the neap tides, when the tidal element has the least influence, the sixteen-hour period throws the direction of the current entirely out of correspondence with the time of the tide.

Wind Influence.—It would be quite erroneous to suppose that the wind always causes a drift in its own direction. On the contrary, the set is primarily due to the nature of the current, and if it has any definite direction of its own, owing to the tide or other causes, it takes a strong wind a considerable time to overcome this, even with currents such as these, which do not exceed one knot.

A set of the current towards the point from which a wind is about to come is in accord with the universal testimony of the fishermen throughout these regions. Of all the signs of bad weather, it is the one which they appear to find the most trustworthy. In the summer, bad weather usually comes from the south-east and "blows itself out" from that direction; but later on, in the autumn, the wind chops round to the north-west before the storm is over. Along the south shore, it is only during ebb tide that there is a weak set to the south-east. Any strong set to the south-east or south is a sign of bad weather. The fishermen regard this as an unfailing indication, and at once run for shelter. The main feature is the fact of the current setting "into the weather," as they express it, and it is difficult to give a satisfactory explanation for this. The actual direction of the current is necessarily modified by local conditions and guided by the trend of the shore, but the greater scope and freedom the current has, the more directly it appears to set towards the coming wind. And further, it will set in either direction in accord with the expected wind. If this behaviour is due to difference of barometer, it is not easy to understand why the water should be the first to feel a change, before the wind itself begins to blow.

Density and Temperature of the Water.—Extended observations of density and temperature were taken during the season. This was done in the hope of tracing the movement of the water, as this method had proved so serviceable in the Gulf of St. Lawrence. The density of the water was taken at the surface only. The variation did not prove sufficient, however, to be relied upon as an indication of direction of movement. The temperature was taken to a depth of 30 fathoms, and more was expected from the temperature than from the density, as it was hoped it would serve to trace the course of the Polar current. The depth of 30 fathoms was found sufficient, as the water was there at the freezing point throughout the region examined, both south and east of Newfoundland, during the whole season from May to September. All the change which took place during the progress of the season or from other causes was between the surface and 30 fathoms. The change of the temperature of the water also afforded an interesting valuation for the amount of wind disturbance, and the depth to which it extended, under given conditions.

Two results were arrived at, which made the temperature observations of little value for the purpose of tracing the movement of the water by its temperature, and which it will therefore be sufficient to mention briefly:—(1) The temperature of the water at 30 fathoms is practically at the freezing point in all parts of this region, from the mouth of Placentia Bay to St. Johns. It varied only from $30\frac{1}{2}°$ to 34° F., and there was no change from one month to another, from May to September. (2) The water of the Polar current warms up quite as much on the surface as the surface water elsewhere in this region. The general increase of the surface temperature along the south shore, from St. Pierre to Trepassey, was from $36\frac{1}{2}°$ in May to 50° in September, and the surface temperature of the Polar current rose from an average of $34\frac{1}{2}°$ at the end of May to $50\frac{1}{4}°$ at the middle of August. Whether this increase of the surface temperature takes place during the progress of the current southward, or whether this warmer surface water flows over it from elsewhere, we have not sufficiently extended observations to determine. But for the guidance of the mariner, it is evident that the lower temperature cannot be depended on as an indication of the current-belt itself.

A very interesting result was met with, however, on account of the rapid fall in temperature from the surface downwards. The temperature proved to be a valuable indication of wind disturbance. During heavy winds, especially when off-shore, the surface water was driven out to the offing, and the cold under-water came up to the surface. A heavy fall in temperature would thus occur. For example, towards the end of August, the surface temperature over the area from Cape Spear to Cape Race was 50°. There followed during three days 1312 miles of westerly winds, ranging from north-west to west-south-west, when the surface temperature within three miles of the shore fell to 36° and 34°, and in a belt ten miles wide along the windward shore it was below 45°. Careful observations and some special runs were made to ascertain the amount of lateral displacement of the current and the depth of disturbance due to a measured mileage of wind. This was done without loss of time, as the weather was then too heavy to carry on work at anchor. Later, when the weather moderated, the temperature again furnished a basis for a very fair estimate of the rate at which the current-belt moved back laterally to resume its usual course.

Ice as an Indication of Current.—To infer the behaviour of a current from the drift of ice with any certainty, the indications given by flat ice and by icebergs must be carefully distinguished. The flat or pan ice runs with the surface current, and is much influenced by the wind, whereas the icebergs indicate the average movement of the body of the water as a whole, and the wind has no appreciable effect upon them. This distinction is well known to sealers, and they habitually take advantage of it. When working against a gale of wind, they will moor their vessel to an iceberg, and lie in its lee while the small ice goes past with the drive of the wind, because, as they express it, the wind takes no hold on an iceberg at all. They thus save a long drift to leeward. It is thus from the icebergs rather than from the flat ice that we can find indications of value.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The following is the text of the speeches delivered by Prof. Love in presenting recipients of the degree of D.Sc. *honoris causa* at the Encaenia, June 22, in the presence of the Chancellor of the university:—

THE HON. CHARLES ALGERNON PARSONS.

Duobus fere millibus abhinc annis Heron Alexandrinus turbinem quemdam per ludum excogitavit, qui vapore calido actus per tubos inflexos afflante converteretur. Carolus Algernon Parsons inter Hibernos nobilissimus, scientiae etiam laude insignis, ita Heronis vestigiis institit ut, quod ille ludendi causa finxerat, ipse in usum nostrum converteret, quo facilius homines naturae imperarent. Optime sane meritus est de omnibus qui urbes habitant, quibus vias et domos luce electrica hoc invento usus illustravit, neque minus profuit Nerea temptantibus, cum his turbinibus impulsae per altum naves celeritate inaudita ferantur recta semper carina adeo ut navigantium incommoda magna ex parte adleventur.

SIGNOR GUGLIELMO MARCONI.

Hic est ille magus, Gulielmus Marconi, qui modum invenit signorum ab ora in oram, a nave ad navem trans maria immensa transmittendorum. Docuerat quidem Maxwell, civis noster, vim electricam per aethera omnia permeantem quasi fluctibus quibusdam perferri. Accessit etiam Hertz, Germaniae ornamentum, qui ostendit quo modo hi fluctus ita regerentur ut tanquam procella quaedam electrica procul exorta aliis in locis satis longinquis agnosceretur. Marconi tandem, qua erat ingenii audacia, id excogitavit ut his subsidiis usus locos disiunctissimos quasi colloquendi quadam facultate coniungeret. Sollertia igitur maxima, patientia vero admirabili praeditus, singula impedimenta quae spei exsequendae obstabant felicissime pervicit, iamque potest nullo vinculo, nullo filo intercedente, quod vel oculi vel tactio deprehendere possint, super dimidiam orbis terrarum partem signa transmittere.

SIR WILLIAM SELBY CHURCH.

Salutat Academia nostra unum ex alumnis suis, olim inter nos artis medicae doctorem, nunc Collegii Universitatis socium honoris causa creatum, Willelmum Selby Church. Academiae etiam personam gessit in communi illo medicorum Britannico consilio, penes quod regimen est examinationum in arte medica habendarum. Multos annos insignis est inter medicos qui mercede vel parva vel nulla accepta egentes in maximis valetudinariis Londinensibus curant: permulti etiam qui hodie in omni parte regni medicinam exercent hoc magistro et auctore studiorum usi sunt. Plurimum auctoritate valet in Regali medicorum Collegio, cui nuperrime Praeses iterum factus est: praemium denique singularium erga artem medicam et cives suos meritorum accepit Baronettus a regina nostra Victoria et Eques de Balneo a rege nostro Edwardo creatus.

SIR ANDREW NOBLE.

Asclepium iure sequitur Mavors, plurium nisi fallor interfector. Ubicunque homines diras illas machinas moliuntur, quae novos bello terrores addiderunt, in honore est Andreas Noble, vir honoribus et insignibus a multis regibus, inter quos noster numeratur, saepe donatus propter operam in omni apparatu bellico praecipuam. Qui cum in exercitu Britannico summa laude meruisset iam rude donatus multos per annos maximae illi prope Tynam officinae praefuit ubi immania Vulcani tela et naves urbis instar habentes in usum nostrum et aliarum civitatum Cyclopes novi fabricantur. Sed quamvis Martis cultor insignis Minervae etiam acceptus est: hoc enim praeter ceteros operam dante et hortante Laboratorium maximum scientiae Physices augendae causa nuper institutum est, novo sane exemplo, unde patet rectores nostros, quantum civium utilitatibus prosit rerum naturalium scientia, aliquando intellegere.

SIR WILLIAM CROOKES.

In multis generibus quaerendi fructus magnos adsecutus est Willelmus Crookes. Ut a Chemia incipiam, novis analyseos modis usus a Kirchhoff et Bunsen in Germania excogitatis, qui substantias a luce quam ardentes emitterent aliam ab alia dignoscerent, ipse novum quoddam elementum, Thallium dico, invenit, prima spolia eademque opima his armis nactus. Eiusdem autem Thallii atomos etiam expendere potuit, quo nihil subtilius, nihil admirabilius. Primus etiam illud divinavit corpora materialia ita posse existere ut neque solida neque liquida neque vapora sint. Hoc demonstravit cum e tubulo aera extraheret donec spatium illud intra tubulum inclusum materia fere omni vacaret. Neque ipse solum in hoc curriculo feliciter versatus est, sed alii ex iisdem carceribus emissi alias palmas reportaverunt. Illud vero non silendum esse arbitror eum, cum de hoc genere quaereret, instrumentum quoddam effinxisse ad vim radiorum solis emetiendam, quod iure omnes inter miracula habent.

SIR DAVID GILL.

In extremo Africae meridionalis promontorio sub tutela navium Britannicarum surgit turris ad siderum motus observandos destinata. Illic plus viginti iam annos magno astronomorum omnium emolumento caeli signa perscrutatus est David Gill. Illic rem quater de integro aggressus id adsecutus est ut distantiam, quae inter solem et nostram terram intercedat, accuratius quam quivis e prioribus emetiretur, adeo ut hodie omnes astronomi eius rationes pro veris habeant. Idem eodem modo distantiam inter solem et quindecim ex stellis, quae fixae vocantur, definivit. Accuratissimam etiam descriptionem fecit earum caeli regionum, quas non nisi Australe latus orbis terrae incolentibus spectare concessum, et in tabulis maximis faciendis, quibus variae caeli partes cura exquisitissima depinguntur, cui operi praeclaro omnes ubique gentes hodie incumbunt, rem felicissime navavit.

SIR JOHN MURRAY.

Alia ex Colonia transmarina ad nos venit Ioannes Murray, qui quamquam origine Scotus media in Canada et natus et institutus est. De aqua marina, de animalibus mare habitantibus nemo est illo doctior. Harum rerum investigandarum causa navigationes plurimas fecit. Triginta quidem abhinc annos, cum novi quidam Argonautae a rectoribus nostris publice missi sunt, qui ex omni mari materiam scientiae colligerent, ipse inter delectos heroas fuit. Fructus vero illius navigationis quinque et quadraginta magnis commentariorum voluminibus continentur, quibus omnes usi sunt, qui de natura salis, de calore maris, de marinorum animalium formis et agendi rationibus postea scripserunt. Maximas profecto gratias habent omnes qui rerum naturae student Ioannae Murray horum commentariorum editori.

PROF. ALFRED MARSHALL.

Academia nostra particeps est laudis quam adsecutus est Aluredus Marshall. Cum enim in litterarum commercio ea ratione semper uberetur quam hic in rebus venalibus constantissime vindicavit ut amico portu advenas omnes reciperet, hunc virum magno cum fructu inter suos adscivit, quamquam Cantabrigiae olim mathematicae studuit et in eadem Academia nunc Oeconomias Professor est. Primus hic inventus est qui rationibus mathematicis fretus, quae antea tantum ad naturam rerum cognoscendam a physicis adhibitae sunt, de commercio hominum et societate quaereret. Cum in omni analyseos genere doctissimus esset, symbolis tamen parcissime est usus, et diviti cuidam ratiocinandi venae rerum minutissimam cognitionem addidit, unde factum est ut opus illud maximum de Oeconomias principiis non solum scientiae maturae et perfectae artis sed etiam sapientiae altissimae monumentum exstet.

PROF. J. J. THOMSON.

Inter Naturae venatores qui experimentis faciendis praecipue incumbunt Iosephus Ioannes Thomson dux est et signifer. Qui rationibus felicissime conceptis id demonstravit, quod nonnulli prius suspicati sunt, atomos illas, e quibus constat materia rerum, e minutissimis quibusdam et fere innumerabilibus corpusculis conglutinatas esse, quae tamen ipse et enumerare et expendere potuit. Neque hoc tantum adsecutus est, sed in vi electrica et magnetica et in natura atomorum cognoscenda se semper exercuit. Nos qui audivimus luculentissimam eius orationem cum nuperrime in hac Academia contionatus est, qui vidimus pulcherrima illa experimenta, quibus rationes suas probavit, minime mirabimur, cum omnes ex omnibus gentibus huius scientiae avidos se Cantabrigiam conferre, tum ex eius fontibus tot discipulos uberrimo cum fructu suos hortulos irrigare.

PROF. HORACE LAMB.

Et hic et apud Antipodas summam laudem adeptus est Horatius Lamb, qui et in Academia de Adelaide, cum in Australia versaretur, et Mancuniae in Academia Victoriana mathematices optimos studendi modos ostendit. Neque solum in rebus Academicis gubernandis maxime floret, sed de rationibus physicis secundum mathematicam artem tractandis libros optimos scripsit, quos omnes in manu habent, velut de fluidorum motu, de luce, de vi electrica, de sonitu, de scientia machinali: nuperrime etiam de terrarum motibus luculentissime disseruit. In his operibus ita tenuissima illa analysi, quae mathematicorum propria est, ad rationes physicas expendendas usus est, ut saepe res tenebris ante sepultas nova luce illustraret. Pauci sane hodie sunt qui de tot scientiae generibus egerunt: qui melius et probabilius de ullo scripserit, nemo est.

PROF. A. R. FORSYTH.

Scientiam mathematicam qualis hodie est tanquam monumentum esse videtur multorum laboribus multis in terris sensim aedificatum: inter quos locum insignem tenet Andreas Russell Forsyth, non solum quod ipse huic praeclaro operi multos lapides imposuit, sed quod haec omnia quasi calce et caemento conglutinavit. Augustinus Cauchy, Bernardus Riemann, Carolus Weierstrass, hi Germani, ille Gallus, analyseos problemata tribus viis aggressi, quisque pro se summi momenti res reppererant: quae inventa ut in unam rationem congruentem conflaret, ut vinculis et nexibus coniungeret, ut his tribus quaerendi modis usus cognitionis humanae fines promoveret, inventus est Andreas Forsyth. De quo illud affirmare possumus si Fata eum insignem inter mathematicos non fecisset, insignem in re publica gubernanda fecisset Natura, adeo eius consilia in rebus Academicis Cantabrigienses sui petunt, tanti eius iudicium ab omnibus aestimatur.

PROF. J. DEWAR.

Liquidone de aere loquitur quis? Occurrit menti Iacobus Dewar. Quid enim? Partem aliquam aeris circumambientis corripere, secernere in vasculo, cogere ut modo fluat sicut aqua, modo congeletur sicut glacies, nonne haec ultra ingenii humani fines videntur? Quae tamen posse fieri iamdudum notum est: immo, aliquando facta sunt, sed in tenui erat et labor et successus. Ulterius vero progressus est Iacobus Dewar, qui cum neque impensae neque labori neque cogitationibus suis parceret, instrumenta exquisitissima perfecit, quibus vis aliqua maior vel aeris vel tenuissimarum illarum substantiarum ipsum aera subtilitate superantium modo liquida modo solida fiat. Ita nova quaedam et potentissima Naturam investigantibus subsidia, quibus ipse maximo cum fructu usus est, aliis tradidit, cum materia qualis sit omni fere caloris particula ablata homines iam cognoscere possint.

PROF. J. LARMOR.

Newtonus ille, "qui genus humanum ingenio superavit," solem terram lunam planetas nutu quodam et pondere contineri docuit, et motus suos conficere hac vi compulsos. Cui successit his diebus Iosephus Larmor, cathedrae Newtonianae novissimum decus, qui vir ingenio Hibernus, mathematices scientia vere Cantabrigiensis, id fecit ut in omni omnis corporis atomo mundi imaginem expressam videremus, cum doceret particulas minutissimas, e quibus corporum atomi constent, vi electrica contineri et hoc momento coactas quasi per orbitas agitari. Quae doctrina non modo in ordinem convenientem redegit quidquid antea de luminis natura de vi electrica et magnetica compertum est, sed nodos difficillimos, quibus implicantur ii qui experimentis faciendis se totos dant, omnes exsolvit.

AT presentation day of the University of Manchester on July 2, the honorary degree of D.Sc. was conferred on Prof. B. Brauner, of the Czech University of Prague, Dr. Ludwig Mond, F.R.S., and Dr. W. H. Perkin, sen., F.R.S.

THE Schunck Laboratory, which was bequeathed to Owens College by the late Dr. Schunck, and has been removed from his residence at Kersal and rebuilt in the college precincts as nearly as possible in its original form, was formally opened by Dr. W. H. Perkin, F.R.S., last week.

WE learn from *Science* that at the recent commencement exercises of Columbia University a gift of 50,000*l.* from Mr. Lewisohn was announced, to be used for a building for the School of Mines. It is also reported that the sum of 65,000*l.* has been collected for MacAlaster College in Minnesota. The largest gifts were 20,000*l.* from Mr. C. D. Dayton and 10,000*l.* from Mr. J. J. Hill.

THE first volume, January to June, 1904, of *School*, the new educational periodical published by Mr. John Murray, has now been issued. It contains a good supply of articles on educational subjects of theoretical interest which will appeal to the student of pedagogics. Matters of educational administration, and notes on the way in which the recent Education Acts are being utilised by local authorities, are given a prominent place. The teaching of science, and topics of especial interest to those engaged in this part of school work, receive but little attention.

IN connection with the opening of the new laboratories and workshops by Sir William H. White, K.C.B., at the Merchant Venturers' Technical College, Bristol—which was announced in our issue of June 9—the governing body has issued a lavishly illustrated "Souvenir," which provides an excellent account of the work and equipment of the enlarged institution. In tracing the growth of the college during the last fourteen years, the pamphlet shows that during this period the number of adult students attending the day classes has increased five-fold, the number in attendance in 1890 being 48, and this year 242. It is only necessary to read the descriptions of the workshops provided for the technical instruction of printers, bookbinders, painters, plumbers, and engineers of various kinds to appreciate how much is being done in Bristol to train fully qualified workmen for the city's industries, and the large number of students who attend the courses of work provided shows that the men themselves appreciate what is offered. The provision of classes in the branches of science associated with these technical subjects is also satisfactory.

THE recently published "Besuchs-Statistik" for the semester ending in March last shows that there were 37,854 matriculated students studying in German universities, including 3093 foreigners (this is the highest total ever reached by the non-German element); the number of non-matriculated students was 9187, thus making a sum total of 47,041. Of the different universities, Berlin easily stands first with 7503 matriculated and 6353 non-matriculated students. The next in numerical order are Munich with 4609, Leipzig with 3772, and Bonn with 2294 students of all classes. Breslau and Halle have each more than 1500, and the following nine universities more than 1000 students:—Tübingen, Göttingen, Heidelberg, Strassburg, Freiburg, Würzburg, Münster, Marburg, and Giessen. Of the foreign students 2620 are Europeans, consequently leaving 473 who hail from the other continents. Among these 2620 European students, Russia, with 986, sends considerably the largest contingent; then follow Austria and Switzerland. It is a remarkable fact shown by the statistics that by far the largest proportion of non-matriculated to matriculated students, viz. 42 per cent., is to be found in Berlin. The weaker sex, represented at all the universities except Münster, Greifswald, and Rostock, forms a seventh part of the total of non-matriculated students. Berlin claims the largest portion of Germany's lady students, for 42 out of every 100 prefer to study in the Imperial capital, the universities next in favour being Breslau, Bonn, and Strassburg, but here their numbers never exceed 100. The total number of students at the French universities for the semester ending in March was 30,405. Here again the university in the capital easily heads the list with 12,948 students. Then come Bordeaux, 2320; Toulouse, 2191; Montpellier, 1707; Nancy, 1327; Rennes, 1190; Lille, 1164; Aix-Marseille, 1080; Dijon, 880; Poitiers, 863; Caen, 752; Grenoble, 705; Besançon, 333; and Clermont, 299. 10,972 belonged to the law faculty, 6686 to the medical, 4765 to the science, 4384 to the arts, 3014 to the "pharmaceutical" faculty. The numbers of foreigners, amounting to nearly 2000, included 450 Russians, 200 Persians, 175 Roumanians, 165 Germans, 109 Bulgarians, 113 Turks, 83 Egyptians, 57 Americans, and 35 English students. The sum total of women students amounted to 1125, of whom 677 were of French nationality and 448 foreigners—almost entirely of Russian birth.

THE Senate of the University of London, at a meeting on June 28, considered a report from the committee appointed to deal with the offer of the Goldsmiths' Company to transfer to the university the Goldsmiths' Institute at New Cross. The Senate decided to accept the munificent offer of the company, and an *ad interim* committee was appointed to carry out the reorganisation of the institute. To meet the needs of the county councils of London, Middlesex, Kent, and Surrey, and the borough council of Croydon, it is proposed that a day training college for about 400 students shall be opened in the Goldsmiths' Institute in the autumn of 1905. In connection with this college it is considered important that day classes should be held preparatory for the intermediate examinations, or up to the standard of the intermediate examinations, in arts and science. This scheme will absorb the funds at the disposal of the university, which will thus be unable to carry on other classes unless it receives further financial support. Should such support be forthcoming, it is prepared to carry on at New Cross the higher part of the work of a polytechnic, and to continue the existing school of art. It will not be possible for the university to continue the social and recreative side of the institute. The scheme has received the full approval of the Goldsmiths' Company. The Education Committee of the London County Council has also had the affairs of the Goldsmiths' Institute under consideration, and on Tuesday the council accepted its recommendations to inform the Goldsmiths' Company that the council would view with regret the closing of the Goldsmiths' Institute and the termination of its educational work as a polytechnic, and inviting the company to consider whether some arrangement cannot be come to by which the work of the institute could be con-

tinued in its present polytechnic form. Another recommendation accepted states, among other points, that, in the event of its proving impossible to secure the continuance of the Goldsmiths' Institute as a polytechnic, the council would regard it as of great importance to secure its retention as a centre of evening instruction in as many subjects as possible, especially in the higher grades, and to arrange for the continuance of an efficient department of mechanical and electrical engineering for evening students.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 9.—"The Fossil Flora of the Culm Measures of North-west Devon, and the Palæobotanical Evidence with regard to the Age of the Beds." By E. A. Newell **Arber**. Communicated by Prof. McKenny Hughes, F.R.S.

The Carboniferous rocks of Devonshire, generally known as the Culm Measures, are divided into an Upper and a Lower division. The Upper Culm Measures, which are of Upper Carboniferous age, form by far the thickest portion of this Carboniferous series. Plant remains, although abundant in these beds, are rarely sufficiently well preserved to admit of identification. A number of species have, however, been obtained, some of which are new to Britain, from the one horizon in the Upper Culm Measures in which coal, known locally as culm, is found. This flora is identical with that of the Middle Coal Measures elsewhere in England, and consequently the horizon on which the coal or culm occurs in the Bideford district is the equivalent of the Middle Coal Measures, a higher horizon than has been previously assigned to these beds.

There is also evidence that the Culm Measures at Instow, which occupy a lower horizon than the Culm Measures of the Bideford district, are probably the equivalents of the Lower Coal Measures. Thus both the Lower and Middle Coal Measures are represented in Devonshire, and, as the higher beds of the Culm Measures are as yet unexplored, possibly even higher horizons may eventually be found to be represented.

It is pointed out that the Culm Measures of Devon, which have been regarded by several geologists as essentially a Lower Carboniferous formation, are in reality chiefly, but not entirely, of Upper Carboniferous age. Consequently, the term "culm" or "kulm" generally applied to certain deposits in Germany, Austria, and elsewhere on the Continent, which are entirely of Lower Carboniferous age, is peculiarly unfortunate, for these beds are not of the same age as the great bulk of the Devonshire Culm Measures.

June 16.—"The Decomposition of Ammonia by Heat." By Dr. E. P. **Perman** and G. A. S. **Atkinson**.

Ammonia gas was heated in a porcelain globe placed in a muffle furnace, and the total pressure of the ammonia and decomposition products was read by means of a mercury manometer at equal time intervals, the volume being kept constant. The temperature was measured by a Callendar-Griffiths pyrometer, and was maintained constant within 1° or 2°; in the various experiments it varied from 677° to 1111°.

At the end of each experiment the temperature was raised to about 1100°, and maintained at that point until the decomposition of the ammonia was practically complete; the pressure was then read again, and from it was calculated the initial pressure of the ammonia in the globe.

Let p_1 be the pressure of the ammonia at any instant during the decomposition, p_1' that of the nitrogen, p_2' that of the hydrogen, P the total pressure at the same instant, p_0 the initial pressure of the ammonia, then $p_1+p_1'+p_2'=P$, $p_2'=3p_1'$, and $p_1'+p_2'=2(p_0-p_1)$; from these equations it follows by substitution that $p_1=2p_0-P$, *i.e.* the pressure of the ammonia at any instant is double the initial pressure minus the total pressure at the instant of observation. The experimental data furnish values of P and $2p_0$, and values of $2p_0-P$ have been calculated and tabulated; from the latter were calculated $\Delta P/\Delta t$; but $\Delta P/\Delta t=dP/dt$ approximately, and $dP/dt=dp_1/dt$, so that the rate of change of pressure of the ammonia at various pressures becomes known. Two series of curves have been drawn, showing the variation of the rate with the pressure. The most noteworthy features of the curves are:—(1) at the highest temperatures they become straight lines; (2) they all run towards the origin; (3) they become much steeper when certain metals (mercury, iron, or platinum) are present in the globe. The chief deductions are:—(1) the decomposition is monomolecular; (2) and (practically if not completely) irreversible; (3) the rate of decomposition is much increased by the presence of certain metals.

Some experiments were made also on the effect of sudden change of pressure on the rate of decomposition; the results confirmed the conclusion that the reaction is monomolecular. The irreversibility of the reaction was confirmed by passing nitrogen and hydrogen through a red-hot glass tube containing porcelain, when no ammonia was found to be produced.

Royal Astronomical Society, June 10.—Prof. H. H. Turner, president, in the chair.—Mr. A. R. **Hinks** read a paper on the reduction of 295 photographs of Eros made at nine observatories during the period 1902 November 7–15, with a determination of the solar parallax; 110 of the plates were taken at Cambridge, the remainder at Algiers, Lick Observatory, Northfield Observatory, Oxford, Paris, and other observatories. The author described the method employed in the reductions, &c., and gave as the resulting value for the solar parallax $8''\cdot7966\pm0''\cdot0047$, a result nearly in accordance with that obtained by Sir D. Gill from heliometer observations of minor planets.—Mr. M. E. J. **Gheury** read a paper on the gyroscopic collimator of Admiral Fleuriais. In this instrument the principle of the gyroscope was employed to furnish an artificial horizon for sextant observations at sea. The instrument was shown to the meeting, and its construction and method of employment were described.—Mr. Bryan **Cookson** gave an account of his paper on the mass of Jupiter, and corrections to the elements of the orbits of the satellites, from heliometer observations made at the Cape Observatory during the years 1901 and 1902. The methods of observation and reduction were explained, and a brief account given of the results.—Mr. E. W. **Maunder** read a paper on the distribution of sun-spots in heliographic latitude during the years 1874 to 1902. The author considered Spoerer's law for the distribution of sun-spots to be true within the limits of its enunciation—that there is only one spot zone in either hemisphere except during the brief period just after minimum.—The Rev. A. L. **Cortie** read a paper on the variation of latitude of the greater sun-spot disturbances, 1881–1903. Dr. Lockyer briefly replied, contesting some of Mr. Maunder's conclusions.

Chemical Society, June 15.—Prof. W. A. Tilden, F.R.S., president, in the chair.—The following papers were read:—The mechanical analysis of soils and the composition of the fractions resulting therefrom: A. D. **Hall**. The object of the investigation was to ascertain the effect of introducing into the mechanical analysis of soils a preliminary treatment of the soil in dilute acid followed by ammonia, as first suggested by Schlœsing. Eighteen soils of known history were selected from the Rothamsted experimental plots, to give comparisons of the same soil in an unmanured condition and when rich in humus through the accumulation of organic matter. With these soils the method involving a preliminary treatment with acid showed the essential identity of soils from the same experimental field whatever the manuring had been, whereas the analyses made on the raw soil gave very different results, depending on the treatment the various plots had received.—The effect of the long-continued use of sodium nitrate on the constitution of the soil: A. D. **Hall**. On reviewing the results of the mechanical analysis of the Rothamsted soils, it was observed that those which had been manured with sodium nitrate every year gave abnormal results for the last fraction. The removal of the finest particles from the surface soil is attributed to deflocculation induced by the use of sodium nitrate, and followed by the washing of the finest particles into the subsoil.—The decomposition of oxalates by heat: A. **Scott**. It is shown that the decomposition of oxalates by heat is less simple than is generally supposed, and that, except in the case of magnesium oxalate, the oxalates of the common metals generally yield a small