solution of potassium carbonate. We may hope that, before long, further light will be thrown on the constitution of these bodies.

The action of alkalies on soil is quite in accordance with the assumption of the amide nature of its nitrogenous compounds. Boussingault long ago showed that the agricultural operation of liming a soil caused the production of ammonia. It has recently been shown by Baumann, and others, that a solution of soda, even in the cold, develops a notable amount of ammonia in soil, while at a high temperature the action becomes very considerable.

Nor are facts wanting which seem to exhibit the actual synthesis of amides from ammonia and humic acids. Knop long ago observed that when peat was treated with ammonia the ammonia disappeared, and could no longer be detected. Joulie found, in his experiments on the changes which take place in farmyard manure, that when finely divided straw, horse-dung, and ammoniacal urine of known composition were mixed, and allowed to ferment, a great disappearance of ammonia took place, accompanied by a gain of 35 to 63 per cent. in the organic nitrogen. The ammonia had in this case clearly united with some of the organic compounds present.

The view of the constitution of the nitrogenous matter of the soil which has been now brought forward will, we think, prove fruitful: it throws much light on the chemical changes within the soil; it has also possibly important bearings on plant-nutrition. That the acid sap contained in roots is capable of rendering soluble, and thus effecting the assimilation of various mineral matters with which they come in contact, is admitted to be a fact by physiologists. May it not equally follow that the insoluble amides of the soil are also attacked by the acid root-sap? We know not yet the properties of the soluble amides which result from the action of acids on the insoluble amides of the soil; but if they are diffusible through a membrane, they must enter the plant, and it is certainly very probable that they would then be found capable of taking part in plant-nutrition. A reaction of the kind we have supposed between the root and the soil would probably take place to a very different extent with different plants, much depending on the character of the root-sap. When the subject has been more fully investigated, it may perhaps be found that we have in this action of the roots an explanation of those obscure cases of plant-nutrition which at present puzzle the agricultural chemist. R. WARINGTON

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The following is the speech delivered by the Public Orator, Dr. Sandys, in presenting for the honorary degree of Doctor of Science, Prof. Alexander Agassiz, Curator of the Museum of Zoology, Harvard College, Massachusetts:—

Cum Collegio Harvardiano antiquitus consociati, nuper vetera amicitiae iura auspiciis optimis renovavimus; litteris datis acceptisque trans maria lata dextras iunximus; legatis denique insignibus missis, ludis illis saecularibus, etiam absentes, velut praesentes interfuimus. Hodie vero e Collegii illius professoribus unum revera praesentem videmus, virum et suo et patris et Collegii sui nomine nobis dilectum. Donec Alpium inter culmina ingentes illae glaciei moles desuper paullatim descendunt, tam diu patris illius nomen superstes vivet, qui, in Republica non magna natus, Rempublicam maximam gloriae suae fecit participem, expertus scilicet vetera illa verba quam vera essent:—

"Omne solum forti patria est, ut piscibus aequor,
Ut volucri vacuo quicquid in orbe patet."

Filii vero famam patre tanto non indignam, quibus potissimum verbis exsequi potero? Utinam tu mihi hodie adesses:—

O testudinis aureae
Dulcem quae strepitum, Pieri, temperas;
O mutis quoque piscibus
Donatura cycni, si libeat, sonum.

Atqui Musa illa vocata non audit; rogata tacet; virumque praeconio altiore dignum sermone pedestri laudandum relinquit. Ergo, utcunque possumus, virum libenter laudamus, qui, cum ingenii sui ope aeris thesaurum ingentem invenisset, Academiam suam divitiarum suarum amplitudine ornavit, iudice me (insusurrare mihi videtur Horatius) iudice me, "non sordidus auctor naturae verique." Quid autem de vivario illo dicam, aequoris Atlantici prope marginem ulteriorem condito, ubi maris immensi miracula minutissima ab hoc viro accuratissime examinantur, ubi oceani ipsius e penetralibus profundis rerum naturae veritas ipsa audacter extorquetur? Satis erit hodie de veritate illa dicere quod olim de Romanorum virtute dictum est:—

"Merses profundo; pulchrior evenit."

Duco ad vos marinae praesertim zoologiae indagatorem indefessum, ALEXANDRUM AGASSIZ.

SCIENTIFIC SERIALS

THE *Quarterly Journal of Microscopical Science*, January.—The anatomy of the Madreporian coral Fungia, by G. C. Bourne (plates xxiii. to xxv.). During a visit to Diego Garcia (an atoll lying in 7° 13′ S. lat., 72° 23′ E. long.) which extended from the middle of September 1885 to the middle of January 1886, the author was able to collect and preserve a large number of specimens of *Fungia dentata*. These Fungiæ were very abundant within the lagoon, where at low spring tides they could be collected by scores from depths of from three to ten feet: a prolonged search failed to secure any specimens under two inches in diameter, or an example of the nurse-stock. It is suggested that the time of the year was the cause of this; the depth of the water in which the search had to be made was also unfortunate for such investigations. The name "mesogloea," suggested by Prof. Lankester, is used to denote the supporting lamina of Cœlenterata: the only seeming objection to the name is that it is the name of a well-known genus of Algæ.—On some points in the development of *Petromyzon fluviatilis*, by Arthur E. Shipley (plates xxvi. to xxix.). The material was obtained by fertilising the eggs of the ripe female Lampern, hatching the larvæ out, and rearing them in confinement. The summary is too long for abstracting, but it may be mentioned that the early development of the skeleton is described up to the stage where Prof. Parker commenced his researches.—The ammoniacal decomposition of urine, by Dr. W. R. Smith (plate xxx.). Records a series of observations proving that the ammoniacal decomposition of urine is brought about by the presence of a Micrococcus which differs from that described by Prof. W. Leube, inasmuch as it liquefies gelatine. Though about twenty different organisms were isolated from one sample of healthy urine, only this one acted so.—Notes on Echinoderm morphology, No. 10; on the supposed presence of symbiotic Algæ in *Antedon rosacea*, by P. Herbert Carpenter (plate xxx.). Discusses the views of Vogt and Yung as to the Sacculi of Antedon being symbiotic Algæ, and considers these views as certainly not proven; an opinion which Perrier seems by intuition to have already ascribed to him.—The function of nettle-cells, by Dr. R. von Lendenfeld (plate xxx.). The plasmotic contractile coat of the cnidoblast is incited to action by the cnidocil: the animal can control this action.—Some new methods of using the aniline dyes for staining Bacteria, by E. H. Hankin. Illustrations of the structure and life-history of *Phytophthora infestans*, by Prof. H. Marshall Ward (plates xxxi. and xxxii.).—On the formation and liberation of the zoospores in the Saprolegnieæ, by Dr. Marcus M. Hartog.

THE *Journal of Botany* for January is chiefly occupied by a biographical notice of the late Dr. H. F. Hance, of Whampoa.—In the number for February, Dr. Richard Spruce describes and figures a Hepatica from Killarney new to science, to which he gives the name *Lejeunea Holtii*; Mr. Alfred Fryer continues his notes on the genus *Potamogeton*; and Mr. J G. Baker commences a synopsis of the six genera *Sodiroa*, *Caraguata*, *Schlumbergeria*, *Guzmannia*, *Catopsis*, and *Tillandsia*, which make up the tribe Tillandsieæ of the natural order Bromeliaceæ.

Bulletin de l'Académie Royale de Belgique, December 1886.—Determination of the parallax relative to the larger member of the double star Σ 1516 of Struve, by L. de Ball. From previous observations the chief star of this group appeared to have a proper movement in a straight line independently of its companion, with which it had no physical connection. By means of a Cointe refractor the author has followed the relative displacements of the two stars, and has determined a periodicity, the effect of the relative parallax, which he finds to be

$$0''\cdot091 \pm 0''\cdot013,$$

and the distances

$$0''\cdot112 \pm 0''\cdot010.$$

From these elements he determines an absolute parallax $0''\cdot104$, with a mean error $0''\cdot008$, corresponding to a distance which

light would take 31 years to traverse.—Note on the transparency of platina mirrors, by Edm. Van Aubel. His further researches confirm the author's previous conclusions regarding the false transparency of these mirrors, the light passing, not through the metal itself, but through the interstices left between the particles deposited on the plates as prepared by Paul Lohmann, of Berlin.—On the instability of equilibrium of the surface-layer of a liquid, second part, by G. Van der Mensbrugghe. The points here dealt with are: (1) the existence of a surface-tension proper to each liquid according to a given inner temperature; (2) the existence of a contractile or expansive force on the surface of a liquid in contact with a solid; (3) tension of a surface common to two liquids not intermingling.—On the valency of an atom of carbon, by Louis Henry. A method is proposed for determining the relative value of the four unities of its chemical action.—On the physiology of the heart of the dog, by Léon Fredericq. The author explains the nature of the contraction of the ventricles, the idio-muscular contraction of the cardiac muscle, the nervous system of the heart, its isolated circulation, and the circulation in the pulmonary artery.—The Neanderthal or Canstadt race in Belgium, by MM. Traipont and Lohest. The authors describe what appears to be the most important anthropological find ever made in Belgium. It consists of two more or less perfect human skeletons discovered by them in association with the remains of *Rhinoceros tichorinus*, *Elephas primigenius*, the cave hyæna, and other extinct animals in the undisturbed Lower Quaternary deposits of a limestone cave at Spy, on the banks of the Orneau, in the province of Namur. The human remains, which came to light during the summer of last year, present remarkable points of resemblance with those of the oldest yet discovered Palæolithic race, as represented by the Neanderthal and Canstadt skulls. The relationship is so close that the strikingly simian features of these skulls, hitherto regarded as possibly aberrant or pathological, would appear to be perfectly normal, and characteristic of the oldest known human inhabitants of Western and Central Europe. One of the skulls of the Spy men is decidedly platidolichocephalic (long and low), with cephalic index 70; the other is sub-platidolichocephalic, with index 74·80. The frontal bone is also very low, narrow, and retreating, and the upper alveolar process highly prognathous, while the chin is but slightly developed, receding more rapidly than that of even the lowest Papuan type.

Engler's Botanische Jahrbücher, Achter Band, 1 Heft.—The latest botanical discoveries in the tombs of Egypt, by G. Schweinfurth. This article, with an appendix dated October 1886, contains an enumeration and description of vegetable remains found in tombs at Dra-Abu'n-Negga. Though the specimens were often in bad preservation, the author has been able to recognise some fifty species of plants from tombs dating from various periods, both very ancient and comparatively modern; among others the garlic (*Allium sativum*), which, with leeks and onions, is mentioned in Numbers, chap. xi.—The next two articles by Alfredo Cogniaux and Dr. F. W. Klatt contain descriptions of the Melastomaceæ, Cucurbitaceæ, and Compositæ collected by Lehmann in Guatemala, Costa Rica, and Columbia.—On the family of the Lactoridaceæ, by A. Engler. The genus Lactoris has been placed by various authors in the Magnoliaceæ, Dilleniaceæ, and Piperaceæ (Saururaceæ). On anatomical as well as other grounds the author rejects the affinity to the Saururaceæ and Dilleniaceæ, and concludes that Lactoris is to be regarded as representing a family (Lactoridaceæ) closely allied to the Magnoliaceæ.—On Didymia, a new genus of Cyperaceæ, by Dr. R. A. Philippi (with one plate).—Contributions to the flora of the Congo district collected by Dr. Naumann on the expedition of H.M.S. *Gazelle*, prepared by A. Engler.—Then follow abstracts of papers published elsewhere.—At the conclusion of this number is a formal offer of prizes for monographs of the genera Ranunculus and Draba, and for a critical revision of the fossil forms of Quercus.

Achter Band, 2 Heft.—Dr. R. A. Philippi, on the Chilian species of Polyachyrus, a genus of Compositæ belonging exclusively to Chili and Peru. The author distinguishes the species according to the characters of the leaves, and illustrates his paper with a plate.—Hepaticæ Africanæ, by F. Stephani (one plate). This is a description of two collections of Hepaticæ: the one, made by F. A. Moller, from the Island of St. Thomas, consists of thirty-four species, of which twenty are new; the other, by W. Mönkemeyer, about the mouth of the Niger, consists of sixteen species, of which eight are new.—The Hepaticæ of the Peninsula of Alaska, prepared by F. Stephani, comprise four new species, three of which are figured on plate iii. The fourth (*Frullania chilcootiensis*) is extremely small, only a few millimetres in length, and is found hidden in the roughnesses in the bark of the birch.—Comparative anatomy of the leaf of the family Olacineæ, by E. Edelhoff. This is a laborious investigation of minute details of the anatomy of the leaf, the outcome of which is apparently no new view as to the grouping of the members of the family, but rather the recognition of microscopic diagnostic characters.—Dr. Gürich, on the botanical results of the expedition of Flegel to the Niger-Binué.—Note on a recently disclosed Pliocene flora in the neighbourhood of Frankfurt/a/M., by Dr. H. Th. Geyler.—Abstracts of papers published elsewhere.

Nuovo Giornale Botanico Italiano, January 1887.—Signor A. Piccone continues his observations on the part played by phytophagous fishes in the dissemination of Algæ. The fish which appears to be by far the most effective in this direction in *Box Salpa*, L.—Dr. F. Tassi contributes an elaborate paper on anæsthesia and poisoning in plants. Among the general conclusions at which the author has arrived, the more important are that there exists in certain plants a property analogous to that which in animals is variously denominated irritability, contractility, excitability, &c., but that this property is located in no special organ, but originates in the protoplasm. Some substances which produce anæsthetic or poisonous effects in animals are in no way injurious to plants.

Rendiconti della R. Accademia dei Lincei, December 1886.—Researches on the nature of malaria, carried out by Dr. Bernardo Schiavuzzi in Pola, Istria. The results of these experiments show the constant presence of a Bacillus, morphologically identical with that already described by Klebs and Tommasi-Crudeli, in the malarious districts of Pola, and its absence from the healthy localities. This Bacillus, artificially cultivated and inoculated on rabbits, develops fevers showing all the characteristics of swamp-fever, while in the infected animals the red corpuscles of the blood undergo the same alterations as Marchiafava and Celli have shown to be characteristic of malarious infection. These alterations, however, are attributed by Dr. Schiavuzzi, not to the presence of a parasitic animal which has never yet been detected either in the air or in the soil of the infected districts, but to a deterioration of the blood-corpuscles directly or indirectly caused by the action of a pathological ferment of quite a different nature. He accordingly concludes that the *Bacillus malariæ* described by Klebs and Tommasi-Crudeli in 1879 is the true cause of marsh-fever.—On the objective spectroscope, by L. Respighi. The author claims the honour of having first introduced and applied to stellar spectroscopy the improved form of this instrument, as now generally used by spectroscopists. Although the important modification made by him is commonly attributed to Secchi, he shows conclusively that it had been adopted and successfully employed by him fully nine months before its application by Secchi in November 1869. An account of his first experiments with the perfected instrument appeared in the Atti of the Academy for May 20, 1869. The modification in question consists in replacing the large prism of Fraunhofer's instrument by one with a small refrangent angle, by means of which may be obtained perfectly distinct and well-defined spectra of the smaller stars.

Rendiconti del Reale Istituto Lombardo, January 13.—Annual Report on the progress of the mathematical and natural sciences, presented by the Secretary, S. Ferrini. In this general survey of work done by members of the Istituto, special reference was made to E. G. Cantoni's memoir on the phenomenon of dew, showing that Aitken's observations have been confirmed by the results obtained in Italy by Fusinieri, Melloni, and Cantoni himself, in opposition to the generally admitted hypothesis of Wells; to C. Poloni's experimental researches on the permanent magnetism of steel at various temperatures, formulating the law of variations caused by changes of temperature, and on his new method for measuring the absolute thermic conductivity of metallic wires; and to Giacomo Cattaneo's studies on the formation of gastric and intestinal glands in the embryo of *Salmo salar*.

Rivista Scientifico-Industriale, January 15.—Electricity developed with the formation of fogs and clouds, by Prof. Luigi Palmieri. Some electric phenomena recently observed at the meteorological stations of Naples and Vesuvius are appealed to in confirmation of the author's view that strong electric tensions in clear skies constantly indicate the near approach of clouds

fogs, and even rain. Hence the strong tensions of atmospheric electricity so frequently signalled from the New York Observatory some days before the arrival of storms and wet weather on the west coast of Europe. During thirty-six years of constant study, the author has recorded thousands of similar observations, which have been overlooked by physicists dazzled by theories opposed to the natural conditions.—Further remarks on the question whether electricity is developed during the condensation of aqueous vapour, by Prof. Costantino Rovelli. In reply to the statements of Prof. Magrini, the author points out that, although his own experiments may have their weak side, the prolonged and repeated observations of Prof. Palmieri cannot be refuted by merely negative proofs.

SOCIETIES AND ACADEMIES

LONDON

Physical Society, February 12.—Annual General Meeting.—Prof. B. Stewart, F.R.S., President, in the chair.—In opening the proceedings the President regretted that in their Report the Council have to record the loss of one who took a prominent part in the proceedings of the Society, the late Dr. Guthrie. It was, however, satisfactory to learn that the appeal of the Guthrie Memorial Committee, under the presidency of Prof. Huxley, had been generously responded to. The Council also learn with regret from Dr. E. Atkinson that owing to pressure of work he is unable to retain the office of Treasurer to the Society, and desire to express their thanks to him for his past services. Prof. Rücker has consented to be nominated for the office thus rendered vacant, and the Council believe that by his election the connection between the Society and the Normal School of Science (which is so desirable) will be maintained.—The Report of the Council for the year 1886 was read and received, and the following gentlemen were elected Members of the Council for the present year:—President: Dr. Balfour Stewart, F.R.S.; Vice-Presidents: Dr. E. Atkinson, Prof. W. E. Ayrton, F.R.S., Shelford Bidwell, F.R.S., Prof. H. McLeod, F.R.S.; Secretaries: Prof. A. W. Reinold, F.R.S., Walter Baily; Treasurer: Prof. A. W. Rücker, F.R.S.; Demonstrator: C. V. Boys; other Members of Council: R. H. M. Bosanquet, W. H. Coffin, Conrad W. Cooke, Prof. G. Forbes, Prof. F. Fuller, Prof. J. Perry, F.R.S., W. N. Shaw, Prof. S. P. Thompson, C. M. Whipple, C. R. Alder Wright, F R.S.—The President proposed the following resolution: "That at the end of Clause 11 of the By-laws, which says, 'Every candidate for admission into the Society shall be recommended by not less than three members, to two of whom he must be personally known,' there be added, 'When a candidate living abroad is a member of a recognised scientific Society, such membership may, subject to the approval of the Council, be held equivalent to the personal knowledge aforesaid.'" The resolution was carried, subject to confirmation by a special general meeting to be held on February 26.—A vote of thanks, proposed by Prof. Ayrton and seconded by Prof. McLeod, to the Lords of the Committee of Council on Education, for the use of the rooms and apparatus of the Normal School of Science, was passed unanimously.—The Hon. R. Abercromby proposed a vote of thanks to the officers of the past year for their gratuitous services, which was seconded by Prof. Pickering.—Sir Philip Magnus proposed a vote of thanks to the auditors, Colonel Festing and Prof. Fuller, which was seconded by Mr. Lecky, and passed unanimously.—Mr. J. Brown was elected a Member of the Society.—The following communication was then read:—Note on the tenacity of spun glass, by E. Gibson and R. E. Gregory. The authors have experimented on the tenacity of glass rods and fibres made from the same piece of glass. The fibres varied from 1/25 to 1/50 mm. and the rods from about ½ to 1 mm. in diameter. They find the tenacity per square centimetre of rods increases as the diameter decreases, as in ordinary wires, whereas with fibres this is not shown. Experiments were shown illustrating the method of working, and the highest tenacity recorded was for a fibre of ·0340 mm. diameter, which gave 466×10^7 dynes per square centimetre, a value about half as great as that for steel wires. The authors refer to Quincke's suggestion that the increased tenacity of small wires is due to surface-tension, and may be represented by $W = Ad + Bd^2$, where W is the breaking weight and d the diameter, but their own results with glass do not agree with this formula. Sir Philip Magnus asked if the diameters were measured at the point of rupture, if the elongation was determined, and whether the authors were able to suggest any other formula which would express their results. Mr. C. V. Boys remarked that the tenacity being so much affected by accidental circumstances, such as rate of cooling, no such formula could be expected. Prof. Rücker, referring to Quincke's experiments, said that the surface-tensions of metals calculated from them appear improbable. After some further remarks by the President, Prof. Ayrton, Mr. C. V. Boys, Prof. McLeod, and Mr. Gregory, the proceedings terminated.

Royal Meteorological Society, February 16.—Mr. W. Ellis, President, in the chair.—The adjourned discussion on the Hon. R. Abercromby's paper on the identity of cloud forms all over the world, and on the general principles by which their indications must be read, was resumed; and the following papers were read:—Remarks concerning the nomenclature of clouds for ordinary use, by Prof. H. H. Hildebrandsson; and Suggestions for an international nomenclature of clouds, by by the Hon. R. Abercromby. Both Prof. Hildebrandsson and Mr. Abercromby have paid great attention to the question of the forms of clouds, and having recently conferred together, they have agreed to recommend for international use the following ten principal varieties, viz.:—High-level clouds: cirrus, cirro-stratus, cirro-cumulus; middle-level: strato-cirrus, cumulo-cirrus; and low-level: cumulus, stratus, strato-cumulus, nimbus, cumulo-nimbus.—The influence of weather on the proportion of carbonic acid in the air of plains and mountains, by Dr. W. Marcet, F.R.S., and M. A. Landriset. The authors give an account of some experiments which they have made on the proportion of carbonic acid in the air at Geneva and on the summit of the "Dole," the highest point of the Jura chain, the difference in altitude being 4193 feet. The results of these experiments show: (1) that in fine clear weather on a mountain chain of moderate Alpine altitude, and in the adjoining valley or plain, the atmosphere holds the same mean proportion of carbonic acid at both places; and (2) that when the summit of a mountain chain is in a fog, a circumstance which frequently happens in an Alpine district, the air in the fog contains a smaller proportion of carbonic acid than it would hold in fine clear weather.—The Secretary, Dr. Tripe, read a letter received from Sir F. Abel, Organising Secretary to the proposed Imperial Institute, inviting the Society to draw the attention of the Fellows to the undertaking, with the view of their contributing towards it. The President stated that copies of the letter and of the accompanying paper, explanatory of the scheme, would be forwarded to each Fellow.

Mathematical Society, February 10.—Sir James Cockle, F.R.S., President, in the chair.—The following communications were made:—On the equation of Riccati, by the President (Prof. Hart, Vice-President, taking the chair).—The orthocentroidal circle (*i.e.* the circle whose diameter is the join of the orthocentre and centroid), by R. Tucker.—On polygons inscribed in a quadric and circumscribed about two confocal quadrics, by R. A. Roberts.—On the binomial equation $x^p - 1 = 0$; quinquisection, by Prof. Tanner.—Symmetrical determinant-formulæ in elliptic functions, by L. J. Rogers.—Notes on curves, by H. M. Taylor.—Some generalisations of differential formulæ connected with the change of the independent variable in a differential expression, with application to a new class of reciprocants, by C. Leudesdorf.

Geological Society, February 9.—Prof. J. W. Judd, F.R.S., President, in the chair.—The following communications were read:—Evidence of glacial action in the Carboniferous and Hawkesbury series, New South Wales, by T. W. Edgworth David.—The terraces of Rotomahana, New Zealand, by Josiah Martin.—The eruption of Mount Tarawera, by Capt. F. W. Hutton. The paper began with a description of the country in which the eruption took place. From Tongariro to White Island, in the Bay of Plenty, a distance of 130 miles, there extends a belt, 20 or 30 miles wide, abounding in solfataras, geysers, hot springs, &c., and composed of volcanic rocks, chiefly rhyolite, with some augite-andesite. About the middle of this belt lie the mountain and lake of Tarawera, and two or three miles further south Lake Rotomahana, the spot where the famous Pink and White Terraces existed. Before the recent eruption there were no craters on Mount Tarawera, the form of which was a ridge, apparently due to denudation. Having described the eruption, Capt. Hutton briefly noticed the results of the eruption in the form of fissures on Mount Tarawera, the change of Rotomahana from a lake to a crater of larger dimensions,