THE Smith-Reed-Russell Lecture for March at the School of Medicine, George Washington University, was recently given by Dr. John Wheeler, professor of ophthalmology at Columbia University and director of the Ophthalmological Institute.

DR. IRVING LANGMUIR will deliver the fourth lecture in a series sponsored by the Rensselaer Chapter of Sigma Xi this year. He will speak on "Some Recent Work with Oil Films." On April 10 the fifth lecture in the series will be given by Dr. William J. Crozier, professor of general physiology at Harvard University, on "Mechanism and Behavior." The May meeting will be held about the middle of the month and will be addressed by Dr. Arthur B. Lamb, professor of chemistry and director of the Chemical Laboratories, Harvard University.

THE Advisory Council of the Milbank Memorial Fund held its twelfth annual meeting at the New York Academy of Medicine on March 15. The principal event of the meeting was the presentation by Dr. James Alexander Miller, president of the Association of Tuberculosis Clinics in greater New York, of a report on the work of the staff of the Milbank Foundation based on the results of the National Committee on the Cost of Medical Care. The meeting concluded with a dinner, Dr. Livingston Farrand, chairman of the council, presiding as toastmaster. The speakers included Harry L. Hopkins, Federal Relief Administrator; Dr. C.-E. A. Winslow, professor of public health at Yale University, and Dr. Henry E. Sigerist, director of the Institute of the History of Medicine at the Johns Hopkins University.

A SUMMER meeting of the Botanical Society of America will be held at Berkeley, Calif., from June 18 to 23, 1934, in conjunction with the summer meeting of the American Association for the Advancement of Science. The program is being arranged by the secretary of the Pacific Section, Professor Richard M. Holman, and applications for places on the program, accompanied by titles of the papers to be presented, should be sent to him at the department of botany, University of California, Berkeley, in time to arrive by May 1. Applications for places on the program will be received from non-members sponsored by a member of the Botanical Society and from members of Section G of the American Association for the Advancement of Science. Another summer meeting of the society will be held from June 18 to 20, with headquarters at Toronto, Canada. The program, which is being arranged by Professor R. B. Thomson, of the University of Toronto, will consist of a short field trip near Toronto, one formal session and a two-day field trip by auto to the Bruce Peninsula of the Georgian Bay region of Ontario.

THE eleventh symposium on colloid chemistry will be held at the University of Wisconsin from June 14 to 16. Plans are being carried forward by Professor J. Howard Mathews, the local general chairman. Entertainments will include an inspection trip through the new United States Forest Products Laboratory, a moonlight boat ride on Lake Mendota and a dinner in the Wisconsin Memorial Union.

THE North Texas Biological Society held its eleventh annual meeting at Texas Christian University, Fort Worth, on March 3. The presidential address by Dr. Hardy A. Kemp, of Baylor Medical College, Dallas, was upon "*Ornithodorus turicata* Duges: its Life History and its Rôle in Relapsing Fever." Professor A. O. Weese, of the University of Oklahoma, gave the guest address on "The Statistical Examination of Animal Populations." O. L. Killian, of the North Texas Agricultural College, was elected president for next year.

THE seventh congress of the German Society for Investigation of the Circulation will be held at Bad Kissingen on April 16 and 17, when the subject for discussion will be thrombosis and embolism, introduced by Professors L. Aschoff, of Freiburg; P. Morawitz, of Leipzig, and L. Nurnberger, of Halle. Professor E. Koch, Bad Nauheim, is secretary.

DISCUSSION

DO LIGHTNING RODS PREVENT LIGHTNING?

THE complete disagreement between Professor J. B. Whitehead[1] and Dr. M. G. Lloyd[2] as to the nature of the protection afforded by lightning rods revives a controversy of long standing. The former believes that the main function of lightning rods is to prevent lightning, and the latter that the sole purpose of lightning rods is to protect a building in case a stroke occurs. While the second view appears to have been gaining ground in recent years the first view nevertheless continues to have many adherents, partly because pointed aerial terminals on lightning conductors have always been in general use, and, as the discharging action of points is a well-known property, it is natural to assume that the purpose of the points on the conductors is to dissipate quietly a part of a cloud's charge and thus to prevent a lightning stroke. Grave doubt as to the effectiveness of points in this regard has, however, been caused by quantitative laboratory studies of the magnitude of discharge currents from pointed conductors. It is a matter of

[1] SCIENCE, December 1, 1933, p. 507.
[2] SCIENCE, December 29, 1933, p. 603.

common knowledge, too, that structures provided with lightning conductors carrying pointed terminals are frequently struck by lightning, and usually no damage results. It is perhaps less well known that in some parts of Europe pointed terminals are not used on lightning conductors which, none the less, are considered to provide good protection.

I wish to point out that existing experimental data are not adequate to decide with certainty to what extent, if any, the presence of pointed terminals on lightning conductors prevents lightning. Owing to unknown factors involved, one may not with confidence extend the results of experiments on point discharges done in a laboratory to the much larger potentials and distances involved in thunderbolts. We are in need of a continuous record of the current flowing from an actual pointed lightning rod during a storm, up to the moment when the rod is struck by a bolt, in order to ascertain whether the total quantity of electricity so discharged is at all comparable to the amount that flows during a lightning flash. Measurements of this character were attempted in England by T. W. Wormell,[3] who found the total quantity of electricity discharged from a pointed wire elevated to a height of 8.3 meters during the passage of each of 61 storms in the neighborhood of his station, situated in an open field. Unfortunately no lightning flash occurred nearer than 0.5 kilometer from the station during any of the storms. The maximum quantity found for any one storm was 30 millicoulombs, the average per storm being 2.9 millicoulombs. This is a very small part of the total quantity which is discharged even during a single lightning flash, estimates of which lie between about 10 and 1,000 coulombs.

The initial rate at which the charge of a cloud is replenished, just after a lightning flash, has been found to be of the order of several amperes. If the points on lightning rods are to prevent the occurrence of lightning, the rate of flow of electricity from them must at least equal the rate of regeneration in the cloud or, in the case of the approach of a highly charged cloud, the points must be able to reduce by a considerable fraction the charge on the cloud during its time of approach. The silent discharge currents passing between a point and a nearby plane measure only a few microamperes and for any given voltage diminish rapidly with increase of distance between the point and plane. If, however, the current for each distance is measured when the potential has been raised up to the point of sparking, then it is found that this limiting current *increases* with increase of distance between the point and plane. Measurements recently made on this subject, using a rectified current from a transformer with a positively charged, pointed aluminum wire, 1 millimeter in diameter, gave the results shown in Table 1 for the currents flowing just before sparking took place. The sparking potential was much higher with a negatively than with a positively charged point, and the limiting current was over ten times as large for a plate distance of 5 cm, the maximum that could be used with the voltage available.

TABLE 1

Positive Discharges

Distance between point and plane	3 cm	5 cm	10 cm	15 cm
Spark voltage in kilovolts	35.5	50.5	69.5	92.0
Current just before spark in microamperes	44	62	84	110

The currents here given are far too small to have any noticeable effect on lightning discharges, but if the current continued to increase with sparking distance at the rate indicated, then for sparks of one kilometer length its value would become comparable to the rate of regeneration of the charge of a cloud. This ten-thousand-fold extrapolation of our data can not be made with any confidence, and a long extension of observations such as those above is what is wanted.

Under the influence of high voltages brush discharges form on blunt projections of conductors, and the currents from these may be of the same order of magnitude as those flowing under the same conditions from points. The equipment described above was used to find the currents flowing under like conditions both from a polished metal sphere 18 millimeters in diameter and from a sharp sewing needle, when at three different distances from a plane. Table 2 gives the negative currents obtained when a potential difference of 75 kilovolts was employed throughout, the apparatus used not supplying enough voltage for a sparking from the sphere at the larger distances.

TABLE 2

Negative Currents in Microamperes

Distance to plane	5 cm	10 cm	15 cm
Needle point	520	230	130
Sphere	470	130	50

The two sets of currents are seen to be of the same order of magnitude, and while the current from the

[3] *Proc. Roy. Soc.*, 115: 443, 1927.

sphere decreases relative to that from the needle with increasing distance, this may arise from the fact that at the two longer distances used the voltage employed was not much removed from that necessary to start the brush discharge from the sphere. The results show that it is not altogether improbable that a few blunt projections or knobs on a building may give rise to as large a discharge current as would flow from a sharp point under the same conditions.

It is interesting to note in this connection that when a potential difference of seven million volts was developed between the two 15-foot spheres of the high voltage generator built by Compton and Van der Graaf, sparks over 20 feet long at an interval of less than a second passed between the spheres and to various parts of the building enclosing the apparatus. Numerous brush discharges appeared on the spheres and on various portions of the building, but the combined current from all these was insufficient to prevent a rapid building up of the potential to the sparking point, although the maximum rate at which the generator could deliver a charge was only about 2.7 milliamperes.

In defense of lightning prevention by lightning rods it is sometimes alleged that experience shows that lightning actually strikes less frequently in cited localities after lightning rods have come into use than was the case previous to their introduction. As far as I know, such statements are based on the conjecture of residents rather than on accurate statistics covering long periods of time, and, owing to the known irregularity in distribution and severity of thunder storms, evidence of this kind can scarcely carry much weight. We have, however, the recent statement by Professor Whitehead in the paper noted above that in a period of some 17 years no lightning bolt has struck any of 61 trees which had been provided with lightning conductors of his specification, although previous to the installation nine of the trees are known to have been struck. I am inclined to think that Professor Whitehead only meant to imply that none of the trees had been visibly injured during the period mentioned, since it is unlikely that they were under constant observation during all the storms that passed over them. Moreover, I gather from the description given that the upper terminal points on these conductors were hidden by the foliage and were thus more or less completely shielded electrically by the latter.

That the leaves and twigs on trees and bushes act as discharge points during the passage of electrified clouds is well known. B. F. J. Schonland[4] has measured in Africa the currents flowing from an insulated bush during the passage of many storms and obtained values as high as 4.5 microamperes, although here again lightning never struck near the station during any of the observations. Owing to the great number of such natural points in a wooded region, the total upward current flowing from them during a storm is correspondingly large, and yet trees in a forest are frequently struck. During a storm in Switzerland the top of a whole forest was seen to take on a vivid glow, repeatedly, which increased in brilliance until a lightning bolt struck. Here myriads of leaves actually served as discharge points, and still the combined current from them all was unable to prevent the building up of charges in the clouds sufficient for lightning-bolts. The conductors on the top of the Washington Monument are provided with 200 points, and the monument is struck not infrequently. Does the presence of three or four pointed terminals on the lightning conductors attached to a house or barn decrease appreciably the liability of its being struck? It may; but we do not know for certain. There is even a possibility that the chances of being struck are increased by such an equipment, owing to the long conducting path provided by the upward moving ions coming from the points. Such an action would be advantageous rather than otherwise in assuring better protection to the parts of the building most distant from a lightning conductor. An interesting and valuable account of protection against lightning by O. S. Peters is given in Technological Paper No. 56 of the U. S. Bureau of Standards, 1915.

JOHN ZELENY

YALE UNIVERSITY

[4] *Proc. Roy. Soc.*, 118: p. 233, 1928.

THE CASE OF DEUTERIUM

BOSWELL: "But he is not restless." JOHNSON: "Sir, he is only locally at rest. A chymist is locally at rest; but his mind is hard at work." These words describe the state we chemists have been in since the discovery of heavy hydrogen laid upon us the duty of giving it a proper name and symbol. A comparable case, only a few years ago, was the discovery of the new planet, which was finally permitted to accept the name "Pluto." To zoologists and botanists there is presented the undignified spectacle of squabbling, or to put it more mildly, of vacillation, on the part of the chemical profession, in trying to make up their minds about what to call the most interesting element of recent years, and how to write its name in shorthand. Zoology and botany observe the rule of priority, that the name first given to a new animal or plant shall be accepted. There are some provisos that affect the working of this rule, but not its spirit. It would seem as if this simple principle, which is based upon courtesy as well as upon the desire for stability of nomenclature, is either unknown to chemists or is ignored by them.

The writer does not especially admire "deuterium"