have been deduced from the new moon of five to eight days old, probably the most convenient time at which to take them from the sun. The whole series, it was stated, consists of 250 separate distances, each distance being either a mean of three or two, or else only one observation, there being about an equal number of each class, though there is no reason to think that the last are less trustworthy than the others in any serious degree; the Greenwich mean time for each being established, with the exception of a very few, within certainly ten seconds. Only 200 of these, the number at present thoroughly verified, were discussed on the present occasion. Classing these in groups of about forty, it was found that the first group gave thirty-two results where the measured distance was in defect of the theoretical distance, and thirteen in which it was in excess. Assuming the rule given in p. 417 of the paper referred to to be correct, this result exactly agrees with what might be expected, it being almost always most convenient, especially for a beginner, to take lunars, at any rate from the sun, under such circumstances as will give this result, while the example of India, founded apparently on observations made at Madras, seems to imply this probable facility, and also that they were made on the new moon, these being more easily taken in our hemisphere than those made on the old one. In the four remaining groups the proportions are 26 to 18: 28 to 15: 25 to 17: 17 to 14: giving a total of 128 observations in defect, and 77 in excess. Rejecting three or four certainly questionable results, the greatest errors occurring are 2′ 59″ in defect, and 2′ 48″ in excess. The true mean has not yet been ascertained, but is certainly in each case not far from 1′—1′ 20″; which, on an average, will give the observer an error of about half a degree of longitude, or of twenty to thirty-five miles, advancing from our own latitude to the equator. There are probably not a dozen clear exceptions to the rule suggested in the communication of March, 1876, that if the luminaries are both on the same side of the meridian, the observed distance is always in defect of the true if the moon be nearest to it, and in excess if she is farther distant; while the same rule holds good, but with less certainty, when the two luminaries are on different sides. The only exceptions seem to arise where the one more distant from the meridian has a greater altitude than the other, or is of a considerably higher declination, and when the distances are very great, *i.e.* from 120° to 130°, in which case the measured distance seems generally to be slightly in excess of the true; but, as might naturally be expected, these last distances cannot often be taken in our own climate. It was explained that all the reductions had been made by Borda's formula, stated in the *Philosophical Transactions* for 1797 to have been the first strictly mathematical solution of the problem. But the results vary only by a few seconds of arc from those given by the system adopted in the large folio published in 1772 by Mr. Shepherd, Plumian Professor at Cambridge University under the superintendence of the Commissioners of Longitude, and while Dr. Maskelyne was Astronomer-Royal; or from other methods which it is believed are allied to this. Two examples were also exhibited of distances reduced according to the elaborate method suggested by Bessel in the *Astronomische Nachrichten* of 1832; Bessel's results, however, do not differ to any great extent from those obtained otherwise. It was suggested that the problem is really one of spherical trigonometry, and from the fact that the errors seem to depend on the position of the luminaries towards the meridian, whereas the old methods of solution depend on their altitudes, and also that the different ways suggested for eliminating the error due to the difference between the geocentric and geographical latitude of the place of observation give different results, a hope was expressed that if these two circumstances were thoroughly reconsidered in dealing with the question, means might be found of discovering a farther correction of the observed distance, which would give a really accurate result.

MANCHESTER

Literary and Philosophical Society, October 15.—J. P. Joule, F.R.S., &c., president, in the chair.—Relative brightness of the planets Venus and Mercury, by James Nasmyth, C.E., F.R.A.S., Corresponding Member of the Society. "On many occasions, when observing Mercury and Venus in full daylight,

I have always been impressed with the strikingly inferior brightness of Mercury as compared with Venus; and as such a condition is the very reverse of what might be expected by reason of Mercury being so much nearer to the sun than Venus, I awaited the rare event of a very close conjunction of these two planets that occurred on September 26 and 27 last. With the advantage of a perfectly clear sky I had the two planets before me for several hours, so to speak, side by side in the field of the telescope at the same time, thus affording me a most perfect opportunity for making a comparison of their relative brightness. It is difficult to convey in words an exact impression of the difference in the brightness of such objects, but I may attempt to do so by stating that Venus looked like clean silver, while Mercury looked like lead or zinc. Were I to indicate my impressions by way of number I would say that Venus was fully twice as bright as Mercury. So remarkable an inferiority in the brightness of Mercury, notwithstanding his much greater nearness to the sun, appears to me to indicate the existence of some very special and peculiar condition of his surface in respect to his capability of reflecting light—a condition that may be due to the nature of his envelope, if such exist, or of that of his surface, by which the fervid light of the sun's rays falling on him are in a great measure quenched or absorbed so as to leave but a small residue to be reflected from his surface. If this be so, it appears to me to be reasonable to suppose that the absorption of so much light must result in a vast increase in the heat of the surface of Mercury beyond what would have been the case had Mercury possessed the same surface conditions as Venus. Whether in the progress of spectroscopic investigation we shall ever be enabled to detect some evidence of metallic or other vapours or gases clinging to or closely enveloping the surface of Mercury that might in some respect account for so remarkable an absorption of the sun's light, we must be content to await the acquirement of such evidence if it ever be forthcoming. It appears to me, however, to be well to raise such a question, so that our astronomical spectroscopists may be on the outlook for some evidence of the cause of so very remarkable a defective condition in the light-reflecting power of Mercury to which I have thus endeavoured to direct attention."—On the water of Thirlmere, by Harry Grimshaw, F.C.S., and Clifford Grimshaw.

PARIS

Academy of Sciences, October 28.—M. Fizeau in the chair.—M. De la Gourmerie read a note on the works of the late M. Bienaymé.—The following papers were also read:—On the decomposition of hydracids by metals, by M. Berthelot. The heat of formation of gaseous chlorhydric acid from its elements is surpassed by that of all anhydrous chlorides, even chlorides of lead, copper, mercury, and silver; gold is the only exception among ordinary metals. The inference that all these metals, except gold, must decompose chlorhydric gas with liberation of hydrogen, is confirmed by experiment. Platina and palladium, also, their chlorides having low heats of formation and little stability, did not decompose chlorhydric gas up to 550°.—On Vice-Admiral Cloué's "Pilote de Terre Neuve," by M. Faye.—On the state in which carbonic acid exists in the blood and the tissues, by M. Bert. The escape of carbonic acid during the respiratory act requires a dissociation of the super-carbonised salts of the blood. These salts were saturated with carbonic acid neither in the arterial nor the venous blood, nor in the tissues. The life of the anatomical elements can only be maintained in presence of carbonic acid in the state of combination. When the alkalis are saturated, and this gas appears in excess in the state of simple solution it rapidly causes death.—Influence of the nervous system on the phenomena of absorption, by M. Moreau. He attached to the dorsal fins of fishes that had swimming bladders a small glass balloon, lighter than the water, and in a few hours the volume of the fish had diminished through absorption of a part of the air contained in the bladder. When a piece of metal was substituted for the balloon, the volume of the fish increased. There is thus a sensation of thrust upwards or downwards, and it is under influence of the former that absorption of air in the bladder takes place, probably through a reflex action.—On *decipium*, a new metal of samarskite, by M. Delafontaine. In the samarskite of North Carolina he finds yttria, erbine, terbine, philippine (yellow (PpO), equiv. about 90; characteristic absorption band about 449 in λ), decipine (white (DpO), equiv. about 122, band 416); thorine and oxides of didymium and cerium. The equivalents of the metals in some of these earths are shown to present interesting numerical relations. *Decipium* is so called from *decipiens*, deceiving. The didymium of cerite is probably a mixture of several bodies, by M. Delafontaine. This is based on spectral observations.—Reply to a recent communication by M. Hirn, on a gyroscopic apparatus, by M. Gruey.—Classification of double stars, by M. Flammarion. Of the 11,000 double or multiple stars discovered, he finds there are only 819 that give certain indications of a relative motion of the components. These groups are divided into 731 doubles, 73 triples, 12 quadruples, 2 quintuples, and 1 sextuple, in all 1,745 stars variously associated. Of these couples in motion 558 have been found with orbital systems, and 316 whose components have been connected merely by the chance of celestial perspectives and form optical groups. In the orbital systems there is a preponderance of retrograde motion from north to south by west (Several other facts are given.)—On the integration of the equation (1) $Ay'^2 + Byy' + Cy^2 + Dy' + Ey + F = O$, by M. Alexeeff.—On involution in curves of n degree, by M. Serret.—Remarks on two integrals obtained by Lamé in the analytical theory of heat, by M. Escary.—Reply to an observation of M. Boltzmann, by M. Lévy.—On the magnetisation of tubes of steel, by M. Gaugain. When a system formed of two parts having different coercive forces is subjected to action of a weak current, the part having the least coercive force is always that which takes the strongest magnetisation (whichever its position, tube, or core).—On a telephone call, by M. Perrodon. This consists in connecting a Ruhmkorff coil with the plate of the telephone, so as to get a loud continuous sound.—On the transformation of valerylene into terpilene, by M. Bouchardat.—Artificial reproduction of melanochroïte, by M. Meunier. This is by keeping fragments of galena in dilute aqueous solution of bichromate of potash.—On the elimination of salicylate of soda, and the action of this salt on the heart, by MM. Blanchier and Bochefontaine. It stimulates various secretions, notably the salivary. In man it is at once expelled by the kidneys (appearing in the urine in 20 mm.); in the dog it appears both in the urine and the saliva, also in the bile and pancreatic fluid. The hypersecretion of saliva is due to action of the salicylate on the grey substance of the central nervous system. In strong doses, the salt stops the heart in diastole.—On parthenogenesis in bees, by M. Sanson.

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