Pfaundler has recently reconsidered this subject, and states the question as follows :—"Can a piece of ice, surrounded by water at 0°, preserve its shape if the water undergo no disturbance?" So far as we know at present, both weight and figure remain unchanged. Either, then, a part of the ice must melt, or a part of the water freeze, or both of these phenomena happen together. Such alterations involve certain mutations of the amount of heat contained in the surrounding water, or, at least, of the equilibrium of temperature in different parts of the liquid. Now, Clausius's researches into the constitution of liquids show that, in the case of individual molecules, such an equilibrium does not exist. Moreover, the conditions of molecular movement at the free surface of the ice are evidently different from those that are within. Hence, the piece of ice must grow, in certain places and in certain directions, at the expense of other of its parts; the increment at one spot corresponding to the decrement at a different one. Two pieces of ice in contact, or even in close proximity, are therefore likely to freeze together.

By freezing water in a flask under a pressure of a decimetre of mercury, solidification was invariably promoted; and it not unfrequently took place in a direction which was definitely related to what may be called a great circle of the flask.

Pressure, however, is not the only source of regelation. According to the author's theory, the phenomenon may result from any *molecular* disturbance.

PHYSIOLOGY

Coagulation of Blood

PROF. MANTEGAZZA cuts the Gordian knot of the cause of the coagulation of the blood, by attributing it to an action of the white corpuscles of the blood. Admitting Schmidt's theory of fibrin being the product of fibrinoplastin and fibrinogen, he puts forward the idea that normal plasma of the blood contains fibrinogen only, but that the white corpuscles have the power, when irritated, of emitting, or we might almost say secreting, fibrinoplastin, and thus of causing coagulation. The shedding of blood, any contact with foreign substances, are causes of irritation to the white blood corpuscles, and hence these things become in turn causes of coagulation. In support of this theory he insists on the complete coincidence of the power of coagulation with the presence of white blood (or lymph) corpuscles; and on the fibrinoplastic properties of tissues, such as cornea, &c., which abound in cells similar at least in nature to white blood corpuscles.—(Ann. di Chim., July 1869.)

THE *Journal of Anatomy and Physiology*, No. 5, November 1869, contains many valuable papers, *e. g.* on the Muscles of the Limbs of the Anteater, &c., by Professor Humphry; on the Movements of the Chest, by Dr. Arthur Ransome; on the Chemical Composition of the Nuclei of Blood Corpuscles, by Dr. Brunton; an abstract of Mr. E. Ray Lankester's Report on the Spectroscopic Examination of Animal Substances; and a long paper by Dr. T. A. Carter, on the Distal Communication of the Blood-vessels with the Lymphatics. The abstracts of Anatomy and Physiology are still continued with the completeness, accuracy, and critical intelligence which render them the best things of the kind to be found anywhere. Dr. Moore, the indefatigable translator from Dutch and other unusual tongues, supplies a translation of a very interesting paper by Engelmann, on the Periodical Development of Gas in the Protoplasm of Living Arcellæ. We may congratulate ourselves on the fact that the journal is able to make its way, in spite of the difficulties with which in this country Anatomy and Physiology have to contend.

SOCIETIES AND ACADEMIES

LONDON

Royal Geographical Society, November 22.—Sir Roderick Murchison in the chair. A paper was read detailing the results of an exploration of the new course of the Hoang-Ho, or Yellow River, made in 1868, by Mr. Elias, a young merchant of Shanghai, illustrated by a map, the positions in which had been carefully laid down from observations taken by that gentleman. The Chinese records, which are very copious in relation to this turbulent river, mention nine changes of its course, dating from 602 B.C. to the last in 1853, during which its outlet has shifted from 34° to 40° north latitude, the present being the former mouth of the river Tsa-Tsing, in the Gulf of Pecheli. The gradual elevation of the bed of the river caused the waters to press against the upper portion of the embankments, and as neither the dykes were raised, nor the bed deepened, the waters effected a breach in 1851, which was enlarged in the following year, till in 1853 the whole stream flowed through the mile-wide breach, in a north and east direction, leaving the old course dry. From this breach at Lung-Menkau, the river flowed in an ancient bed for 52 miles, but from that point a tract 96 miles long was inundated to a width of 15 miles. Ruined houses, broken bridges in the midst of the waters, and the remains of the banks of two canals forming the northern and southern channels, and here and there vast stretches of mud—were all that told of a once fertile and populous district. The deserted houses were in many cases silted up to the eaves by the alluvial deposit. In the dry season fifteen inches of water were scarcely found in some places. At Yushan the waters converged into the bed of the former river, Tsa-Tsing, now usurped by the Yellow River. The Grand Canal crossed this flooded district, but its banks have been carried away and its communication to the north destroyed. Proceeding down, a broken bridge of seventy arches obstructed the stream it could not span. For 150 miles a fertile and garden-like country was passed through, to which succeeded a barren treeless waste, except for the belt adjoining the river, which was fertile and cultivated; the ground, however, even with the growing crops, and in one place the town wall, was undermined and carried away piecemeal by the encroaching river. A barren, marshy tract of reeds, tenanted by wildfowl, extended for about twenty miles from the sea. This change of course, has, it is said, cost the Chinese Empire fifty to sixty millions of its population, the country lying on the old course having been ruined by the drying up of the river, and that in the new by the floods. The new course is unfit for navigation. Vessels drawing six feet of water might cross the bar, and proceed with difficulty to Yushan, but none beyond.—Captain Sherard Osborn remarked that in 1818 the Chinese Censors had called the Imperial attention to the impossibility of effectually controlling the Yellow River; although the expense of the maintenance of the dykes had been quintupled. The maladministration which had resulted in this calamitous change could not, therefore, be chargeable to British interference with China. British engineers, if employed, would soon restrain the Hoang-Ho within due bounds, and utilise its waters for navigation and irrigation. The Chinese water-systems were beginning to be better known, and he hoped that the Upper Yangtse would soon be opened to our steamers, for every forward footstep of Englishmen would, he believed, be a blessing to China.—Mr. Wylie, the first Englishman who saw the results of the diversion of the river from its course, gave an account of his crossing the river bed, then become a sandy highroad covered with passengers, and some particulars of a journey made by him to the sources of the Han River, in which he identified the pass described by Marco Polo as the White Horse Pass.

Royal Asiatic Society, November 15.—This was the first meeting of the Society after the recess. Mr. W. E. Frere occupied the chair. A paper was read containing an Account of the Bheel Tribes of the Vindhya and Satpura Ranges, by Lieut. J. Waterhouse. The writer starts from a popular tradition among those tribes, according to which the originator of the Bheel race is said to have been a vicious and deformed son of Mahadeva, who, on account of his having killed his father's favourite bull, was sent off to the jungle and uninhabited wastes, and told to cultivate where he chose. From this tradition, combined with the well-known legend of the Mahabharata and Shrî Bhagavata, by which the Nishadas are said to have descended from the Rajput king Vena, Mr. Waterhouse concludes that the Bheels had originally been settled in Judhpur and Marvar, but being driven thence by Rajputs, they emigrated southwards and established themselves in the mountains of Malwa and Candeish, in the Vindhya and Satpura ranges, and on the rugged banks of the Nerbudda and Tapti, where, protected by the natural conditions of the country, they had since dwelt, subsisting partly on their own industry, but mainly by inroads into the surrounding plains. Moreover, it was stated in the history of the princes of Judhpur and Oodeypur, that the Rajputs originally conquered their country from the Bheels. These are then divided by the writer into three classes—the Village, the Cultivating, and the Mountain Bheels. The first are said to consist of a few only, who, being scattered over the villages on the plains, were generally considered as honest and trustworthy, and

often employed as the watchmen of their villages. The Cultivating Bheels continued to live peacefully in hamlets under the rule of their Turwees, though still preserving traces of a ruder and wilder state, such as was prevalent among the Mountain Bheels, who, owing to the difficult nature of the places inhabited by them, had never been altogether subdued, and subsisted only by plunder. Notwithstanding these distinctions the Bheels were one people, and their different tribes intermarried, though with certain restrictions. Polygamy was the rule with them, and it was by no means uncommon to find men with four or five wives. Many children were born, but a large portion died young, owing perhaps, in a great measure, to the malaria in the jungles, where fever and diseases of the spleen were common. The writer then proceeds to give a brief description of their dress and arms, their language and some of their customs. The Bheels are said to be very vindictive and to keep up feuds for many years, sometimes for generations. "Blood for blood" is their general maxim. The life of a man can, however, be made good to his relatives by payment in kind or money of 120 rupees, or of a woman of 60 rupees. In each community the head Bheel is called Turwee. His office is hereditary, and the police arrangements of the village are carried out by him. On the succession of any of the Rajput chiefs it is considered essential the head Bheel Turwee should make a mark with his blood on the forehead of the chief, without which ceremony no succession is considered complete. By the Rajputs intermarrying with the Bheel women, a race results called Bheel-alahs, to which most of the chiefs of the Vindhya Bheels belong. In consequence of their descent from the Rajput conquerors they obtain superior rank and authority among the Bheels, though, as is generally the result of a blending of different races, they seem to combine the viciousness and roguery of the subdued Bheels with the arrogance and haughty bearing of the conquering Rajput. The reading of Mr. Waterhouse's paper was followed by a lively discussion, in which several of the members present took part, who, from a residence in the places occupied by the tribes in question, were able to supply some new and interesting particulars with regard to their dialect and manners. It was then announced by the chairman that the next meeting would be held on Monday the 29th inst.

Royal Horticultural Society. *Scientific Committee*, Nov. 16.—Mr. W. W. Saunders, F.R.S., in the chair. The Rev. M. J. Berkeley exhibited some walnuts, in which the outer rind was completely blackened and shrivelled by frost, the nut in the interior being unaffected. Mr. Glaisher remarked that during winter the temperature of the atmosphere was usually considerably warmer at a level of 20—50ft. above the surface than at a lower altitude. He expressed his opinion that the peculiar appearances presented by the walnuts were due rather to dryness of the atmosphere than to actual frost. Prof. Ansted called attention to the effect of wind in blackening the leaves on one side of a tree, while on the unexposed side they retained their green colour. The chairman stated that an illustration of this fact might recently have been seen in Somersetshire, where the trees for a distance of thirty miles or more were thus affected. Mr. A. Murray then alluded to a peculiar beetle preying on the foliage of orchids introduced from widely diverse countries, and pointed out many interesting facts. Dr. Masters, who spoke on the part of the sub-committee appointed to watch the progress of the plants in the experimental ground at Chiswick, exhibited a series of diagrams, showing in a graphic form the relative degrees of vigour exhibited by the plants at the various dates of observation, and the fluctuations in the intervals between them. Similar tables had been prepared, showing the amount of heat and rainfall during the entire period of observation, and the fluctuations in the intervals between each separate observation. The most striking results shown in the diagrams were as follows:—In almost every case the plants in the unmanured boxes were the least vigorous. The application of purely mineral manures was productive of little or no result in the case of the grasses, but was much more effective in promoting vigour in the case of the clovers. A striking contrast was exhibited in the case of almost all the twelve separate kinds of plants treated with ammonia salts, or with nitrate of soda respectively. It was shown in Dr. Masters' tables that almost invariably when the plants treated with ammonia salts manifested an increased degree of vigour, those treated with nitrate of soda showed a corresponding decrease. These contrasted fluctuations occurred at a time when the weather tables showed a high rainfall and a decreased temperature. Similar antagonistic results, but manifesting themselves at a later period, when the temperature was higher and the rainfall less, prevailed to a less extent in the boxes manured with a combination of mineral manures and nitrate of soda, and of mineral manures and ammonia respectively. Dr. Gilbert remarked that the experiments, as conducted this year, were serviceable rather as indications of what to avoid in the coming year, than for any immediate use at present. The soil made use of was too fertile, and in consequence the plants made undue growth. The contrasting conditions alluded to by Dr. Masters probably depended on variations in the relative power of diffusion of the several salts, and the range of the roots. Nitrate of soda was distributed with great rapidity. The ammonia salts were converted into nitrates before absorption by the plant, and were thus distributed at a lower depth. Dr. Voelcker corroborated Dr. Gilbert as to the necessity of caution in drawing general inferences from this season's experiments, and advised that in future the plants should be grown in pots, so as to be more under control, and less subject to disturbing influences. Mr. Glaisher alluded to the effects produced by the roots of plants in increasing the temperature of the soil, and suggested that a thermometer should be inserted into each of the seventy-two boxes. These thermometers, moreover, should be made with great care, and the mercury in all should be derived from the same source, so as to secure uniformity of expansion.—A report from Mr. Barron, on various experiments that have been carried on as to grafting on various stocks, was then read. The results had been very varied, and were of a very interesting character. In those cases where failure had resulted, the want of success was attributed to one or more of the following causes:—Imperfection in the mode of operating; the too advanced condition of the stocks or of the buds before the operation; the want of correspondence in point of time between the growth of stock and scion, &c. This report will be published *in extenso*.—A communication from Mr. Barber, forwarded by Dr. Hooker, relating to the culture of Aloes, was then read. The Chairman remarked that the rocky nature of the country in which Aloes grew was serviceable in preventing excessive or long-continued moisture. He had ascertained from Mr. Cooper that many of the Haworthias grew naturally closely environed by herbage, and that when this was eaten by the sheep the plants became unduly exposed to the sun, and died in consequence; hence the sheep were only indirectly injurious (not directly, as Mr. Barber had stated) by removing the herbage. Mr. Saunders in practice substituted a fold of thin paper or muslin for the grass, and thus tempered the light, to the great advantage of the plants.—A report from Mr. Moore on the experiments carried out at Chiswick with various chemical manures on variegated zonal and other *Pelargoniums*, with a view to ascertain the effect of the manures on the colouration of the leaves and the production of flowers, was then read.—A lengthy communication on the cultivation of Tea, by Mr. McPherson, was laid on the table, on which the secretary was instructed to report to a future meeting.—Dr. Masters exhibited, on the part of Mr. D. T. Fish, a sample of soil in which there was a thin layer of lime about six inches below the surface. This had evidently been put on as a top-dressing. Mr. Fish attributed the position of the lime beneath the surface to an annual superposition of a layer of carbonaceous matter on the surface, and to the decomposition of the roots. He advanced this view in opposition to that of Mr. Darwin, who attributes similar effects to the agency of worms. Dr. Voelcker remarked that lime so applied was always washed down gradually in the manner described.

Ethnological Society, Nov. 23.—Prof. Huxley, F.R.S., President, in the chair.—Dr. G. W. Leitner gave an account of his visit in 1866 to Ladak, Little Tibet, Kashmere, and the unvisited country of Ghilghit. He succeeded, by a new route crossing the Shingun and Maraug, in reaching Ladak six weeks before the usual passes were open. The Abbot of Pugdal—the Buddhist monastery where Csoma de Körös spent five years—agreed with him to secure the safe passage of any English or Hungarian traveller to Lassa; offering to give a near relative of his own as hostage for the safety of the visitor. The Punjab Government having commissioned him to obtain information respecting the Chilasi people, with a view of tracing a connection between them and the Darada, and the Hindu Olympus, the Kaylas, he crossed the frontier and penetrated into Ghilghit, four marches beyond any previous European travellers. Out of fifty, only two of his followers accompanied him to the country of the dreaded Dards. Dr. Leitner gave an account of the legends of this people, whom he

judges to be a remnant of the most ancient Aryan stock, speaking a highly inflexional and perfect, though unwritten language, and preserving ancient mythologies and traditions of their origin. A singular exception to the Dard dialects is found in the Khajuna spoken by the Hunza people—the robbers of Kunjut—and Nagyr, which is like no other known language. Dr. Leitner has brought a large collection of Thibetan and Dard curiosities, and an intelligent Yarkandi, who as soldier and trader has traversed nearly all Eastern Turkistan: it is to be hoped that he may be given, during his stay in England, opportunities of learning something of our manufactures and commerce, so that he may carry back to Yarkand a good report of English power, and, we will add, of English hospitality and friendship, which will assuredly bear good fruit in the future conduct of the Yarkandis, who are already well disposed to receive and trade with our countrymen.

Entomological Society, November 15.—Mr. H. W. Bates, President, in the chair. The following gentlemen were elected: Messrs. French and Websdale as members; and Messrs. Barnes, Brown, E. M. Janson, O. E. Janson, Pearson, and Robinson, as subscribers. Exhibitions of insects were made by Messrs. F. Smith, Pascoe, Briggs, Davis, and Salvin; and the discussion which ensued thereon was participated in by the President, Messrs. Westwood, Wallace, Müller, Weir, Janson, McLachlan, Eaton, Wormald, Horne, Verrall, and Dunning. The following papers were read:—"New Genera and Species of *Coleoptera* from Chontales, Nicaragua," by the President. "Description of New Genera and Species of *Hispidæ;* with notes on some previously-described species," by Mr. J. S. Baly. "A Synopsis of the Genus *Clothilda*," by Mr. Osbert Salvin.

Statistical Society, November 16. — A large body of Fellows assembled to hear the President, Mr. W. Newmarch, F.R.S., deliver his inaugural address, in which he reviewed the progress that had been made in statistical science since the foundation of the Society in 1834. He pointed out that at that time, with perhaps two or three partial exceptions, foreign Governments and Legislatures had not arrived at even the faintest notion of the desirableness of systematic statistical evidence, but that during the last twenty-five years this state of things had almost disappeared, and in several foreign states there were now in full activity statistical departments, and a vigour of statistical research by independent persons, that almost reduced the United Kingdom to a second place. Having enumerated the branches of inquiry in which this country had made most decisive and gratifying progress during the last thirty-five years, he stated that the following fields of statistical research seemed to him to require early attention:—1. The annual consumption per head among different classes, and by the nation as a whole, of the chief articles of food—corn, butchers' meat, tea, coffee, sugar, tobacco, wine, spirits, and beer. 2. The annual production in agriculture, minerals, metals, ships, and manufactures. 3. The comparative wages, house-rent, and cost of living in different parts of the country. 4. The total annual income and earnings and the total annual accumulations of different classes, and of the country as a whole. 5. The relative taxation of different classes in this country, as compared with the same classes in those foreign countries, the competition of which England has to understand and meet—carefully attending in the inquiry to the comparative merits of direct and indirect taxation. 6. The financial and economical cost and burdens entailed by extensive warlike armaments. 7. Periodical statistics of public hospitals in the metropolis and larger towns, with a view to the comparison of the efficiency and cost of the relief afforded in each. 8. Periodical returns of the income and operations of charitable trusts and endowments, for relief and education. 9. A statistical ascertainment of the numerical strength of the different religious churches and sects. 10. Statistical evidence of the cost to the community in sickness, excessive mortality, and poor-rate expenditure of defective dwellings, and sanitary regulations. 11. Statistical evidence of the gain to the community of instruction in popular schools in the rudiments of political economy, in the commoner industrial arts, and in military exercises. 12. Statistical evidence of the consequences in this country of the emigration from it. 13. Investigations relative to the advantages and cost to this country of the occupation of India. 14. An investigation on grounds of fact of the effect of commercial treaties, especially of the French Treaty of 1860. 15. A similar investigation of the consequences produced in the United States by the rigid system of protective tariffs. 16. And by the protracted suspension of specie payments. 17. Statistical inquiries relative to the effects produced in Europe on commerce, accumulation, invention, prices, and the rate of interest, by the gold discoveries in California and Australia. 18. Investigations of the mathematics and logic of statistical evidence; that is to say, the true construction and use of averages, the deduction of probabilities, the exclusion of superfluous integers, and the discovery of the laws of such social phenomena as can only be exhibited by a numerical notation.

DUBLIN

Royal Dublin Society, November 15.—The first meeting of the 139th session. Mr. W. Andrews read a paper on Deep-Sea Soundings. The author stated that he did not mean to refer to the deep-sea dredgings of the *Lightning* and *Porcupine*, but to some soundings of his own, extending to the moderate depths of eighty fathoms off the Blasquet Islands, on the west coast of Ireland, which were chiefly undertaken in connection with the subject of Irish fisheries. There was a rock near Dingle harbour known as the Barrack Rock to the fishermen, the position and bearings of which had never been determined, no notice of it appearing in the corrected charts of 1860. In July of the present year he had succeeded in taking its bearings and soundings; at low water and at extreme springs there are barely three fathoms covering the rock, and yet in the charts the soundings over it were marked at from 38 to 40 fathoms. The author then proceeded to notice some of the more interesting animals taken by him off the west coast of Ireland during this and other soundings; such as, *Paracyathus taxilianus* and *P. thulensis*, the animals of which he had examined [these two species were first described by Gosse, from single Scotch specimens, and the animals belonging to them were up to the present unknown]; *Eschara foliacea*, which he inclines to think is very different from the true *Millepora cervicornis*, which latter coral he took living in 39 fathoms off the little Skellig Island. [*E. foliacea* is not uncommon off the west coast of Ireland; but we suspect some strange mistake here, as *Eschara* is a well-known genus of the Polyzoa, whereas *Millepora* is almost without doubt a *Hydrozoön*, and has never yet been met with, we believe, north of a mean winter temperature of the sea of 66° F.]

Mr. W. F. Kirby read an account of a natural history excursion made to the continent of Europe in the spring of the present year, detailing his captures at Hilden, Basle, the Righi, St. Gothard, and the Val da Foin.—Mr. A. G. More read an account of an excursion, zoological and botanical, to Connemara, county Galway.—Mr. H. Grubb gave an account of a remarkable meteor seen in the heavens over Dublin between 6 and 7 o'clock, P.M., on the 6th inst.

Royal Irish Academy, November 8.—The first meeting of the present session. The council announced that Lord Talbot de Malahide had, owing to his intended sojourn abroad for the winter and spring months, sent in his resignation of the office of President; this resignation was, with regret, accepted. Of the names of those mentioned as likely to succeed to the post, that of the Earl of Dunraven would appear to be the most popular. A paper was read by Mr. G. H. Kinahan on the ruins of Ardillaun, county Galway.

The following numbers of the Transactions have been published since the session closed in July.—Mr. W. Andrews on *Ziphius Sowerbyi*. [Trans. vol. xxiv. Science, part X.]—Prof. W. King on the Histology of the Test of the class Palliobranchiata. [Trans. vol. xxiv. Science, part XI.]—John Casey, A.B., on Bicircular Quartics. [Trans. vol. xxiv. Science, part XII.]—Professor E. Perceval Wright, contributions toward a knowledge of the Flora of the Seychelles, with four plates. [Trans. vol. xxiv. Science, part XIII.]

MANCHESTER

Literary and Philosophical Society, November 2.—J. P. Joule, LL.D., F.R.S., &c., President, in the chair. William Boyd Dawkins, M.A., F.R.S., and Thomas Edward Thorpe, Ph.D., were elected ordinary members of the Society. Professor H. E. Roscoe, Ph.D., F.R.S., presented a paper on a new Chromium Oxychloride, by T. E. Thorpe, Ph.D., assistant in the laboratory of Owen's College. When chromyl dichloride, CrO_2Cl_2, prepared by heating a mixture of potassium dichromate, sodium chloride, and sulphuric acid, is maintained at a temperature of 180°—190° C. in a sealed tube for three or four hours, it is almost completely converted into a black solid substance, and on opening the tube when cold a considerable quantity of free chlorine escapes. By exhausting the tubes containing the liquid

chloride before subjecting them to heat, the author ascertained that chlorine was the only gaseous product of this decomposition. The black compound invariably contained more or less of the liquid chloride which had escaped decomposition; the greater part of this was easily expelled on gently heating the mass after opening the tube. In order to free it completely from the latter body the black substance was transferred to a clean tube, and heated to 120° C. (*i.e.* about 2° above the boiling point of chromyl dichloride) in a current of dry carbonic acid gas until its weight appeared constant. A determination of the amount of chlorine contained in the volatile portion showed that it was simply chromyl dichloride which remained undecomposed. The solid substance, dried in the manner above described, appeared as a black uncrystalline powder, which, when exposed to the air, rapidly deliquesced to a dark reddish brown syrupy liquid, smelling of free chlorine. When thrown into water it quickly dissolved, forming a dark brown solution, which, on standing, also evolved chlorine. In nitric acid solution hypochlorous acid appeared to be produced. In strong hydrochloric acid the substance dissolved with a dark brown colouration, and on boiling the solution chlorine was evolved, the liquid became greenish yellow, and ultimately changed to the dark green colour, peculiar to a solution of chromium sesquioxide in hydrochloric acid. When thrown into dilute ammonia, chromic acid was dissolved, together with all the chlorine, and a precipitate was formed, possessing the properties of the chromate of chrome sesquioxide ($Cr_2O_3CrO_3$) described by Storer and Eliot. Upon this decomposition is based the method which the author employed for the estimation of the amount of chlorine contained in this body. The weighed quantity of the substance was treated with very dilute ammonia, the solution boiled for a few minutes, filtered, the precipitate well washed by hot water, an excess of nitric acid added to the filtrate, and the chlorine precipitated by the addition of silver nitrate. Two determinations of chlorine, carried out in this manner on preparations made at different times, gave 21·06 per cent. of chlorine as the mean. In order to determine the amount of chromium, a weighed portion of the substance was repeatedly heated with strong hydrochloric acid on a water-bath until the evolution of chlorine entirely ceased; the solution was then diluted with water, heated to boiling, ammonia added in slight excess, and again boiled until the supernatant liquid appeared perfectly colourless. The precipitated chrome sesquioxide was then filtered, dried, and weighed. The mean of two determinations indicated 48·91 per cent. of chromium. These results come very near to the percentage composition calculated for the empirical formula $Cr_3O_6Cl_2$. In conformity with the analytical results, the new oxychloride may be regarded as a compound of chromous chloride with two equivalents of chromium trioxide, and represented by the formula $CrCl_2 2CrO_3$, analogous to the formulæ assigned by Péligot to a series of chlorochromates. Experiment, however, led the author to believe that the constitution of his chromium chlorochromate, and of the salts described by Péligot, is not correctly represented by such formulæ, and in his paper he gives elaborate structural formulæ, which seem to him to agree better with experimental facts, and to show the relation of these compounds to chromyl dichloride.

PARIS.

Academy of Sciences, November 15.—M. E. Becquerel communicated the fifth memoir of his researches upon the luminous effects resulting from the action of light upon bodies, containing his investigation of the influence of the waves of light of different refrangibilities. His paper, which is of the greatest interest and importance to physicists, describes his experiments upon the behaviour of a number of phosphorescent bodies in various parts of the spectrum. No idea of its contents could be given in a short abstract, but we shall probably revert to it on another occasion.—In a note on "The Explosions of Bolides and the Falls of Aerolites which accompany them," M. Delaunay suggested that the explosion of a bolide is caused by the pressure of the atmosphere in front of it taking advantage of any irregularities in the structure of the body, the latter being probably, in many cases, caused or increased by the influence of the great superficial heat. The same atmospheric pressure, in M. Delaunay's opinion, stops the onward motion of the detached fragments, which then fall to the ground. The black crust of the surface of aerolites was ascribed by the author to the passage of the fragments at the moment of their being detached through the compressed and heated air. General Morin remarked upon the compression of the air in front of projectiles and below falling bodies.—M. Chapelas presented a note on the meteors of November 1869, in which he stated that on the 12th and 13th of this month the number of meteors observed was—on the 12th, 6·8, and on the 13th 24·8, per hour. The maximum occurred in the early part of the night.—A notice of the partial explosion of a bolide by M. J. Silbermann was communicated. This meteor was observed on the 11th November, at 10·55 p.m., in the constellation of Ursa Major. It descended obliquely towards the horizon N.N.E. of Paris, and passed through a space of about 34°. Its trajectory, at first nearly straight, soon became undulated between the stars ψ and ω, *Ursæ Majoris;* its rapidity of movement diminished considerably, and a violent explosion took place, the apparent volume and brilliancy of the body having previously increased greatly. After the explosion it continued in a straight course for some distance. The explosion was very brilliant, and sparks were scattered in all directions. The author concluded that this explosion was only partial. M. H. Lartigues, who also observed this meteor, spoke of it as having disappeared after dividing into fifteen or twenty fragments. He described some of these as coloured, which was denied by M. Silbermann; and the latter gives the meteor a duration of at most $1\frac{3}{4}$ seconds, whilst according to M. Lartigues it was visible for four seconds.—M. H. Sainte-Claire Deville presented the correction of an error in the formulæ for calculating the co-efficients of dilatation in some of his memoirs.—M. E. J. Maumené communicated some facts observed with regard to inverted sugar. The author stated that inverted sugar consists not of equal quantities of glucose and levulose, as supposed by Dubrunfaut, but of 12·14 of the former and 87·86 of the latter. Crystals of glucosate of sodium-chloride obtained from inverted sugar, presented the same composition and primitive crystalline form as crystals obtained from diabetic sugar, but their solution effected what M. Maumené calls the *deversion* of the rotatory power in an hour and three-quarters, whilst the solution of the same compound prepared from diabetic sugar requires seven hours to produce the same effect. The author also remarked upon some other points connected with inverted sugar and the glucosate of sodium chloride.—Of two geological papers presented to the meeting, the first was by Mr. Gaston Planté on "The Lower Lignites of the Plastic Clay of the Paris Basin." The author described a section near Meudon, where the lower lignite beds had been exposed. It showed in descending order—(1) the lower beds of the *Calcaire grossier;* (2) a bed of plastic clay with a black lignitiferous vein (the upper lignite bed); (3) a red marbled clay bed; (4) a dark clay bed containing lignites (the lower lignite bed); and (5) conglomerate. The lower lignite beds furnished parts of the lower jaw of *Crocodilus depressifrons* (Blaino), and a femur belonging to the same species; two vertebræ, probably of *Coryphodon;* and the lower extremity of a bone, probably the humerus of a mammal, having the whole of the osseous tissue converted into gypsum in small crystals. The bed contained numerous coprolites of crocodiles. The subjacent conglomerate furnished numerous fossils, including teeth and fragments of crocodiles and mammals, portions of tortoises, and scales of *Lepidosteus*. The teeth of mammalia appear to indicate the genera *Coryphodon*, *Palæonictis*, and *Pachynolopyus*.—The second geological paper was by M. E. Guignet, and treated of the chemical composition and formation of the beds of the great oolite and forest marble of the Haute Marne. The author discussed the distribution of these formations and the influence exerted by their presence upon agriculture.—M. Croullerois presented a note on a "Theorem of Electro-Dynamics and the Explanation of an Electrical Phenomenon;" and M. Milne Edwards four notes on some zoological observations made in his laboratory at the Museum.—In the first of these, M. Jobert described the structure and anatomical relations of the nasal glands in birds; the second, by M. Oustalet, contained a minute description of the respiratory organs in the pupæ of dragon-flies; the third consisted of observations on the salivary glands of *Myrmecophaga tamandu*, by M. J. Chatin; and the fourth was an anatomical and zoological investigation of the species of the genus *Equus* allied to the *Hemione*, by M. George.—A letter from Mr. A. Mayer, accompanying his photographs of the late total eclipse of the sun, was communicated by M. Delaunay.—M. E. Mathieu presented a memoir on the equation with partial differences of the fourth order $\Delta\,\Delta\,u = 0$, and on the equilibrium of elasticity of a solid body.—A portion of a letter from M. E. Duclaux was read, in which he announced that by exposing the eggs of silkworms to cold in August, he had caused an early development of the embryos, which were hatched in November.

—M. E. Prillieux described some experiments by which he has demonstrated that etiolated plants acquire their healthy green colour more rapidly when shaded than when exposed to the direct rays of the sun.—M. L. Colin communicated a note on the etiology of intermittent fevers, or "telluric intoxication," in which he ascribed them entirely to the toxical action of the soil, and declared that residence in large cities has a remarkable prophylactic effect.—Several other notes, of which only the titles are given, were read.

VIENNA

Imperial Academy of Sciences, October 21.—A memoir was communicated from Dr. W. F. Gintl on Ratanhine and its Compounds.—Dr. F. Steindachner presented a report on a collection of fishes made by Baron Ransonnet, at Singapore. The collection contained 60 species, some of them of particular interest, as having been previously obtained only from Japan or Eastern Africa. Four species were described as new, belonging to the genera *Platyglossus* (2), *Pseudochromis*, and *Gerres*.—A memoir, on the origin of the fatty oil in the olive, by M. C. O. Harz, was presented, in which the author states that at first this secretion does not possess the properties of a fatty oil, but its constituents are surrounded by a membrane, and therefore represent true secretion-cells, until the approach of maturity. These secretion-cells are not simple vesicles, but contain numerous daughter-cells, which, with the membrane of the mother-cell, all finally become converted into oil. The presence of the membrane is best demonstrated by treatment with Miller's Salt solution of aniline and chloriodide of zinc successively; the membrane acquires a fine dark-blue colour.—The table of meteorological and magnetical observations at the Central Observatory for the month of September was presented.

November 4.—M. F. Maly communicated a memoir entitled Theorems upon Straight Lines in Space.—Dr. Fitzinger presented the concluding part of his memoir on the cynopterine family of bats; and Dr. A. Boué made some remarks on the geography of the basins of the Drin and Vardar in North Albania and Macedonia.

November 11.—Prof. Lang communicated a memoir describing an experimental investigation of the velocity of light in quartz. Quartz, unlike other uniaxial crystals, possesses a doubly refractive power in the direction of its longitudinal axis. The author has already stated theoretically that in quartz there is no ordinary undulation, and even the extraordinary undulation changes according to a different law from that prevailing in the ordinary uniaxial crystals. His present paper contains the observational proof of this theoretical result. Dr. C. Jelineck reported upon a self-registering thermometer, constructed by M. Hipp, of Neuchâtel. Dr. F. Steindachner presented the first part of his ichthyological report upon a journey to Senegambia. It referred to the brackish-water fishes of the Senegal, and contained descriptions of 21 species, most of which are among the greatest rarities in European museums, and several of them are only known from the Guinea coast. The species belong to the families *Percidæ*, *Pristipomatidæ*, and *Carangidæ*. The author stated that *Otolithus senegalensis* is identical with *Pseudolithus typus* (Bleek.), *Pristipoma macrophthalmum* (Bleek.) with *Larimus auritus* (Cuv. and Val.), *Trachynotus myrias* and *maxillosus* with *T. goreensis* (Cuv. and Val.), and *Trachynotus goreensis* (Bleek.) with *T. ovatus* (Lin.), and that *Pristipoma Rangii* (Cuv. and Val.) is only a young form of *P. suillum* of the same authors.—Prof. Ditscheiner communicated a note upon the dispersion of the optic axes in rhombic crystals, in which he showed that both the true and the apparent angle of the optic axes may be represented by Cauchy's dispersion formula:—

$$\frac{\phi}{2} = A + B\frac{1}{\lambda 2}$$

as a function of the wave-length λ. The table of observations for the month of October, at the Imperial Central Institution for meteorology and terrestrial magnetism, was communicated.

BERLIN

German Chemical Society, November 8.—The following papers were read.—Schultsen and Nenky on the formation of Urea in the Body.—Liebreich on an Antidote against Strychnia.—Oppenheim on Iodo-bromide of Mercury.—Baeyer: Remarks on Thomsen's Criticism of Hermann's Calculation of the Heat of Combustion.—Hoffmann on some Derivatives of Sulphuretted Ureas.—Von Somaruga on Cresylopurpurie Acid.—Weidel on Sandal-wood.—Weselsky on Double Cyanides.—Thomsen (1) on the Preparation of the Hydrate of Chloral; (2) on Selenious and Selenic Acids.—Henry on Ethylated Derivatives of Alcohols and of Polyatomic Acids.—Henry on the Preparation of Pure Iodine from Iodide of Mercury.—Henry and Radziewsky: Correction of a Former Note on Paratoluidine.—Friedel: Scientific Correspondence from Paris.—Merz and Weith on a new method of forming Triphenylated Guanidine.

PHILADELPHIA

Academy of Natural Sciences, May 4.—A paper entitled "A Review of the Species of Plethodontidæ and Desmognathidæ," by E. D. Cope, was presented for publication.—Mr. J. H. Redfield stated that on the 22nd of April, in company with Mr. C. F. Parker, he had visited Cedar Bridge, Ocean County, New Jersey, in search of *Corema Conradii*. This plant occurs in Newfoundland, on islands near Bath, Maine, at Plymouth, Cape Cod, and near Islip, Long Island, and was first discovered at Cedar Bridge by Prof. S. W. Conrad. This locality was visited by Dr. Long about 1835, and carefully indicated by him in Ann. N. Y. Lyc. Nat. Hist. iv., 83, so that there was no difficulty in finding the precise points mentioned; but Mr. Redfield was sorry that no trace of the plant could be found there; and it has doubtless been eradicated by animals or by unscrupulous collectors, or has been otherwise unable to maintain its foothold in "the struggle for existence." The vicinity also was carefully examined, but without success. The plant is said to have once existed near Pemberton Mills, New Jersey; but as that neighbourhood is now entirely under cultivation, there is no evidence that the *Corema Conradii* now exists south of Long Island. If it is again to be discovered in New Jersey, it will probably be in the wide sandy waste a few miles west of Cedar Bridge, near the boundary between Burlington and Ocean counties, where a succession of elevated ancient ocean beaches offer conditions similar to those of Cape Cod.—Prof. Cope exhibited bones and teeth of a large extinct Chinchilla of the island of Anguilla, West Indies, *Amblyrhiza inundata;* and with them teeth of a second and new species, which he called *Loxomylus longidens*. It was also allied to the Chinchillas, and of large size. They were accompanied by a shell implement of human manufacture, which was (so far as discovery in earthy matrix, the colour, &c., were evidence) of the same age as the Rodent.

May 11 and 18.—The following papers were presented for publication:—"Further notes on Microscopic Crystals"; by Isaac Lea, LL.D.—"Sexual Law in the Conifera"; by Thomas Meehan.—"An attempt to ascertain the average weight of the brain in the different races of mankind"; by Joseph Barnard Davis.

June 1.—Prof. Cope exhibited some interesting specimens of extinct reptiles; one of these was the cranium, minus a portion of the muzzle of a gavial, from the New Jersey Greensand, previously described under the name of *Thoracosaurus brinispinus*, but which this specimen demonstrated to belong to another genus, since it did not present the lachrymal foramina of the former. He applied the name *Holops* to it, and stated that he had evidence that *Crocodilus tenebrosus* Leidy, and probably *C. obscurus* L. also belonged to it. He also exhibited drawings, with measurements of portions of the limbs, of a very large Dinosaur, in the collection of Dr. Samuel Lockwood, of Keyport, Monmouth county, New Jersey. It was discovered by this gentleman in the lower cretaceous clays on the shores of Rassitan Bay. It consisted of the extremity of the tibia, with astragalus and fibula. He said it indicated the second genus of his suborder Symphypoda, and was thus allied to Compsognathus, differing in the remaining indication of suture between astragalus and tibia, which disappeared in Compsognathus. The astragalus thus entirely anchylosed was also confluent with the calcaneum, forming a continuous condyloid surface for the tibia. In an anterior projection externally, the extremity of the fibula reposed by a condyloid extremity, the shaft lapping over the outline of the tibia. This demonstrated what he had already stated, that the fibulæ of Iguanodon and Hadrasaurus had been reversed. The length of the fragment was sixteen inches, the fractured section was a transverse oval, the medullary cavity nearly filled with cancellous tissue. The transverse width of the extremity 12 in.; oblique diameter 14 in. This form he called *Ornithotarsus immanis*, and placed it between Hadrasaurus and Compsognathus. It indicated one of the most gigantic of the Dinosaurs yet discovered. He made some observations on a fine fragment of the muzzle of a large Mosasauroid, which pertained to a cranium of near five feet in length. The pterygoid bones were separated from each other, and support nine teeth. A peculiarity of

physiognomy was produced by the cylindric prolongation of the premaxillary bone beyond the teeth, and a similar flat prolongation of the extremity of the dentary. He referred the species to *Macrasaurus* Owen, under the name of *M. pririger*. The specimen he stated belonged to Prof. Agassiz, who obtained it from Western Kansas, probably from the No. 3 of the Upper Cretaceous of Hayden. The following paper was presented for publication:—"Description of new Carboniferous Fossils from the United States"; by F. B. Meek and A. H. Worthen.

June 8.—The following paper was presented for publication: "On the production of Bractæ in *Larix*"; by Thos. Meehan.

June 22.—The following paper was presented for publication: "Notice of certain obscurely known species of American Birds, based on specimens in the museum of the Smithsonian Institution"; by Robert Ridgway.

June 29.—The report of the Biological and Miscroscopical Section was presented, and referred to the Publication Committee. On permission being granted, Mr. Warner spoke upon the mathematical representation of organic forms. Such limitations, he said, might seem to narrow the field of research into the physical causes of organic forms, and perhaps furnish the suggestion of a rational theory of these causes. If no other advantage were desirable from investigations of this kind, they might, he thought, be useful for description and classification. He exhibited a representation of the longitudinal section of an egg by a curve which he called the hyper-ellipse, and of the section of an embryo by another curve, which he termed a deformed lemniscate. Of the egg curve he said that it very closely resembled an ideal section of an egg, taken from a standard modern work. Of the curve representing the embryo he said that it not improbably marked the boundary of matter lying within it in a different state of temperature, density, or tension from the matter lying without. These representations were verified by the members present. The speaker expressed the intention of making these representations the subject of a future paper, in which he would give drawings and formulæ.

July 18.—Mr. Thos. Meehan presented leaves of the peach and cherry, and said it had fallen to him to point out that the leaf-blades of plants were developed in proportion as vigorous vitality was released, and that they were adherent or decurrent in proportion as vigorous vitality was thoroughly developed in the central axis or stem. By following out the same line of observation he had discovered the law which governed the production of sexes in plants, and he now wished to call attention to the operation of the same cause in the production of glands on the leaf-stalks of the peach and cherry. A careful examination of the gland-bearing variety of either of these would show that these glands were simply germs of the cellular matter which formed the leaf-blade. They might be seen in every stage of development, from dense full globes on the petioles to very small dots on the apex of the tolerably well-expanded matter, and it would be further seen that in proportion as vitality was weak were these germs and glands developed. Leaves from the shaded centre of the tree, or from shoots weak or enfeebled from any other cause, produced glandless leaves, while the stronger the shoot the stronger and more numerous were the glands or undeveloped parts. Remembering that these glands were but undeveloped leaf-blades, and that it had been previously proved by the author that plants developed these less freely in proportion to a vigorous axial or stem growth, it should necessarily follow that a weakened vitality would be indicated by an absence of glands. That this was so in the cases referred to, the weak and glandless leaves showed. The author had had a very remarkable confirmation of these recent physiological discoveries. Many varieties of peaches have no glands, and these had been found by the growers of southern Illinois, as he was informed by Dr. Hull, of Alton, in all cases to be the first to succumb to diseases or unfavourable circumstances. It was very seldom that the developments of science and untutored observations went along together, and so thoroughly accorded. To the author it was one of the most interesting facts he had met with in support of his theory, that the degree of separation of the leaf-blade from the main stems was wholly a question of vitality.—Mr. Meehan exhibited some fibre obtained from Mr. Roezel, of Vera Cruz, which was finer and stronger than that furnished by the "Ramie." Mr. Roezel obtained it from a plant which he had found in the Alleghanies, and which he believed to be a new species of Boehmeria. Mr. Meehan had, however, since found it abundantly along the Missouri River, and it proves to be only *Urtica purpurascens*, Nuttall.

EDW. D. COPE, *Corresponding Secretary.*

DIARY

THURSDAY, NOVEMBER 25.

ROYAL SOCIETY, at 8.30.—Preliminary Report of the Scientific Exploration of the Deep Sea in H.M. surveying vessel *Porcupine*, during the summer of 1869, conducted by Dr. Carpenter, V.P.R.S., Mr. J. Gwyn Jeffreys, F.R.S., and Prof. Wyville Thompson, LL.D., F.R.S. (conclusion). Spectroscopic Observations of the Sun; No. 5: J. N. Lockyer, F.R.S. Researches on Gaseous Spectra in Relation to the Physical Constitution of the Sun, Stars, and Nebulæ. Note 3: Dr. Frankland, F.R.S., and J. N. Lockyer, F.R.S. And other papers.

SOCIETY OF ANTIQUARIES, at 8.30.—Ancient British Barrows of Wiltshire and the adjacent counties: J. Thurnam, M.D., F.S.A.

ZOOLOGICAL SOCIETY, at 8.30—Notes on some Spiders and Scorpions from St. Helena, with descriptions of new Species: Rev. O. P. Cambridge. On a small collection of Birds from the Tonga Islands: Dr. O. Finsch and Dr. G. Hartlaub.

MATHEMATICAL SOCIETY, at 8.

LONDON INSTITUTION, at 7.30.—Architecture: Prof. R. Kerr.

PHILOSOPHICAL CLUB, at 6.

FRIDAY, NOVEMBER 26.

QUEKETT MICROSCOPICAL CLUB, at 8.

SATURDAY, NOVEMBER 27.

ROYAL BOTANIC SOCIETY, at 3.45.

MONDAY, NOVEMBER 29.

INSTITUTE OF BRITISH ARCHITECTS, at 8.

INSTITUTE OF ACTUARIES, at 7.—Translation by Mr. Bumsted of "Suggestions for a Law to regulate the Calculation and Investment of the Reserve in Life Assurance Companies:" Herr Hopf.

MEDICAL SOCIETY, at 8.

ROYAL ASIATIC SOCIETY, at 3.

LONDON INSTITUTION, at 4.—Elementary Physics: Prof. Guthrie.

TUESDAY, NOVEMBER 30.

ROYAL SOCIETY, at 4.—Anniversary.

INSTITUTE OF CIVIL ENGINEERS, at 8.—Renewed Discussion upon Mr. Gandard's paper on the Strength and Resistance of Materials. On the Public Works of the Province of Canterbury, New Zealand: Mr. Edwd. Dobson, Assoc. Inst. C.E.

ANTHROPOLOGICAL SOCIETY, at 8.—The Shina People (described for the first time): Dr. G. W. Leitner.

WEDNESDAY, DECEMBER 1.

PHARMACEUTICAL SOCIETY, at 8.

OBSTETRICAL SOCIETY, at 8.

THURSDAY, DECEMBER 2.

LINNEAN SOCIETY, at 8.30.

CHEMICAL SOCIETY, at 8.30.

BOOKS RECEIVED

ENGLISH.—Dictionary of Scientific Terms: Dr. Nuttall (Strahan and Co.) Dr. Buckland's Bridgwater Treatise: Geology and Mineralogy as exhibiting the Power, Wisdom, and Goodness of God, fourth edition, edited by Francis T. Buckland (Bell and Daldy).—The Development of the Idea of Chemical Composition: Prof. A. Crum Brown (Edinburgh: Edmonston and Douglas).—Country Walks of a Naturalist with his Children: Rev. W. Haughton (Groombridge and Sons).—Hereditary Genius; and Inquiry into its Laws and Consequences: Francis Galton, F.R.S. (Macmillan).—The Origin of the Seasons considered from a Geological Point of View: Samuel Mossman (Blackwood and Sons).—As regards Protoplasm in relation to Prof. Huxley's Essay on the Physical Basis of Life: James Hutchinson Stirling (Blackwood and Sons).

FOREIGN.—Manuel de Chimie Médicale et Pharmaceutique: Alfred Riche.—Des Bases Organiques, naturelles et artificielles, au point de vue chimique, physiologique et médicale: Dr. A. Lacote.—Ein Jahr auf den Sandwich-Inseln: Dr. J. Bechtinger.—Bryologia Silesiaca: Dr. Julius Milde.—Lehrbuch der Chemie: A. Geuther.—Leçons de Chimie: A. Riche.—Neue Probleme der vergleichenden Erdkunde als versuch einer Morphologie der Erdoberfläche: Oscar Peschél.—Etude sur la Physique du Globe: R. Bruck.—Die Abhängigkeit der Pflanzengestalt von Klima und Boden. (Through Williams and Norgate.)

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