

manurial trials, of progress in soil management, plant breeding, in bacteriology, in our knowledge of plant and animal requirements, so far as practical agriculture is concerned, besides dealing with questions of cost and with practical methods ascertained to give good results and worthy of wider trial.

To come, however, to the actual papers. Two on pigs deal respectively with the general problem and with the bacon-curer's requirements in a way that will appeal to the practical man. Mr. Archibald completes a series of notes on wild birds begun in the journal for 1892 and continued in the 1894 number; if these could be bound up into a separate booklet they would doubtless prove very attractive to the agricultural community. The report on the prize farms in Lincoln is a valuable revival of a practice discontinued since 1892; some of the best things in the literature of practical agriculture are found in the old reports. Mr. Güssow's article on poisonous plants is of interest both to botanists and to practical men.

Dr. Voelcker's report on the work carried out at Woburn is as interesting and suggestive as usual. In the pot-culture station, lithium salts have been found to be very poisonous to wheat, as little as 0.05 per cent. reducing the yield to one-quarter, whilst manganese and iron salts increased the yield. A connected account of the work is promised, and will be awaited with interest. In the field experiments it has been thought desirable to alter the scheme of manuring consistently adhered to since 1876, and we cannot help thinking that this is a great mistake. Stackyard field is one of the best experimental fields in the kingdom, and would prove an almost ideal place for solving problems in soil physics and in soil bacteriology when the methods of working are sufficiently developed. Manures take so long to act on the soil, and we know so little about the action, that it would surely have been better not to break the continuity of treatment, but to leave the fields as material for future workers just as is being done at Rothamsted.

(2) to (5) These bulletins are typical of much of the work executed under the auspices of county councils. The field trials fall under two heads, variety and manurial trials; in the former a number of the varieties of a plant are grown to see which gives the biggest yield, in the latter a scheme of manuring is designed to test the effect of the various fertilisers. Properly executed with duplicate plots and accompanied by adequate chemical analyses, the manurial trials are capable of furnishing results both of practical and scientific interest. Without soil analyses the results have only a temporary value, and are, indeed, often useless to those who do not know the actual field on which the trial was made. Although no analyses are recorded in the bulletins, it is to be hoped they exist. The Midland College bulletins speak well for the energy and enterprise of the staff. Some refreshing departures from the conventional *motif* are found in the Reading report, the experiments on weeding and on cultivation being particularly interesting. E. J. R.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The Public Orator, Dr. Sandys, spoke as follows in presenting to the Chancellor the five representatives of mathematics and natural science who received the degree of Doctor in Science *honoris causa* on June 17:—

THE HON. CHARLES ALGERNON PARSONS, C.B., F.R.S.,
Honorary Fellow of St. John's.

Regiæ Societatis præsidis, Astronomiæ fautoris maximi filius, quem hodie decoramus, etiam in ipsa pueritia machinarum novarum inventor felix fuisse dicitur. Postea Dominae Margaretæ Collegii alterius scholaribus adscriptus, honorum mathematicorum in classe prima, Dominae Margaretæ in nave prima, locum insignem est adeptus. Deinde Archimedis æmulis hodiernis additus, non gram-mophoni tantum tubam terribilem sonitus suaviores edere docuit, sed etiam navium vi vaporis impulsarum more novo movendarum opus difficillimum exitu prospero est aggressus. Machinae genus illud novum, a Societate Regiæ numismatis aurei honore approbatum, etiam navibus maximis oceanum transeuntibus postea est accommodatum.

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Quod si Neptunum ipsum alumni nostri de meritis interrogare volueritis, sine dubio Neptunus ipse profinus respondebit:—

Experto credite quantus

Per pontum properet, quo turbine torqueat undas.

SIR ANDREW NOBLE, Bart., K.C.B., F.R.S.

Ballistarum scientiam hodiernam baronetti huius ingenio plurimum debere inter omnes constat. Milites nostri, machinarum bellicarum in apparatu neque terra neque mari rerum novarum cupidi, viri huius praesertim consiliis admoniti, meliora didicerunt. In ballistis vero nostris in melius mutandis, atque etiam imperii Iaponici in navibus aedificandis, nemo Archimede nostro venerabili plus effecit. Nemo operariis nostris cessantibus et mercedem maiorem flagitantibus potiora suavit. Quid autem est praeclarium quam honoribus perfunctum senem posse dicere idem quod apud Ennium dicat ille Pythius Apollo, se esse eum unde sibi et populi et reges et omnes sui cives, summarum rerum incerti, consilium expetant?¹

SIR WILLIAM CROOKES, F.R.S.

Cancellarii nostri auspiciis nunc demum eum ipsum praesentem videmus quem diu desideravimus, quem alia ex alia scientiarum in studiis occupata Societas praesidem suum olim suscepit. De scientia chemica et physica exploranda per annos plus quam quinquaginta praeclare meritis, in rerum primordiis primis spectri (ut aiunt) auxilio examinandis eam ipsam provinciam feliciter exploravit, quae etiam scientiae physicae in officina nostra maximo cum fructu indagata est. In observando quam acutus est, in experiendo quam peritus, in rebus difficillimis investigandis quam pertinax! Viri tanti exemplo Vergili dictum denuo praeclare confirmatum est:—"Labor omnia vicit improbus."

PROF. HORACE LAMB, F.R.S., Late Fellow of Trinity
Professor of Mathematics in the Victoria University
Manchester.

Abhinc annos septem et triginta Newtoni in Collegio alumnus nostrum Newtoni disciplinam perquam feliciter coluisse constat. Postea in Australia professor nominatus, in colonia nostra remotissima studiorum mathematicorum, studiorum physicorum, diu duratura posuit fundamenta. Deinde scriptorum eius propter merita insignia a Mancuniensibus domum revocatus, ea quae ipse de vi electrica disputationum suarum in regione pura inveniit, ab aliis in machinis fabricandis vita nova donata vidit. Peritis nota sunt "Hydrodynamica" eius, in editione nova in maius exaucta. Etiam aliis innotuit oratio Societatis Britannicae in conventu Cantabrigiensi haud ita pridem pronuntiata, in qua primum studiorum mathematicorum historiam recentiore dilucide delineavit; deinde etiam in studiis illis severis aliquid audendum, aliquid periclitandum esse dixit; denique rerum naturam nondum omnem esse exhaustam, sed miraculis etiam nunc esse plenam, quae scientiarum cultores per plurima in posterum saecula sint exercitura.

PROF. GEORGE DOWNING LIVEING, F.R.S., Fellow of
St. John's.

Abhinc annos duo et sexaginta Cantabrigiam primum petivit vir intra proximum quinquennium in disciplina mathematica et in rerum naturae studiis honores summos adeptus, qui, post itinera sua Berolinensia, scientiae chemicae inter nosmet ipsos docendae sese strenue dedicavit, et Divi Ioannis in Collegio primam scientiae illius officinam Cantabrigiensem aedificandam curavit. Postea Universitatis professor nominatus, horum studiorum officinae amplissimae publice condendae summam diligentiam, summam operum exterorum experientiam, feliciter adhibuit. Lucis vero radiis spectri (ut aiunt) ope retexendis, et rerum naturae penetralibus examinandis, quot annorum labores dedicavit! quot discipulis studiorum uno tenore assidue peractorum exemplar quam pulchrum praebuit! In operibus bonis adiuvandis liberalissimus, in negotiis academicis partium liberalium defensor indefessus, per tot annos inter tantas rerum vicissitudines animum serenum, aequum, prudentem, modestum conservavit.

¹ Cicero, "De Or," i. 199.

Virum talem preconio eodem dignum esse crediderim, quo populi Americani praeses quidam magnus, professoris nostri in anno primo munus suum ingressus, populi sui a poeta eximio postea est laudatus:—

En vir benigne intentus, fortis, providus,
Sagax patiensque, laudem non culpam timens.¹

On June 17, Lord Rayleigh was formally installed as Chancellor of the University in succession to the late Duke of Devonshire. At a luncheon given by the master and fellows of Gonville and Caius College to the Chancellor, the recipients of honorary degrees, and a large party of guests, Sir Andrew Noble announced that several of Lord Rayleigh's friends, non-resident members of the University, proposed, in order to express the gratification of the scientific world at his election, to offer to the University a fund large enough to provide an annual award to be associated with the name of the Chancellor.

The Harkness scholarship for 1908 has been awarded to T. O. Bosworth, and the Wiltshire prize to W. C. Smith. The John Winbolt prize has been awarded to L. B. Turner, for his essay on "The Elastic Breakdown of Materials submitted to Compound Stress." The examiners were also of opinion that the essay sent in by E. T. Busk was deserving of honourable mention.

The special board for biology and geology has approved a grant of 200l. from the Balfour fund made by the Balfour managers to J. Stanley Gardiner, in aid of researches in the Seychelles, Aldabra, and the neighbouring islands.

The professorship of chemistry is vacant by the resignation of Prof. Liveing. The electors will meet for the purpose of electing a professor on Saturday, July 25. Candidates are requested to communicate with the Vice-Chancellor on or before July 13.

OXFORD.—The Drapers' Company has offered to make a grant of 22,000l. for a new electrical laboratory at the University, and to contribute 1000l. toward its equipment. This generous offer will be brought before Convocation in October.

LIVERPOOL.—The council of the University has instituted two new chairs, one of Celtic studies and the other of mediæval archæology. Prof. Kuno Meyer, who already holds the endowed chair of German in the University, has been appointed to the first of these new chairs, and Mr. F. P. Barnard to the second.

A COURSE of lectures and demonstrations on the scientific study of fisheries has been started this summer session in the University of Aberdeen. It is being conducted by Dr. T. Wemyss Fulton, scientific adviser to the Scottish Fishery Board.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, April 30.—"A Photographic Determination of the Elements of the Orbits of Jupiter's Satellites." By Bryan **Cookeon**. Communicated by H. F. Newall, F.R.S.

During the opposition of Jupiter in 1902, the author was engaged in making a series of measurements of the relative positions of the four Galilean satellites with the 7-inch heliometer at the Cape Observatory. Simultaneously with these visual observations, photographs were taken with the astrographic telescope. This paper contains a short account of the work done in connection with the photographs; a detailed account has appeared as vol. xii., part iv., of the "Annals of the Cape Observatory."

The investigation with the heliometer was undertaken with the object of determining the mass of Jupiter and correcting the best available elements of the orbits of the satellites, which observation showed were considerably in error.

The mass of the system of Jupiter, in terms of the sun's mass, was determined with great care from the heliometer observations. The value finally deduced is

$$1 : 2047.30 \pm 0.06.$$

¹ (Abraham Lincoln).

"The kindly-earnest, brave, foreseeing man,
Sagacious, patient, dreading praise, not blame."
Lowell's "Commemoration Ode," vi. *ad finem*.

In the case of the second satellite, which has an orbit at an inclination of $0^{\circ}.48$ to Jupiter's equator, the node retrogrades 12° per annum, and of this motion 82 per cent. is due to the compression of Jupiter, 4 per cent. to the influence of satellite I., 13 per cent. to that of III., and 1 per cent. to that of IV.

The fifth satellite discovered by Barnard is so near to the primary that the node of its orbit revolves through about 912° per annum, and second-order terms begin to make themselves felt. A careful measurement of this motion would be of much value, for a comparison of the compression of Jupiter, deduced from the motion of the node of V. with that deduced from the motion of the node of II., might provide information concerning the distribution of mass in Jupiter.

June 4.—"On the Decay of the Radium Emanation when dissolved in Water." By R. B. **Moore**. Communicated by Sir William Ramsay, K.C.B., F.R.S.

The results obtained by Ramsay and Cameron on dissolving radium emanation in water and in copper sulphate solution have made it advisable to investigate the behaviour of the emanation, when dissolved in such solvents, from a radio-active standpoint. The present note deals with the rate of decay of the radium emanation when dissolved in water. The emanation accumulated by 110 milligrams of radium bromide in two days, with the accompanying oxygen and hydrogen, was collected in a gas burette over mercury. After exploding, a small amount of water was run into the burette, and the solution of the emanation thus obtained, together with the slight excess of hydrogen, was transferred to a glass tube 2 inches long and 5 mm. in diameter, which had previously been exhausted. The solution filled about five-sixths the volume of the tube. The latter was sealed, and the decay curve of the emanation was obtained by means of the γ rays, sheet lead being used to cut down the rays to the required amount. The half-time period found was 3.8 days. It may, therefore, be assumed that the emanation decays at the same rate when dissolved in water as it does in air.

Geological Society, June 3.—Prof. W. J. Sollas, F.R.S., president, in the chair.—The fossiliferous rocks of the southern half of the Tortworth inlier: F. R. **Cowper Reed** and Prof. S. H. **Reynolds**. This paper is a continuation of that on the igneous rocks of this area published in 1901 (Quart. Journ. Geol. Soc., vol. lvii., p. 267). The rocks are affected by the Hercynian flexures which produced the Bristol coal-basin, and the outcrop of the beds in the main follows the horseshoe-shaped outcrop of the Old Red Sandstone. This regularity is lost at Daniel's Wood and Middlemill. Two important transverse faults traverse the outcrops, which are further obscured by the overlap of unconformable Trias. The trap-bands are found to be confined to the Llandovery, the number of recorded fossils has been largely added to, and previous statements as to the thinness and imperfect development of the Ludlow rocks and as to the probable exposure of the district to erosion in Ludlow and Lower Old-Red-Sandstone times are confirmed.

Chemical Society, June 4.—Sir W. Ramsay, K.C.B., F.R.S., president, in the chair.—The interaction of copper and nitric acid in presence of metallic nitrates considered with reference to the existence of hydrates in solution: E. H. **Rennie**, A. J. **Higgin**, and W. T. **Cooke**. The authors consider that the acceleration caused by some nitrates and the retardation induced by others on the dissolution of copper in nitric acid are due to the withdrawal by the salts of water or nitric acid from the solution, and the consequent concentration or dilution of the acid.—The triazo group, part iv., allylazoimide: M. O. **Forster** and H. E. **Fierz**. Allylazoimide prepared in small yield and with some difficulty from allyl chloride and sodium azide is a mobile refractive liquid which boils at $76^{\circ}.5$ under 760 mm. pressure.—Aromatic arsonic and arsenic acids: F. L. **Pyman** and W. C. **Reynolds**. The following new substances are characterised:—bis-2-amino-tolyl-5-arsinic acid, bis-2-acetylaminotolyl-5-arsinic acid, bis-*p*-aminophenylarsinic acid, and bis-*p*-acetylaminophenylarsinic acid.—Condensation products from aminopenedicarboxylic acid: W. **Godden**.—A delicate test for bromides alone or in solution with chlorides: J. S.