

but in the stratified liquid marked differences appeared between the layers on readings being taken every five minutes. Thus in ten minutes the readings were 31° (below), 18.5° (middle), 18° (top); after twenty minutes, 44° , 19.5° , 18° ; after fifty-five minutes, 77° , 40° , 21° . The numbers prove, then, that in liquids of decreasing density heat is distributed very slowly from below upwards. Experiments in cooling led to a similar result.

PROF. QUINCKE, of Heidelberg, has long experimented as to whether gases can penetrate through the pores of glass. A pressure of forty to one hundred and twenty atmospheres is found to be incapable of forcing a perceptible quantity of carbonic acid or hydrogen gas through a glass wall 1.5 mm. thickness, during a period of seventeen years. No loss of weight was perceptible. M. Quincke, however, will not draw the inference that the molecules of hydrogen and carbonic acid have larger dimensions than the molecules or pores of the glass. The distance at which the molecular forces of the glass act on the gas-particles is of course greater than the dimensions of the molecules themselves. The pore walls of the glass may get coated with an "absorbed" gas layer, which itself becomes immovable through the nearness of the solid substance, and hinders the passage of gas particles from the interior of the glass tube into the outer air. Perhaps, too, there may be dropable liquid in the pores of the glass, preventing outflow of the gas. A similar objection applies (according to M. Quincke) to M. Traube's method of determining the size of the molecules of a substance from the possibility of passing through a so-called "precipitate-membrane."

A DROUGHT in excess of any that have occurred during the last fourteen years, as regards long continuance and severity, has prevailed for some months in Victoria and parts of Australia adjoining. It terminated about February 12, and from that date to the 22nd of the same month, when the mail left, heavy thunderstorms and rainfall had prevailed, and cooler weather set in. The reports from Deniliquin and other places in the interior state that not a blade of grass was to be seen on the plains, and cattle were dying in thousands.

THE Russian Naval Department proposes to send a ship this summer to the mouths of the Obi and Jenissei to make a thorough maritime survey of both gulfs.

THE *Western Review of Science and Industry* is the title of a new monthly devoted to various departments of science, and published in Kansas City, Mo.

In view of the promising future of the African continent M. Bernardin, of Ghent, has done a good service by publishing a *brochure* (compiled from the works of various travellers), on the commercial products of Central Africa. An excellent map of Petermann's, showing the standpoint reached by exploration up to September, 1876, is included in the pamphlet.

THE death is announced of Prof. P. Panceri, the eminent Italian anatomist. He died suddenly whilst lecturing in the University at Naples.

THE additions to the Zoological Society's Gardens during the past week include a Common Wolf (*Canis lupus*) European, presented by Mr. J. A. Parlet; a Ceylon Fish Owl (*Ketupa ceylonensis*) from Ceylon, presented by Capt. B. B. Turner; a Vulpine Phalanger (*Phalangista vulpina*) from Australia, presented by Mr. W. Bazeley; two Sykes's Hemipodes (*Turnix sykesii*), a Rain Quail (*Coturnix coromandelica*), an Asiatic Quail (*Pedicularia asiatica*) from India, three Chinese Quails (*Coturnix chinensis*) from China, presented by Mrs. Wood Mason; an Entellus Monkey (*Semnopithecus entellus*) from India, received in exchange; a Collared Fruit Bat (*Cynonycteris collaris*) born in the Gardens.

SOCIETIES AND ACADEMIES

LONDON

Chemical Society, April 5.—Prof. Odling, F.R.S., in the chair.—A lecture on the discrimination of crystals by their optical characters was delivered by Prof. N. S. Maskelyne, F.R.S. After a few general remarks on the use, to the chemist, of the methods employed by crystallographers, the lecturer proceeded to consider the methods of determining the symmetry of crystals by their optical characters. The origin and meaning of various terms used in crystallography were explained and illustrated by models, &c.; the lecturer then threw on the screen, by means of a polarising apparatus and the electric light, the beautiful coloured effects produced by crystals of cerussite, barytes, borax, &c., the effect of heat in altering the position of the optical axes of a crystal of gypsum being especially beautiful. In conclusion, the lecturer pointed out the ready means, which the examination of the optical characters of a crystal under the polarising microscope often afforded to the chemist, of acquiring a great deal of information in a very short time, and expressed a belief, that if chemists would work up suitable groups of crystals for examination by the crystallographer, very important knowledge as to the functions of various groups of molecules in a crystal would be gained.

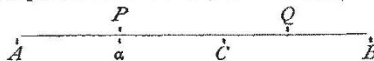
Anthropological Institute, March 27.—Col. A. Lane Fox, F.R.S., V.P., in the chair.—Capt. W. Samuells, of the Bengal Staff Corps, was elected a member.—An account of some Kitchen Middens near Ventnor, by Mr. Hodder M. Westropp was read by the director. A corn-crusher, of Scandinavian appearance, was found in one of them, and in another higher up in the cliff, there was discovered a small cinerary urn of unusual shape encircled with a pattern of coralline sea-weed.—Messrs. W. Power and E. Laws communicated a short paper on a Kitchen Midden near Tenby; Dr. Crockley Clapham a paper on the brain-weights of the Chinese and Pelew Islanders; and Mr. James Shaw some notes on right-handedness and improved instinct in animals during the human period. Dr. Clapham found that the weight of the brain both of the Chinese and the Islanders was above the average, but they presented certain peculiarities in their convolutions. The skulls of the Pelew Islanders were markedly dolichocephalic. The size of the brain of the Chinese and the Islanders was in no wise an index of the intelligence possessed by them.

MANCHESTER

Literary and Philosophical Society, February 6.—E. W. Binney, F.R.S., president, in the chair.—Notice of the Junior Literary and Philosophical Society of Manchester, 1806-1807, by W. E. A. Axon, M.R.S.L.—On compound combinations, by Prof. Cayley, F.R.S., &c.—On ternary differential equations, by Robert Rawson.—On the powerful oxidising action of animal charcoal upon organic matters as shown by the analysis of the drainage from a large heap of a mixture of night-soil and animal charcoal, by William Thomson, F.R.S. Edin.—A plea for the word "Anglo-Saxon," by Rooke Pennington, LL.B., F.G.S.

CAMBRIDGE

Philosophical Society, March 12.—Prof. Cayley, vice-president, in the chair.—Prof. Clerk Maxwell communicated to the Society a paradox in the theory of attraction.



Let the line AB be divided in any given point C , and let

$$PC^{-1} - AC^{-1} = CQ^{-1} - CB^{-1}$$

be the condition of correspondence of two points P and Q , in the segments AC , CB respectively, then if P and Q vary simultaneously, still remaining correspondent,

$$PC^{-2}d(PC) = CQ^{-2}d(CQ),$$

or the corresponding elements are to each other as the squares of their distances from C . If we now suppose that AB is a material line of uniform density, the law of attraction being the inverse square of the distance, the attractions of corresponding elements on the point C will be equal and opposite. But every element of AC has a corresponding element in CB , and hence we might conclude that the attraction of AC on C is equal and opposite to that of CB on C , which is evidently not the case, unless $AC = CB$. The paradox is explained by considering that all that we have proved is that the attraction of AP on C is equal and opposite to that of QB on C , and this however near to C the

corresponding points *P* and *Q* are taken, and this is strictly true. But however near to *C* the corresponding points are taken, the attractions of *PC* and of *CQ* are both infinite, but differ by a constant quantity, namely the attraction of *Aa* on *C*, where *aC* is taken equal to *CB*.—Prof. Clerk Maxwell also made a communication on double and triple integration by summation.—Mr. J. W. L. Glaisher gave a preliminary account of the results of an enumeration of the primes in Burckhardt's tables (1 to 3,000,000).

PARIS

Academy of Sciences, April 2.—M. Peligot in the chair.—The following papers were read:—Isoperimetric triangles having one side of constant length and satisfying three other conditions, by M. Chasles.—On a theorem relative to expansion of vapours without external work (continued), by M. Hirn.—Report on a new work of M. Bertin, following his note on rolling. This work gives an account of M. Bertin's double oscillograph, which records each instant the inclinations of the ship in the direction of the rolling and the inclination of the part of the wave which carries the ship; also observations with it from the war-ship *Crocodile*. Though the indications are only approximate, they are thought of considerable interest. Admiral Paris called to mind an instrument devised by his son in 1867, for tracing waves.—Experimental researches on natural sulphides, by M. Meunier. It is a general fact that natural sulphides brought into the presence of suitable metallic solutions cause reduction in the free state of the dissolved metal. The experimental facts given seem to have a bearing on the *mineralogical associations* so frequent in metalliferous veins. If a vein of galena receive the infiltrations of sea-water (which always contains silver), all the silver will be held and concentrated by the sulphide. Now native silver exists in a certain number of galenas, and we may suppose it has been thus introduced.—New nebulae discovered and observed at the Observatory of Marseilles, by M. Stephan. Thirty in number.—On the approximation of a class of transcendents which comprise, as a particular case, hyperelliptic integrals, by M. Laguerre.—On the paraboloid of eight straight lines, by M. Mannheim.—On the theory of frigorific machines, by M. Terquem. Even under the best conditions, frigorific air-machines cannot successfully compete with machines having volatile liquid, (1) because of the large size necessary; (2) the passive resistances due to this, and the use of two pumping bodies; and (3) the want of adaptability to produce different degrees of refrigeration. Their advantages are the production of lower temperatures, simplicity, and the use of a safe and cheap agent.—Researches on the metallic reflection of obscure and polarised calorific rays, by M. Mouton.—On the sulphide of manganese, by MM. De Clermont and Guioit. They produce the green sulphide in new cases, and by reactions in which its formation was said never to have been observed. Thus M. Muck says it is impossible to transform manganous carbonate into green sulphide; but the authors effect this by heating in free air, with ebullition, carbonate of manganese, precipitated with some sulphhydrate of ammonia. They find the rose sulphide dried at 105° contains 9 per cent. of water (green sulphide at 105° is anhydrous). The rose sulphide is much more soluble in chlorhydrate of ammonia. These sulphides are thought isomeric modifications of one and the same body, more or less hydrated.—Reply to remarks of M. Chevreul concerning the phosphorescence of organic bodies, by M. Radziszewski. He adduces some facts showing that in phosphorescence the slowness of the reaction is an essential condition, though to define the maximum and minimum limits would be difficult at present.—Two cases of aneurism of the bend of the elbow treated successfully with the antiseptic ligature of catgut, by M. Boeckel.—On some abnormal fecundations in star fish, by M. Fol.—On the distribution of carbonic acid of the blood between the red corpuscles and the serum, by M. Fredericq. It is generally said that all or nearly all the carbonic acid held in the blood is in the serum (or plasma) in the state of combination or solution. Examining venous horse-blood, the author found the red corpuscles capable of absorbing a considerable quantity of CO₂, though always less than that taken by an equal volume of serum (about a half less). Passing a current of CO₂ through the blood, the excess seemed to be distributed equally between the corpuscles and the serum. While blood can be almost directly deprived of its gases by vacuum and heat; it is quite otherwise with serum, which, after such treatment, will give a fresh liberation of CO₂, when treated with phosphoric acid newly boiled. This invalidates some of MM. Mathieu and Urbain's results.—On the rôle of stomates and cuticular respira-

tion, by M. Barthélemy. He thinks M. Merget's recent experiments overlook the most important factor in the case, viz., the living being submitted to experiment, the leaves having been detached from the plant and submitted to various vapours.—Observations of globular lightning formed and bursting without sound above a layer of clouds, by M. Blanc. The apparent diameter of the balls at 18 k. distance was 1°; they were reddish or yellow, but always white on bursting; they went horizontally, and looked like immense soap bubbles.

VIENNA

Imperial Academy of Sciences, March 1.—The following among other papers were read:—Main outlines of a theory of the sense of temperature, by M. Herzog.—Researches on the Tunicata of the Adriatic and the Mediterranean, by M. Heller. The freely-moving Salpæ and Salpæ-like Ascidians, which are numerous in the Mediterranean, are almost wholly wanting in the Adriatic.—On normal hexylic alcohol and normal cenanthylic acid, by M. Janecek.—Researches on the extension of the tonic vascular nerve-centres in the spinal cord of the dog, by M. Stricker.—The development of the antheridium of *Anthoceros*, by M. Waldner.—On Ranvier's representation of bone-structure, with remarks on the use of a Nicol in microscopic researches, by M. Ebner.—On metanitro- and metanido-benzacetylic acid; on the action of animal charcoal on salts; on solution of sulphur in acetic acid; and on demonstration of fuchsine in wine, by Dr. Liebermann. Fuchsine solutions give very characteristic absorption bands, in the spectrum, between yellow and green. Fuchsine may be detected even with a dilution of 1:500,000.—Note on molecular transformations, by M. v. Sonstorff. Iodine crystals kept eight years in a glass vessel were found to grow by volatilisation and subsequent condensation. Amorphous phosphorus passed, in part, into the crystalline state.—On the origin of the zodiacal light, by M. Noë.—Behaviour of calcium-phosphate towards sugar solutions, by M. Krasan.—On new Rudista from the Bohemian chalk formation, by M. Teller.—On the Sarmatian deposits between the Danube and the Timok, by M. Toula.—Researches on the etiology of Pelorian flower-forms, by M. Peyritsch.—On a new method of determining the internal resistance of galvanic batteries, by M. Fleischl. The two like poles of two equal elements (of the kind to be measured) are connected, and the resistance of this currentless combination is then compared with a known resistance.—On the geological character of the Isthmus of Suez; the pliocene formations of Zante and Corfu, the nature of the Sarmatian formation and its analogies in the present and in earlier geological epochs, by M. Fuchs. The fauna of the Red Sea and Mediterranean are very different, but they appear to have been so also before the isthmus arose.

CONTENTS

	PAGE
THE ARCTIC BLUE-BOOK	505
ANTHRACEN	507
OUR BOOK SHELF:—	
Jewitt's "Half-Hours among some English Antiquities"	508
LETTERS TO THE EDITOR:—	
Centralism in Spectroscopy.—Prof. PIAZZI SMYTH	508
Parhelia and Paraselenes seen on March 20, 1877, and again on March 21, 1877, at Highfield House Observatory.—E. J. LOWE (With Illustrations)	508
Owens College.—W. STREEDMAN ALDIS	509
The Suspected Intra-Mercurial Planet; Occultation of Kappa Gemini-um.—J. BIRMINGHAM	509
a Centauri.—MAXWELL HALL	510
The Boomerang.—ARTHUR NICOLS	510
Is Meteorology a Science?—RALPH ABERCROMBY	510
Atmospheric Currents.—JOSEPH JOHN MURPHY	510
The Germ Theory.—Dr. T. MACLAGAN	511
SEXUALITY IN PLANTS. By W. R. MCNAB	511
TYPICAL LAWS OF HEREDITY, II. By FRANCIS GALTON, F.R.S. (With Illustrations)	512
ON THE SIMPLEST CONTINUOUS MANIFOLDNESS OF TWO DIMENSIONS AND OF FINITE EXTENT. By F. W. FRANKLAND (With Illustrations)	515
HYDROGRAPHY OF WEST CENTRAL AFRICA	517
THE LONDON INDUSTRIAL UNIVERSITY	518
OUR ASTRONOMICAL COLUMN	
The Opposition of Mars in 1892	519
The Comet 1873 II. (Tempel, July 3)	520
New Comet	520
CHEMICAL NOTES:—	
The New Metals Iminium and Neptunium	520
Absorption of Hydrogen by Organic Substances under the Influence of the Silent Discharge	521
Phosphorus Pentafluoride	521
Molecular Volumes of Sulphates and Selenates	521
Contributions to the Theory of Luminous Flames	521
NOTES	521
SOCIETIES AND ACADEMIES	523