

defective, and educational experiments in schools. No charge is made for admission, and tickets may be obtained from the Chief Inspector, Education Department of the London County Council.

LA LIGUE DU L'ÉDUCATION FAMILIALE was founded in 1899, with the cooperation of the Belgian Government, to secure closer association between parents and teachers in the study and practice of educational methods. An international congress was held at Liège in 1905 to discuss the relationship of home life to education in school and college. A second similar congress was held in Milan in 1906. At the request of the Belgian Government a committee has been organised to bring to the attention of the British public the third International Congress, to be held in connection with the Brussels Exhibition, August 21-25, 1910. The Marquess of Londonderry has accepted the presidency of the committee, and Mr. Walter Runciman, President of the Board of Education, and Mr. Charles Trevelyan, Parliamentary Secretary to the Board, have been appointed vice-presidents. The necessity for intimate association of home and school influences if we are to obtain efficiency in education is becoming increasingly recognised, and the committee desires that parents and teachers will take full advantage of such an interchange of opinion as is offered by this congress.

THE prize distribution at the Imperial College of Science and Technology, South Kensington, on Thursday, December 16, was chiefly noteworthy for the interesting address by Prof. Sedgwick, F.R.S., on scientific research, reprinted in another part of this issue. Lord Crewe, the chairman of the governing body, presided, this being the first occasion on which he has attended this annual function. In his opening remarks the chairman referred to the resignations of the rector (Dr. Bovey), Sir William Tilden and Prof. Gowland. The proceedings were enlivened by numerous interruptions from students of the Royal School of Mines, who, by shouting the name of the school, demonstrated that the individuality of the school has not been lost by the establishment of the Imperial College, of which it forms an "integral part." The vote of thanks to Lord Crewe for presiding was proposed by Sir Julius Wernher and seconded by Mr. Arthur Acland, who stated that the governing body has set aside the sum of 12,000*l.* for the establishment of a students' club. Lord Crewe, in responding, appealed for a double loyalty among the students—for their respective colleges on the one hand, and for the Imperial College on the other, the relation of which to the component colleges he compared to that of his own University of Cambridge to the Cambridge colleges. The associateship of the Royal College of Science was granted to forty-four students, and the associateship of the Royal School of Mines to thirty-four students.

THE Mathematical Association and the Association of Public School Science Masters will hold their annual meetings next January in common, to a large extent. The meetings of both associations are to be held at Westminster School. On January 12, 1910, the Mathematical Association will hold its own meeting in the morning, when, after the business part of the agenda has been completed, addresses will be delivered by Mr. C. Godfrey on different methods in algebra teaching for different classes of students, by Prof. P. J. Harding on elliptic Trammels and Fagnano points, and by Mr. W. J. Dobbs on a patent inexpensive balance. During the afternoon of the same day a joint meeting will be held of both associations for the consideration of the report of the committee on the correlation of mathematical and science teaching. On January 13 the science masters will hold their annual meeting. The president for the year, Prof. H. E. Armstrong, F.R.S., will deliver his address, taking for his subject "The Future of Science in Our Schools." Afterwards Mr. Eccles, of Gresham's School, Holt, will read a paper dealing with the confusion existing in the symbols used in text-books on physics, and urging that some uniform system be introduced. In the afternoon Mr. L. Cumming, of Rugby School, will read a paper on the desirability of teaching all boys geology or biology during some portion of their school life; Mr. Cross, of King's School, Peter-

borough, will deal with laboratory equipment and design, and Mr. Oldham, of Dulwich College, on teaching oxidation and reduction. The usual exhibition of books and apparatus will be held.

THE annual prize distribution of the Sir John Cass Technical Institute was held on December 16, when the awards were distributed by Dr. H. A. Miers, F.R.S., principal of the University of London. In the course of his address, Dr. Miers pointed out that success in competition is to be regarded as a special gift, because it is not everyone who is born to succeed in competing with his fellow men and women, and, moreover, success is not to be measured by the faculty of excelling others. No pleasure can surpass that of success in one's own work, and the problem in modern life is how to combine this conscious spirit of pleasure and pride in work with the totally different conditions in which it is carried out now as compared to those which existed in the old days of the guilds and apprenticeship in the City of London. The aim of technical institutions should be to make the students less of specialists and to give them more versatility and adaptability so as to enable them to find out new ways of pursuing their own work. It is true that in order to effect this many subsidiary subjects of study are necessary, but such subjects should be regarded as only representing the different principles of the more special subject of study, and should be worked out with enthusiasm and keenness from the point of view of their bearing upon the specific science or industry in question. New methods of work which may have a bearing in many directions of science are not made as accessible as they should be, owing to the extreme difficulty of reading research papers outside one's own special subject, a difficulty due to the fact that those who are pursuing scientific research and are studying scientific methods do not devote sufficient attention to expressing themselves in simple English. The student who goes out into the world with a keen interest, not only in his special work, but also in the other subjects which he had to learn as a student, and with some knowledge of the general principles underlying them all, will never feel helpless when he finds himself in new conditions and confronted by new problems. In conclusion, Dr. Miers pointed out that no educational work could be quite successful unless it is inspired by the spirit of research, and he welcomed the encouragement of research in the Sir John Cass Technical Institute, referring especially to the prizes awarded by the Goldsmiths' Company in metallurgy, and to the award by the Institution of Mining and Metallurgy of the "Consolidated Goldfields of South Africa premium of forty guineas" jointly to Mr. C. O. Bannister, the head of the metallurgy department, and to Mr. W. N. Stanley, a student in the department.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, December 9.—Sir Archibald Geikie, K.C.B., president, in the chair.—W. J. Young: The hexosephosphate formed by yeast-juice from hexose and phosphate.—L. S. Dudgeon and H. A. F. Wilson: On the presence of hæm-agglutinins, hæm-opsonins, and hæmolysins in the blood obtained from infectious and non-infectious diseases in man (third report). These results are based upon some hundreds of experimental observations which have been made upon normal and pathological blood, and are as follows:—(1) Auto-agglutination of the red blood cells, as tested for by the methods which we have employed, may be shown to occur with specimens of pathological blood only occasionally, but never with normal blood; and auto-hæmolysis has not been met with. (2) Iso-agglutination is often met with in specimens of blood obtained from patients suffering from the same disease. (3) Hæm-agglutination is largely a specific phenomenon, both in normal and pathological blood, and the specific effect can be shown to persist even if the red cells have been subjected to high degrees of temperature or to complete drying. (4) Hæm-agglutination and bacterial agglutination are distinct phenomena. (5) Well-marked iso-hæmolysis in specimens of normal and pathological blood is not common, although some degree of hæmolysis can

frequently be demonstrated. (6) Concerning phagocytosis: It would appear necessary to avoid mixing specimens of normal or pathological blood, because just as samples of sera are known to vary in value, so do the leucocytes, although to a less extent, whether they are obtained from specimens of normal or pathological blood. Still further, by mixing samples of normal or pathological blood a hæmolytic action may be induced which in itself has been found capable of exciting abnormal results in phagocytosis. (7) It appears to be incorrect to regard a specimen of blood as normal until it has been subjected to a detailed examination by the methods referred to in this and the two previous communications, quite irrespective of its actual source.—**L. Doncaster**: Gametogenesis of the gallfly *Neuroterus lenticularis* (*Spathogaster baccarum*), part i. The cynipid *Neuroterus lenticularis* has two generations in the year, hatching in April and June. The April generation consists of females only, which lay parthenogenetic eggs. Evidence is given that some of these flies lay only eggs destined to become males, other flies only eggs which become females. The June generation thus consists of males and females; the eggs are fertilised and give rise to the generation which appears in April. In the spermatogenesis no chromosomes are found in the spermatogonial mitoses. In the spermatocytes, the first maturation division is abortive, only a small piece of cytoplasm with the centrosome being separated. In the second spermatocyte division 10 chromosomes appear and divide equally into the spermatids. The two spermatids are similar, except that one receives a small extra-nuclear body absent in the other. Somatic mitoses in the male show 20 chromosomes, except in the nerve-cells, which appear to contain 10 only. The eggs of the June generation undergo a double but irregular maturation division, apparently leaving 10 chromosomes in the pronucleus. Segmentation divisions in these eggs and body-cells in females of both generations show 20 chromosomes. The study of the maturation of the eggs of the spring (parthenogenetic) generation is not yet complete, but suggests that the eggs of some females undergo maturation and chromosome-reduction; those of others undergo no reduction. It is suggested that the former eggs yield males, the latter females. These observations, combined with (1) those of the author on the relation between sex and a somatic character in the moth *Abraxas*, (2) with the inheritance of such cases as colour-blindness, and (3) with the sex-relations of "heterochromosomes" in insects, lead to a hypothesis as to the nature of sex. It is suggested that there are male and female sex-determinants (symbols ♂, ♀) which behave as Mendelian characters, each being allelomorphous with its absence (symbol ⊙). Females have constitution ♀ ♂, and produce ♀ eggs and ♂ eggs; males have constitution ♂ ⊙, and produce ♂ and ⊙ spermatozoa. ♀ eggs are fertilised by ♂ spermatozoa, yielding females; ♂ eggs by ⊙ spermatozoa, yielding males.—**Dr. E. Schuster**: Preliminary note upon the cell lamination of the cerebral cortex of echidna, with an enumeration of the fibres in the cranial nerves.—**Dr. F. W. Mott**, **Dr. E. Schuster**, and **Prof. W. D. Halliburton**: cortical lamination and localisation in the brain of the marmoset. This research is one which has been carried out on lines similar to that previously published by two of the authors in relation to the brain of the lemur. A series of sections of the cerebral cortex has been examined in order to map out the extent and boundaries of the types of cell lamination observed. It is now well known that these differences are correlated with differences in function, and this method of histological localisation of function (as it may be termed) has been controlled by the physiological method of stimulation.—**R. H. Whitehouse**: The caudal fin of fishes (preliminary paper). The paper communicated is a summary of a fuller work on the caudal fin of fishes in general, but principally the Teleostei. It aims at a revision of the definitions of terms in general use, in order to disperse the vagueness surrounding these terms. Diphyrcy is shown to be very vague, inasmuch as it does not specify the primary or secondary nature of the symmetry, and thus it may be dispensed with in favour of protocyrcy and gephyrcy, the former of which implies primary, and the latter secondary, symmetry. Concerning heterocyrcy, the essential features of this condition are considered to be (1) an

enlarged lower lobe, and (2) the retention of individual centra, when formed, to the end of the axis. The term "hypural" is introduced into this form, since there is evidence of these structures being formed by the union of radials and hæmal arches. Under homocyrcy, three varieties of fin-structure are discussed for the purpose of showing (1) the breadth of the term, (2) features which determine the degree of specialisation, and (3) the taxonomic value of the caudal. Evidences of caudal abbreviation are reviewed, and a re-defining of the term "epural" is given, by which this structure is considered the dorsal homologue of the ventral hypural. The presence of radials dorsally and ventrally is directed attention to, and also the composite nature of hypurals and epurals. Finally, evidence is given in support of the theory that the permanent homocercal caudal is a shifted anal, and, moreover, support is forthcoming among the Elasmobranchs.—**H. E. Arbuckle**: Some experiments with the venom of *Causus rhombeatus*.—**Dr. V. H. Veley** and **Dr. A. D. Waller**: The comparative action of stovaine and cocaine as measured by their direct effects upon the contractivity of isolated muscle. As tested by an independent method, these two drugs are found to be of approximately equal physiological action in correspondence with their affinity values.—**Sir David Bruce**, **Captains A. E. Hamerton**, **H. R. Bateman**, and **F. P. Mackie**: *Glossina palpalis* as a carrier of *Trypanosoma vivax* in Uganda.—**Prof. W. M. Hicks**: A critical study of spectral series, part i., the alkalis, H and He.—**G. W. C. Kaye**: The distribution of the Röntgen rays from a focus bulb. A Röntgen bulb was constructed with an antikathode the inclination of which to the beam of kathode rays could be varied at will. The bulb as a whole was also capable of rotation, and thus by the use of a stationary ionisation chamber, intensity distribution curves could be obtained for the X-rays. The hardness and intensity of the Röntgen rays were found to be almost independent of the obliquity of the antikathode. Some possible improvements in the modern focus bulb are suggested in the paper.—**R. D. Kleeman**: The direction of motion of the electrons ejected by the α particle. When an α particle collides with a molecule, we should expect that the direction of motion of the ejected electron depends on that of the α particle. If the whole or a part of the energy of ionisations is derived from the α particle, the electron should have a component of motion in the same direction as the direction of motion of the α particle. Some experiments to test this showed that when α particles are shot through thin metal foil more electrons are given off from the side of the foil where the α particles emerge than where they enter. This shows that the motion of the liberated electrons is on the whole in the same direction as that of the ionising α particle.—**F. Soddy** and **A. J. Berry**: Conduction of heat through rarefied gases. By the aid of the calcium absorption process of producing high vacua, the conductivity of twelve gases for heat has been determined at pressures so low that the actual path of the molecule is comparable with its mean free path (*cf.* Sir W. Crookes, Proc. Roy. Soc., 1880, 31, 239). By an electrical method the heat dissipated from a platinum strip, maintained at 61° in the gas, has been measured at various pressures down to a thermally perfect vacuum. As indicated by the kinetic theory, the heat dissipated at low pressure is proportional to the pressure, whereas at higher pressures it is independent of pressure. It was found that the conductivity in the first case bore no relation to that in the second. At all ordinary pressures hydrogen and helium are easily the best conductors, while of the gases examined carbon dioxide was the worst. At low pressure the conductivity of acetylene, methane, and cyanogen somewhat exceeded that of hydrogen, while helium was but slightly better than carbon dioxide. At low pressures the conductivity will be defined in terms of the calories ($\times 10^{-5}$) dissipated per second, per 0.01 mm. of pressure, per sq. cm. of surface, per 1° difference of temperature between the surface and the wall of the containing vessel. The symbols K and Q will be used to express respectively the experimental and calculated values of the conductivity so defined. On the assumption that the heat interchange between the molecule and the surface it impinges upon is perfect, Q is the product of the number of impacts of the molecules per second per sq. cm. and the

specific heat of the molecule. By the aid of the kinetic theory, Q may readily be approximately calculated from the mean molecular velocity and the molecular heat at constant volume. In the table the gases have been arranged in ascending order of K . In the second column, which gives the relative conductivity of the gas at ordinary pressures, the figures refer to the watts dissipated by the gas in the apparatus at pressures such that conductivity was independent of pressure. In the last three columns the values of K , Q , and of the ratio of K to Q , are given.

	Watts.	K.	Q.	K/Q.
Argon	1.07	1.30	1.20	1.09
Neon	2.35	1.76	1.70	1.04
Carbon dioxide	0.95	1.89	2.64	0.72
Oxygen	1.55	1.91	2.23	0.86
Helium	7.30	1.94	3.80	0.51
Carbon monoxide	1.37	1.96	2.38	0.82
Nitrous oxide	0.97	2.11	2.75	0.77
Nitrogen	1.44	2.21	2.35	0.94
Hydrogen	8.75	2.29	8.95	0.25
Cyanogen	0.97	2.35	—	—
Methane	2.81	2.70	3.95	0.68
Acetylene	1.24	2.75	3.82	0.72

For argon and neon the agreement between the observed and calculated conductivity is as good as can be expected, whereas for all the other gases the ratio is less than unity, and in the case of hydrogen and helium the divergence is especially marked. The results appear to afford the means of obtaining information concerning the nature of the single impact of the gas molecule with a surface. Whereas for the denser monatomic gases the interchange of energy appears perfect, for the more rapidly moving molecules of helium and hydrogen this is not the case. The results are preliminary, and the conclusions now tentatively suggested are being tested further with improved apparatus.—**T. Wright**: Harmonic tidal constants for certain Chinese and New Zealand ports.—**S. Kinoshita**: The photographic action of the α particles emitted from radio-active substances. The photographic action of α rays is quite distinct from that of light. There is no diminution in the action when the rays are screened by an absorbing substance, so long as they are capable of passing through the photographic film. In the case of light, the action varies with the intensity of the light, which decreases on passage through an absorbing screen. The photographic action of α rays is thus independent of the velocity of the rays and depends on the number of α particles, N , which passes through the film and can be expressed, when measured by the density, D , as

$$D = D_{max}(1 - e^{-CN}), \text{ where } C \text{ is a constant.}$$

This formula can be theoretically deduced on the assumption that each halide grain is rendered capable of development when struck by a certain number of α particles. By counting the number of silver grains in the film exposed to a known number of α particles, it was found that each halide grain was rendered capable of development when struck by a single α particle. The mass of silver per unit area of a developed film, calculated from the number of grains and their average size (deduced from the constant, C , in the above equation) by a consideration of the theory of probability, agrees well with the value determined from the density and the photometric constant. The sensitiveness of a photographic film to α rays cannot be characterised by its inertia. A rapid plate is more sensitive to α rays than a slow plate, if density be taken as a criterion. The reverse holds, however, when the number of grains is considered, provided that the total amount of silver halide per unit area is the same in both cases. The authors have now this new method of counting single α particles, in addition to the electrical and scintillation methods. The photographic method should prove very valuable for counting very small numbers of α particles, since it is applicable to very weak sources by using very long exposures, and also to α particles having a very short range.—**Hon. R. J. Strutt**: The accumulation of helium in geological time, III. The present experiments refer to the amount of helium in zircon. This mineral is found in igneous rocks of all ages, and the experiments show clearly that the quantity of helium generated closely follows the geological age. This must not be taken to prove that they retain the

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whole of the helium generated within them by radio-active change, but rather that, as they all crystallise from fusion, they are all of similar structure, and retain a not very different fraction of the full quantity of gas in each case. The following table summarises the results. The last column shows the ratio of helium to radio-active matter (c.c. per gram of uranium oxide), thoria being reckoned as equivalent, in helium production, to 0.203 times its weight of U_3O_8 :—

Locality.	Geological Age.	Per Gram of Zircon.			Helium Ratio
		Helium cc. $\times 10^{-4}$	U_3O_8 Grams $\times 10^{-8}$	ThO_2 Grams $\times 10^{-4}$	
Vesuvius	Tertiary ...	<0.4	38.0	—	<0.01
Campbell I., New Zealand	Tertiary ...	0.007	3.17	8	0.223
Mayen, Eifel	Tertiary ...	1.14	12.7	0	0.090
Expailly, Auvergne	Tertiary ...	2.12	3.72	0	0.570
N.E. Tasmania	?	4.34	1.14	0	3.88
Brevig, Norway	Post Devonian	98.8	13.3	32.7	4.94
Cheyenne Cañon, Colorado	Paleozoic ...	193	12.8	11.4	12.8
Green River, Henderson Co., N. Carolina	Paleozoic ...	255	12.9	30.1	13.4
Ural Mts.	Paleozoic ...	300	6.34	46.5	19.0
Kimberley Diamond Mines	Paleozoic ...	323	10.8	1.32	29.2
Ceylon	Ancient ...	210	6.57	19.8	19.8
Ceylon	Ancient ...	283	10.1	4.6	26.0
Ceylon	Ancient ...	575	75.3	28.5	7.1
Sebastopol, Renfrew Co., Ontario, Canada	Archæan ...	114	1.83	0.92	56.6

Royal Anthropological Institute, December 14.—**Mr. H. Balfour**, past-president, in the chair.—**E. Torday**: Results of a recent ethnographical expedition to the Congo Free State. The expedition left England in October, 1907, and travelled by the Kasai and the Sankuru to the Ba-Songe country. The Ba-Songe are a tribe of the Ba-Luba people, whose affinities lie rather to the south. The next tribe visited was the Ba-Tetela, a cannibal people who occupy a large extent of country between the second and fifth degrees of southern latitude. These people seem to have been extending, gradually but steadily, south and west from the Lower Lomami. Their culture is interesting as exhibiting a transition between that of the forest and of the plains. Other tribes visited were the Bu-Shongo, the Akela, and the cannibal Ba-Nkutu, who seem to have cultural affinities with the northern Ba-Tetela. The Ba-Songo Meno, a term given to a large number of tribes on both banks of the Kasai between the Sankuru and the Mfani, were also visited. These tribes have never been investigated, and show great hostility to the white man. The western Bu-Shongo tribes were also visited. These people, originally migrants from the north, gained most of their culture from the tribes to the west, and it was with these people that the paper chiefly dealt, including the Ba-Kongo and the Bashi Lele, who represent the first waves of Bu-Shongo immigration into the country. With regard to history, it is a remarkable fact that the Bu-Shongo people have preserved their records. The name means people of the Shongo, the shongo being a weapon, now obsolete, which was the principal arm of offence in the early days. The chief drew a picture of this weapon in the sand, and it was unmistakably a throwing knife. Now the throwing knife as a weapon does not occur south of the great bend of the Congo. The argument, therefore, that the people originally came from the north is strengthened by this fact, as the north was the original home of the weapon. From evidence of language, tribal history, and culture, the original home of the people seems to have been the west central Sudan. The remainder of the paper dealt with the institutions, government, and religion of the people. The tribal organisation is extremely elaborate. At the head is the chief, but in certain points his mother appears to take precedence. There are also six great officers and a host of other officials. Although nominally absolute, the chief has little real power. The right to the throne descends in the female line, but a woman can only come to the throne if the male stock fails.

This is the theory. In practice the chief has the power practically of nominating his successor, as he can disinherit any likely claimant. In religion the Bu-Shongo believe in an all-powerful creator, but they pay no worship to him. Magic is largely practised. The spiritual nature of man is considered to consist of three elements, soul, double, and shadow. The soul only leaves the body at death, the double at both death and sleep, and the shadow only at death, the belief that a corpse cannot cast a shadow being current among the people. The nearest approach to true totemism as yet discovered in Africa was found among the western Bu-Shongo, where each person inherits from his father an Ikina, a plant or animal which he may not eat. This Ikina has no connection with tribal names, and the division into Ikina cuts across the division into tribes and villages. Persons possessing the same Ikina may not marry.

Royal Meteorological Society, December 15.—Mr. H. Mellish, president, in the chair.—Dr. W. N. Shaw, F.R.S.: The variations of currents of air indicated by simultaneous records of the direction and velocity of the wind. In order to form a mental picture of the changes which are taking place in the amount of air flowing past an anemometer, we need to take into account the changes of direction as well as the changes in velocity. The author had endeavoured to combine these in what he called a "vector diagram," and he pointed out some interesting results which he had obtained from such diagrams.—W. G. Reed, jun.: A critical examination of South American rainfall types. The object was to make a simple yet accurate map showing the seasonal distribution of rainfall in South America.—W. G. Reed, jun.: The study of phenomenal climatology. The suggestion has several times been made that treatment of weather elements by days and months is arbitrary and unnatural for places not within the tropics. The author points out that in latitudes subject to cyclones the distribution of weather elements depends largely upon the relation of cyclones and anticyclones, and he therefore suggests that the cyclone is a more rational unit than the day or the month.

EDINBURGH.

Royal Society, December 6.—Prof. Cossar Ewart, F.R.S., vice-president, in the chair.—Dr. D. C. L. Fitzwilliams: The short muscles of the hand of the agile gibbon (*Hyllobates agilis*), with comments on the morphological position and function of the short muscles of the hand of man. The material was supplied by the late Prof. Cunningham. The extraordinary length of the upper limb of the agile gibbon, and the manner in which it uses the hook-like hand as it swings itself from tree to tree, have an influence upon the anatomy which can be clearly recognised, especially in regard to the muscles. Thus in the gibbon the muscles of the hand tend to wander down the phalanges. This is evidently a mechanical gain, and is a response to the demands of function. The paper contained an elaborate comparison of the layers of muscles in the hand of the gibbon with the arrangements in the human hand, the discussion being based upon the distribution of the three primitive layers which, according to Cunningham, characterise the typical mammalian manus.—G. Green: Waves in a dispersive medium resulting from a limited initial disturbance. Following up a former paper on group velocity, the author investigates the effect of the same initial disturbance in all media in which the velocity of an infinite train of regular waves is proportional to the wave-length. The results obtained are similar to those given by Prof. Burnside for water waves in his paper on deep-water waves resulting from a limited original disturbance, of which the paper is an extension. It is shown that in all the media considered the greatest disturbance at each point is inversely as the square root of the distance of the point from the place of the original disturbance, and the wave-length of the disturbance when greatest is the same for every point, being determined entirely by the form of the initial disturbance.—Dr. W. A. Caspari: The composition and character of oceanic Red Clay. The chemistry of this deposit, though it has received attention

from several investigators, still presents uncertainties. At Sir John Murray's suggestion a re-investigation of the whole subject from the chemical standpoint was undertaken. Moreover, Sir John Murray's unique collection of deep-sea deposits afforded the opportunity of choosing a highly representative series of red clays from all parts of the world. The methods and the results of analysis are given in detail. Regarding the general question of the molecular constitution of submarine clays, the author concludes that these hydrous silicates are not so much definite chemical compounds or mixtures of such as agglutinates of colloidal silica, alumina, &c., in inconstant proportions. What the affinity is which binds the constituents together we do not know, but it is certainly not exclusively chemical. In the Red Clay areas we have a temperature of 1° C. to 3° C., pressures of 400 to 600 atmospheres, and a uniform medium (sea-water), conditions which give to deep-sea weathering features which sharply contrast with subaërial weathering. The degradation product has much the same composition all over the globe, and it is a more acid silicate than the corresponding continental material. Clearly silica can escape into the hydrosphere just as well as alkalis and alkaline earths. On the whole, there seems to be something approximating to a genuine equilibrium between Red Clay and sea-water. When the colloidal nature of Red Clay is realised, the invariable presence of calcium, magnesium, and alkalis causes no surprise. This retention of highly soluble matter may be ascribed to capillary action at the enormous surfaces presented by the fine grains of clay and their internal framework, but the possibility that chemical affinities are also exerted is not to be disregarded. Potassium, calcium, magnesium, and sodium are withdrawn, in approximately constant proportions, out of the sea-water. The order given is the order of their adsorbability, and is just the reverse of their abundance in sea-water.

PARIS.

Academy of Sciences, December 13.—M. Bouchard in the chair.—H. Deslandres: Arrangement of the large telescope at Meudon for the photography of comets. Application to the Halley comet. Details are given of the addition of a finder to the large telescope and its mode of use for keeping the image of the comet on a fixed point of the photographic plate.—H. Deslandres and A. Bernard: Preliminary note on the spectrum of the Halley comet. At the Lick Observatory W. Wright found this comet to give an absolutely continuous spectrum; the results obtained by the authors, on the contrary, show clear discontinuities in the spectrum. There is a possibility that two condensations noted in the ultra-violet are near the bands λ 388 and λ 391.45 found in the Morehouse comet. Further measurements are required, but it seems proved that the comet shines by its own light, part of which is due to incandescent gases.—H. Poincaré: A generalisation of the method of Jacobi.—M. Coggia: Observations of comets made at the Observatory of Marseilles with the Eichens 26-cm. equatorial. Data are given for Daniel's comet on December 9 and 10, and Halley's comet on December 2, 3, 4, 5, 8, 9, and 10.—Eugène Bloch: The Hertz photoelectric effect. The classification of metals in the order of their photoelectric effect is modified by the wave-length of the light employed.—G. A. Hemsalech and C. de Wattleville: The line spectrum of calcium given by the oxy-acetylene blow-pipe. The spectrum approaches that of the arc in the number and intensity of the lines. The relation between the number of lines and the nature of the flame is discussed.—A. Lafay: An arrangement for the determination of very small differences of pressure. A silvered collodion film is displaced by the pressure to be measured and brought back to its original position electrostatically, an interference method being used to measure the displacement.—E. Caudrelier: The discharge of inductors. The influence of the primary condenser on the length of the spark.—Louis Dunoyer: The variation in the conductivity of glass with temperature.—P. A. Guye and N. Zachariadès: The reduction of weighings to a vacuum applied to the determination of atomic weights. A revision of the figures given in an earlier paper, in which the errors caused by the presence of occluded air in the salts

weighed are determined. This occlusion of air results in the density assumed in the corrections to the weight in a vacuum being taken too low.—L. **Bruninghaus**: A relation between absorption and phosphorescence.—J. **Taffanel**: Experiments relating to the propagation of coal-dust explosions in mine workings. The inflammation of the coal-dust was started in these experiments either by exploding a small charge of dynamite or some cubic metres of a mixture of methane and air. Measurements of the velocity of propagation of the wave at varying distances from the firing point were made, and the effect of obstructions and changes in the direction of the gallery studied.—E. **Goutal**: The estimation of carbon monoxide in steel. In a previous paper the author has shown that during the solution of iron or steel in cupric chloride a small amount of carbon monoxide is given off, corresponding to about 0.006 per cent. of the carbon in the steel. The first experiments were carried out with iodine pentoxide as the oxidising agent; it is now shown that identical results are obtained when blood is used as the reagent. An amount of carbon monoxide of 0.0142 per cent. by weight represents the limit of saturation for solid steel.—Emm. **Pozzi-Escot**: The separation of vanadium, molybdenum, chromium, and nickel in special steels.—G. **Cheuneau**: The analysis of niobites and tantalites. The proposed process is described in detail, and as an example of its application the complete analysis of a tantalite is given.—P. **Freundler**: Some *c*-oxyindazylic derivatives.—Marcel **Godchot**: Some derivatives of dicyclohexylphenylmethane.—M. **Chevalier**: The scientific expedition to eastern Africa, September and October, 1909.—L. **Trabut**: Some facts relating to the hybridation of Citrus and on the origin of *Citrus aurantium*.—E. **Coquidé**: The plurality of the types of vegetation in the peaty soils of the north of France.—A. **Prunet**: The resistance of the Japanese chestnut to disease (*maladie de l'encre*). The chestnut has been destroyed in various parts by a cryptogamic disease of the roots, and experiments have been made during the last six years on the possibility of replacing the French trees by an American or Japanese variety. The American tree did not resist the disease, but so far the Japanese tree appears to be immune. The latter grows well, and its introduction may have important economic consequences.—Paul **Becquerel**: The variations of *Zinnia elegans* under the action of traumatism.—Émile **Gautrelet**: The partial transformation of fatty food materials by pepsic and pancreatic digestion *in vitro*. It is shown that mannites are the result of this partial digestion.—H. **Guillemard**, R. **Moog**, and G. **Regnier**: The dehydration of the organism by the pulmonary and cutaneous channels and its variation with altitude.—Maurice **Holderer**: The influence of the reaction of the medium on the filtration of the diastases. Sucrase from *Aspergillus niger* was chosen as the diastase for these experiments. In media neutral to phenolphthalein, this sucrase passes entirely through porcelain filters; in media neutral to methyl orange, the sucrase is completely retained by the filter.—R. **Anthony**: The elevation of *Zeugopterus punctatus* at the maritime laboratory of Saint-Vaast-la-Hougue.—L. **de Launay**: The characteristic features of hydrothermal springs.—Paul **Lemoine**: The magnitude of the shrinking produced by the folds of the Paris basin.—G. **Delépine**: The succession of fauna and the distribution of the facies of the Carboniferous limestone of Belgium.—René **Gambier** and Armand **Renier**: Observations on Pinakodendron.—E. A. **Martel**: The subterranean hydrology of the *massif* of Penè-Blanque or Arbas, Haute-Garonne.—Charles **Moureu** and A. **Lepape**: The gases from thermal springs: the presence of krypton and xenon. The gases from twenty-six springs were freed from gases other than the rare gases in the usual way. The residual rare gases were fractionated, firstly, by wood charcoal at the temperature of liquid air, thus separating the helium and neon, and the remainder further treated with charcoal at -23° C. The xenon and krypton were then obtained from the charcoal. These two gases were identified in every one of the waters examined. Blank experiments were also carried out to guard against the possibility of a leakage of air into the apparatus during the analyses, with negative results.

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CALCUTTA.

Asiatic Society of Bengal, December 1.—W. A. **Ingis**: Rivers of Bengal. The author refers to Captain Hirst's article on the Kosi River, and discusses the general question of the construction of marginal embankments, which have for their object the prevention of the overflow of floods.—D. **Hooper**: The secretion of *Phromnia marginella*. In north-east India the larvæ of these insects secrete in the dry weather a saccharine substance, which gives to the plants they affect a snow-white appearance. The chief constituent of this deposit is dulcitol (dulcite). The Phromnias are frequently found upon Celastrus, Elæodenoton, and other species of Celastrineæ, and it is interesting to know that chemists have isolated dulcitol from several plants of this natural order.—Hem Chandra **Das-Gupta**: A probable identity between *Clypeaster complanatus*, Duncan and Sladen, and *Clypeaster Duncanensis*, Noetling. The author gives reasons for thinking that *Clypeaster Duncanensis*, Noetl., was founded on large specimens of *Clypeaster complanatus*, Duncan and Sladen.

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