illness. Prof. Cayley also contributes some tables of pure reciprocants to the weight S (pp. 75-77). Two short notes follow on the differential equation, $\Delta u + k^2 u = 0$ by Maxime Bôcher (pp. 78-83), and geometrical illustrations of some theorems in number by Ellery W. Davis (pp. 84-90, with a diagram). M. Halphen is the mathematician whose portrait is given with this opening number.

Bulletin de l'Académie Royale de Belgique, No. 3 (1893).—Among the scientific papers communicated to the Academy are the following: On the common cause of surface tension and evaporation of liquids, by G. Van der Mensbrugghe. The author deduces from his theory an explanation of the fact that evaporation is more rapid from a convex, and less rapid from a concave, than from a plane surface.—Survival after the successive section of the two vagi, by M. C. Vanlair. Survival after successive section of both the branches of the vagus nerve can be obtained in full-grown animals as well as in young ones. The time necessary for the regeneration of its inferior laryngean branch is generally much longer than that hitherto accepted. In the full-grown dog the period exceeds at least ten months. The regeneration of one branch is quite independent of the section of the other. The question whether the pneumogastric, like the sciatic nerve, possesses the power of regenerating itself twice in succession remains as yet unanswered. It is, however, certain that an interval of six months and a half does not suffice for its second regeneration.—On the digestion of the cœlenterata, by Marcelin Chapeaux. The action of the ferments secreted by the actinia upon starch, cellulose, chlorophyll, and fat, was investigated. Starch submitted to the action of an aqueous solution of these ferments, or injected into the gastrovascular cavity, was transformed into glucose. The action was slow in the case of non-hydrated starch. The transformation took place equally well in acid and in alkaline solutions. Cellulose and chlorophyll were not digested. The fats were emulsioned by the ferments contained in the endodermic cellules. These ferments were without effect upon the algæ. Among the Siphonophora digestion is certainly exclusively intracellular. No dissociation of fibrine is, on the other hand, ever observed in the gastrovascular cavity, and no difference could be established between the alkalinity of the liquid contained in this cavity and the surrounding sea-water.—Contribution to the nitrogen question, by A. Petermann. This is an experimental confirmation of the results of MM. Schlœsing fils and Laurent, showing that free nitrogen is absorbed from the air by the micro-organisms of the soil.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 2.—"Harmonic Analysis of Hourly Observations of Air Temperature and Pressure at British Observatories," by Lieut.-General R. Strachey, R.E., F.R.S.

This paper is a discussion of the results of the computations contained in a volume recently published by the Meteorological Office, of the harmonic components of the first four orders, for each month for twenty years, of the daily curves of temperature and pressure at Greenwich; and for the first three orders, for the temperature and pressure, for each month for twelve years, at the seven observatories maintained by the Meteorological Office.

This system of analysis supplies the means of establishing an exact comparison between various unsymmetrical curves, such as those representing hourly values of temperature, by resolving them into symmetrical components, having periods of twenty-four hours, twelve hours, eight hours, and six hours, and so forth, and its application to the records dealt with in the tables contained in the volume above referred to gives satisfactory proof of the important light it can bring to bear on the periodical changes of diurnal temperature.

In the usual expression the coefficients of the cosines of the arcs are designated by the letter p, and those of the sines by q. The total amplitude of the component is designated by P.

A modification of the usual notation is made by the introduction of the value of the epoch of the first maximum that occurs after midnight, which is designated by the letter μ, and establishes the connexion of the component with the hour of the day and the sun's place more conveniently than the method usually adopted.

1. *Greenwich Temperature.*

The examination of the tables shows that, with very considerable variations of absolute magnitude, there is on the whole very marked consistency in the main characteristics of the components.

Taking as a test the position of the epoch of maximum, which is more directly dependent on the sun's action and on his position than the amplitude, it will be seen that the values of μ indicate very clearly the closeness of this connexion.

In all the components a truly periodical variation of the value of μ is apparent, and the period of maximum always travels backwards, that is, it becomes earlier as the year passes from winter to summer, while it returns in the opposite direction in the change back to winter.

For the first component the variation of the five years' mean of μ from the twenty years is in no month more than $2\frac{1}{2}°$, or ten minutes of time, and the average for all months is less than half that amount.

In the second component the variation of the five-year mean from the twenty-year mean is in no month more than 6°, and the average is only 2°·3, or nine minutes of time.

In the third component the variation of the five-year from the twenty-year mean in no month exceeds 5°, and the average in all months is only 2°·1, or $8\frac{1}{2}$ minutes of time.

The largest variation of the five-year mean of the fourth component for any month from the twenty-year mean is 10°, and the average for all months is 4°·3, or seventeen minutes. Considering how small are the absolute values of the coefficients p_4 and q_4, on which the value of μ_4 depends, the average being a little less than $\frac{1}{10}$th of a degree Fahrenheit, it is rather a matter of surprise that the variations should be so small than that they should reach their actual amounts.

The component of the first order, which in the winter is more than double the magnitude of any of the others, and in summer more than ten times as great, gives the dominant character to the daily curves of temperature. In the series of twenty years variations in different years of as much as 100 per cent. are to be found for almost every month, but for the most part even these irregularities disappear in the mean of a series of five years, and the monthly means for the twenty years are remarkably consistent.

The progression of the value of P, in the course of the year, follows approximately the sine of the sun's meridional altitude and the empirical formula

$$P = 10 \cos z - 0{\cdot}91$$

gives a close approximation to the values shown in the tables, if a "lagging" of eight or ten days is allowed in reckoning the sun's place.

The second component has two clearly marked *maxima* about the time of the equinoxes, and a principal *minimum* at midsummer.

The component of the third order varies in a converse manner, having two well-marked *minima* at the equinoxes, with a principal *maximum* at midsummer.

The component of the fourth order appears to combine the characters of the two previous ones, having two *maxima* about the time of the equinoxes, and a principal *minimum* in the winter.

The mean value of μ for the first component is 214°, corresponding to 2h. 26m. p.m., the variation due to season being 12° or 48m. of time, by which the maximum is earlier in summer than in winter.

In the second order the first maximum in June is 24°, or 1h. 20m. earlier than in January.

In the third order the difference in the same direction is 63°, or 4h. 12m. of time.

In the fourth order there is some doubt as to the manner in which the change of epoch of the summer and winter maxima is brought about. But remembering that the fourth component includes four series of undulations, the most probable explanation of these changes is to be found in a change of the position of these undulations, during which, between January and February, when the first maximum is about 10° after midnight, or 0h. 40m. a.m., the first recedes, and its place is taken by the second, which leads to sudden appearance of a maximum about 60°, or 4 a.m. A similar change between October and November in an opposite direction would reproduce the maximum at 10° after midnight.

In the summer months (May, June, and July) the temperature curve during the day hours, from 8 a.m. to 8 p.m., hardly differs from a curve of sines, the first component being more than ten times as large as any of the others, which therefore influence the temperature, relatively, very little.

The relation of the epoch of the first maximum of the component of the third order to the time of sunrise is decidedly marked, the former occurring, on the average, about 12°, or 48m. after sunrise; the mean deviation of the interval from that amount being only 7°, or 28m.

The periodical variation in the position of the maximum leads, during the winter months, to a *positive* maximum of this component about 1 p.m., which is combined with *negative* maxima four hours earlier and later, which correspond to the *reduced* temperature in the mornings and afternoons of the *shorter* days. In like manner, in the summer months, when this component has a negative *maximum* about 1 p.m., instead of a negative *minimum*, as in winter, there will be two *positive* maxima, one four hours earlier, the other four hours later, corresponding to the *higher* temperature in the mornings and afternoons of the *longer* days.

It will be seen that these positions of the midsummer and midwinter maximum phases correspond respectively to days of 16 hours with nights of 8 hours, or days of 8 hours and nights of 16 hours, and that at these seasons, when the variations of temperature, due to these differences, are greatest, the amplitudes of this component are also the greatest. At the equinoxes, with 12-hour days and nights, the component becomes a minimum; and at this season the change in the position of the maximum takes place as already noticed.

It might be supposed that an analogous relation between the fourth component and the occurrence of days of 18 hours, combined with nights of 6 hours, and *vice versâ*, is likely to arise. But the data are not forthcoming to test this.

In the summer months the time of mean temperature is nearly where the first component becomes zero, the second and third components then balancing one another.

In the winter the time of morning mean temperature is later than in summer, and occurs when a positive value of the first component is equal to a negative value of the second.

The time of afternoon mean temperature throughout the year is somewhat either before or after 7 p.m., and almost exactly coincides with the time when the first and second components are equal, with opposite signs.

In the summer the time of absolute minimum is between the hours of 3 a.m. and 6 a.m., during which the whole of the components are negative.

Sunrise in December is about an hour and a half before the time of mean temperature; while in June it is more than four hours earlier.

Sunset in December is rather more than three hours *before* the time of mean temperature; in June it is about half an hour *after* that time.

The *rationale* of some of the empirical rules for obtaining the mean daily temperature from a limited number of observations is supplied by reference to the harmonic expressions for the hourly deviations of temperature from the mean value.

In the first place, it will be seen that by adding together the harmonic expressions for any two hours twelve hours apart, the whole of the *odd* components disappear, and that the sum is twice the mean value, added to twice the sum of the *even* components of the selected hours, which are equal.

By taking the mean of observations at any four hours, at intervals of six hours, both the odd components and those of the second order will disappear, and the result will only differ from the true mean by the amount of the fourth component for the selected hours.

So, if the mean of any three hours at equal intervals of eight hours be taken, the sums of the first, second, and fourth components will disappear, and the result will only differ from the true mean by the amount of the third component for the selected hours, which in no case can be so much as $\frac{3}{4}$°.

2. *Temperature at the Seven Observatories.*

The examination of the tables will show that in their main characteristics the results closely resemble those for Greenwich, and it will not be necessary to discuss them in any detail.

The amplitude of the component of the first order is, however, in all cases less than that observed at Greenwich, the lowest values being those for Valencia and Falmouth, no doubt due to their position on the sea coast, for which stations the means for the years are 2°·28 and 2°·35 compared with 5°·10 at Greenwich.

The Kew values most resemble those at Greenwich, but the mean maximum at Kew is more than 1° less, and the mean for the year $\frac{1}{2}$° less.

The mean values of μ_1 for the seven observatories lie between 205° and 220°, that for Greenwich being 214°. The means of the summer values are about 3° or 4° less than the mean of the year, and of the winter values as much above it, as in the case of Greenwich.

The amplitude of the first component conforms approximately, but not so closely as at Greenwich, with the sine of the sun's meridian altitude, but with a flattening of the curve in the summer months, and a tendency at some of the stations to a maximum value in May.

The components of the second and third orders, beyond which the analyis is not carried for these observatories, conform in all important respects to those for Greenwich, the numerical values of the latter being, however, in all cases somewhat higher. The epochs of maximum follow the same laws, with an increased divergence of the summer epoch from that of the winter at the more northern stations.

In order to test, and in some degree throw light, on the character and significance of the harmonic components of temperature that have been under discussion, and bearing in mind that they cannot be considered to represent separate effects of physical forces operating at the assumed periods of the components, I have, at the suggestion of Prof. G. Darwin, calculated the harmonic components from a curve representing an intermittent heating action such as that of the sun, continued only during a portion of the day, and commencing and ending abruptly at sunrise and sunset.

All cooling effects have been disregarded, and the sun's direct heating action is assumed to be proportional to the sine of his altitude, the power of a vertical sun being taken to be 10. Having calculated the sun's altitude for each hour of the day, for midwinter, the equinox, and midsummer, for certain selected latitudes, the corresponding heating effects have been computed to which the usual method of analysis has been applied.

The comparison of the results thus obtained with the corresponding components derived from actual observation at places having nearly the same latitudes as those selected, establishes their close similarity, and the conclusion is unavoidable, that, although both in the actual and hypothetical cases the harmonic components when combined are truly representative of the peculiar forms of the curves from which they were derived, this affords no evidence of the existence of recurring cycles of action corresponding to the different components, but that the results are, to a great extent, due to the form of the analysis.

The diurnal curve of temperature is *not* symmetrical in relation to the mean value, the maximum day temperature being much more in excess than the minimum night temperature is in defect. To adjust the first component, which *is* symmetrical about its mean value, to the actual unsymmetrical curve, it must be modified by the other components. That of the second order, which has one of its maxima not far removed from the minimum of the first order, supplies the chief portion of the compensation due to this cause.

Further, from the character of the analysis, when the diurnal curve is symmetrical on either side of the hour half way between noon and midnight—that is, when the day and night are equal in length—the third component becomes zero. Any departure from this symmetry introduces a component of the third order, with the result that with a day shorter than 12 hours one maximum will fall in the day between 6 a.m. and 6 p.m., and the other two in the night between 6 p.m. and 6 a.m.; while with a day longer than 12 hours, two maxima will occur in the day and only one in the night. In the former case the negative portions of the component correspond with the reduced morning and afternoon temperatures of the short day, and in the latter the two positive phases correspond with the higher temperature of the mornings and afternoons of the longer day.

These conclusions are in conformity with those previously indicated.

The available data are insufficient to enable us to say whether the corresponding results connected with the fourth component are as fully supported by observation as in the case of the third, but the facts so far as they go confirm this view.

Anthropological Institute, April 11.—Prof. A. Macalister, President, in the chair.—Mr. G. M. Atkinson exhibited a cranium and several metal ornaments found by Mr. A. Michell Whitley and Dr. Talfourd Jones in a grave at Birling, near Eastbourne, Sussex. The peculiar coffin-like shape of the skull seemed to point to its belonging to the early Saxon period, while the metal ornaments were assigned to the late Roman or immediately post-Roman age.—Mr. R. Duckworth read a paper on two skulls from Nagyr, recently added to the Cambridge University collection. One of them is a female skull, and is remarkably dolichocephalic, the cephalic index being 69·94. The other skull is that of an adult male.—Prof. Macalister read a paper on Egyptian mummies. He described the manner in which they were prepared, the unguents used by the Egyptians and the various cloths in which the mummies were rolled. He explained the difference between the Egyptian cloths and those manufactured in England at the present day, and said that the object of using so few threads in the weaving was for the purpose of saving time and trouble. The material at the same time was brought to a high state of perfection as a manufacture, and indeed might even compare with some of the finest linen productions at the present day. Specimens of cloth were exhibited and the author stated, on the authority of a linen manufacturer, that there was only one specimen of linen manufacture in the United Kingdom which could be recognised as of similar structure to the Egyptian productions.—A paper on Damma Island and its natives by P. W. Bassett Smith, R.N., was also read.

Geological Society, April 12.—W. H. Hudleston, F.R.S., President, in the chair.—The following communications were read:—On some Palæozoic Ostracoda from Westmoreland, by Prof. T. Rupert Jones, F.R.S. In 1865 the author determined for Prof. Harkness some fossil Ostracoda which he had obtained from the Lower Silurian rocks of South East Cumberland and North-East Westmoreland, and subsequently other specimens mentioned by Harkness and Nicholson in 1872. In 1891 Prof. Nicholson and Mr. Marr submitted a series of similar microzoa from the same district; and the author now endeavours to determine their specific alliances, and revises the list of those previously collected. He has to notice about eleven forms of *Primitia*, *Beyrichia*, *Ulrichia*, *Æchmina*, and *Cytherella*—several of them being closely allied as varieties, but all worthy of study as biological groups, such as have been illustrated from other regions by writers on the Ostracoda, with the view of the exact determination, if possible, of species and genera, of their local and more distant or regional distribution, and of their range in time.—On some Palæozoic Ostracoda from the Girvan district in Ayrshire, by Prof. T. Rupert Jones, F.R.S. This paper aims at the completion of the palæontological account of the Girvan district, so far as the Ostracoda are concerned; and follows up the researches indicated in the "Monograph of the Silurian Fossils of the Girvan District in Ayrshire," by Nicholson and Etheridge, vol. i., 1880. In about a dozen pieces of the fossiliferous shales, submitted for examination some few years ago, the writer finds nearly thirty specimens of *Primitia*, *Beyrichia*, *Ulrichia*, *Sulcuna*, and *Cypridina* which show interesting gradations of form, not always easy to be defined as specific or even varietal, but valuable as illustrating modifications during the life-history of individuals, thus often leading to permanent characteristics of species and genera. Like those formerly described in Nicholson and Etheridge's "Monograph," the specimens have all been collected by Mrs. Elizabeth Gray, of Edinburgh.—The reading of these papers was followed by a discussion, in which the President, Mr. Marr, and the author took part.—On the dwindling and disappearance of limestones, by Frank Rutley. The existence of chert between two sheets of eruptive rocks at Mullion Island seemed to the author to require some explanation. Cherts are usually associated with limestones, and the absence of limestones in many cases where cherts are found points to their removal by underground waters. The older the limestone the greater the probability of its thickness having dwindled. The thicknesses of the Ordovician, Silurian, Devonian, and Carboniferous Limestones seem to be in the ratio of 1 : 15 : 15 : 100. Many limestones once existing in Archæan rocks may have disappeared, as also limestones in later rocks. The author comments on the difficulty of distinguishing some cherty rocks from felstones. Two appendices are added to the paper, the first on the transference of lime from older to newer deposits, and the second on the formation of nodular limestone-bands.—This paper gave rise to a discussion in which the President, Prof. Hull, Mr. Walford, Prof. Judd, General McMahon, Prof. T. R. Jones, Prof. Hughes, Mr. H. W. Monckton, Dr. G. H. Hinde, and the author took part.—On some Bryozoa from the Inferior Oolite of Shipton Gorge, Dorset, Part II., by Edwin A. Walford.

Royal Meteorological Society, April 19.—Dr. C. Theodore Williams, President, in the chair.—The following papers were read:—The direction of the wind over the British Isles, 1876–80, by Mr. F. C. Bayard. This is a reduction on an uniform plan of the observations made twice a day, mostly at 9 a.m. and 9 p.m., at seventy stations during the lustrum 1876–80; and the results are given in tables of monthly and yearly percentages.—Notes on two photographs of lightning taken at Sydney Observatory, December 7, 1892, by Mr. H. C. Russell, F.R.S. These photographs were taken with a half-plate view lens, mounted in a whole plate camera, and, as a matter of course, there is some distortion at the edges. Both photographs show the gaslights in the streets as white specks, the specks being circular in the centre and crescent-shaped in other parts of the plate owing to distortion. The lightning flashes are also distorted. Mr. Russell believes that this distortion may account for the so-called "ribbon" flashes, which are seen in many photographs of lightning. He has also made some measurements of the length and distance of the flashes, and of the intensity of the light.—Notes on lightning discharges in the neighbourhood of Bristol, 1892, by Dr. E. H. Cook. The author gives some particulars concerning two trees in Tyntesfield Park, which were struck by lightning, one on June 1 and the other on July 18, and also some notes concerning a flagstaff on the summit of Brandon Hill, which was struck on October 6.—Constructive errors in some hygrometers, by Mr. W. W. Midgley. The author, in making an investigation into the hygrometrical condition of a number of cotton mills in the Bolton district, found that the mounting of the thermometers and the position of the water receptacle did not by any means conform to the regulations of the Royal Meteorological Society, and were so arranged that they gave the humidity results much too high. The Cotton Factories Act of 1889 prescribes the maximum weight of vapour per cubic foot of air at certain temperatures; and the author points out that if the instruments for determining the amount present in the mills have an error of 20 per cent. against the interests of the manufacturer, it is necessary that the makers of the mill hygrometers should adopt the Royal Meteorological Society's pattern for the purpose.

PARIS.

Academy of Sciences, April 17.—M. Lœwy in the chair.—Note on the observation of the partial eclipse of the sun of April 16, 1893, by M. F. Tisserand.—On the observation of the total eclipse of the 16th inst., by M. J. Janssen.—Effects of the drought upon this year's crops; reply to M. Demontzey's note on the planting of the highlands, by M. Chambrelent.—Expansion of water at constant pressure and at constant volume, by M. E. H. Amagat. At pressures higher than 200 atmospheres water has no maximum density above zero. At the lower temperatures, contrary to what takes place in the case of other liquids, the coefficient of expansion increases with the pressure. This increase is gradually effaced as the temperature rises, is sensibly zero at 50° or 60°, and changes sign for higher temperatures. If water is kept at a constant volume the pressure increases rapidly with the temperature. Thus, for unit volume the coefficient of pressure increases fourfold between 10° and 100°, and the variation is proportionately even more rapid between 0° and 10°.—On the structure of simple finite and continued groups, by M. Cartan.—On a simple group with fourteen parameters, by M. F. Engel.—Demonstration of the transcendental nature of the number e, by M. Adolf Hurwitz.—Comparison of the international meter with the wave-length of cadmium light, by M. Albert A. Michelson.—Photography of gratings engraved upon metal, by M. Izarn. It is possible to reproduce opaque gratings engraved upon metal in a manner analogous to the reproduction of transparent ones already described. On covering such a grating with a layer of bichromated gelatine, and exposing to the sun through this layer, a grating effect is produced which, although rather feeble, is due to successive differences of structure corresponding to the rulings. These differences of structure are probably due to stationary reflected waves, and need not necessarily be alternations of transparency and opacity in order to produce the desired effect. Very close contact between the film and the grating is essential.—On atmospheric polarisation, by M. A. Hurion.—Researches on the higher alcohols and other impurities in vinic alcohol, by M. Émile Gossart.—On the general relations which exist between the coefficients in the fundamental laws of electricity and magnetism, by M. E. Mercadier.—On the reflection of electric waves at the end of a linear conductor, by M. Birkeland.—Multiplication of the number of periods of sinusoidal currents, by M. Désiré Korda.—On the hygroscopic properties of several textile fabrics, by M. Th. Schlœsing fils.—Contribution to the study of the Leclanché cell, by M. A. Ditte.—Attempt at a general method of chemical synthesis; formation of nitrogen compounds, by M. Raoul Pictet.—On the stereochemistry of the malic compounds, and the variation of the rotatory power of liquids, by M. Albert Colson.—On a chlorobromide of iron, by M. Lenormand.—On the saccharates of lime, by M. Petit.—On a new soluble ferment doubling trehalose into glucose, by M. Em. Bourquelot.—On the circulatory apparatus of *Mygale Cæmentaria*, Walck, by M. Marcel Causard.—Influence of the pressure of gases upon the development of vegetables, by M. Paul Jaccard.—On the ammonite layers of the inferior Malm in the county of Montejunta, Portugal; little known phases in the development of the mollusca, by M. Paul Choffat.—On the mode of reproduction of the parasites of cancer, by MM. Armand Ruffer and H. G. Plimmer.—M. Lippmann presented to the Academy, in the names of MM. Auguste and Louis Lumière, coloured photographs obtained by the interference method.

BERLIN.

Physical Society, March 10.—Prof. Kundt, President, in the chair.—The President gave an account of some researches undertaken as an introduction to the study of Hall's phenomenon. As is well known, this is directly proportional to the intensity of the primary current, but inversely proportional to the pressure of the plates; on the other hand, it is not strictly proportional to the magnetising current in the case of the several metals so far examined, and it appeared probable that it might more possibly be proportional rather to the magnetisation of the plate. Prof. Kundt wished to test this possibility in the case of iron, nickel, and cobalt, employing transparent metallic films of these metals magnetised to 28,000 units, whose magnetisation could be tested directly by means of their rotatory power. It was found that the Hall effect increased hand in hand with the increase of rotatory power, and therefore proportionally to the magnetisation of the plates. The effect was, as Hall had already shown, positive in the case of iron and cobalt, negative in that of nickel. Bismuth deposited electrolytically in a transparent film gave very feeble or no results, whereas, when drawn out into a thin plate the effect was considerable.—Dr. Wren spoke on Maxwell's proposition that waves of light exert pressure in the direction of their transmission, as proved in a certain case by Boltzmann. He deduced, under certain assumptions, a formula for the calculation of temperature based upon a determination of maximal energy.

AMSTERDAM.

Royal Academy of Sciences, March 25.—Prof. van de Sande Bakhuysen in the chair.—Mr. Pekelharing spoke of the peptone of Kühne. Some years ago he argued there was not a real difference between the substances called peptone, and the substance called propeptone or hemialbumose. The researches of Kühne and his disciples afterwards proved that what was called peptone by Schmidt-Mülheim and by Salkowski, contained albumose. But it was not proved by Kühne that the substance called by himself peptone was really free from albumose. Out of a solution of Kühne's peptone, saturated with ammoniumsulphate, there can be precipitated by metaphosphoric acid, and more fully by trichloracetic acid, a substance which has the properties of albumose. It gives the biuretreaction, it is precipitated, the reaction may be acid, neutral, or alkaline, by ammoniumsulphate, it is precipitated by picrinic acid, and, in acid solution, by saturation with natriumchlorid. So it is clear that there is no ground for believing with Kühne that the substance called by him peptone is a substance *sui generis*, and not an impure albumose.—Mr. Bakhuis Roozeboom dealt with the cryohydrates in systems of two salts. Three cases are to be considered. The first is that the two salts may exist without combination. Then there is a cryohydratic point in which the two salts A and B exist with ice next the solution. This point is a minimum temperature. Besides, there are two cryohydratic lines, representing the series of solutions which may exist with ice and A or ice and B as solids. In the other cases when A and B form a double salt D, there are two cryohydratic points, one for the solution in equilibrium with ice + D + A, the other for ice + D + B; and three cryohydratic lines for the solutions in equilibrium with ice + D, ice + A, ice + B. When the double salt is soluble without decomposition, the two cryohydratic points are both minimum temperatures, and therefore there must exist a maximum temperature on the line for ice + D; this maximum relates to the solution which presents the same relation A/B as in the double salt. All these conclusions may be deduced from thermoe dynamical rules; they were confirmed in experimental research by Mr. Schreinemakers.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

BOOKS.—Carlsbad, a Medico-Practical Guide: Dr. E. Kleen (Putnam).—Louis Agassiz, his Life and Work: Dr. Holder (Putnam).—Die Natürliche Auslese beim Menschen: O. Ammon (Jena, Fischer).—Public Health Laboratory Work: H. R. Kenwood (Lewis).—Annual Statement of Works carried out by Public Works Department (Sydney, Potter).—The Principles of Agriculture: G. Fletcher (Derby, Central Educational Company).—Science et Religion: T. H. Huxley (Paris, Baillière).—Au Bord de la Mer: Dr. E. L. Trouessart (Paris, Baillière).—Conférences Scientifiques et Allocutions—Constitution de la Matière: Lord Kelvin. Traduites et Annotées sur la Deuxième Edition: P. Lugol and M. Brillouin (Paris, Gauthier-Villars).—Premiers Principes d'Électricité Industrielle: P. Janet (Paris, Gauthier-Villars).—The Great Barrier Reef of Australia: W. Saville-Kent (W. H. Allen).

PAMPHLETS.—Meteorological Results deduced from Observations taken at the Liverpool Observatory during the Years 1889, 1890, 1891 (Liverpool).—On the Effects of Urban Fog upon Cultivated Plants: Prof. F. W. Oliver (Spottiswoode).—The Fundamental Hypotheses of Abstract Dynamics: Prof. J. G. MacGregor.—Il Clima di Torino: G. B. Rizzo (Torino, Clausen).—On the Application of Interference Methods to Spectroscopic Measurements: A. A. Michelson (Washington, Smithsonian Institution).—Recreation: W. Odell (Torquay, Iredale).

SERIALS.—Journal of the Chemical Society, April (Gurney and Jackson).—Annalen des k. k. Naturhistorischen Hofmuseums, Band viii No. 1 (Wien, Holder).—Timehri, No. xxii. (Stanford).—Notes from the Leyden Museum, vol. xv. No. 2 (Leyden, Brill).—L'Anthropologie, tome iv. No. 1 (Paris, Masson).—Journal of the Royal Microscopical Society, April (Williams and Norgate).—The Asclepiad, No. 37, vol. x. (Longmans).—Records of the Geological Survey of India, vol. xxvi. Part 1 (Calcutta).

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