

rate of leak is almost independent of the potential difference. Thus in chlorine we found that the rate of leak was practically the same when the potential difference was 278 volts as when it was ten. The relation between the rate of leak and the potential difference thus exhibits the same general features as that between the magnetisation of a piece of soft iron and the magnetising force.

This result seems to throw light on the manner in which the electricity passes through the illuminated gas, and may perhaps be extended to conduction through ordinary electrolytes.

M. Stoletow has observed a somewhat similar relation between the potential difference and the rate of leak from a negatively electrified surface illuminated by ultraviolet light.

Mr. McClelland and I also investigated the connection between the rate of leak and the potential difference in the case of solid dielectrics, such as paraffin and sulphur exposed to the Röntgen rays. We found that this obeyed Ohm's law up to the highest potential difference (278 volts) used in our experiments, so that the potential difference required to "saturate" solid dielectrics is evidently very much greater than for gases. The polarisation is also much greater for paraffin and sulphur than for gases, and it can be locked up, as it were, in the dielectrics for any length of time by screening them from the rays

J. J. THOMSON.

THE EXPERT WITNESS.

WE are rejoiced to see the daily press at last calling attention to the need of reform in the present system of expert witnesses, indicating that public opinion is coming round to the view which we have advocated for the past twenty-five years. The fact that scientific men, some of them even of high standing, can be procured to sustain the most contradictory views is, we have no hesitation in saying, hurtful to the interests of science, and tends to degrade science in the opinion of the public.

An easy way to secure perfectly unbiassed opinion is to insist that a scientific expert should not be called by a particular side in a case, but should be nominated by the Judge. We have urged the expansion of this system from the Admiralty Court, in which it is constantly employed, and within the past few days our opinion has been echoed by the daily press.

Commenting upon the judgments in two actions brought by the Incandescent Gas Light Company against rival companies for infringement of Dr. Welsbach's patent, the *Times* says:—

"One reflection is likely to occur to any who has watched the progress of these cases. The substantial question to be determined was one of chemistry and chemical history. The principle of law to be applied was clear and simple. A cloud of scientific witnesses was in attendance, and men of great eminence, such as Sir Henry Roscoe and Prof. Dewar, were called on both sides. The objection to this course is not perhaps very serious when the litigants are wealthy companies and the patent is of great value. But it must strike an impartial mind that the length of such inquiries would be curtailed, that the expert would be more in his true place than he often now is, and that there would be fewer exhibitions of startling conflicts between the opinions of high scientific authorities, if the Court frequently did what it is not customary to do—namely, took the evidence more into its own hands, nominating one expert, or it may be two, to report for its guidance on some of the matters of controversy. An expert reporting as the delegate of the Court would sometimes express himself very differently from one paid for his evidence, and many cases would occupy as many hours as they now occupy days."

The *Globe* also has something to say in condemnation of the present state of things, and its plain words will not

be pleasant reading to men imbued with the true scientific spirit. Referring to the same cases as the *Times*, it remarks:—

"From the conflict of expert testimony, which is almost invariable in these cases, an idea has grown up that such evidence is not very valuable to the plain man, and the average jurymen is much disposed, when he hears the eminent experts contradicting one another, to pay little or no attention to either side. The fact is that our whole system of taking expert evidence is founded on a wrong basis, except in the Admiralty Court, where the Judge has the advantage of professional opinion from persons occupying a quasi-judicial position. The expert who is called in an ordinary case receives a fee which varies according to his reputation, and also according to the length he is prepared to go in supporting the case of those who call him. Naturally, a plaintiff, whose case depends upon, say, a doubtful point in chemistry will search for an expert witness who takes that view of the question which is most favourable to his contention, and the defendant on his side, will look for one who does exactly the reverse. Hence there is a continual pressure being exerted upon the expert witness to go further in his evidence than would be the case if he could be impartial, and testimony becomes bewilderingly contradictory. A simple remedy for this state of things would be for the Judge to select the expert himself. There are few departments of science in which he would not know of some recognised authority, and, even if he did not, he could always obtain the information. An expert so chosen would, of course, receive his fees from the suitors, but he would give his evidence as the assessor of the Court instead of as the witness of one litigant, the truth would be much more easily got at, and cases that now take weeks would be settled in a few days."

As in most matters with which science is concerned, Germany is able to show us the best mode of action. Experts are appointed by the State at the discretion of the Judge; these may be men not suggested by either of the litigants, or chosen by both of them.

It has been legal in England for some years for a Judge to select an expert to report to the Court upon a particular matter in dispute, and this practice is occasionally followed. There is thus little difference between the status of the official English expert and the expert of the Imperial Courts in Germany. All that is needed is the substitution of official experts entirely for those called by the parties concerned. Under such a system, no question of bias could be raised, and science would not be scandalised from time to time as it is now by those who are content thus to trade on their scientific reputation, and give rise to such unpleasant insinuations as those in which the *Times* and *Globe* are pleased to indulge.

H. C. LEVINGE.

BOTANIC science has sustained a loss by the death, in the full vigour of middle life, of H. C. Levinge, of Knock Drin Castle, Mullingar, late Secretary to the Government of Bengal (Public Works). During his Indian career he devoted all the time he could spare from official labour to natural history, and especially to the vascular cryptogams. His collection of Indian ferns was the largest and finest hitherto made; he had himself explored more particularly Sikkim, Kashmir, the Neilgherries, and the mountains south therefrom. At the very time when, on retiring home, he was preparing to work on his superb collection, the larger and finer part of it was destroyed in the fire of Whiteley's fire-proof warehouse. From this cause, and perhaps from the excellence of the late work of Colonel Beddome on Indian ferns, Mr. Levinge, at Knock Drin Castle, devoted himself chiefly to the Irish flora. He contributed several papers to the *Irish Naturalist*, and to the *Journal of Botany*; and added no less than seventy-seven additional species to area vii. of the *Cybele Hibernica*. Most of these were from West Meath, many from the im-

mediate neighbourhood of Knock Drin. They are mainly critical or easily overlooked species as *Chara denudata*, Braun (new to the British Isles); he also discovered new localities for many very rare plants, as for *Neotinea intacta*, Reich, f.; for which see his paper in *Journ. Bot.*, 1892, p. 194. Among his Sikkim collections he found a small undescribed *Selaginella*, in which the macrospores are covered with hairs (perhaps only extensions of the tubercles frequently present) exceeding the breadth of the macrospore—an extraordinary morphologic example of the possibilities of unicellular development, and also of interest to the student of fossil botany, where similar, possibly Lycopodiaceous, spores occur.

Botanists, strangers to Mr. Levinge, who called at Knock Drin Castle, were received with domestic and scientific hospitality at once; they were instructed by the beautiful gardens; they were expedited to all the best collecting grounds in Westmeath and neighbouring counties, and the interesting plants put in their hands. His friends will unanimously agree that no more delightful man remains behind him. It is understood that he has bequeathed his collection to the Dublin Museum of Science and Art. C. B. C.

NOTES.

THE French Academy of Medicine has decided to divide between Dr. Roux and Prof. E. Behring the 250,000 francs prize, founded by M. and Mdme. Victor Saint Paul as a reward to whomsoever should first discover a remedy for diphtheria.

WE regret to have to record the death of the Moscow Professor of Zoology and Anthropology, Anatoly Petrovich Bogdanoff. He was born in Southern Russia in 1834, and after studying at the Moscow University, and writing, in 1858, his first dissertation on the colours of birds, he became Professor of the same University in the year 1863. In connection with this work he wrote an excellent text-book of zoology, and a still better work, unique in its kind, namely, a "Chrestomathy of Zoology," in three volumes, in which the reader obtains a thorough scientific acquaintance with the different classes of the animal kingdom by means of admirably chosen abstracts from the best authors, considerable attention being given to purely biological questions, and especially to the lowest animals, as well as to their manners of life. A couple of generations of Russian zoologists have been indebted to this admirable work. In the sixties, Prof. Bogdanoff founded, at Moscow, the well-known "Society of Lovers of Natural Sciences, Anthropology and Ethnography," whose numerous quarto volumes of *Memoirs* rank among the best scientific publications in Russia; and whose expeditions included the well-known Turkestan expedition of the late Fedchenko and Madame Olga Fedchenko. The chief anthropological work of A. P. Bogdanoff was on the inhabitants of the grave-mounds of the Moscow region. The full list of his nearly forty anthropological, and nearly thirty zoological works is given in the most valuable publication, "Materials for the History of Zoology, pure and applied, in Russia, chiefly for the last Thirty Years," of which he was the editor, and of which three volumes have already been published. His works for popularising biology, especially on Darwin's ideas, and for extending the interest in anthropology, are also numerous.

THE sixty-eighth meeting of German Naturalists and Physicians will be held this year at Frankfort-on-Main, from September 21 to 26.

OUR American correspondent writes, under date April 10: "Mrs. Elizabeth Mary Ludlow, mother of the late Robert Center, has given his estate, valued at 150,000 dols., to Columbia

NO. 1382, VOL. 53]

College as an endowment of 'The Robert Center Fund for Instruction in Music.' An anonymous friend has given 10,000 dols. to be expended in the purchase of books for the library. The Havemeyer family have given to Columbia College a fund as a memorial to Frederic Christian Havemeyer, with which the finest building in America for the study of chemistry will be erected, at a cost of nearly 500,000 dols. on the new site of the college. The building will be 80 × 208 ft., and four stories high. It will be finished in hard enamel, with floors of asphalt; and the corners of all rooms will be rounded so as to prevent accumulation of dust and disease germs, and the drainage system will permit every room to be washed out with a hose. Work is rapidly progressing on the other buildings, the library, the hall of physics, and Schermerborn Hall, which is devoted to natural sciences. Plans for the hall of engineering have been approved, and ground broken. The site of the chemistry building will be dedicated on May 2."

THE conditions of the 1100 guineas road carriage competition have now been settled by the proprietors of the *Engineer*, and are announced in the current number of our contemporary. An arrangement has been made with the Crystal Palace Company, who have offered facilities at the Crystal Palace for showing the carriages in work there, and for holding the subsidiary trials. The judges will be Sir Frederick Bramwell, F.R.S., Mr. J. A. F. Aspinall, and Dr. John Hopkinson, F.R.S. The competition is to be international. The vehicles will be divided into four classes and one supplemental class, in each of which a prize will be given, as follows:—(a) For the best mechanically propelled vehicle constructed to carry (including the driver) four or more persons, the total weight, when fully loaded, not exceeding two tons, a prize of 350 guineas; (b) for the best mechanically propelled vehicle constructed to carry either one or two or three persons, the total weight, when fully loaded, not exceeding one ton, a prize of 250 guineas; (c) for the best mechanically propelled vehicle constructed to carry, in addition to the driver, not more than one ton of goods or parcels, the total weight, when fully loaded, not exceeding two tons, a prize of 250 guineas; (d) for the best mechanically propelled vehicle constructed to carry, in addition to the driver, five hundredweight of goods or parcels, the weight, when fully loaded, not exceeding one ton, a prize of 150 guineas. (Supplemental).—For the vehicle, whether for passengers or goods, propelled solely by a motor actuated by the vapour of oil or spirit, having a lower specific gravity than 0.8, or a flashing-point lower than 73° F., Abel's test, and constructed to satisfy the requirements of any Act of Parliament, and the rules to be made thereunder for the time being respectively in force, which, in the opinion of the judges, best satisfies the purpose for which it is built, a prize of 100 guineas. Any method of propulsion other than muscular power may be employed, provided it be contained in the vehicle. Entries are to be made on printed forms (to be obtained at the offices of the *Engineer*) at any time prior to 6 p.m. on the last day of July, 1896. Preliminary runs will be made in the grounds of the Crystal Palace with each of the vehicles in succession. The practical working run will consist of a run on the public roads of not less than 100 miles out and 100 miles home, or a total of not less than 200 miles over a course to be announced three days prior to that fixed for the run. It will probably be arranged for Monday, October 12. Any vehicle which does not complete the "practical working run" at a *minimum* average speed of five miles an hour, to include all stoppages, to be disqualified.

In reference to the article on "The Tick Pest in the Tropics," contributed by Mr. C. A. Barber to these columns last June (vol. lii. p. 197), Dr. M. Francis, Veterinarian of the Texas Experiment Station, has drawn our attention to an account by