liantly by Metchnikoff, and received a new impetus from the wonderful discovery of antitoxin by von Behring, through which a wide new field, that of the science of immunity and the investigation of serums, was opened up, on which Pfeiffer, Bordet, Widal, Wassermann, and many others, including myself, have worked with successful result. Some of the most valuable fruits of these labours from a practical point of view have been the diagnosis of diseases first in the form of the Widal-Grüber reaction, and later the Wassermann syphilis-reaction, the importance of which for diagnosis and therapeutics cannot be estimated.

All these discoveries, especially in regard to the ways of spreading diseases on the part of the infecting agencies, have, in accordance with the principle that "Prevention is better than cure," been made good use of in the fight against epidemics and for prophylactic measures, and have brought about an improvement surpassing expectation. In the second place the struggle with diseases which have already broken out has been able to derive advantages from these discoveries, the most wonderful example being the diphtheria serum.

Now that the liability to, and danger of, disease are to a great extent circumscribed, so far as epidemics and many other diseases are concerned, the efforts of chemio-therapeutics are directed so far as possible to fill up the gaps left in this ring, more especially to bring healing to diseases in which the natural powers of the organism are insufficient. And I believe that now when definite and sure foundations have been laid for the scientific principles and the method of chemiotherapeutics, the way is visible before us; not always an easy but yet a practicable way. In the diseases involving protozoa and spirilla extraordinarily favourable results, as I have shown, have already been gained, which can also satisfy far-reaching tests. There are many valuable indications that in a series of other diseases—smallpox, scarlatina, typhus exanthematicus, perhaps also yellow fever, and, above all, infectious diseases caused by invisible germs—the prospects of success are brightening. But in contradistinction to these super-parasites the ordinary or common bacterial diseases (diseases due to the streptococcus and the staphylococcus, coli, typhoid, and dysentery, but, above all, tuberculosis) will still require a hard struggle. Nevertheless, I look forward with full confidence to this development also, and might, without being set down as an optimist, put forward the view that in the next five years we shall have advances of the highest importance to record in this field of research. There are indeed problems which often prove too great for the powers of individuals, and can only be solved by a many-sided effort. Considering the enormous number of chemical combinations which are taken into consideration in a struggle with diseases, it will always be a caprice of chance or fortune or of intuition that decides which investigator gets into his hands the substances which turn out to be the very best materials for fighting the diseases, or the basal substances for the discovery of such. But the chances in favour of finding a real cure, and so of winning the big prize, will naturally rise with the number of those who occupy themselves with the definite problem. It is just at this point, above all, that necessity arises to gather and unite all powers, and here special force attaches to that motto, *Viribus unitis*, which gives guidance in so many other fields; which in so exemplary and fine a way is the foundation of this great International Congress, to which thousands have been drawn from all lands, to give their testimony that in the world of science all national barriers have disappeared.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

LEEDS.—The council of the University has accepted with deep regret the resignation of Mr. Roberts Beaumont, professor of textile industries. To mark its sense of the value to the University of his work, extending over a period of thirty-four years, the council has placed on record its high appreciation of the services which, during his long tenure of the professorship, Prof. Beaumont has rendered to the cloth-workers' departments of the University, and to technical instruction in the textile industries.

LONDON.—Dr. W. C. McC. Lewis, having been appointed to the chair of physical chemistry in the University of Liverpool, has resigned his office in connection with the department of chemistry at University College. Dr. R. E. Slade has been elected to succeed him as assistant. Dr. Slade was educated in the University of Manchester. In 1909, he was appointed assistant-lecturer in physical and electrochemistry at the University of Liverpool, and was subsequently appointed lecturer-in-charge of the department of physical chemistry.

Dr. A. J. Clark, assistant in the department of pharmacology at University College, has been appointed lecturer in pharmacology at Guy's Hospital Medical School. His successor at University College will be appointed at the beginning of next session.

THE short Education Bill recently introduced into the House of Commons by the President of the Board of Education, which dealt with grants in aid of building, has been dropped for this session, owing to the great pressure of Parliamentary business.

BY the will of the Rev. L. C. Chamberlain, we learn from *Science*, 5000*l*. is bequeathed to the Smithsonian Institution for its mineralogical collections, and 2000*l*. for its collection of molluscs. There was also bequeathed 1000*l*. to the Academy of Natural Sciences in Philadelphia for increasing and maintaining the Isaac Lea collection of Eocene fossils. These bequests were made for the benefit of the scientific work in which the late Mr. Isaac Lea was interested, Mrs. Chamberlain, his daughter, having inherited the money from him. Mr. Chamberlain also bequeathed 20,000*l*. and his residual estate to the Thessalonica Agricultural and Industrial Institute, Turkey.

THE programme for the session 1913–14 of the department of technology of the City and Guilds of London Institute has now been published by Mr. John Murray. It contains the regulations for the registration, conduct, and inspection of classes, for the examination of candidates in technological subjects, and for the award of teachers' certificates in manual training and domestic subjects. The regulations are in the main the same as those of last year, but the rules respecting the award of full technological certificates have been revised. The passing of examinations in science, and in some cases in art, held by approved schools will be accepted as a qualification for the full certificate. Under certain conditions, candidates from approved schools may be exempted from the examination in the first grade in some subjects in which the examinations are held in more than two grades. In a number of technological subjects the syllabuses have been rearranged and redrafted.

THE Illuminating Engineering Society has issued a preliminary report of the joint committee appointed in 1911 to consider the questions in connection with the artificial lighting of schools. The report appears in *The Illuminating Engineer* for July. The com-

mittee was chiefly concerned with the needs of the children. The intensity of illumination necessary in schoolrooms depends on the nature of the work carried out. It is suggested that for ordinary clerical work the minimum illumination measured at any desk where the light is required should not fall below 2 foot-candles—four members of the committee say 2½ foot-candles. For special work, such as stitching with dark materials or that in art classes, a minimum of 4 foot-candles is desirable; and for general illumination in assembly-rooms one foot-candle. As regards blackboard lighting, the committee recommends an illumination on the blackboard about 60 per cent. in excess of that prevailing in the rest of the room. To avoid glare it is recommended that no lamps should come within the solid angle subtended at the eye by the blackboard, and a space 2 ft. above it, unless they are completely screened from the eye by a shade impervious to light. With the same object it is suggested that for text-books intended for the use of young children matt paper, sensibly free from prejudicial reflection, should be employed. The use of light-tinted surroundings which serve to diffuse the light is recommended to avoid inconvenient shadows.

SOCIETIES AND ACADEMIES.

MANCHESTER.

Literary and Philosophical Society, July 22.—Dr. H. **Wilde**: Some new multiple relations of the atomic weights of elementary substances, and the classification and transformations of neon and helium. In several of the author's papers on the origin of elementary substances, published by the society (1878–1906), special attention was directed to the seventh series of his classification, on account of the magnitude and importance of its primary members in the economy of nature, viz. nitrogen, silicon, iron, and gold. Silicon in combination with oxygen constitutes more than half the weight of the earth's crust, and is the principal constituent of glass for all the purposes of civilised life. The policy of several writers in doubling the atomic weights of four of the gaseous members of this series, viz. neon, argon, krypton, and xenon, induced the author to review the multiple relations of the seventh series with the important result (1) that six triads are formed out of the eight principal members of the series, in which the sum of the atomic weights of the extreme members is double the atomic weight of the means, and are all multiples of seven. Triads of atomic weights have been fully recognised by Dumas, Faraday, and other philosophical chemists, as indubitable evidence of community of origin, of transmutation, and important factors in the classification of elementary substances. Radium (as was indicated in Dr. Wilde's tables of elements some years previous to its discovery) is one of the synthetic transformations of helium, and is the next higher member of the series to barium, as was since confirmed by Mme. Curie. Helium is also shown in the author's table of 1878 as the analytic transformation ultimate of radium and other members of the second series of elements. The positions of helium and neon, as the transformation ultimates of the second and seventh series respectively, are further interesting in connection with the recent announcements that these elements have been found in glass vessels and tubes in which they had no previous existence. Assuming the reality of these observations, the phenomena not only admit of explication from Dr. Wilde's classifications, but also account for the discordant results obtained by the experimenters engaged in the research. One of the investigators could only find neon, while others, working independently, found helium alone, and in other cases a mixture of both gases. These results were of sufficient interest to induce the author to ascertain the composition of various glasses used in the arts. The principal and most important constituent of the glasses tabulated by Dr. Wilde is silicon, the transformation ultimate of which is neon. The next important constituents of the glasses are barium, calcium, and lead, all members of the second series of elements, the transformation ultimate of which is helium. The alkali methods, sodium and potassium, are constituents of nearly all glasses, and their transformation ultimates (with others of the first series) will be hydrogen and neon, but without helium. All the silicates of the first and second, and some of other series, are easily vitrified in small quantities in laboratory crucibles. Their spectra can then be examined during electrification in tubes (under suitable conditions of temperature and pressure) for the discovery of new elements and the identification of those already known.

PARIS.

Academy of Sciences, August 4.—M. F. Guyon in the chair.—J. **Boussinesq**: The complete determination, by its partial differential equations, of the problem of slow regularised movement of a heavy liquid mass, in the midst of another fluid mass, indefinite and at rest, and equally incompressible.—G. **Charpy** and A. **Cornu**: The displacement of the critical points of iron by the addition of silicon. Contradictory results on this subject have recently been published by Vigouroux and Baker. Seven alloys have been prepared by the authors from Swedish iron to which increasing quantities of ferro-silicon were added. Complete analyses are given of the seven alloys, the silicon ranging from 0·11 to 6·10 per cent. The critical points were determined by the velocity of cooling method, the curves being recorded automatically with the double Saladin-Le Chatelier galvanometer. The point a_3 vanishes when the silicon reaches 1·5 per cent. The point a_2 remains clear throughout, but each increase of 1 per cent. of silicon lowers the temperature by about 11° C. The temperature of a_1 is slightly raised as the proportion of silicon increases, and tends to disappear when the silicon is more than 5 per cent.—Paul **Vuillemin**: The greening of the wood of the pear-tree. The wood is rendered green by *Helotium aeruginosum* and *H. aeruginascens,* the two species differing in the size of the spores. The name of Chlorosplenium is without systematic value, since several genera have been described under this name which are not closely allied. The colour of the wood is retained indefinitely and has been utilised in the arts.—R. **Gateaux**: Continued and analytical functionals.—Jules **Andrade**: The law of similitude of circular springs.—J **Rey**: A method of testing optical reflectors. The proposed method, which is applicable to all optical systems giving a real or virtual image of a luminous point placed at its focus, is based on a photograph of the image of square mesh wire gauze. The photograph shows not only that there is an imperfection of the surface, but gives the points of the surface the curvature of which is incorrect. Two reproductions of such photographs accompany the paper.—MM. **Massol** and **Faucon**: The absorption of the ultra-violet radiations by some mineral colouring matters in aqueous solution. The various colouring matters studied (potassium ferrocyanide, gold chloride, sulphate of copper, potassium chromate, uranium nitrate, nickel sulphate, chromium sulphate) absorb the ultra-violet radiations unequally. From a quantitative point of view, the absorbing power of synthetic organic colouring matters is much greater than that of the mineral colours.—Daniel **Berthelot** and Henry **Gaudechon**: The rôle of uranium salts as photochemical catalysts.