

Conference held at Chiswick, October 1885;" "Report of the Primula Conference held at South Kensington, April 1886, and of the Orchid Conference held at Liverpool, June 30, 1886," "Report on the Effects of Frost on Vegetation during the Severe Winters 1879-80, 1880-81, published in 1887."

4. The Council are of opinion that the connection of the Society with South Kensington, however promising at first, has proved adverse to its true interests and permanent welfare. They recognize that altered circumstances require a complete re-organization of the Society on a more popular basis. They believe that, while local Horticultural Societies attract local support, a central Metropolitan Society (to which local Societies may be affiliated) is, in the interests of horticulture, indispensable. Under analogous circumstances the Royal Agricultural Society prospers, although there are local Societies in every county of the Kingdom.

5. The Council do not believe that the Society can be carried on any longer under the trammels of the existing Charter, which was granted in 1850 in view of a wholly different state of things; nor do they think a Charter will be requisite for its future working. They believe that the numbers of the Council should be considerably increased and their mode of election modified and made popular, and that the ordinary work of the Society should be carried on by Committees, under powers delegated to them by the Council. They hold that the Society should henceforth devote itself strictly to the advancement of practical and scientific horticulture.

6. The view of the Council is that the expenditure of the Society should be reduced as much as possible, and its resources devoted to the following objects:—

(1) The maintenance of the Chiswick Gardens and the conduct of plant, fruit, and vegetable trials there; and possibly the establishment of a School of Gardening.

(2) The immediate engagement of such premises in a convenient and central situation as may suffice for office requirements, the safe housing of the Lindley Library, the meetings of the Society's Committees, and its fortnightly shows, to the maintenance of which they attach great importance.

(3) The publication of periodical Reports of the work done at Chiswick, and by the Society's Committees, and on horticultural subjects generally.

7. For many years the nature of the accommodation which the Society has been able to obtain at South Kensington has virtually prevented meetings being held for the discussion by the Fellows of points of interest in the practice of horticulture. It is essential that these meetings should be resumed, and it is believed that they will be of great value in bringing together those who take an active part in British horticulture. It is also hoped that such meetings would give an opportunity for the consideration of the numerous directions in which the rural economy of the country seems likely to be modified by the substitution of horticultural for agricultural methods.

8. The Council would recommend that the subscription should be in future £2 2s. for Fellows, and that a grade of Member or Associate, at £1 1s., should be created for professional and practical gardeners, who have rarely hitherto belonged to the Society. They calculate that the maintenance of Chiswick will cost £1500 a year, and that for the other purposes of the Society a further sum of not less than £1500 a year will be required. During 1887, 150 Fellows have paid £4 4s., and 623 Fellows £2 2s., making a total of £1938 6s., a sum altogether insufficient for the working and requirements of the Society.

9. In conclusion, the Council believe that the extinction of the Royal Horticultural Society would be regarded by all interested in horticulture as a national loss. The history of the Society, and the good work it has done and is doing, entitle it to the consideration and support of the horticultural world, to whom the Council make this appeal. They address it with equal confidence to amateurs and to the trade, in the belief that their interests are identical, and that for the protection and advancement of these interests the maintenance of the Royal Horticultural Society is essential. The Council have had difficult duties to perform. While they are willing to continue to discharge these duties, if desired, they believe that the best course would be for them to place their resignations in the hands of the Fellows, at the end of the year, so as to leave the Society entirely unfettered. But they consider it due both to the Fellows and to themselves to say that, unless they receive assurances of adequate support, in response to this appeal, the Society must necessarily come to an end.

10. The favour of an early answer is requested on the inclosed form. The Donations would be devoted to the cost of establishing the Society in its new home and to similar purposes.

On behalf of the Council,

TREVOR LAWRENCE, *President*.

### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The Thurston Prize at Caius College, value £54, for the best original investigation by a member of the College in the past three years in physiology, pathology, or practical medicine, has been adjudged to Mr. C. S. Sherrington, M.A., M.B., Fellow of the College.

The Sedgwick Memorial Committee having declined to assent to the building of rooms for teaching purposes with the Sedgwick Fund, while waiting the building of a complete museum; and other proposals having been made, a syndicate has been appointed to plan out the entire disposal of the sites surrounding the new museums, so as to satisfy as many scientific requirements as possible.

Mr. E. C. Dowson has been appointed Demonstrator of Mechanism and Applied Mechanics in succession to Mr. Ames.

Next term the General Board of Studies will nominate a University Lecturer in Pure Mathematics, in consequence of the resignation of Mr. Macaulay. The stipend is £50 per annum, and the appointment will be for five years. A preference will be given to a lecturer who would take subjects not at present represented. Among these are theory of equations, theory of numbers, and projective geometry.

Scholarships in Natural Science will be competed for this month or next at Gonville and Caius, King's, Jesus, Christ's, St. John's, Trinity, Emmanuel, and Sidney Sussex Colleges. The tutors will give full information.

A Clothworkers' Exhibition for Natural Science, tenable at Oxford or Cambridge for three years, will be awarded next July by an examination under the Oxford and Cambridge Schools Examination Board. Particulars may be obtained from the Censor of Non-Collegiate Students, Cambridge.

Another general modification of examinations in natural science is proposed, which we shall refer to when it has been discussed by the Senate.

### SCIENTIFIC SERIALS.

*American Journal of Science*, November.—On the relative motion of the earth and luminiferous ether, by Albert A. Michelson and Edward W. Morley. A complete and satisfactory explanation of the aberration of light is given by Fresnel's undulatory theory, which assumes, first, that the ether is supposed to be at rest except in the interior of transparent media; secondly, that in this case it moves with a velocity less than that of the medium in the ratio  $\frac{n^2 - 1}{n^2}$ , where  $n$  is the index of refraction. The second hypothesis having been fully established by Fizeau's celebrated experiment, the first alone is dealt with in this paper. From the delicate researches here described, which have been carried out by the aid of the Bache Fund, it is inferred that, if there be any relative motion between the earth and the luminiferous ether, it must be small, quite small enough entirely to refute Fresnel's explanation of aberration. It is further shown that the theories of Stokes and Fresnel also fail, and that it would be hopeless to attempt to solve the question of the motion of the solar system by observations of optical phenomena at the surface of the earth.—On the existence of carbon in the sun: contributions from the physical laboratory of Harvard University, by John Trowbridge and C. C. Hutchins. Without discussing the well-known observations of Abney on the absorption-bands in the solar spectrum at high altitudes, or Siemens's hypothesis of the presence of carbon vapour in interplanetary space, the authors here study the remarkable character of the carbon spectrum formed by the voltaic arc in air between carbon terminals, drawing attention to the evidence presented by the juxtaposed solar spectrum of the existence of carbon in the sun. They conclude that at the point of the sun's atmosphere where the carbon is volatilized, the temperature of the sun approximates to that of the voltaic

arc.—History of the changes in the Mount Loa craters, by James D. Dana. A recent visit of ten weeks to Hawaii has enabled the author to carry out the purpose expressed in his communication of last August. Here are presented only such facts as bear on the history of Kilauea since 1832, the general summary and conclusions being reserved for future numbers of the journal. The subject is illustrated with plates of Kilauea Crater, its lava floor, and the Halema'uma'u basin.—Is there a Huronian Group? (continued), by R. D. Irving. For the extensive region stretching from the north side of Lake Huron to the Mississippi it is here concluded that the succession of rocks in ascending order is from the great complex of crystalline schists, gneiss, and granite through the Huronian Group, mainly of detrital rocks, to the Keweenaw, of interleaved detrital and eruptive beds and the Potsdam, or Upper Cambrian Sandstone, with great structural breaks between the first and second, and second and third groups. The Huronian series itself, traceable throughout the Lake Superior province, is shown to be of clastic and sedimentary nature, of great volume, and structurally and chronologically separated from all other rock formations. The term *Agnostozoic*, originally suggested by Chamberlain, is proposed to cover the whole geological interval lying between the base of the Cambrian and the summit of the Archæan crystallines.—Description of an iron meteorite from St. Croix, County Wisconsin, by Davenport Fisher. This specimen, discovered in 1884 on a farm in Hammond Township, weighed 53 pounds, and yielded, on analysis: iron 89.78, nickel 7.655, cobalt 1.325, phosphorus .512, silica .562, with traces of carbon, copper, and tin.—The Rockwood meteorite, by J. Edward Whitfield. Picked up in March 1887 in a field in Cumberland County, Tennessee, this meteorite yielded, on analysis: iron 87.59, nickel 12.09, with traces of cobalt and copper.—Principal characters of American Jurassic Dinosaurs, by O. C. Marsh. This paper, forming Part 9 of the whole series, deals with the skull and dermal armour of *Stego-aurus*, a nearly complete skeleton of which has lately been discovered. The specimen here described constitutes a new and very distinct species, for which the name of *S. duplex* is proposed.

THE *Journal of Botany* for September commences with an important paper, by Mr. Geo. Masee, on the growth and origin of multicellular plants. He describes the structure and mode of formation of the gelatinous membrane exterior to the true cellulose-wall, and extending continuously over the whole plant, which is not uncommon in Algae, and nearly universal in the Floridæ. It can be easily shown that the formation of the cellulose-wall never precedes that of this mucilaginous sheath, and its function is rather a supporting than a protecting one. The mucilaginous sheath is composed of protoplasm, or of a substance very nearly allied to protoplasm. It is usually homogeneous, even after the appearance of the cell-wall; but in *Pandorina* the innermost portion consists of parallel rods placed end to end on the cell wall. The portion composed of rods stains readily with methyl-violet and other aniline dyes, while the homogeneous portion does not. The remainder of the space in this number, and in those for October and November, is chiefly occupied by monographs or descriptive papers on new exotic species, or to others mainly of interest to English botanists. It is a remarkable evidence that the old-fashioned species-botany is not altogether dead in this country, that no fewer than three species of flowering-plants have been added to the flora of these islands during the past year—all in Scotland.

WE have received the numbers of the *Botanical Gazette*, published at Crawfordsville, Indiana, for August-November 1887. They furnish satisfactory evidence of the activity of botanical science in the Western States of North America. The articles and shorter paragraphs, where they are original, chiefly concern the flora of the district; but we may mention as of more general interest:—Vegetable parasites and evolution, by W. G. Farlow; development of the Umbellifer fruit, by J. M. Coulter and J. N. Rose; and plant odours, by A. J. Stace. The first of these papers is the Presidential Address given by Prof. Farlow before Section F of the American Association for the Advancement of Science. In it he treats specially of the phenomenon of "symbiosis" in lichens, and of "mycorrhiza." As to the former he doubts whether there is any sufficient evidence of the usual statement that the lichen-gonidia derive benefit from their association with the fungus.

THE *Nuovo Giornale Botanico Italiano* for October contains two papers only—on the Muscinæ of the Island Giglio, off the

coast of Tuscany, by Signor A. Bottini; and an enumeration of plants gathered in the Balearic Islands in 1885, by Signor P. Porta. To the latter is prefixed an account of the physical geography and natural productions of the islands, and a *résumé* of previous botanical explorations.

*Revue d'Anthropologie*, troisième série, tome ii., sixième fasc., 1887 (Paris).—On the stature of the ancient inhabitants of the Canary Islands, by Dr. R. Verneau. The writer draws attention to the discrepancies to be found in the narratives of older chroniclers and travellers as to the stature of the islanders at the time of the discovery of the Canarian Archipelago. Thus while the Portuguese explorers sent out by Alphonso IV, of Portugal in 1341 described the natives as of the same medium height as the Portuguese, some of the Spaniards who took part in the conquest of the islands 200 years later maintained that they had seen the skeleton of a man 24 feet long, and spoke of living men who were respectively 9 and 14 feet in height. Setting aside the obvious absurdity of such estimates, Dr. Verneau is of opinion that in regard to some of the islands, as Lancrotte and Fortavente, it may be fairly assumed that the Guancho natives of pre-Spanish times were a tall, well-developed race, since such is still the character of the people in isolated villages in those islands which have been the least exposed to contact with strangers and invaders, while he found that the bones recovered from ancient local burying-grounds of the latter island indicated a mean height of 1.84 metre for men, and 1.60 for women. Amalgamation with invading races of lower stature seems to have lowered the mean height of the people, more especially in the south-east of the archipelago. Dr. Verneau finds that in regard to cephalic characteristics, the ancient Guanchos closely resembled the Cro-Magnon type, and he believes he has found incontrovertible proof that Numidian, Semitic, and other North African races were among the earliest invaders of the Canaries.—On criminal anthropology, by M. Topinard. This is virtually a review of the Italian writer C. Lombroso's work on "Criminal Man," to whose theory of the physical and atavistic character of criminality he is strongly opposed. Signor Lombroso believes that the criminal is born with irrepressible tendencies to crime, and that certain physical anomalies characterize the born malefactor. M. Topinard disputes not merely his mode of reasoning, but the facts which he adduces in support of his theories, and the accuracy, or applicability, of his numerous statistical tables. In conclusion, he not only shows the unscientific methods of inquiry followed by Lombroso, but he attacks the use of the denomination of "criminal anthropology," since the term implies the possibility of grouping together as fixed characteristics a number of phenomena which depend upon endless complications of psychical and social causes whose varied action on physical conditions does not admit of strict scientific determination.—Contributions to the sociology of the Australians, by M. Elisée Reclus. In this continuation of a series of papers which appeared in this journal last year, M. Reclus treats of spirits and sorcerers. The author uses his materials dexterously, and has compiled a highly interesting memoir on the superstitions and mythological fancies of these races, but as the greater part of the narrative has been derived from English sources it has little novelty or interest for English readers, who will find few facts in it with which they are not already familiar through the writings of Taplin, Woods, Grey, &c.—On lacustrine and lake-villages and pile-dwellings, by M. Pompeo Castelfranco. After a general consideration of the subject, more especially in regard to Italy, and the references bearing on it in the writings of Italians from the middle of the sixteenth century to the present times, the author gives the history of the discovery of lacustrine dwellings in Northern Italy which was made in 1862. Since that period almost all the lakes of that region have supplied rich yields of flints and pottery and bronzes, although none more so than Lake La Garda. The most interesting of these pile stations is that of La Lagozza, whose area of 2400 square metres was not wholly revealed till 1880. On examining the various piles which he had caused to be extracted from the superincumbent peat, Signor Castelfranco recognized that some were of birch (*Betula alba*) and others of fir and pine (*Pinus picea*, *P. silvestris*). Various flint and polished stone implements were found, but with the exception of a bronze fibula, which probably belongs to a later age than the original pile-dwellings, not a vestige of metal has been discovered at Lagozza. Potsherds and shreds of linen fabric have been found, but the most remarkable thing is the complete absence of bones, or any other animal remains; and while the

abundance of seeds, grains, nuts, acorns, &c., plainly indicates the vegetable character of the diet of these lake-dwellers, the appearance of masses of husked wheat and barley proves that they practised agriculture, and understood how to thrash and winnow the grain. Considerable interest attaches to the discovery below the peat, in what is characterized as the archaic bed, of large masses of seeds, determined by Prof. Sordelli as identical with those of the cultivated so-called Indian poppy (*Papaver somniferum*). Heer has recorded in the Swiss pile-dwellings the presence of poppy seeds which he referred to *P. seligerum*, but whether the Italian and the Swiss remains belong to the same or different species of poppy, the use to which they were put by primæval men in the two countries remains an unsolved problem.—On the Polynesians, their origin, migrations, &c., by MM. Lesson and Martinet. The purpose of this work is to refute the three most generally accepted theories regarding the origin of these races, viz. whether they are survivals from an almost wholly submerged continent, or whether they are of American, or of Asiatic descent; and to maintain the novel hypothesis that they are descendants of Maoris of the Middle Island of New Zealand. These views the authors endeavour to support by showing close analogies of language between the two peoples, affinities between certain names of places and of deities used by both, and frequent identity in forms of belief, rites, and superstitions. They further point out that the natives of the Marquesas, who are regarded as of the purest Polynesian race, use the same word, Havaiki, as the Maoris to denote their original ancestral home. From these and numerous other linguistic affinities the writers conclude that the Maoris are the autochthonic ancestors of the Polynesians, and that the Maori language is the mother speech of all the Polynesian dialects.

### SOCIETIES AND ACADEMIES.

LONDON.

**Royal Society, November 24.**—"On the Motion of a Sphere in a Viscous Liquid." By A. B. Basset, M.A. Communicated by Lord Rayleigh, D.C.L., Sec. R.S.

The determination of the small oscillations and steady motion of a sphere which is immersed in a viscous liquid, and which is moving in a straight line, was first effected by Prof. Stokes in his well-known memoir "On the Effect of the Internal Friction of Fluids on the Motion of Pendulums" (Camb. Phil. Soc. Trans., vol. ix. part 2, p. 8); and in the appendix he also determines the steady motion of a sphere which is rotating about a fixed diameter. The same subject has also been subsequently considered by Helmholtz and other German writers; but, so far as I have been able to discover, very little appears to have been effected with respect to the solution of problems in which a solid body is set in motion in a viscous liquid in any given manner, and then left to itself.

In the present paper I have endeavoured to determine the motion of a sphere which is projected vertically upwards or downwards with given velocity, and allowed to ascend or descend under the action of gravity (or any constant force), and which is surrounded by a viscous liquid of unlimited extent, which is initially at rest excepting so far as it is disturbed by the initial motion of the sphere.

In solving this problem, mathematical difficulties have compelled me to neglect the squares and products of velocities, and quantities depending thereon, which involves the assumption that the velocity of the sphere is always small throughout the motion; and I have also assumed that no slipping takes place at the surface of the sphere. The problem is thus reduced to obtaining a suitable solution of the differential equation—

$$D \left( D - \frac{1}{\mu} \frac{d}{dt} \right) \psi,$$

$$\text{where } D = \frac{d^2}{dr^2} + \frac{\sin \theta}{r} \frac{d}{d\theta} \left( \operatorname{cosec} \theta \frac{d}{d\theta} \right),$$

$\psi$  is Stokes's current function, and  $\mu$  is the kinematic coefficient of viscosity. The required solution is obtained in the form of a definite integral by a method similar to that employed by Fourier in solving analogous problems in the conduction of heat; the resistance experienced by the sphere is then calculated, and the equation of motion written down and integrated by successive

approximation on the supposition that  $\mu$  is a small quantity. The values of the acceleration and velocity of the sphere to a third approximation are found to be

$$v = f\epsilon^{-\lambda t} - \sqrt{\lambda}\epsilon^{-\lambda t} -$$

$$fka \sqrt{\frac{\mu}{\pi}} \left\{ \left( \frac{1}{2} - \lambda t \right) \phi(t) + \sqrt{t} \right\} + f\lambda^2 a^2 \mu t \epsilon^{-\lambda t} \left( 1 - \frac{1}{2} \lambda t \right),$$

$$\dot{v} = \frac{f}{\lambda} (1 - \epsilon^{-\lambda t}) + \sqrt{\lambda} \epsilon^{-\lambda t} -$$

$$fka \sqrt{\frac{\mu}{\pi}} \left\{ \left( t + \frac{1}{2\lambda} \right) \phi'(t) - \frac{\sqrt{t}}{\lambda} \right\} + \frac{1}{2} f\lambda^2 a^2 \mu t^2 \epsilon^{-\lambda t},$$

where

$$f = \frac{(\sigma - \rho)g}{\sigma + \frac{1}{2}\rho}, \quad k = \frac{9\sigma}{a^2(2\sigma + \rho)}, \quad \lambda = k\mu,$$

$$\phi(t) = \int_0^t \epsilon^{-\lambda\tau} (t - \tau)^{-\frac{1}{2}} d\tau,$$

$\rho$  being the density of the liquid,  $\sigma$  that of the sphere, and  $a$  its radius.

It thus appears that, after a very long time has elapsed, the acceleration will vanish and the motion will become steady. The terminal velocity of the sphere is  $f\lambda^{-1}$ , which is seen to agree with Prof. Stokes's result.

If the sphere were projected with velocity  $V$ , and compelled by means of frictionless constraint to move in a horizontal straight line, the values of the acceleration and velocity would be obtained from the preceding formulæ by expunging the terms  $f\epsilon^{-\lambda t}$ ,  $f\lambda^{-1}(1 - \epsilon^{-\lambda t})$ , in the expressions for  $\dot{v}$  and  $v$  respectively, and then changing  $f$  into  $-\sqrt{\lambda}$ .

The preceding results can only be regarded as a somewhat rough representation of the actual motion, for (1) the square of the velocity has been neglected; (2) no account has been taken of the possibility of hollow spaces being formed in the liquid; (3) if the velocity of the sphere became large, the amount of heat developed would be sufficient to vaporize the liquid in the immediate neighbourhood of the sphere, and the circumstances of the problem would be materially changed.

In the latter part of the paper I have considered the problem of a sphere, surrounded by a viscous liquid, which is set in rotation with given angular velocity,  $\Omega$ , about a fixed diameter, and similar results are obtained. To a first approximation the angular velocity is equal to  $\Omega\epsilon^{-\lambda t}$ , where  $\lambda$  is a positive constant, which shows that the motion ultimately dies away.

December 8.—"The Sexual Reproduction of *Millepora plicata*." By Dr. Sydney J. Hickson.

Considerable attention has of recent years been paid by naturalists to the phenomena connected with the sexual reproduction of the Hydromedusæ. Stimulated by the brilliant results obtained by Allman and Weismann, several naturalists have investigated the structure of the various Medusæ and medusoid gonophores found in the group, the origin of the sexual cells, and the development of the embryo. These results have, on the whole, been so interesting and important that it was confidently anticipated that an investigation of the phenomena connected with the sexual reproduction of Milleporidæ would yield results of considerable interest. The systematic position of this family has always been a doubtful one, and naturalists were agreed that until the sexual reproduction was described, the position assigned to them could only be considered a temporary one.

It was my good fortune when in Talisse Island, North Celebes, to find on the reef just opposite my hut a fine specimen of *Millepora plicata* in vigorous growth. I visited it whenever the tide allowed, in the hopes of seeing the polyps fully expanded, and of being able to search them for any form of gonophore they might possess. In this, however, I was disappointed. Notwithstanding all my precautions, I never succeeded in finding the polyps more than partially expanded, and I could find no gonophores.

Having collected some specimens and dissolved the calcareous skeleton in strong acid, I discovered in the canals of the cœnosarc both the ova and the spores; but the unforeseen difficulties to be met with in working in a hot little bamboo hut in a tropical island prevented me from making any satisfactory series of sections, and I was reluctantly obliged to leave the further investigation of the subject until I returned to a laboratory in Europe.

Since my return home I have made a large number of prepa-