be too late for the dissemination of the forecasts by the morning papers. Under the existing arrangements it was found that sixteen out of twenty-four "radiation" fogs and four out of eight "smoke" fogs were anticipated. The three "cold surface" fogs and four "cloud" fogs were not forecasted. The present forecasts rarely, if ever, contain any indications of the intensity of the fog expected.

The problem of the issue of fog warnings for individual districts has been approached from two points of view. As was pointed out in the previous report, the observations of drift smoke, during the incidence of fog usually show an indraught of air to some central district of London, but this is rarely symmetrical; a preponderating direction, usually identical with that due to the barometric gradient, can in most cases be identified, and plays a most important part in determining the region of thickest fog. Out of forty-four days of fog twenty-seven showed the thickest fog to leeward, five showed it to windward, while in the remaining twelve cases no particular preference for any one locality could be identified. Captain Carpenter had suggested that a more detailed study of the distribution of temperature might prove useful in this connection, and Mr. Lempfert reproduces diagrams which show conspicuous differences of temperature within the London area, in which the thickest fog is also to be found in the coldest region. Four out of the five apparently exceptional cases in which fog was thickest to windward show the lowest temperatures also on the windward side. It is the more to be regretted that the inquiry has had to be discontinued as the winter proved to be singularly free from fog. Investigation of the thick fogs of the present season from this point of view would probably have yielded interesting results.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

EDINBURGH.—The annual report for 1904 shows that the total annual value of the university fellowships, scholarships, bursaries, and prizes now amounts to about 18,270*l.* In addition, a sum of upwards of 600*l.*, being the income of the Earl of Moray endowment fund, is annually available for the encouragement of original research. As already announced, in response to the appeal for subscriptions to provide for the further development of the university, Sir Donald Currie has made the munificent gift of 25,000*l.* He has expressed a wish that the revenue from his money should be applied to the remuneration of a staff of lecturers such as the authorities of the university may find it advisable from time to time to appoint. The university court, being desirous of permanently associating his name with the fund, has resolved to designate it "The Sir Donald Currie Lectureship Endowment Fund." Other contributions to the extension scheme have also been intimated to the extent of 15,000*l.*, including a sum of 5000*l.* given by Sir John Jackson to the Tait memorial fund, for the encouragement of physical research.

LIVERPOOL.—The committee of the institute of archæology has been enabled by the munificence of Sir John Brunner to take in hand the publication of a "History of Egypt," to include all the results of modern research, and to be, so far as possible, a complete history of the Egyptian civilisation from the earliest times down to the conquest by Alexander the Great. It is estimated that the work will take two years to complete, and it will be published with full photographic illustrations.

A CONFERENCE on school hygiene has been arranged by the Royal Sanitary Institute, to be held in the University of London, under the presidentship of Sir Arthur W. Rücker, F.R.S., on February 7–10.

A COURSE of ten lectures on "Enzymes" will be given by Dr. W. M. Bayliss, F.R.S., at University College, London, commencing on January 18. The lectures are open to all internal students of the university, and also to medical men on presentation of their cards.

THE sixteenth issue of the "Public School Year Book"—that for 1905—with its select list of preparatory schools, is as useful as ever. The information given respecting each public school connected with the Headmasters' Conference is of just the kind to help parents to a decision as to where to send their boys to be educated.

PROF. FRITZ HEISE, of the Berlin School of Mines, has been appointed director of the Bochum School of Mines, and Mr. Georg Baum, the author of several works on coal-mining, has been appointed to succeed him in the Berlin chair. Mr. August Schweman, mine manager of Neurode, has been appointed professor of mining at the Aachen Technical High School to fill the vacancy caused by the death of Mr. Lengemann.

IN view of the educational and scientific progress which Japan has made in recent years, the two lectures on "The Japanese Spirit," which will be delivered by Mr. Y. Okakura, of the Imperial University, Tokyo, at the London School of Economics, Clare Market, W.C., on January 17 and January 20, should be of special interest. Tickets of admission may be obtained free from the secretary of the school.

Science reports that Mr. W. A. Riebling, of Newark, N.J., has sent an additional 2000*l.* to the Rensselaer Polytechnic Institute, Troy, N.Y., to be used in replacing the building destroyed by fire. Mr. Riebling gave 2000*l.* last June. A gift of 1000*l.* from Mr. George B. Cluett is also announced. Wellesley College has received 3600*l.*, we also learn, from the Robert Charles Billings fund, the income of which is to be applied to the department of botany.

THE West Riding Education Committee has resolved, says the *British Medical Journal*, subject to certain conditions, to make grants, which will doubtless be renewed annually, to the Universities of Leeds and Sheffield of 4500*l.* and 1500*l.* respectively. In thanking the county council for the grant to Leeds, the Pro-Chancellor, Mr. A. G. Lupton, stated that of the 100,000*l.* for which the university was now asking a sum of 64,000*l.* had already been subscribed.

THE 1905 edition of the "Schoolmaster's Yearbook and Directory" follows on the same excellent lines as the issue of last year. It contains an immense amount of well arranged information, and has become indispensable to all engaged in educational work. If the publication continues to increase in size, as it seems to do annually, the section on the books of the year might be dispensed with, as information of the same kind can be obtained from many educational periodicals. The editor is to be congratulated on the fact that this useful work of reference has become established so securely.

A RESEARCH scholarship or scholarships, founded by Mr. Andrew Carnegie, will be awarded shortly on the recommendation of the council of the Iron and Steel Institute. Candidates, who must be under thirty-five years of age, must apply on a special form before the end of February to the secretary of the institute. The object of this scheme of scholarships is not to facilitate ordinary collegiate studies, but to enable students, who have passed through a college curriculum or have been trained in industrial establishments, to conduct researches in the metallurgy of iron and steel and allied subjects, with the view of aiding its advance or its application to industry. There is no restriction as to the place of research which may be selected, whether university, technical school, or works, provided it be properly equipped for the prosecution of metallurgical investigations.

A CONFERENCE of teachers from elementary and secondary schools and technical institutes was held under the auspices of the London County Council at the Medical Examination Hall, Victoria Embankment, on January 5, 6, and 7. On the first of these days, under the presidency of Sir William Collins, the teaching of arithmetic was discussed. Mr. C. T. Millis, principal of the Borough Polytechnic, said that what is needed in the teaching of arithmetic is that some of the time now spent in teaching special rules in money sums should be devoted to giving a sound knowledge of general principles. Mr. S. O. Andrew, during the course of a paper on the same subject, remarked that whatever part of arithmetic may be given up or postponed, there is a general agreement that it must still include a know-

ledge of the standards of measurement necessary for the investigation of physical phenomena. The need for a co-ordination of the elementary instruction in arithmetic and geometry was emphasised by subsequent speakers.

THE third annual meeting of the North of England Education Conference was held in Liverpool on January 6 and 7. More than 2000 members of education committees, teachers, and others attended. The question of leaving certificates was discussed at the first meeting, and during the course of the discussion Sir Oliver Lodge said the use and not the abuse of examinations is admitted by all as an adjunct to teaching, but the point is to determine the relation between teachers and examiners, also between teachers and inspectors. People are no longer going to be satisfied with purely external examinations imposed from above upon the schools. It is not a dignified position for the schools, and they have rebelled. Prof. Sherrington, F.R.S., read a paper later on child study, in which he urged that this study could not devote itself more profitably at the present time than to what may be termed the natural history of the child. In healthy school life lay the first line of defence against race deterioration. It would help society if teachers and physiologists could combine to examine into the mischief to growth resulting from hours of breathing vitiated air, from want of warm clothing that economised food, from semi-starvation, from improper food, from chronic fatigue, and from insufficient rest and sleep in bed. Among other subjects dealt with were the teaching of geography, the teaching of domestic science, and the place of handwork in the school curriculum.

A DEPUTATION from the executive committee of the Association of Education Committees (England and Wales) recently waited upon the Board of Education to urge the adoption of a more liberal scale of grants for secondary schools, to ask for a larger share from the Government of the cost of training pupil teachers, and to urge the necessity for the compulsory attendance up to the age of fourteen at evening continuation schools of all children who do not continue as whole-day scholars up to that age. Sir William Anson, in reply to the deputation, agreed that more money should be allowed to secondary schools, but though such a demand would have his support, Sir William Anson said he was by no means sure of obtaining the necessary funds. He expressed the opinion that the question of cost made it almost impossible to enforce a system of compulsory attendance at evening continuation schools up to fourteen years of age for children leaving the day school before that time. Until we have better security that the education given in the elementary school lasted, and a better secondary education system with larger grants for secondary schools, Sir William added, he would not be a party to asking for another penny for elementary education, as such. It is satisfactory to find it recognised officially that this country must spend more money on secondary and technical education if we are to have an educational system which will assist national progress.

THE annual meeting of the Geographical Association was held on January 6. Mr. Douglas Freshfield presided, and an interesting discussion took place on the teaching of practical geography in schools. Prof. Dryer, of the State Normal College, Terre Haute, Indiana, opened the debate, and said that practical geography meant in America laboratory work. This work is not necessarily done in a special room, and, indeed, the best part of it is done out of doors. The study of maps plays a large part in this laboratory work. Contoured topographical maps are also much used, together with raised models illustrating different forms of the earth's surface. Pictures, photographs, and lantern slides also have a conspicuous place in the school's equipment. The instrumental study of the earth's atmosphere is taken next by the students, who keep records of their own observations for a period of three months. The official weather charts can be obtained daily at every school, and, owing to the area covered by them, it is possible to follow cyclonic and anti-cyclonic disturbances for several days together, and sometimes to predict in the school itself the arrival at a particular time of an atmospheric disturbance. Field excursions are regarded as the most important part of geographical study. Mr. B. B. Dickinson described an experiment in the teaching of practical geography carried out by him at Rugby School. The report of the association shows that 123 new members have been added to the roll, making the total membership 448. The members now include teachers of every grade, school inspectors, directors of education, technical education committees, and others interested in geographical education, both at home and abroad.

SOCIETIES AND ACADEMIES.

LONDON

Royal Society, December 1, 1904.—"The Ascent of Water in Trees." By Dr. Alfred J. **Ewart**, Lecturer on Botany in the University of Birmingham.

Since the time when Strasburger's researches seemed to show that the ascent of water in trees was a purely physical phenomenon, attempts have been made by Dixon and Joly, as well as by Askenasy, to prove that the ascent of water is due to a tensile stress set up by transpiration in the leaves, and transmitted downwards by continuous water-columns which are practically suspended from them. A knowledge of the resistance to the transpiration current in the stems of trees, and of the influence of various factors upon it, forms, however, an essential preliminary to any such explanation.

The author finds that when the vessels are completely filled with water and are open at both ends, the flow through them takes place in accordance with Poisseuille's formula, the rate of flow being directly proportional to the pressure and inversely proportional to the viscosity of the liquid and the square of the radius of the vessel. Hence in climbing plants where a rapid rate of flow is required the vessels are large, approaching 1 mm. in diameter, and in such cases the total viscosity resistance during average transpiration is equal to a head of water considerably less than the height of the stem. Under normal conditions, however, air bubbles always appear in the conducting vessels of angiospermous trees, and each bubble exerts a resistance to flow which is directly proportional to the surface tension of water against air and inversely proportional to the radius of the tube. In a tall tree the theoretical resistance due to this cause alone might amount to as much as 300 atmospheres, whereas calculations from direct experiments gave total resistances for the tallest trees of 100 atmospheres during active transpiration.

No leaf could produce or maintain an osmotic suction of this intensity, nor could the water columns in the vessels transmit it without rupture. In addition, actual observation showed that although differences do occur in the osmotic concentration of the cell-sap in the leaves at different levels, these are not sufficient to overcome the resistance to average flow in the intervening portions of the trunk. It appears, therefore, that a staircase pumping action must be exercised in the wood of a tall tree, which enables the leaves to obtain the water they require without their being forced to exercise tensions of more than $\frac{1}{2}$ to $\frac{2}{3}$ of an atmosphere. No satisfactory physical explanation of such action has yet been given, but the author points out that by appropriate surface-tension action along the length of a Jamin's chain the water could be led upwards from water-column to water-column, and maintained in a labile condition ready to flow in any direction where moderate suction was exercised. Various indirect estimations have been made which lend support to this view, but direct observations have not hitherto yielded satisfactory proof, so that further investigations are still needed in this direction, and these are, in fact, in progress.

December 15, 1904.—"An Analysis of the Results from the Falmouth Magnetographs on 'Quiet' Days during the Twelve Years 1891 to 1902." By Dr. Charles **Chree**, F.R.S.

The paper contains an analysis and discussion of the results obtained from the declination and horizontal force magnetographs at Falmouth on quiet days from 1891, when the records commenced, until 1902.

The total secular changes of declination from 1891 to 1900 at Kew and Falmouth were identical, and the changes