

of a central position for the Institute, have considered the various possible sites, and have, as far as has been within their power, obtained estimates of their cost.

To carry out the several objects which the committee have indicated, a large space is necessary. The committee have been unable to find any such suitable site in the central parts of London, except at a cost which, looking at the probable amount of subscriptions, would, after the purchase of the ground, leave a sum wholly inadequate for the erection and maintenance of the buildings, and for carrying out the objects of the Institute.

The site of about five acres recently secured for the New Admiralty and War Offices is valued at 820,000*l.*, or rather over 160,000*l.* per acre. That now vacant in Charles Street, opposite the India Office, is less than an acre, and would cost at least 125,000*l.*; probably another acre might be secured by private contract, so that the value of a limited site in this position would not be less than 250,000*l.* It has been suggested that a single acre not far from Charing Cross might be obtained for 224,000*l.* Two and a half acres on the Thames Embankment have been offered for 400,000*l.*; and it is stated that six acres might be procured from Christ's Hospital at 600,000*l.* Another good central position has been suggested, consisting of two and a half acres, which has been valued at 668,000*l.*

It is, of course, probable that these sites might be obtained at somewhat less than the prices asked, but, allowing for this, it is obvious that the purchase of any adequate area would involve the expenditure of a quarter to half a million.

The committee have therefore been forced to abandon the hope of obtaining a central site within the limits allowed by any probable subscription.

The attention of the committee was then drawn to the property at South Kensington belonging to the Commissioners for the Exhibition of 1851. This property was bought out of the profits of that Exhibition, with the express object of offering sites for any large public buildings which might be required for the promotion of science and art.

Under these circumstances, the committee submit to your Royal Highness that the Imperial Institute may well establish a claim for the grant of a site of sufficient magnitude on property bought and reserved for public institutions of this character.

Though sensible of the objections that may be urged against the situation at South Kensington, the committee think that the advantage must be obvious of obtaining a sufficient site virtually free of cost, so that the whole of the subscriptions may be devoted to providing a building for and establishing and maintaining the Institute.

The committee, while guided in the recommendation of a site by the considerations they have indicated, think it right to add that there are some incidental advantages connected with that at South Kensington.

In that locality are combined the City and Guilds Technical College, the Royal College of Music, and the Government Museums and Schools of Science and Art, which ought to be in immediate proximity to an Imperial Institute of the character which we have described.

The technical character of the collections and exhibitions of the Imperial Institute has a natural connection with the collections of science and art in the Government Museums.

*E. General Observations.*—An Imperial Institute for the United Kingdom, the Colonies, and India, would fail in its chief object if it did not constantly keep in view that it ought to be a centre for diffusing and extending knowledge in relation to the industrial resources and commerce of the Empire.

The necessity for technical education is now fully appreciated, because the competition of industry has become, in a great measure, a competition of trained intelligence. The committee, however, do not recommend that the Imperial Institute should aspire to be a college for technical education. Many of the large towns in Great Britain have recently established colleges or schools of science and art. The Imperial Institute might serve to promote technical education in these, and to unite them with colleges of larger resources which have been founded or formed branches for the purpose in the metropolis. It is too much to hope that an active co-operation of this character between the provincial centres and London could be at once undertaken by the Imperial Institute. But the committee bear in mind that, in their last report, the Commissioners of 1851 have indicated an intention to assist in carrying out such a scheme. If the Commissioners would contribute three or four thousand

pounds annually, it would be possible to establish scholarships which might enable promising candidates of the working classes to attend the local institutions, and even, when it was desired, to complete their technical education in colleges of the metropolis. In addition to this aid, the Imperial Institute might be able, in other ways, to promote the foundation of scholarships both in connection with the colonies and provincial centres, in the hope of still further extending these benefits to the working classes.

In conclusion, the committee submit that an Imperial Institute such as they have sketched in broad outline would form a fitting memorial of the coming year, when Her Majesty the Sovereign of this Empire will celebrate the jubilee of her happy reign. It would be an emblem of the unity of the Empire, embracing as it does all parts of the Queen's dominions, and tending to promote that closer union between them which has become more and more desired. It would exhibit the vast area, the varied resources, and the marvellous growth, during Her Majesty's reign, of the British Empire. It would unite in a single representative act the whole of her people; and, since both the purpose and the effect of the Institute will be to advance the industrial and commercial resources of every part of the Empire, the committee entertain a confident hope that Her Majesty's subjects, without distinction of class or race, will rejoice to take part in offering this tribute of love and loyalty. —HERSCHELL (Chairman), CARNARVON, REVELSTOKE, ROTHSCHILD, G. J. GOSCHEN, LYON PLAYFAIR, HENRY JAMES, HENRY T. HOLLAND, H. H. FOWLER, C. T. RITCHIE, FRED. LEIGHTON (President of the Royal Academy), ASHLEY EDEN, OWEN T. BURNE, REGINALD HANSON (Lord Mayor), J. PATTISON CURRIE (Governor of the Bank of England), JOHN STAPLES, FREDERICK ABEL (Vice-President of the Society of Arts), J. H. TRITON (Chairman of the London Chamber of Commerce), NEVILLE LUBBOCK, HENRY BROADHURST.

#### UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—At the annual election to scholarships and exhibitions in St. John's College, for candidates who have not yet commenced residence, the following awards were made:—

Foundation Scholarships: (80*l.*) to A. Vaughan, University College School, and H. Reeves, Surrey County School; (50*l.*) to O. W. Owen, Liverpool Institute (all for Mathematics); (60*l.*) to J. T. Hewitt, South Kensington School of Science, for Chemistry.

Minor Scholarships: (50*l.*) to G. T. Bennett, University College School, and W. J. Dobbs, Wolverhampton School, for Mathematics, and to R. A. Lehfeldt, for Physics.

Exhibitions to J. J. Alexander, Queen's College, Belfast, for Mathematics, and to F. F. Blackman, St. Bartholomew's Hospital, for Physiology and Botany.

#### SCIENTIFIC SERIALS

THE articles in the *Journal of Botany* for November and December are mostly descriptive. Mr. H. N. Ridley concludes his description of the Monocotyledonous plants collected in New Guinea by Mr. Forbes, including a number of new species; Mr. J. G. Baker, his synopsis of the Rhizocarpeæ, with a monograph of *Pitularia*; and Dr. Trimen, his valuable account of the flora of Ceylon and its relations to the climate of the island.—Mr. J. G. Baker describes some new species of Liliaceæ from the Cape of Good Hope.—The other original papers refer to the distribution of British plants.

*Nuovo Giornale Botanico Italiano* for October.—G. Venturi describes several species of moss new to the Italian flora, or rare or critical species.—L. Macchiati, on the extra-floral nectaries of the Amygdaleæ, describes nectariferous glands on the leaf-stalk of *Persica vulgaris*, *Cerasus vulgaris*, *Prunus domestica*, and *Amygdalus communis*. These agree in function with the extra-floral nectaries in other European plants, in serving as a protection against the attacks of caterpillars; while in the case of natives of Tropical America, their purpose is invariably to protect against the attacks of the ant *Oecodoma*, by attracting other ants, enemies to this species. The author records a diurnal periodicity in the amount of nectar exuded from the glands, which reaches its maximum early in the morning, its minimum in the afternoon.—B. Scortechini describes several

new species of Scitamineæ from the Malayan peninsula, including a new genus, *Lowia*.—Prof. T. Caruel has a note on the fruit and seeds of the cacao.—P. Severino describes the variety *purpurea* of *Aceras anthropophora*, and the micro-chemical reactions of the purple cells.—Two teratological papers complete the list: on viviparity and proliferation in *Spilanthes caulirrhiza*, by Dr. F. Tassi; and teratological notes (on *Aegle sepiaria*, *Lysimachia ephemerum*, and *Saxifraga crassifolia*), by C. Massalongo.

### SOCIETIES AND ACADEMIES

#### LONDON

**Royal Society**, December 16.—“On a Varying Cylindrical Lens.” By Tempest Anderson, M.D., B.Sc. Communicated by Prof. A. W. Williamson.

The author has had constructed a cylindrical lens in which the axis remains constant in direction and amount of refraction, while the refraction in the meridian at right angles to this varies continuously.

A cone may be regarded as a succession of cylinders of different diameters graduating into one another by exceedingly small steps, so that if a short enough portion be considered, its curvature at any point may be regarded as cylindrical. A lens with one side plane and the other ground on a conical tool is therefore a concave cylindrical lens varying in concavity at different parts according to the diameter of the cone at the corresponding part. Two such lenses mounted with axes parallel and with curvatures varying in opposite directions produce a compound cylindrical lens, whose refraction in the direction of the axes is zero, and whose refraction in the meridian at right angles to this is at any point the sum of the refractions of the two lenses. This sum is nearly constant for a considerable distance along the axis so long as the same position of the lenses is maintained. If the lenses be slid one over the other in the direction of their axes, this sum changes, and we have a varying cylindrical lens. The lens is graduated by marking on the frame the relative position of the lenses when cylindrical lenses of known power are neutralised.

Lenses were exhibited varying from 0 to -6DCy, and from 0 to +6DCy.

**Linnean Society**, December 16.—W. Carruthers, F.R.S., President, in the chair.—H. R. H. the Prince of Wales was elected an Honorary Member of the Society.—Messrs. A. Bawtree, F. Justen, T. N. Mukharji, F. W. Oliver, and R. V. Sherring were elected Fellows, and G. Nicholson an Associate, of the Society.—The President announced that Sir George MacLeay, K.C.M.G., had presented to the Society a portrait of the late Rev. W. Kirby, the distinguished entomologist, and the manuscripts and correspondence of his father, Alexander MacLeay (elected F.L.S. 1794), formerly Secretary to the Society. For these acceptable donations, a special vote of thanks was accorded by the Fellows.—Prof. F. O. Bower exhibited a series of photographs illustrating the vegetation of Ceylon.—Mr. E. A. Heath showed a stormy petrel, *Procellaria pelagica*, which was picked up alive in Kensington Gardens on December 9; the bird evidently having been driven inland by the great storm of the previous day.—Mr. D. Morris drew attention to the fresh leaves, and the fibres extracted therefrom, of *Agave salmodyckia* and *A. Ixili*.—Mr. W. T. Thiselton Dyer showed one of the volumes of “Honzo Zufu” (“Illustrations and Brief Descriptions of the Plants of Japan”), by Iwasatti Tsanemasa, which consists of ninety-six volumes containing 2000 coloured figures. Only two or three copies of this important botanical work are known to be complete, as a great part of it only exists in the original native hand-work.—The President exhibited a spike of maize from an ancient Peruvian grave, also samples of prehistoric wheat from ancient British and Romano-British burial-mounds in Wiltshire.—Mr. G. J. Romanes read a paper on the sense of smell in dogs, a report of which we hope to give in a future number.—Mr. C. T. Druery gave a communication on a new instance of apospory in *Polystichum angulare*, var. *pulcherrimum*. He infers that the formation of the prothallus is preceded by a very different series of phenomena from those already recorded. In the one case the prothalli are simple extensions of the cellular substance of the tips of the pinnales commencing at points quite beyond the venation, and produce no root-hairs unless brought into contact with the soil. In the other case, however, the prothallus is a direct outgrowth of the tip of a veinlet, and at

once produces root-hairs in abundance long before it assumes any other characteristic of a prothallus, and finally the resulting prothallus is much thicker in substance.—A paper was read on apospory and allied phenomena, by Prof. F. O. Bower. The term “sporal arrest” is applied to all cases where such spores do not come to functional maturity. The arrest is often, but not always, followed by substitutionary or correlative vegetative growths: these take the form of buds, similar to the sporophyte which produced them, and then would be termed cases of “sporophytic budding”; but in other cases the correlative growths may assume the characters of the oophyte or prothallus. Where this happens, the phenomenon is termed “apospory.” This direct transition from the sporophyte to the oophyte was induced some ten years ago in certain mosses, by Pringsheim and Stahl; and it is now described in detail in two ferns, an *Athyrium* and a *Polystichum*. Both plants were found some years ago growing wild, and the fact of the transition was recognised by Mr. Druery and Mr. Wollaston, and has been already published by the Linnean Society. The present paper describes these and similar phenomena in detail, and shows how in the *Polystichum* at least four different modes of origin of the oophytes may be distinguished, two being in connection with the sorus, while two are at points apart from the sorus, and may even occur on fronds which bear no sori at all. The latter part of the paper is occupied by comparing these phenomena with others already known in higher and lower plants. The general conclusion is that the whole phenomenon of apospory is to be regarded rather as a sport than as a reversion bearing deep morphological conclusions with it.

**Chemical Society**, December 2.—W. Perkin, F.R.S., Vice-President, in the chair.—Mr. Forbes Rickard was formally admitted a Fellow of the Society.—The following papers were read:—Bismuthates, by M. M. Pattison Muir and Douglas J. Carnegie.—The action of inorganic compounds on living matter, by James Blake, M.D.—Morindin and morindon, by T. E. Thorpe, F.R.S., and T. H. Greenall.—The hydration of salts: cadmium chloride, by S. U. Pickering.—The decomposition of sodium carbonate on fusion, by S. U. Pickering.—Derivatives of tolylbenzene, by Thomas Carnelley, D.Sc. (Lond.), and Andrew Thomson, D.Sc. (Edin.).—The amount of chlorine in rain-water collected at Cirencester, by Edward Kinch, Royal Agricultural College, Cirencester.—Some analogous phosphates, arsenates, and vanadates, by John A. Hall, student in the Laboratory of Owens College.—Agricultural experiments with iron sulphate as a manure during 1886, by A. B. Griffiths, Ph.D.

**Royal Meteorological Society**, December 15.—Mr. W. Ellis, F.R.A.S., President, in the chair.—Mr. G. R. Farncombe, B.A., Mr. C. E. B. Hewitt, B.A., and Capt. S. Trott were elected Fellows of the Society.—The following papers were read:—On the proceedings of the International Congress of Hydrology and Climatology at Biarritz, by Mr. G. J. Symons, F.R.S. This Congress was held in October, and was divided into three sections, viz. Scientific Hydrology, Medical Hydrology, and Climatology, Scientific and Medical. The total number of papers read was 109. An Exhibition was also held in connection with the Congress. The excursions were of primary importance to the medical men, and extended over a period of three weeks. The places visited were: Bayonne, Cambo, Dax, Arcachon, Pau, Eaux-Bonnes, Eaux-Chaudes, Cauterets, Lourdes, Bagnères-de-Bigorre, Luchon, Ussat, Ax, Montpellier, Cette, Boulou, Amélie-les-Bains, La Preste, Banyuls-sur-Mer, and Thues.—Report on the phenological observations for 1886, by the Rev. T. A. Preston, M.A., F.R.Met.Soc. The weather was, on the whole, very ungenial and everything much retarded; it was also very fatal to insect life, so that the complaints on this head have been far less than usual. Bush fruits were very abundant; strawberries and peas were spoilt by drought in many places; stone fruits, except plums, were not abundant; plums were extraordinarily plentiful, so much so that they realised nothing in the markets, the cost of picking and carrying often being more than they realised; apples were very poor, from the destruction of the bloom by heavy rain. Hay was good and plentiful, and well harvested; corn and other grain were not up to an average: root-crops were, as a rule, remarkably good.—A criticism of certain points of Prof. Langley's researches on solar heat, by Prof. S. A. Hill, B.Sc., F.R.Met.Soc. These experiments were carried out at Mount Whitney, in Southern California, during 1881.—Account of the