we have seen, and we hope it will have many readers both among industrial employers and employées.

Two attempts have recently been made from Norway to reach Spitzbergen in the middle of winter, for the purpose of taking additional supplies to the storehouse at Eisfiord, erected and fitted with all necessaries last summer, as we noted some months ago, for the purpose of sheltering the exploring expeditions which are endeavouring to penetrate polewards to the north of Europe. The steamer *Albert* left Tromsoe on November '20, and reached about 77° under the meridian of Greenwich, when, on account of the great danger from the ice, not to mention the unbroken twilight, and the improbability of reaching the goal, it was determined to put back. One result of the voyage is the observation that the temperature of the sea at that season is several degrees higher than that of the air. In spite of the failure of the *Albert*, the sailing-vessel *Isbjärn* left Tromsoe on December 24, with the same object in view, and came within sight of Bear Island on January 7, which, however, it was found impossible to reach. After one or two attempts in other directions, the *Isbjärn* was compelled to put about, more from the difficulty of managing the frozen sails than from the danger from ice and the inconvenience of perpetual darkness. Notwithstanding these two failures, we learn from *Les Mondes* that M. Rosenthal, of Bremen, has fitted out his steamer *Groënland* for another attempt. M. Rosenthal has already lent his vessels to the service of science, and we hope this third attempt may be more successful than the previous ones, though it seems hopeless.

An advanced sheet sent us of Petermann's *Mittheilungen* contains an article on King Karl Land, the island which lies to the east of Spitzbergen. English geographers identify this island with Wiche Land discovered by the Englishman Edge, in 1617, while Prof. Mohn, the writer of the article referred to, claims it for the Norwegian discoveries of 1872, and names it King Karl Land, after King Karl XV., of Norway and Sweden. Dr. Petermann maintains that Wiche Land has no existence, as the position given to it until recently in the maps was considerably south of King Karl Land, where there is nothing but water. Dr. Petermann in a note to us suggests that if the English Admiralty or any private English expedition should explore and survey it thoroughly, there might be no objection to naming it afresh. The naming of any geographical discovery is not of very great importance, but it seems to us that the discovery of the island really belongs to Edge; all that can be said against it is that either he or subsequent geographers misplaced the island by a few degrees. On the same ground the credit of many early discoveries might be taken away from those to whom it is justly attributed.

It is said that an American aëronaut, Prof. Donaldson, intends this summer to cross the Atlantic to Ireland in a large balloon. The machine will weigh about 2,000 lb, will contain 268,000 ft. of gas, with two reservoirs to provide against leakage, and an electrical arrangement for light. The professor calculates to accomplish his trip in from 17 hours to two days and a half, and intends, if the experiment proves successful, to establish a balloon mail and passenger line round the world.

The additions to the Zoological Society's Gardens during the past week included a short-toed eagle (*Circaëtus brachydactylus*), and two Algerian tortoises (*Testudo mauritanica*), from Morocco, presented by Capt. Perry; a white-faced tree-duck, (*Dendrocygna viduata*), and a Capoeira partridge (*Odontophorus dentatus*), from Brazil, and a crocodile from Sumatra, deposited; a Great kangaroo (*Macropus giganteus*), and a vulpine phalanger (*Phalangista vulpina*), born in the gardens; three red-breasted cardinals (*Paroaria culculata*) from South America, and a western ground parrakeet (*Geopsittacus occidentalis*) from South Australia, purchased. Only one specimen of the last mentioned extremely rare bird has been previously alive in the gardens.

SOCIETIES AND ACADEMIES

London

Royal Society, March 20.—"On the Temperature at which *Bacteria*, *Vibriones*, and their Supposed Germs are killed when immersed in Fluids or exposed to Heat in a Moist State." By H. Charlton Bastian, M.D., F.R.S., Professor of Pathological Anatomy in University College, London.

For more reasons than one, we may, perhaps, now look back with advantage upon the friendly controversy carried on rather more than a century ago between the learned and generous Abbé Spallanzani and our no less distinguished countryman Turberville Needham. Writing concerning his own relation to Needham, the Abbé said*:—"I wish to deserve his esteem whilst combating his opinion;" and, in accordance with this sentiment, we find him treating his adversary's views with great respect, and at the same time repudiating much of the empty and idle criticism in which so many of Needham's contemporaries indulged with regard to his work. This criticism Spallanzani says†:—"Without looking into details, contented itself by throwing doubt upon some of the facts, and by explaining after its own fashion others whose possibility it was willing to admit." He moreover warmly reprobated the ignorant and disrespectful statements made by an anonymous writer who had shown himself little worthy of being heard upon the subjects in dispute. Spallanzani on this occasion very wisely said‡:—"When it is a question concerning observations and experiments, it is necessary to have repeated them with much circumspection before venturing to pronounce that they are doubtful or untrustworthy. He who will allow himself to speak of them with contempt, and who can only attempt to refute them with writings composed by the glimmer derived from a treacherous lamp, will not find himself in a condition to retain the esteem of learned men." The anonymous writer (in his 'Le'tres à un Americain"), to whom Spallanzani referred, had gone so far as to doubt the statements of Needham as to the constant appearance of organisms in infusions which had been previously boiled, and also intimated that even if they were to be found, it was only because they had been enabled to resist the destructive influence of the boiling fluid. This latter assertion was emphatically denied by Spallanzani—his denial being based upon a most extensive series of experiments with eggs in great variety and with seeds of all degrees of hardness. These were all found to be killed by a very short contact with boiling water. Spallanzani had thoroughly satisfied himself that even very thick-coated seeds could not resist this destructive agent, whilst he thought that the idea entertained by some, of the eggs of the lowest infusoria being protected from the injurious influence of the boiling water by reason of their extreme minuteness, was a supposition so improbable as scarcely to deserve serious consideration. Such a notion was, he thought, wholly opposed to what was known concerning the transmission of heat. Whilst, therefore, the opinion of those who believe that eggs have the power of resisting the destructive influence of boiling water could be wholly refuted, Spallanzani thought it by no means followed that the infusoria, which always after a very short time appeared in boiling infusions, had arisen independently of the existence of eggs. The infusions being freely exposed to the air, it was very possible that this air had introduced eggs into the fluids, which by their development had given birth to the infusoria.§

After the lapse of a century it has at last been clearly shown that this supposition of aërial contamination advanced by Spallanzani (warrantable and natural as it was at the time) is one which, in the great majority of cases, is devoid of all foundation in fact, so far as concerns the organisms essentially associated with processes of putrefaction, viz., *Bacteria* and *Vibriones*. The means of proving this statement, based upon independent observations made by Prof. Burdon Sanderson and myself, were recently submitted to the consideration of the Royal Society.‖ Before the reading of this communication I was under the im-

* "Nouvelles Recherches sur les Découvertes Microscopiques et la Génération des Corps Organisés, &c. London and Paris, 1769, vol. i. p. 69.

† *Loc. cit.* p. 9.

‡ *Loc. cit.* p. 114.

§ A few pages further on this view is thus shortly expressed.:—"Il est évident que toutes les tentatives faites avec le feu, peuvent bien servir à prouver que les animaux microscopiques ne naissent point des œufs que l'on supposit exister dans les infusions avant qu'on leur fit sentir le feu: mais cela n'empêche, pas qu'ils n'aient pû être formés de ceux qui auront été portes dans les vases après l'ébullition."

‖ See Proceedings of Royal Society, No. 141, 1873, p. 129.

pression that almost every one of those who had taken part in controversies which had been carried on both here and abroad concerning the Origin of Life, were prepared to admit, as Spallanzani had done, that the eggs or germs of such organisms as appear in infusions were unable to survive when the infusions containing them were raised to the temperature at which water boils. This impression was produced in part by the explicit statements on the subject that had been made by very many biologists, and also in part by a comparatively recent and authoritative confirmation which this view as to the destructive effects of boiling infusions upon *Bacteria* had received. Little more than two years ago Prof. Huxley, as president of the British Association for the Advancement of Science, recorded experiments in his Inaugural Address which were obviously based upon this belief as a starting-point. And subsequently, in one of the Sectional Meetings, after referring to some of my experiments, and to the fact that all unmistakeably vital movements ceased after *Bacteria* had been boiled, Prof. Huxley added: *—"I cannot be certain about other persons, but I am of opinion that observers who have supposed they have found *Bacteria* surviving after boiling have made the mistake which I should have done at one time, and, in fact, have confused the Brownian movements with *true living* movements." Prof. Huxley does not now (in reference to the experiments cited in my last communication) suggest that the organisms found in the infusions were dead and had been there before the fluids were boiled: he expresses doubts concerning that which he seems formerly to have regarded as established, and, with much caution, wishes for evidence confirmatory of his own, to show that the germs of *Bacteria* and *Vibriones* are killed in a boiling infusion of hay or turnip, as they have been proved to be in "Pasteur's Solution" and in solutions containing ammonic tartrate and sodic phosphate

With the view of removing this last source of doubt more effectually, and also of refuting the unwarrantable† conclusions of M. Pasteur, to the effect that the germs of *Bacteria* and *Vibriones* are not killed in neutral or slightly alkaline fluids at a temperature of 212° F., I almost immediately after the reading of my last communication commenced a fresh series of experiments.

Nearly two years ago, in my "Modes of Origin of Lowest Organisms," I brought forward evidence to show that *Bacteria*, *Vibriones*, and their supposed germs, are killed at a temperature of 140° F. (60° C.) in neutral or very faintly acid solutions containing ammonic tartrate and sodic phosphate, and also evidence tending to show that these living units were killed in neutral infusions of hay and in acid infusions of turnip at the same temperature.

The crucial evidence adduced concerning the degree of heat destructive to *Bacteria*, *Vibriones*, and their germs, in the saline solution was of this nature. The solution had been shown to be incapable of engendering *Bacteria* and *Vibriones* (under all ordinary conditions) after it had been boiled, although it still continued capable of supporting the life and encouraging the rapid multiplication of any of these organisms which were purposely added to it. Some of this boiled solution, therefore, was introduced into flasks previously washed with boiling water; and when the fluids had sufficiently cooled, that of each flask was inoculated with living *Bacteria* and *Vibriones*—in the proportion of one drop of a fluid quite turbid with these organisms to one fluid ounce of the clear saline solution. ‡ These mixtures containing an abundance of living organisms were then heated to various temperatures, ranging from 122° F. (50° C) to 167° F. (75° C.), and it was invariably found that those which had been heated to 122° or 131° became quite turbid in about two days, whilst those which had been raised to 140° F. or upwards as invariably remained clear and unaltered. The turbidity in the first series having been ascertained to be due to the enormous multiplication of *Bacteria* and *Vibriones*, and it being a well-established fact that such organisms when undoubtedly living always rapidly multiply in these fluids, the conclusion seemed almost inevitable that the organisms and their germs must have been killed in the flasks which were briefly subjected to the temperature of 140° F. How else are we to account for the fact that these fluids remained quite unaltered although living organisms were added to them in the same proportion as they had been to those less-heated fluids which had so rapidly become turbid? Even if there does remain the mere possibility that the organisms and their supposed germs had not actually been killed, they were certainly so far damaged as to be unable to manifest any vital characteristics. The heat had, at all events, deprived them of their powers of growth and multiplication, and these gone, so little of what we are accustomed to call "life" could remain, that practically they might well be considered as dead. And, as I shall subsequently show, the production of this potential death by the temperature of 140° F. enables us to draw just the same conclusions from other experiments, as if such a temperature had produced a demonstrably actual death. Seeing also that these saline solutions were inoculated with a fluid in which *Bacteria* and *Vibriones* were multiplying rapidly, we had a right to infer that they were multiplying in their accustomed manner, "as much by the known method of fission, as by any unknown and assumed method of reproduction." So that, as I at the time said,* "These experiments seem to show, therefore, that even if *Bacteria* do multiply by means of invisible gemmules, as well as by the known process of fission, such invisible particles possess no higher power of resisting the destructive influence of heat than the parent *Bacteria* themselves possess."

This is, in fact, by far the most satisfactory kind of evidence that can be produced concerning the powers of resisting heat enjoyed by *Bacteria* and *Vibriones*, because it also meets the hypothesis as to their possible multiplication by invisible gemmules possessed of a greater power of resisting heat, and because no mere inspection by the miscroscope of dead *Bacteria* can entitle us positively to affirm that they are dead, even though all characteristically vital or "true living" movements may be absent.

Facts of a very similar nature were mentioned in the same work, strongly tending to show that *Bacteria* and *Vibriones* are also killed at the same temperature in other fluids, such as infusions of hay or turnip. These facts were referred to in the following statement †:—"Thus, if on the same slip, though under different covering-glasses, specimens of a hay-infusion turbid with *Bacteria* are mounted, (*a*) without being heated, (*b*) after the fluid has been raised to 122° F. for ten minutes, and (*c*) after the fluid has been heated to 140° F. for ten minutes, it will be found that in the course of a few days the *Bacteria* under *a* and *b* have notably increased in quantity, while those under *c* do not become more numerous, however long the slide is kept. Facts of the same kind are observable if a turnip-infusion containing living *Bacteria* is experimented with; and the phenomena are in no way different if a solution of ammonic tartrate and sodic phosphate (containing *Bacteria*) be employed instead of one of these vegetable infusions. The multiplication of the *Bacteria* beneath the covering-glass, when it occurs, is soon rendered obvious even to the naked eye by the increasing cloudiness of the film."

(*To be continued.*)

Geological Society, March 12.—Joseph Prestwich, F.R.S., vice-president, in the chair. The following communications were read:—1. Note on some Brachiopoda collected by Mr. Judd from the Jurassic deposits of the East Coast of Scotland, by Thomas Davidson, F.R.S. In this note the author stated that four species of Brachiopoda collected by Mr. Judd were especially worthy of notice, two of them being quite new, and two new to Britain. Three of them were obtained from the equivalent of the Kimmeridge clay, which was the more remarkable as the Brachiopoda of that formation are comparatively few. The new species described were *Rhynchonelle Sutherlandi* and *Terebratula Joassi*, derived, with *Terebratula humeralis* Röm., from the Upper Oolite of Garty in Sutherland; the fourth species is *Terebratula bisuffarcinata* Schlot., from the Lower Calcareous Grit of Bramberry Hill. 2. On Solfataras and deposits of Sulphur at Kalamaki, near the Isthmus of Corinth, by Prof. D. T. Ansted, F.R.S. After noticing the traces of volcanic action east of the Pindus chain, the author described the Solfataras and sulphur-deposits of the neighbourhood of Kalamaki as furnishing indications that there is even now a real though subdued volcanic energy in this part of Europe. 3. On the origin of clay-ironstone, by Mr. J. Lucas, F G.S. The author commenced by giving a general view of the varieties, chemical composition, and mode of occurrence of clay-ironstone, and suggested that the formation of all the bedded varieties may be explained by the

* See Report in Quart. Journ. of Microscop. Science, Oct. 1870.

† Reasons for this opinion have been fully set forth in "The Beginnings of Life," p. vol. i. 374 *et.seq.*; or the discriminating reader may at once find my justification for this expression by reading pp. 58-66 of M. Pasteur's memoir in Ann de Chim. et de Physique, 1862.

‡ Fuller details concerning these experiments may be found in the little work already mentioned at pp. 51-56, and also in "The Beginnings of Life," vol. i., pp 325-332,

* "Modes of Origin of Lowest Organisms," 1871, p. 60.

† *Loc. cit.* p. 60.

supposition that they originated in peaty or non-peaty lagoons on the alluvial flats of the deltas of the Carboniferous formations, which would present semi-terrestrial conditions, that is to say, a surface exposed to the air but subject to be covered by floods. 4 Note in vindication of *Leptophlœum rhombicum* and *Lepidodendron gaspianum*, by Principal Dawson LL.D., F.R.S. This note accompanied some photographs of the remains of plants referred to, and was in opposition to the identification of these remains with the *Lepidodendron nothum* Unger, as proposed by Mr. Carruthers in his Appendix to Mr. Daintree's paper on the Geology of Queensland.

Zoological Society, March 18, 1873.—The Viscount Walden, F.R.S., president, in the chair.—A communication was read from Mr. R. B. Watson on some marine mollusca from Madeira, including a new genus of the *Muricidæ*, proposed to be called *Chascax* and a new *Rissoina*, and embracing descriptions of the whole of the *Rissoæ* of the group of islands.—A communication was read from Dr. J. D. Macdonald, F.R.S., on a specimen of *Acanthias vulgaris* and a species of *Galeus*, probably new to science, taken off Flinder's Island, Bass' Straits.—Mr. W. T. Blandford read a paper on the Gazelles of India and Persia. This contained the description of a new species, *Gazella fuscifrons*, founded on a single specimen obtained by the author in 1872, near the edge of the desert of Seistan.—A communication was read from Dr. J. S. Bowerbank, F.R.S., containing the fifth part of a series of memoirs entitled Contributions to a General History of the Spongiadæ.—A communication was read from Mr. Gerard Krefft, C.M.Z.S., containing the description of a new species of crocodile from Queensland, proposed to be called *Crocodilus johnsoni*.—Mr. Edward Bartlett exhibited and gave the description of a new moth belonging to the family Saturniidæ, which had been obtained in the interior of Madagascar by Mr. T. Waters, and which was proposed to be called *Tropœa madagascariensis*.

Mathematical Society, March 13.—Dr. Hirst, F.R.S., president, in the chair.—Prof. Greenhill, of Cooper's Hill College, was elected a member.—Mr. R. B. Hayward read a paper on an extension of the term *area* to any closed circuit in space. In the sense in which the writer employed the term, area is no longer a mere magnitude or a magnitude affected only with the positive or negative sign, but a magnitude affected with direction; in other words it is a *vector*, not simply a *scalar*. The paper concluded with a few illustrations of the use of this extension of the term area.—Other communications were, on the evaluation of a class of definite integrals involving circular functions in the numerator and powers of the variable only in the denominator, by Mr. J. W. L. Glaisher; note on normals and the surface of centres of an algebraical surface, by Mr. S. Roberts, V.P.; and a proof of the proposition that a number which divides the product of two numbers and is prime to one of them will divide the other, by Mr. M. Jenkins (Hon. Sec.).—Notice was taken in NATURE (August 1, 1872) of the formation of a mathematical society in Paris on the plan of the similar societies of London, Moscow and Berlin. This society having forwarded the first number of its "Bulletin," it was agreed to exchange publications.

Chemical Society, March 20, Dr. Frankland, F.R.S., president, in the chair.—Mr. C. W. Siemens, F.R.S., delivered a lecture "On Iron and Steel." The lecturer, after adverting to his former discourse delivered before the Society in 1868, and describing the various experiments he had made to obtain malleable iron direct from the ore, gave an account of the process by which he had succeeded in completely attaining that object. It consists essentially in fusing the ore by means of the most intense heat in a revolving furnace, and then adding the requisite amount of carbonaceous matter to reduce the iron to the metallic state. The malleable iron thus precipitated in the molten mass becomes aggregated into balls by the revolution of the furnace, and can then be easily removed. It is free from sulphur, phosphorus, and other impurities, and dissolves readily in a bath of molten cast iron, producing steel of a quality equal to that made from the best Swedish bar iron.

Anthropological Institute, March 18.—Prof. Busk, F.R.S., president, in the chair. A paper was read by Mr. George Harris, F.S.A., on theories regarding intellect and instinct, with an attempt to deduce a satisfactory conclusion therefrom. The author, after taking a general survey of the opinions on this subject, citing those of Aristotle, Plato, Descartes, Hobbes, Locke, and several other writers, including some modern authorities, proceeded to compare them one with another, and to consider how far certain apparently irreconcileable differences might be considered compatible. The great perfection of the sensitive system in animals he considered to be the main cause of the unerring dexterity with which they engage in various operations connected with their career. And although they differ essentially from man as regards his capacity for abstract studies, it appears difficult to deny to them the possession of an immaterial being of some kind. High authorities, both among philosophers and divines, have attributed to them a future state of existence. Mr. Harris also read a paper on the concurrent contemporaneous progress of renovation and waste in animated frames, and the extent to which such operations are controllable by artificial means. The writer took a general view of the opinions of those who have treated on this subject, more especially the older authorities, citing Galen, Willis, Buffon, Hunter, and Smellie, and referring also to recent articles on the subject in *Fraser's Magazine* and the *Edinburgh Review*. He adverted to the ascertained fact of the progress of renovation and waste in all animated frames, as also to the circumstance that certain of these operations were known to be controllable. He analysed the principle of waste and decay in different bodies, and referred to ossification of the bones and deterioration of the blood as contributing to those conditions. As medical science advances these matters might be more perfectly understood. He recommended experiments of various kinds as to the nature of substances, and their effect on bodies animate as well as inanimate, and with regard to animals and plants as well as man.

Royal Horticultural Society, March 19.—Scientific Committee, Dr. J. D. Hooker, C.B., in the chair. Prof. Thiselton Dyer called attention to the discovery by Fankhauser of the prothallial stage of *Lycopodium*. It appears to be almost identical with that of the *Ophioglosseæ*, and consequently altogether different from that of *Selaginella*. It was remarkable that the carboniferous *Lepidostrobus* and *Triplosporites* differed as regards their spores in precisely the same way as *Lycopodium* and *Selaginella*. If the nature of the germination in the two latter must be held to imply systematic diversity, analogy would equally imply it in the case of the two former. But the parallelism would, under these circumstances, be extremely difficult to understand.—General Meeting, W. Wilson Saunders, F.R.S., in the chair. The Rev. M. J. Berkeley commented on the fine collection of *Cycadeaceæ* exhibited by Mr. Bull, a well-fruited pot-plant of the Loquat (*Eriobotrya japonica*), and *Epidendrum erubescens*—a Guatemalan orchid rarely seen in flower, which was exhibited by Mr. C. Leach.

Entomological Society, March 17.—Prof. Westwood, president, in the chair.—M. Ernest Olivier was balloted for and elected a foreign member.—The president exhibited a very rare species of *Paussus* from Abyssinia.—Mr. Smith exhibited a box of ants sent from Calcutta by Mr. G. A. J. Rothney, collected principally in the Botanic Gardens. There were many new species amongst them, a complete series of which was to be reserved for the national collection.—Mr. Cole exhibited two boxes of *Bombycidæ* from Natal.—Mr. Bates read a paper on some species of geodephagous coleoptera from China.—Mr. Müller made some remarks on a beetle (*Araœocerus coffeæ*) which had been imported into Basle with some coffee from Java, and that the insect had since become naturalised and might be found in any quantity there. Mr. Müller also remarked on a cargo of ground nuts which arrived in London direct from Sierra Leone, the kernels of which were destroyed by myriads of the larvæ and perfect insects of the *Tribolium ferrugineum*, accompanied by the larvæ and perfect insects of a species of *Rhizophagus* preying on the former.—Mr. Dunning read some further notes on *Atropos pulsatoria*, with reference to Dr. Hagen and Mr. W. A. Lewis. Mr. Bates put some questions to the meeting, suggested to him by Mr. Darwin, with a view to eliciting information as to sexual differences in certain insects, viz., whether any cases had been noticed of sexual differences in the ocellated spots with which certain insects, as the *Bombycidæ*, were furnished, and also as to sexual differences amongst the *Buprestidæ*. A conversation ensued during which Mr. Jenner Weir stated that *Satyrus hyperanthus* had more ocellated spots in the female than in the male; and Mr. Butler mentioned that *Drusillus* had double ocelli in one sex. It was also stated that Mr. Saunders had detected sexual differences among the *Buprestidæ*.

MANCHESTER

Literary and Philosophical Society, March 4.—Dr. J. P. Joule in the chair.—Mr. Baxendell read the following communication

from Mr. S. Broughton :—It appears there is some doubt as to the existence of ball discharge in thunderstorms. At the request of Mr. Baxendell I communicate an observation of such, seen during the approach of a storm, in 1854 or 1855, when walking from Altrincham to Timperley. Over the edge of a cloud near the east horizon a flash of lightning was seen, and a ball *apparently* the size of one from a Roman candle shot upwards through an arc of 20° or 30°. I cannot say that it went to another cloud, but that would most likely be so, as my attention was taken up watching the progress of the electric ball.—E. W. Binney, V.P., F.R.S., said that shortly after the meeting of the Society on January 21, when he exhibited the singular fossil plants, which were quite new to him at the time, which he thought would have to be placed in a new genus, he had received excellent transverse and longitudinal sections of similar specimens from Professor Renault of Cluny, which were if possible in a more beautiful state of preservation than those found in the carboniferous strata of Lancashire. On February 4, Prof. W. C. Williamson, F.R.S., stated that these specimens were the branches or stems of the well-known genus *Asterophyllites*. Now the French professor states that he had described this fossil plant in a memoir read before the Academy in 1870, and that in his opinion it belonged to *Sphenophyllum*. I am not in possession of the facts from which the two learned professors came to such different conclusions, but I am inclined to consider the singular little stem as belonging to a new genus until the leaves of *Sphenophyllum* or *Asterophyllites* are found attached to it. When this comes to pass of course there can be no doubt on the matter.—The President said that he had made another observation of the position of the freezing point in the thermometer used in making the observations recorded in the Proceedings for April 16, 1867, and February 22, 1870. The gradual rise of the zero during twenty-nine years was shown by a diagram, the ordinates representing divisions etched on the glass stem, each corresponding to $\frac{1}{200}$ of a degree Fahrenheit.—Mr. William H. Johnson, B.Sc., read a paper "On the Influence of Acids on Iron and Steel," in which he showed the general effects of acid; its effects on the weight; on the breaking strain and elongation; effect of pyroligneous acid; effects of acids on copper and brass; and of zinc on iron.

PARIS

Academy of Sciences, March 17, M. de Quatrefages, president, in the chair.—The following papers were read: On the theory of the movement of Jupiter, by M. Le Verrier.—The transit of Venus—method for obtaining the moment of contact by photography, by M. Janssen. The author suggests the use of a photographic plate cut in the form of a disc, and made to revolve. By this means a number of photographs can be obtained with very minute intervals of time between each exposure.—On the heat produced by the mixture of the hydracids with water and on the molecular volumes of their solutions, by M. Berthelot. The acids experimented on were the hydrochloric, hydrobromic, and hydriodic. The author decides that these acids and their compounds give rise to similar amounts of molecular work.—On new applications of the principles of the navigation sluice to oscillating columns of liquid, by M. A. de Caligny.—On a shock of earthquake observed at Florence on March 12, 1873, by M. de Tchihatchef. The shock was observed at 9h. 5m. p.m., it did not last more than half a second, and its direction was S.E. to N.W., bar. 725mm.—M. Secchi presented his memoir "On the Distribution of the Prominences on the Solar Disc, and on the study of the Spots."—On barometic changes and their connection with magnetic variations, by M. J. A. Broun.—New experiments on singing flames, by M. F. Kastner.—Observations on the theory of solar cyclones, by M. E. Vicaire. The author raised several objections to M. Faye's theory of the sun, and promised to explain his own hypothesis shortly; this, he said, was simply that of Wilson.—On "Spectrometry;" Spectronatrometry, by MM. P. Champion, H. Pellet, and M. Grenier. The authors described an instrument for the spectroscopic estimation of minute quantities of sodium. The principle depended on the comparison of a sodium flame in which a known quantity of sodium was being heated with the flame coloured by the substance the sodium in which it was required to know. The apparatus described was somewhat complicated, but the principle upon which it worked was the use of a graduated compensating wedge of coloured glass. M. Janssen made some observations on the process.—Observations on M. Gernez's recent note on the crystallisation of supersaturated solutions, by M. Ch. Violette.—On the methods of increasing the length of bones and stopping their growth, by M. Ollier. On the anatomy of *Comatula rosacea*, by M. Edm. Perrier. On a deposit of fossil mammiferæ near Lapsista, Macedon, by M. Gorceix. "On polyhedric concamerations," by M. G. Perry.

DIARY

THURSDAY, MARCH 27.

ROYAL SOCIETY, at 8.30.—The Radiation of Heat from the Moon, the Law of its Absorption by our Atmosphere, and of its Variation in Amount with her Phases (Backerian Lecture): Earl of Rosse.
SOCIETY OF ANTIQUARIES, at 8.30.—Election of Fellows.
ROYAL INSTITUTION, at 3.—Coal and its Products: A. V. Harcourt.

FRIDAY, MARCH 28.

ROYAL INSTITUTION, at 9.—Force and Energy: Prof. Clifford.
QUEKETT CLUB, at 8.
ROYAL COLLEGE OF SURGEONS, at 4.—Extinct Mammals: Prof. Flower.

SATURDAY, MARCH 29.

ROYAL INSTITUTION, at 3.—Darwin's Philosophy of Language: Prof. Max Müller.

MONDAY, MARCH 31.

LONDON INSTITUTION, at 4.—Fungoid Organisms: Prof. Thiselton Dyer.

TUESDAY, APRIL 1.

ROYAL INSTITUTION, at 3.—Forces and Motions of the Body: Prof. Rutherford.
ANTHROPOLOGICAL SOCIETY, at 8.—Notes on the Collection of Peruvian Skulls and Pottery lately received from Consul Hutchinson: Prof. Busk and Dr. Barnard Davis.—On the Natives of Vancouver's Island: Richard King.—On a Human Skull from Birkdale, Southport: T. M. Reade.
SOCIETY OF BIBLICAL ARCHÆOLOGY, at 8.30.
ZOOLOGICAL SOCIETY, at 8.30.—On the Brain and a portion of the nervous system of *Pediculus capitis*: Dr. J. S. Bowerbank.—Notes on the genera of Turtles (*Oiacopodes*) and especially on their skeleton and skulls: Dr. J. E. Gray.—Descriptions of three new species of Flying Squirrels: Dr. A. Günther.
ASIATIC SOCIETY, at 3.

WEDNESDAY, APRIL 2.

SOCIETY OF ARTS, at 8.—On Economy of Fuel for domestic purposes: Capt. Douglas Galton, C.B.
LONDON INSTITUTION, at 7.—Courts of Special Commercial Jurisdiction: N. H. Paterson.
ROYAL MICROSCOPICAL SOCIETY, at 8.—On a new *Callidina* with the result of experiments on the desiccation of Rotifers: H. Davis.—On the Development of the Sturgeon's facial arches: W. K. Parker.

THURSDAY, APRIL 3.

CHEMICAL SOCIETY, at 8.—A way of exactly determining the specific gravity of Liquids; Dr. H. Sprengel.—On Cymene from various sources: Dr. C. R. A. Wright.—Researches on the action of the Copper-zinc couple on organic bodies, II.—On the iodides of Amyl and Methyl: J. H. Gladstone and A. Tribe.—Contributions from the Laboratory of the London Institution, No. XI.—Action of the acid chlorides on Nitrates and Nitrites: Dr. H. G. Armstrong.
LINNEAN SOCIETY, at 8.—On new Indian Fishes: Surgeon-Major F. Day.—On the Fungi of Ceylon: Rev. M. J. Berkeley and C. E. Broome.
ROYAL INSTITUTION, at 3.—Coal and its Products: A. V. Harcourt.

BOOKS RECEIVED

ENGLISH.—Celestial Objects for Common Telescope. 3rd edit.: Rev. T. W. Webb (Longmans).—Elementary Treatise on Wave Theory of Light. 3rd edit.: H. Lloyd (Longmans).—The Childhood of the World: E. Clodd (Macmillan).

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