presses the opinion that, 'expert witnesses ought to be selected by the court, and should be impartial as well as learned and skilful. A contrary practice, however, is now probably too well established to allow the more salutary rule to be enforced.' Another judge suggests that the law should be so changed 'that this class of witnesses should be selected by the court, and that this should be done wholly independent of any nomination, recommendation, or interference of the parties, as much so to all intents as are the jurors.' This would not make experts *amici curiæ* any more than before, for all witnesses should be regarded in that light, but it would be a provision rather to preserve that character to them, coupled as it is with a recommendation as to compensation, so intimately connected with it. It is not the fact of extra compensation, or that the compensation is paid by the party benefited by his testimony, that creates the unfavourable impression. The other witnesses are friends of the court, by whatever party they may be called, they stand upon the same footing as to pay; but here is a witness who is paid according to a private agreement, by one of the parties; the amount is their own private arrangement on which the court is not consulted, over which the court has no control, a circumstance that imparts to him, in high degree, the character of a friend of one of the parties; and these facts as to compensation are often elicited at a time, and in a way, calculated to impair otherwise valuable testimony in the minds of the jury.

"By far the best plan seems to be that adopted in the Imperial Courts of Germany. For certain matters and lines of business permanent experts are appointed by the State, but they are not regarded as officers, but as *employés* for the time being. They have no official title, nor regular salary. The payment they receive is not enough to support them, but barely compensates them for their loss of time. For most cases the expert is appointed by the particular judge in the case, often on the demand of one or the other or both parties, but the choice of the expert lies within the discretion of the judge. He may appoint any man whom both parties suggested, or may also appoint a third man not suggested by either, but if both parties unite on one man he must listen to his testimony. If a question is involved for which regular legal experts are provided, these need only be or can be appointed. The qualifications for such a regular expert are that he should follow that particular profession or line of business habitually, and for the purpose of earning his living. The number of experts in a case is not limited by law, it rests with the discretion of the judge. The status of the expert in court is almost analogous to other witnesses, but it is not a civic duty, as with witnesses, to give evidence in court except where a profession is followed publicly and for a livelihood. The text of his oath before giving testimony is different from that of an ordinary witness; and he need not be sworn at all if both parties unite in dispensing with such qualification."

If a similar system were followed in England the testimony of scientific experts would be regarded with a little less suspicion than it is at present. Only by some such means can technical evidence of a wholly disinterested character be obtained.

SCIENCE CLASSES IN CONNECTION WITH THE LONDON COUNTY COUNCIL.

THE Technical Education Board of the London County Council has issued a series of Regulations with regard to the administration of grants to science classes. All the prescribed conditions tend to make the instruction efficient and develop technical education in the right direction. The following are those that refer to the manner in which various classes must be conducted:—

(1) That as a condition of aid being granted by the Board for the teaching of chemistry, physics, mechanics, and botany, it will be regarded as indispensable that provision should be made, to the satisfaction of the Board, not only for the experimental illustration of the lectures or class teaching, but for experimental work by the students themselves, either in laboratories belonging to the institution or, where this cannot be arranged, in the laboratories of some neighbouring institution with which the class should be associated; and every lecture must be followed by at least one hour's practical work on the same evening, or some other evening in the same week.

(2) That with regard to classes in the subjects comprised in the Science and Art Department Directory which are more strictly to be included under the head of technology, viz. building construction and drawing, machine construction and drawing, steam and the steam-engine, navigation and naval architecture, it be required, as a rule, that such classes be taught by teachers having a practical acquaintance with the industries to which they refer; provided that, in the case of teachers who have already successfully taught such classes, it shall be open to the Board, on being satisfied of the sufficiency of the qualifications, to make exceptions in particular cases. No grant will be given for classes in agriculture or mining.

(3) That for classes in geology and mineralogy suitable museum specimens be provided and examined by the pupils, and for classes in machine drawing a suitable collection of models and parts of actual machines be provided.

(4) That in the teaching of mathematics, practical geometry, building construction, machine drawing, naval architecture, navigation and nautical astronomy, "home work" be made an important feature, and that the students' work be examined and corrected by the teacher out of class hours.

(5) That in all practical laboratory classes, and in classes on mathematics, practical geometry, building construction, machine drawing, naval architecture, navigation and nautical astronomy, not more than twenty students shall be under the charge of one teacher at the same time, but where more than one teacher is present during the whole meeting of the class the number of students may be increased in proportion to the number of teachers.

(6) That in all subjects there be a sufficient supply of apparatus and materials for efficient teaching, and that such apparatus and materials be effectively used.

(7) That no payment be made on account of pupils who, in the opinion of the Board, may not reasonably be expected to profit by the teaching provided (*e.g.* pupils in navigation or nautical astronomy, or in the advanced stage of theoretical or applied mechanics who have insufficient knowledge of mathematics; those in building construction or machine drawing who have no knowledge of elementary mechanics, &c.).

The Board is prepared to consider applications for assistance to erect laboratories and provide the necessary equipment. It will also make grants in aid of the purchase of apparatus for science teaching. With so many advantages, technical education in the administrative county of London should grow apace.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE following is the list of candidates successful in the competition for the Whitworth Scholarships and Exhibitions, 1893:—Scholarships (tenable for three years, having an annual value of £125):—William Hamilton (Glasgow), John G. Longbottom (Keighley), Arthur E. Malpas (London), Richard J. Durley (London); Exhibitions (tenable for one year, having a value of £50):—Charles F. Smith (Glasgow), John Ball (Derby), William Buchan (Glasgow), John B. Chambers (London), Henry J. Loveridge (Southsea, Portsmouth), William F. Ireland (Glasgow), George W. Fearnley (Shipley), Oliver Styles (Edinburgh), George M. Russell (Portsmouth), Alexander A. Jude (Hull), Edward R. Amor (Devonport), Joseph Jeffery (Birmingham), Paul J. Reynolds (Plumstead, Kent), Thomas Pilkington (London), Richard Reynolds (Cardiff), George Wilson (Sheffield), Walter O. Hammant (Plumstead, Kent), John Orr (Airdrie), William I. Chubb (London), Henry Smith (Brighton), Frederick D. Green (Wanstead, Essex), John Powell (Crewe), James H. Hardy (Woodley, near Stockport), James H. Shepherd (Swindon), Herbert Thompson (Sheffield), Evan Stevens (Swindon), Henry E. Morrall (Wolverton), Herbert Bates (Manchester), Charles H. Hill (Stratford, London), William F. Massey (Newport, Salop).

The Scholarships Committee of the 1851 Exhibition Science Scholarships has issued a list of appointments for 1893. Four scholarships awarded in 1891 have been renewed for a third year in order to permit the holders to complete their investigations. These scholars are James H. Gray, John Joseph Sudborough, Harry Ingle, and Thomas Ewan. The following scholars of 1892 have had their scholarships renewed for a second year:—Andrew John Herbertson, James Blacklock Henderson, John Macdonald, Lionel Simeon Marks, George Lester Thomas, Harold Hart Mann, James Terence Conroy,

Thornton Charles Lamb, Edward Arnold Medley, William Henry Oates, William Gannon, Frederick J. Smale, Samuel Henry Barraclough, David Hamilton Jackson, Edward Taylor Jones, James Bernard Allen. The list of science scholars of 1893 is as follows:—Herbert William Bolam, George Edwin Allan, James Wallace Walker, Arthur Lapworth, John Ellis Myers, Arthur Walsh Titherley, Edward Chester Cyril Baly, John Cannell Cain, Ella Mary Bryant, James Darnell Granger, Mary O'Brien, Frederick George Donnan, James Alexander MacPhail, Norman Ross Carmichael, Wm. Henry Ledger, George Wm. Macdonald. The institutions to be invited to nominate science scholars for 1894 are:—the University of Edinburgh, the University of Glasgow, the University of Aberdeen, Mason College, Birmingham, University College, Bristol, Yorkshire College, Leeds, University College, Liverpool, University College, London, Owens College, Manchester, Durham College of Science, Newcastle, University College, Nottingham, Firth College, Sheffield, University College of South Wales, Cardiff, Queen's College, Cork, Queen's College, Galway, the University of Toronto, Dalhousie University, Halifax, Nova Scotia, the University of Adelaide, and the University of New Zealand.

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, August 7.—M. Lœwy in the chair.—On the periodic maxima of spectra, by M. Aymonet.—On the heat spectrum of fluorine, by M. E. Carvallo. A comparison between the results obtained by the author and simultaneously by Messrs. Rubens and Snow, of Berlin. In those portions which are common to all three observers, the agreement is perfect, although the results were arrived at by very different methods.—On the absorption of light by liquid bromine, by M. Charles Camichel. Liquid bromine absorbs luminous rays very energetically, especially the most refrangible ones. Thus, a thickness of bromine of a wave length and a half of D light exerts a considerable absorptive action upon the green ray of thallium, and a layer of six times that thickness absorbs the same radiation to such an extent that measurements become difficult. A drop of bromine was introduced between two pieces of glass constructed for observing Newton's rings. These glasses were mounted in a screw frame resting upon the carriage of a dividing engine, by means of which they could be moved in front of one of the collimators of a Gouy spectrophotometer. The thickness of the layer was measured by observing Newton's rings in monochromatic light. Two luminous pencils proceeded from the same source, one traversing the polarising collimator, the other the bromine glasses and then the ordinary collimator. Two patches were thus produced, which were equalised by the analyser when the bromine glasses were full and empty respectively. It was found that the absorption followed the exponential law between thicknesses of 0·5 and sixty times the principal wave length of sodium.—On the origin of atmospheric oxygen, by Mr. T. L. Phipson. Various plants, such as *Poa*, *Trifolium*, *Antirrhinum*, and *Convolvulus* were placed under glass shades with their roots immersed in water containing free carbonic acid and certain salts, shut off from the light, and their upper portions exposed to a north light in atmospheres of carbonic acid, hydrogen, and nitrogen respectively. It was found that in carbonic acid the plants were able to live for some time, but did not prosper. In hydrogen they fared better, but the gas gradually disappeared, probably combining with the oxygen evolved by the plants. *Convolvulus* throve very well in an atmosphere of nitrogen, especially if mixed with a third part of carbonic acid. After several weeks the composition of the gas began to approach that of our atmosphere, no change of volume having taken place. The bearing of these facts upon the history of the earth's atmosphere may prove important.—Of the isomorphism of anhydrous alums, by M. T. Klobb.—Influence of solar radiation upon plants, by M. G. Landel. Variations of intensity of solar radiation appear always to act in the same sense upon plants, as regards the quantity of flowers and the proportion of red pigment colouring the various parts. These variations differ much according to the species. In some the red pigment is well developed in the shade, whilst others remain perfectly green. The inflorescence in certain species does not seem to be sensibly modified by shade; in others the number of flowers is less.—The young bulbs of the *Dioscoreæ*, by M. C. Queva.

BOOKS AND PAMPHLETS RECEIVED.

BOOKS.—Mathématiques et Mathématiciens; Pensées et Curiosités deux edition: A. Rebière (Paris, Nony).—Solutions of the Exercises in Taylor's Euclid, Books 1 to 4: W. W. Taylor (Cambridge University Press).—A Treatise on the Mathematical Theory of Elasticity, Vol. 2: A. E. H. Love (Cambridge University Press).—A History of the Theory of Elasticity and of the Strength of Materials, Vol. 2, Parts 1 and 2: the late I. Tod hunter, edited and completed by K. Pearson (Cambridge University Press).—British Rainfall, 1892: G. J. Symons and H. S. Wallis (Stanford).—Birds in a Village: W. H. Hudson (Chapman and Hall).—Pocket-book of Useful Formulæ and Memoranda for Civil and Mechanical Engineers, 23rd edition: Sir G. L. Molesworth and R. B. Molesworth (Spon).—Report of the Fourth Meeting of the Australasian Association, held at Hobart in January, 1892 (Sydney).—Royal University, Ireland, Examination Papers, 1892 (Dublin, Thom).—Griffin's Electrical Engineer's Price Book: H. J. Dowsing (Griffin).—Les Turbines: G. Lavergne (Paris, Gauthier-Villars).—Fourth Report of the Department of Science and Art (Eyre and Spottiswoode).—Electric Lighting and Power Distribution: W. P. Maycock, Parts 2 and 3 (Whittaker).—Geology, an Elementary Hand-book: A. J. Jukes-Browne (Whittaker).—Electricity and Magnetism: S. R. Bottone (Whittaker).

PAMPHLETS.—U.S. Department of Agriculture, Report of the Chief of the Weather Bureau for 1892: M. W. Harrington (Washington).—Catalogue of the Crabs of the Family Maiidæ in the U.S. National Museum: M. J. Rathbun (Washington).—The Planet Venus: E. M. Clerke (Witherby).—Notes on the Trunk Skeleton of a Hybrid Grouse: R. W. Shufeldt.—Report upon the Scott-Moncrieff System for the Bacteriological Purification of Sewage: A. C. Houston (Waterlow).—On the Distortion of Photographic Star Images due to Refraction: Prof. Rambaut (Dublin).—A Preliminary Report on the Aquatic Invertebrate Fauna of the Yellowstone Natural Park, &c., &c.: S. A. Forbes (Washington).—Notes on a Few Fossil Plants from the Fort Union Group of Montana: F. H. Knowlton (Washington).

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