students has more than doubled during this period, the gain being one of 113 per cent., that is, from 27,424 to 58,342. There has been a marked change, too, in the relative position of the various German universities since 1893–4, when the largest universities were, in order, Berlin, Munich, Leipzig, Halle, Würzburg, Bonn, and Breslau. The only university that shows a decrease in the attendance of matriculated students as against 1894 is Würzburg, and there the loss is very slight.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 5.—Mr. A. B. Kempe, treasurer and vice-president, in the chair.—Colonel Sir David **Bruce**, Captains A. E. **Hamerton** and H. R. **Bateman**, and Captain F. P. **Mackie**: The development of trypanosomes in tsetse-flies. Until the end of 1908 it was believed that tsetse-flies acted merely as mechanical agents in the transference of trypanosome diseases. The parasite was supposed to be carried by the fly in the same way that vaccine lymph is carried—on the point of a lancet from one child's arm to another. The limit of time of infectivity of the fly was placed at forty-eight hours, and it was believed that if an infected area were emptied of its sleeping-sickness inhabitants for a couple of days, it would then be quite safe for healthy persons to enter it. At the end of 1908 Kleine made the discovery that a tsetse-fly could convey a trypanosome for some fifty days after the fly had fed on an infected animal. The experiments were carried out on these lines in Uganda. Both lake-shore and laboratory-bred flies (*Glossina palpalis*) were used, and various trypanosome diseases besides sleeping sickness were experimented with. Tsetse-flies are numerous on the lake-shore, 500 or more being caught every day by a few fly-boys. The flies brought up from the lake-shore were found to be naturally infected with at least two species of pathogenic trypanosomes, so that it was afterwards found necessary to use flies bred in the laboratory from pupæ gathered on the lake-shore. At first it was difficult to find these pupæ, but after some time the supply was more than sufficient, as many as 7000 being brought up in one day by a few natives. These experiments go to show that a late development of trypanosomes takes place in about 5 per cent. of the flies used. This development of trypanosomes in the inside of a fly renders the fly infective and capable of giving the disease to the animals it feeds on. The shortest time which elapsed before a fly became infective after feeding on an animal infected with sleeping sickness was eighteen days, the longest fifty-three days, and the average thirty-four days. An infected fly has been kept alive in the laboratory for seventy-five days, and remained infective during that time. It is not known how long the tsetse-fly may live under natural conditions on the lake-shore. Experiments made to test directly the duration of the infectivity of tsetse-flies show that they can retain their infectivity for at least two years after the native population has been removed from the fly area.—Dr. H. G. **Chapman**: The weight of precipitate obtainable in precipitin interactions.—Miss Ida F. **Homfray**: The absorption of gases by charcoal. The experimental portion of the work here summarised consisted in determining the volumes of gas absorbed by a known weight of charcoal, 3 grams, at definite temperatures, varying from that of liquid air to that of boiling aniline, and at pressures up to 80 cm. of mercury. The gases used were He, A, N_2, CO, CH_4, C_2H_4, CO_2, O_2, and mixtures of N_2 and CO. After making all necessary corrections, the isothermals were constructed, and from them points of equal absorption were read off, the family of curves so obtained being termed the isosteric diagram. The concentration for each isostere was calculated in the form

$$C = \frac{w \times 100}{W + w},$$

where w is the weight of gas absorbed and W that of the gas-free charcoal. The concentration of pure gas when W=0 thus becomes 100 per cent. Two relations have been obtained which hold, within experimental accuracy, for all these gases:—(1) each isostere follows Ramsay and Young's rule for saturated vapours,

$$\frac{T_0}{T_1} - \frac{T'_0}{T'_1} = R\,(T_0 - T'_0),$$

and is expressible by Bertrand's vapour-pressure formula; (2) at constant pressure $dT/d\log C = K$. Also, in all cases at low pressures, and in some cases at all pressures, when these straight lines are produced to $\log C = 2$, *i.e.* 100 per cent., the corresponding temperature is found to be the recognised boiling point of the liquefied gas at that pressure. By means of a simple formula the heats of absorption at various concentrations were calculated, and the thermodynamical relations are comparable to those of concentrated solutions. Calorimetric measurements were made in the case of CO_2, and found to agree well with the calculated values. The suggestion put forward, as a result of the experimental work, is that a homogeneous solution phase is formed in equilibrium with the gas phase, the presence of a large concentration of charcoal greatly raising the equilibrium temperature of the volatile component at a given pressure. This rise is not constant, as in the case of dilute solutions, but is itself inversely proportional to the gas concentration. If any other function of the quantity of charcoal, such as its surface area, were substituted for the mass in calculating the concentrations, the relations between the absorption results and the constants for the liquefied gases would be lost. For mixtures of two gases in charcoal the phase rule holds, and the relations can be deduced from those of the components.

Royal Meteorological Society, May 25.—Mr. H. Mellish, president, in the chair.—W. C. **Nash**: The daily rainfall at the Royal Observatory, Greenwich, 1841–1903. From the statistics given in this paper it was shown that the average annual rainfall for the sixty-three years was 24·19 inches with 157 rain days. The day with the maximum number of rain days to its credit is December 5, while the days with the least number of rain days are April 18, 19, June 27, and September 13. There were ninety-four occasions during the whole period on which the rainfall exceeded 1 inch in the day. The greatest fall was 3·67 inches, on July 26, 1867.—L. C. W. **Bonacina**: Low-temperature periods during the winters 1908–9 and 1909–10. It is often observed that if a given week, month, or other period in one year is marked by some very special meteorological character with respect to one or more elements of weather, the corresponding period the following year shows exactly the opposite character. Dealing with the last two winters, the author directed attention to four very remarkable frosts which stand out prominently, viz.:—(1) December, 1908, in the south of England; (2) March, 1909, in the south of England; (3) November, 1909, in Scotland and Ireland; and (4) January, 1910, in Scotland and the north of England.—R. **Corless**: The rate of rainfall at Kew in 1908. A method was described of obtaining information about the rate of fall of rain from the records of a self-recording rain-gauge, which yields a continuous trace showing, by the position of the pen, the amount of rain fallen.

PARIS.

Academy of Sciences, May 25.—M. Émile Picard in the chair.—Remarks by the president on the forthcoming meeting of the International Association of Academies at Rome.—H. **Deslandres**: The influence of comets on the terrestrial atmosphere according to the kathodic theory. The study of Morehouse's comet showed that the whole of the light emitted by the tail was of kathodic origin, and it is highly probable that the tails of comets emit penetrating rays analogous to the γ rays of radium. These rays could ionise the atmosphere and cause the immediate condensation of supersaturated water vapour. Hence a connection is at least possible on this theory between Halley's comet and the weather.—P. **Villard** and H. **Abraham**: The existence of two explosive potentials. For a given system of electrodes two explosive potentials exist. The first is the potential of the brush discharge; the second appears to be the normal explosive potential, and is more definite. Between these two limits there is a continuous silent discharge.—A. **Haller** and A. **Comtesse**:

The action of the bromides of *ortho*- and *para*-anisylmagnesium upon anthraquinone and β-methylanthraquinone. In these reactions substitution derivatives are formed in all respects analogous with those obtained with phenylmagnesium bromide and quinones. The reduction products of the diols obtained are also described.—Ch. **André**: The passage of the earth through the tail of Halley's comet. Observations with both the electrometer and magnetometer gave negative results.—M. **de Kerillis**: The aurora borealis. Laws and heliodynamical theories. Observations are discussed tending to prove the accuracy of the heliodynamical theory of the aurora.—A. **Blondel**: Observation of Halley's comet made at the Toulouse Observatory with the Brunner Henry equatorial of 38-cm. aperture. The apparent position of the comet and the comparison star are given for May 8.—Léopold **Féjer**: The partial sums of Fourier's series.—G. **Sagnac**: The interference of two beams superposed in the inverse sense along an optical circuit of large dimensions. The arrangement figured resembles that of Michelson in using half-silvered plates, the path of the rays being 30 metres. Some of the inconveniences of silvered glass interferometers are discussed.—A. **Chassy**: The absorption of energy by the passage of an alternating current through a gas at atmospheric pressure. The energy has been measured by the amount of heat developed; above a certain potential the heat developed is proportional to the intensity of the current.—Paul **Jégou**: A very sensitive electrolytic detector working without an auxiliary electromotive force. One of the platinum electrodes is replaced by a mercury-tin amalgam. The detector has a sensibility of the same order as the ordinary form, is invariable with the time, and is unaffected by vibrations.—Pierre **Sève**: A new model balance for the determination of magnetic fields. The apparatus described and figured is an improved form of the instrument designed by Cotton and made by Weber.—Georges **Claude**: The composition of the atmosphere after the passage of Halley's comet. A determination of the proportion of (helium+neon) showed no variation.—A. **Lafay**: A modification of the resistance of the air produced by roughnesses suitably arranged on the surface of a body. The experimental results given have a bearing on the problem of aërodynamics.—Georges **Meslin**: The structure of the lines of the spectrum.—C. **Chéneveau**: The precision of the measurement of magnetic susceptibilities. A discussion of a method recently proposed by M. Pascal.—Louis **Malclès**: The effect of penetration in dielectrics.—M. **Barre**: The solubility of silver sulphate in alkaline sulphates.—E. **Briner** and A. **Wroczynski**: The chemical action of high pressures: the compression of nitrous oxide and a mixture of nitrogen and hydrogen: the decomposition of carbon monoxide by pressure. No change was observed for nitrous oxide after compressing to 600 atmospheres at a temperature of 420° C. Negative results were also obtained with a mixture of hydrogen and nitrogen up to pressures of 900 atmospheres. Carbon monoxide showed clear evidence of chemical change after exposure to a temperature of 320° C. under a pressure of 400 atmospheres.—Daniel **Berthelot** and Henri **Gaudechon**: The chemical effects of the ultra-violet rays on gaseous bodies. On exposure to the ultra-violet rays a mixture of cyanogen and oxygen was nearly quantitatively converted into carbon dioxide and nitrogen. Ammonia mixed with oxygen gave as a final product water, nitrogen, and hydrogen. Hydrogen does not combine with oxygen under these conditions. Formic acid was identified amongst the products of the reaction with a mixture of acetylene and oxygen.—Georges **Denigès**: The presence of tartaric residues of wine in an ancient flask. The flask dated from the first century. Tartaric acid was detected in the deposit on the sides, proving that wine was originally placed in the flask.—P. **Clausmann**: The action of ozone upon carbon monoxide. The interaction of carbon monoxide with ozone produces carbon dioxide. The oxidation is increased by exposure to light and by the presence of moisture.—H. **Cousin** and H. **Hérissey**: Dehydrodicarvacrol.—J. B. **Senderens**: Ketones derived from benzoic and phenylacetic acids. The properties of a series of ketones prepared by the general catalytic method described in a previous paper.—N. **Chercheffsky**: The determination of the place of origin of a naphtha or of substances derived from it.—H. **Gault**: The condensation of ethyl oxalate with ethyl tricarballylate.—H. **Pariselle**: A new synthesis of natural and racemic erythrite.—W. **Louguinine** and G. **Dupont**: The heat of fixation of some ethylenic compounds. The hydrobromic acid was used in xylene solution, as much more concordant results were obtained with this than with aqueous hydrobromic acid.—Ernest F. L. **Marchand**: *Plasmodiophora brassicae*, a parasite of the melon and of celery.—J. **Capus** and J. **Feytaud**: A method of treatment against Cochylis and Eudemis. These Microlepidoptera are parasitic to the grape, and in recent years have caused great damage. The results of two modes of treatment are given.—R. **Robinson**: Re-section of the affluent veins.—M. **Hallopeau**: General considerations on the evolution of the treponeme in the human organism.—E. **Fauré-Frémiet**: Physico-chemical study on the structure of the nucleus of the granular type.—C. **Gerber**: Comparison between the mode of action of certain retarding salts and of the proteins of milk coagulable by heat on the caseification by ferments of boiled milk.—M. **Javillier**: The migration of the alkaloids in grafts of Solanaceæ.—M. and Mme. M. **Rosenblatt**: The influence of the concentration in saccharose on the paralysing action of certain acids in alcoholic fermentation.—H. **Bierry** and Albert **Ranc**: The diastatic hydrolysis of some derivatives of lactose. The lactase contained in the gastro-intestinal juice from *Helix pomatia* possesses unusual powers of hydrolysis, as it splits up, not only lactose, but several lactose derivatives, including lactobionic acid, lactosazone, lactose-amidoguanidine, lactose-urea, and lactose-semicarbazone. Galactose is in all cases one of the products, and this agrees with the views of E. Fischer, who regards lactose as a galactoside of glucose.—M. **Smoluchowski**: The mechanical theory of glacial erosion. A criticism and development of the theory put forward by M. de Martonne.—Alfred **Angot**: The magnetic and electric variations on the nights of May 18 and 19, 1910. None of the variations noted can be regarded as exceptional.—J. A. **Lebel**: Observation of the ionisation of the air in a closed vessel during the passage of Halley's comet.—C. **Limb** and T. **Nanty**: Observations of the magnetic variometers of the Observatory of Fourvière, at Lyons, during the night May 18–19. The variations were of the same order as those usually observed.—F. **Garrigou**: The presence of metalloids and metals in potable waters.—J. **Thoulet**: The measurement of the colour of marine vases.

GÖTTINGEN.

Royal Society of Sciences.—The *Nachrichten* (physico-mathematical section), part i. for 1910, contains the following memoirs communicated to the society:—

December 4, 1909.—W. H. **Perkin** and O. **Wallach**: Researches from the Göttingen University laboratory, xxiii.; on Δ^5-menthenol.

January 15, 1910.—W. **Schnee**: The formula representing the coefficients in the theory of Dirichlet series.

January 29.—E. **Madelung**: Molecular free-vibrations (supplementary paper).

February 26.—P. **Kolbe**: Hilbert's method of uniformisation.—L. **Bieberbach**: The movement-groups of the *n*-dimensional Euclidean space with a finite fundamental region.—O. **Haupt**: Remarks on oscillation-theorems, a letter to Prof. Klein.

FORTHCOMING CONGRESSES.

JUNE 19–23.—International Congress of Mining, Metallurgy, Applied Mechanics and Practical Geology. Düsseldorf. General Secretaries: Dr. Schrödter and Mr. Löwenstein, Jacobi-strasse 3/5, Düsseldorf, Germany.

JULY 4–8.—International Congress in Naval Architecture and Marine Engineering. London. Secretary: 5 Adelphi Terrace, London, W.C.

JULY 10–25.—International American Scientific Congress. Buenos Aires. Address for inquiries: President of the Executive Committee, c/o Argentine Scientific Society, 269 Calle Cevallos, Buenos Aires.

JULY 27–31.—International Congress on the Administrative Sciences. Brussels. Secretary of British Committee: Mr. G. Montague Harris, Caxton House, Westminster.

AUGUST 1–6.—International Congress of Entomology. Brussels. Chairman of Local Committee for Great Britain: Dr. G. B. Longstaff, Highlands, Putney Heath, S.W.

AUGUST 1–7.—French Association for the Advancement of Science. Toulouse. President: Prof. Gariel. Address of Secretary: 28 rue Serpente, Paris.