and "Longmans' Gazetteer of the World", of which he was editor, which first appeared in 1895 and has been often reissued. Both works show that rigorous accuracy in detail, based upon profound and wide research into original sources, and that sober and balanced judgment which were his outstanding characteristics.

Dr. Chisholm may, indeed, be said to have been one of the founders of scientific geography, particularly from the economic side, within Great Britain. Not only did he show that it demanded as exact scholarship, as wide knowledge as the subjects which had been recognised earlier as worthy of academic rank, but also at a time when, with the apparently sudden recognition of its interest and wide ramifications there was grave risk of hasty generalisation, he insisted upon the need for precise and, if possible, statistical proof of fundamentals. Rigidly conscientious himself, and with a passion for accuracy and completeness of statement, he was peculiarly impatient of slovenliness, whether in speech or thought, and if modern geography in Great Britain may seem to have developed relatively slowly, it is to Dr. Chisholm largely that we owe the fact that its foundations have been well and truly laid.

Dr. Chisholm's influence also extended far beyond the limits of his own country. His "Handbook of Commercial Geography" had the rare distinction of being translated into Arabic, and he carried on an extensive correspondence with geographers, economists, and others throughout large parts of the world. It was characteristic that his handwriting was clear and precise to the end and that he would give to letters, even on trifling matters, the same care and attention as to his own special work. His help and advice were, in consequence, constantly asked for, and so freely given as to bring him into contact with a wide circle. Though never in much sympathy with the narrowly nationalist Scottish point of view, he was a Scot of the best type, upright, honourable to the last degree, fair-minded, indifferent to worldly advancement, but profoundly concerned with the deeper problems of man's destiny, and too clear-sighted to be content with easy solutions. Even apart from his influence on economic geography and history, which was both wide and deep, the example he set of a life devoted to the search after knowledge was an inspiration to all who knew him.

WE regret to announce the following deaths:

The Hon. Edward Gerald Strutt, C.H., past president of the Surveyors' Institution and agricultural adviser to the Board of Agriculture during the War, on Mar. 8, aged seventy-five years.

Prof. Eugenio Rignano, professor of theoretical philosophy at the University of Milan and editor of *Scientia*, on Feb. 9.

News and Views.

SINCERE regret will be felt throughout the world of science at the destruction by fire of a large part of Lord Rayleigh's laboratory at Terling Place, Chelmsford, Essex, on Mar. 7. After taking his degree at Cambridge in 1865, the late Lord Rayleigh found great difficulties in getting opportunities for experimental research or instruction in laboratory work. Three years later he started experiments on his own account at Terling Place, and from there produced a number of papers which at once secured for him a position as a leader in physical science. When he resigned from the chair of experimental physics at Cambridge in 1884, he continued his researches in his private laboratory, and it was there that he carried out the precise determinations of the density of nitrogen which led to the discovery of argon. The simplicity of the apparatus used by the late Lord Rayleigh is well known, and most visitors to the laboratory were astonished that results of prime significance could be obtained with such modest equipments. We are glad to know that most of this historic apparatus has been saved as well as all books and papers belonging to the late Lord Rayleigh.

THE upper storey of the laboratory at Terling Place—originally a stall loft—has been burnt out; it was here that the main work on argon was done. Among the pieces of historic apparatus which have been destroyed are the original Rayleigh refractometer and the manometer used for adjusting the pressures of gases to an accurate standard in the weighings of nitrogen, hydrogen, and oxygen. Most of the present Lord Rayleigh's chief working instruments have also been destroyed and much preparatory work for experiments in progress is gone. The apparatus thus lost includes several valuable spectrographs, quartz apparatus and lenses for investigating the optical properties of mercury vapour, air pumps, equipment for measuring the light of the night sky by photo-electric cells, and other instruments used in recent or current researches. It is distressing to have to record a disaster of this kind, and we ask Lord Rayleigh to accept the sincere sympathy of scientific workers everywhere at the losses he has suffered and the consequent interference with his research work.

THE Department of Scientific and Industrial Research has, since the inception of research associations, always emphasised that the associations, to be eligible for grant from the Department, must secure adequate financial contributions from industry itself. While the securing of this support from the great industries has not been an easy matter, it is gratifying to find that in several of the most important industries of Great Britain a general levy is made in order to provide funds for particular research associations. The report of the council of the British Research Association for the Woollen and Worsted Industries for 1929–1930 indicates that this Association is about to complete an arrangement under which the wool textile industry will submit to a voluntary levy on imported wool, mohair, and so on, as well as to a levy on those processing sections of the industry which do not pay the levy on the raw material. The income which will

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thus become available, together with the generous assistance which is being given by the Empire Marketing Board, the Ministry of Agriculture, and by the Dominions of South Africa, Australia, and New Zealand, should ensure that the future work of this important Research Association shall be conducted on a scale which the importance of the industry to the Empire as a whole properly demands.

THE British Research Association for the Woollen and Worsted Industries has continued to devote its attention to fundamental problems of research into the properties of individual hairs and fibres, as well as to technical and more practical problems of the trade itself. The determination of Young's modulus for the wool fibre appears to indicate that plastic flow occurs in the fibre after the initial rapid change of length due to change of load. If the measurements are made quickly, the extension of fibre appears to be proportional to the load over small ranges of change of load, and it exhibits negligible hysteresis. The examination of the cultivation of skin and hair by tissue culture methods, and of the effect of diet on the characteristics of the fleeces, is being continued. The result of the examination of samples of wool for mean fineness has indicated the extraordinary variability which occurs over very small areas. This condition constitutes, of course, an important problem for the wool sorter, and, as such, is of sufficient practical importance to justify the most exhaustive experimental examination. An important practical application from the chemical work of the Association may arise as the result of an investigation which appears to indicate that low quality and waste woollen materials may be dissolved and spun in the manner which has now become familiar in the production of artificial silk yarns. Yarn has already been produced from a mixture of wool and cellulose, and solvents have been found which may make possible the production of a similar all-wool yarn.

FROM time to time references have been made in NATURE and elsewhere to the need for authoritative portrayal and dissemination of the scientific point of view. It is, of course, neither useful nor possible that everyone should be trained to elucidate scientific facts or substantially to understand the implications of properties and behaviour, nor even is it reasonable that he should with much labour and exclusion of other important affairs acquire that foundation of special knowledge which would enable him to do so. On the other hand, it is clearly desirable to show the general public that science does not depend for its advance on the intuition and 'formulæ' of a few 'brilliant inventors' so much as on ordered, if sometimes laborious, experiment and deduction. It needs to be constantly advertised that chemistry, for example, progresses because chemists make use of strategy and tactics which they have been able to develop by applying scientific methods of thought and by consistently employing the results of scientific inquiry.

IF the problems of chemistry can be solved thus, so also, by similar appropriate methods, can those of other factors in the life of the individual or his community. In a recent issue of *The Listener*, Prof. Arthur Smithells made a noteworthy contribution to the education of the general public in this particular. Confining himself to simple, fundamental facts and to the study of their relationships, he succeeded in exposing in a pleasant, conversational manner something of the working of the experimenter's mind and something of the way in which our knowledge concerning combustion was acquired. The B.B.C. is wise to include in its publication devoted to raising the general standard of culture such an article as that contributed by Prof. Smithells. Whether the B.B.C. can assist would-be students of chemistry in their actual studies is, of course, entirely another matter. When telephony and television are joined by radio-olfaction, who knows what it may not be possible to broadcast?

AT the annual general meeting of the Institute of Chemistry, Prof. Arthur Smithells, the president, in moving the adoption of the report of council, made some observations on the question of chemical training, urging in particular that the burden now put upon the student is excessive and too apt to result in undigested knowledge of what are regarded as the higher things of chemistry, with accompanying neglect of what is more simple and basic. He thinks that the courses have become congested and the pace too rapid, though he acknowledges the great improvement that has taken place in schools of chemistry in Great Britain. It is now no longer necessary to go abroad for the latest or the best in any division of the science: we are, in a way, doing too much rather than too little. He alluded at some length to the ways of teaching and work which prevailed in Bunsen's laboratory at Heidelberg as illustrating the kind of conditions under which, he believed, the early training of the chemist might be more satisfactorily conducted. Prof. Smithells said he had only touched on one part of a very large question and was concerned to arouse interest in it rather than to lay down any law; the education of the professional chemist is really an important question of the day and calls for the most careful consideration. The report of council shows that the roll of the Institute has increased by 156 members and 20 students, that the Institute is in a sound position financially, and that the committees of the council and local sections have been actively engaged in the interests of the profession of chemistry. The Meldola Medal was awarded to Dr. R. A. Morton, of Liverpool, and the Sir Edward Frankland Medal and Prize to Mr. B. W. Bradford. The officers and members of Council for the ensuing year were elected, Dr. G. C. Clayton being elected president in succession to Prof. Smithells, who has occupied the chair during the past three years.

As a result of heavy and long-continued rains at the end of February and the beginning of March, disastrous floods have occurred in southern France, entailing enormous damage to property and the loss of several hundred lives. The floods reached their greatest intensity in the valley of the Garonne and

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its tributaries, especially the Tarn, which originate in the southern Auvergne Mountains. Few details are yet available, but it appears from the *Bulletin Quotidien d'Études*, published by the French Meteorological Service, that the heavy rain was associated with a persistent strong south-easterly wind blowing from the Mediterranean. Even on the low ground of the coast and of the Rhone valley, falls of two or three inches in a day were reported from several stations on Feb. 28 and Mar. 1, and where the moist wind struck the higher ground one would expect the rain to be very much heavier. The rivers flowing westward from the Auvergne Mountains occupy deep narrow valleys which offer no opportunity for the floods to dissipate, and the water appears to have risen with such rapidity that the inhabitants of the valley towns were caught almost unawares. Where the swollen streams debouched on the low ground of the main Garonne valley conditions were even worse, and the greatest disaster of the week occurred at Moissac, near the junction of the Tarn and Garonne. The report says that the Tarn burst its banks, and the town was almost entirely destroyed.

IN his Huxley lecture to the University of Birmingham, delivered on Mar. 6, Sir William B. Hardy dealt with "The Physical Basis of Life", which was the subject of one of Huxley's essays in 1868. He asked if we could still be as sure of the soundness of Dujardin's postulate of the one common physical basis of life, protoplasm, as Huxley was? And are we right in ascribing to this protoplasm the contradictory attributes of extreme stability and extreme instability? The view to-day is that protoplasm *is* the physical basis of life; but there are as many distinct varieties as there are species of living organisms, the differences in the chemistry of their proteins giving rise to such varied forms as a whale or a gnat, a mushroom or a man. All forms of organisms from the whale to the smallest bacillus are built up on this fundamental basis; but the gap between the smallest bacillus and the properties of the half-dozen kinds of atoms of which it is made is immense. This gap has perhaps been partly bridged by the discovery of the viruses. The virus is only known by its effects; it is exceedingly potent in producing disease and yet is so small that it passes through the pores of unglazed porcelain; its dimensions may be compared with those of a sphere of 0·000025 mm. diameter. It possesses great power of multiplication. A small drop of fluid from a dog with distemper may be diluted ten million times, and yet when a drop of this is injected into another dog, the virus may multiply to such an extent that in three days it has invaded every tissue; and if the rest of the dog could be removed, leaving the virus, the latter would form a good model of the dog. These viruses possess individuality and are not interchangeable. Are they to be regarded as protoplasm? We can scarcely regard so small an aggregation of molecules, 400 or 500 say, as the basis of life. Perhaps they are 'first attempts' at protoplasm, parasitic on more advanced forms.

IN his Friday evening discourse, delivered at the Royal Institution on Mar. 7, Dr. C. Tate Regan spoke on "Angler Fishes". In off-shoots of the perch tribe the spinous dorsal fin is variously modified; in the angler fishes its spines have become slender and flexible, and the first is placed on the head, and serves as a line and bait. Anglers that lie on the bottom have a coloration that harmonises with their surroundings and tends to conceal them; their bait or lure is a flap or a tassel at the end of the line, and is used to entice other fishes near enough to be caught. The anglers that float about in the middle depths of the ocean, where there is little or no light, are uniform in colour, generally blackish, and possess a luminous lure. Oceanic anglers generally have a large mouth, strong sharp teeth, and a very distensible stomach; such fishes are able to swallow others many times their own size. An interesting group of these oceanic anglers includes little fishes that have lost the line and lure, live at lesser depths and seek small prey by smell and sight; they have a small mouth and feeble teeth, but large nostrils and olfactory organs; one has the eyes directed forwards, and the snout is shortened in relation to stereoscopic vision. All the free-swimming oceanic anglers are females, and the only males known are dwarfs parasitic on the females, to which they are completely united. The males, as soon as they are hatched, when they are relatively numerous, seek the females; if they find one they hold on by the mouth; then the lips and tongue unite with the skin of the female, and the husband becomes an insignificant appendage of his wife, degenerate in structure, and nourished by the continuity of his blood system with hers. The evolution of the dwarfed and parasite males is difficult to explain unless it be assumed that the actions and reactions of the fishes themselves produce modifications that become hereditary.

ON Mar. 6 a public lecture on "Twenty-five Years Study of the Polar Aurora" was delivered at Oxford by Prof. C. Størmer of Oslo. A large series of photographs, taken during the last twenty years, was exhibited. Base lines starting from Oslo and going in several directions were employed for taking these photographs, and by means of the parallax thus shown, the height of the lower border of each aurora had been calculated. This was found to be usually in the neighbourhood of 100 km. above the surface of the earth, though in some instances a height of 600-800 km. was reached. The height was greater in the morning and evening than at night. Many of the phenomena could be explained, said Prof. Størmer, by attacking the problem in a simplified form, such factors as gravitation, repulsion, etc., being omitted. He attributed the aurora to a stream of negative electric corpuscles passing from the sun through the magnetic field surrounding the earth's magnetic axis. This view was illustrated by a number of photographs of ingenious models. In moving a vote of thanks to Prof. Størmer, Prof. Lindemann observed that he hoped that the omitted factors would eventually be taken into account. He thought that Prof. Størmer's explanation of the 'echo' phenomenon was perhaps the most interesting feature of the whole research.

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SWITZERLAND is to have a 'regional' broadcasting system, somewhat similar to that which is being instituted by the British Broadcasting Corporation, with three high-power stations—in the German, French, and Italian speaking sections of the country respectively—and smaller relay stations where required in the principal towns. The most powerful of the new stations, a Marconi Type 'P.B.' 60-kilowatt broadcasting transmitter, is to be erected at Münster, about twelve miles to the north-west of Lucerne, and will constitute the main 'regional' station for German-speaking Switzerland. It will be allotted the wavelength of 459 metres. To provide for 'crystal listeners' in the towns, Marconi broadcasting stations of ½ kilowatt aerial power are to be erected at Berne and Basle. The new station at Berne will replace the present Marconi 1 kw. 'Q' broadcasting station, which was erected in 1925 and will later be modernised and re-erected elsewhere to play a part in the 'regional' plan. At Basle the new station will be this town's first full-time broadcasting station, the broadcasting service having previously been carried out by the Marconi transmitter at the Basle aerodrome, which is primarily employed for wireless telephony with aircraft. The reorganisation of the Swiss broadcasting service on the 'regional' basis is expected to be completed in 1931.

IN connexion with the Physical and Chemical Survey of the National Coal Resources, which is one of the important aspects of the Fuel Research work of the Department of Scientific and Industrial Research, the Department has recently appointed a committee to deal with the West Yorkshire Coal Area. Among the members are: Prof. J. W. Cobb, Leeds; Prof. J. A. S. Ritson, Leeds; Mr. C. E. N. Bromehead, Geological Survey of Great Britain; Dr. C. H. Lander, Director of Fuel Research; and Dr. F. S. Sinnatt, Superintendent of the Coal Survey. The object of the Survey is to investigate the characteristics of the various coal seams in Great Britain with the view of their utilisation to the best advantage. Local laboratories are established in each area for the examination of samples, and, when necessary, large-scale investigations are carried out at the Fuel Research Station (East Greenwich) or elsewhere. The Survey is now in active operation in most of the coalfields of Great Britain.

THE recent award of the Roozeboom gold medal to Prof. J. J. van Laar was made at a special meeting of the Royal Academy of Sciences at Amsterdam by Prof. Schreinemakers. This is the third time since Roozeboom's early death in 1907 that such an award has been made, the other recipients being Profs. Schreinemakers and Tamman. From the *Chemiker-Zeitung* we learn the following particulars of van Laar's career, as outlined by Prof. Schreinemakers. Born in 1860 at The Hague, van Laar first adopted the career of a naval officer, and in that capacity he travelled over the whole world. In 1881 he began to study at the University of Amsterdam, where he came directly under the inspiring influence of van 't Hoff and van der Waals. In 1898 he was appointed lecturer in mathematical physics and chemistry, and in 1907 he was appointed successor to Prof. Bakhuis Roozeboom, but he resigned his chair five years later for reasons of health. From 1892 onwards there appeared under his name a constant stream of scientific papers, amounting to more than two hundred and covering almost every branch of physical chemistry.

PROF. VAN LAAR devoted much attention to the melting-point and freezing-point curves and vapour-pressures of binary mixtures, to van der Waals' equation of state, to the formulæ and theories used in electrochemistry, and to the calculation of potentials of liquids, which are now used in physiological investigations. He was also the author of several books on thermochemistry, electrochemistry, the equation of state, and a well-known volume entitled "Six Lectures on Thermodynamic Potentials". His work has perhaps not received everywhere the attention which it merits. This may be due to some extent to the extreme intricacy of the problems with which he has dealt. But although his mathematical investigations of binary and ternary mixtures may not be easy to follow, the results are often relatively simple. Van Laar indeed rendered a great service by his masterly application of strict thermodynamical principles and the equation of state to the problem of co-ordinating mathematical theory with experimental results. As might be expected, his work provoked a good deal of criticism, and he frequently came into conflict with those who attempted to adapt to concentrated mixtures laws which are only applicable to dilute solutions. His investigations upon the borderline between the solid and liquid states under very high pressures will undoubtedly have an important bearing on the solution of some geochemical problems.

THE seventh annual number of *Brighter Biochemistry*, the journal of the Cambridge Biochemical Laboratory, is up to the standard of its predecessors. The identity of the various contributors is but thinly veiled under the initials appended to each item. For matter, the authors have cast their net wide and caught a number of well-known scientific workers whose habitat is not in this laboratory. The number could scarcely have been considered complete without references to the Nobel prizemen for 1929. It is probable that for a true appreciation of many of the points a personal acquaintance with the victims and their biographers is a necessary precedent, but even without this knowledge many of the rhymes can be understood by those with some idea of modern biochemical literature. For an hour's quiet fun, the number can be recommended to all biochemists and physiologists as a method of retreat from scientific problems.

THE successor to the ninth annual report of the Tidal Institute of the University of Liverpool is the Annual Report (1929) of the Liverpool Observatory and Tidal Institute, which now form a single institution governed by a joint committee of the Mersey Docks and Harbour Board, and the University of Liverpool. The scientific staff numbers Prof. J. Proudman and Dr. A. T. Doodson, as director and

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associate director, with six assistants. About half the income of the institution is derived from grants by the Board, the University, and the Liverpool Steam Ship Owners' Association, the remainder being obtained as payment for services rendered by the institution to outside bodies; these services consist mainly of the analysis and prediction of tides, but also of the supply of meteorological information and the testing of chronometers, sextants, and other instruments. The institution has acquired the business, and the tide-predicting machine, of Messrs. E. Roberts and Sons, Broadstairs, tidal and astronomical computers; the first machine owned by the institution was being worked almost to its full capacity. The detailed account of the year's activities shows that the institution continues its valuable and highly successful combined work of practical analysis and prediction of tides, with theoretical research on tidal currents and the meteorological and other influences which affect them.

IT has long been known that the currents in the mains of electric traction systems interfere, sometimes most seriously, with delicate electrical measurements carried out in laboratories and observatories. It has now been proved that similar interference from electric tramways has been affecting the quality of the reception in broadcast receiving sets. Some results obtained by C. O. Horn of the Post Office are published in *Engineering* for Feb. 21. Generally, in electric tramways in Great Britain, a trolley wheel is pressed against the trolley wire. At every suspension 'ear', the trolley usually gives a jump, the ensuing arc burning by a minute amount the wheel and the wire. Similarly, at the section insulators which occur at every half-mile, there is an arc when the wheel passes from one section to the next. Radio receiving sets in the neighbourhood hear a click every time an arc is formed. Tests made at Blackpool prove that if the trolley wheel be replaced by a Fischer plate similar to those usually employed on the continent, much of the noise is eliminated. Tests were made at Birmingham with another type of collector, but the results were not so good as those obtained by the Fischer plate. It was apparent that most of the interference was due to causes outside the collecting system. Satisfactory results were obtained by transposing the coils of the traction motor so that they came between the trolley wire and the armature instead of between the armature and the rails. In the new position, the coils act as a high frequency choking coil and so prevent the formation of oscillatory currents.

THE nineteenth report of the Development Commissioners for the year ending Mar. 31, 1929, has recently been published by H.M. Stationery Office. It is arranged in four sections, the first two of which are concerned with advances in agriculture, rural economy, fisheries, and harbours. The third part relates to action taken in connexion with the compulsory acquisition of land for road improvement, while the fourth deals with the financial position of the Development Fund. The successful establishment of the eight new Imperial agricultural bureaux was one of the chief features of the year, their object being to act as central agencies for the collection and dissemination of information on the various branches of agricultural research. An important step in determining the practicability of extending electrification into rural areas has been taken in a trial scheme started in Bedfordshire, from which it is hoped to calculate the probabilities of success in other areas. With regard to research and education, each of the institutes and advisory centres is dealt with in turn and an account of the investigations in progress given in some detail. In the rural economy section, the work of the community councils and their organisation for the development of rural industries seems to be giving encouraging results. Reports are also supplied of the work at the various marine biological institutions and of the special investigations 'directed' by the fishery departments of the Ministry. The grants and loans made during the year are quoted in detail, and the report concludes with three appendices, in which a list of all work published by members of the staffs of institutions receiving financial support from the fund is given.

THE honorary membership of the Academia Scientiarum Fennica, Helsingfors, has been conferred on Sir J. C. Bose for his contributions in advancement of knowledge of life-reactions in plants.

THE G. J. Symons memorial lecture of the Royal Meteorological Society will be delivered on Mar. 19 by Dr. Herbert Lapworth, who will take as his subject, "Meteorology and Water Supply."

THE following appointments in the Colonial Agricultural Services have recently been made by the Secretary of State for the Colonies: Dr. W. Youngman to be director of agriculture, Ceylon; Mr. E. J. Wortley, director of agriculture, Nyasaland, to be director of agriculture, Trinidad; Mr. F. Burnett, divisional agricultural officer, Ceylon, to be deputy director of agriculture, British Guiana; Dr. F. J. Martin, agricultural chemist, Sierra Leone, to be assistant director of agriculture, Sierra Leone; and Mr. R. W. Donkin to be produce inspector, Nigeria.

THE governors of the Scottish Woollen Technical College, Galashiels, have elected Dr. A. W. Stevenson, of the British Research Association for the Woollen and Worsted Industries, as colleague and successor to Dr. Thos. Oliver, who wishes to retire from the principalship in 1931. Under Dr. Oliver, wool textile education in Galashiels has grown from a local evening class to a well-equipped mono-technical institution controlled by and serving the whole Scottish woollen industry. He was also a pioneer in wool textile research, that being the subject of his degree thesis more than twenty years ago. Since the war, Dr. Stevenson's principal work has been connected with problems in worsted spinning. The high standard of this work was recognised by the University of Edinburgh in 1928, when the degree of Doctor of Science was awarded to him on a comprehensive thesis embodying the main points of his investigations.

APPLICATIONS are invited for the following appointments, on or before the dates mentioned:—A senior secretary in the Matriculation and School Examinations Department of the University of London—The

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Principal, University of London, South Kensington, S.W.7 (Mar. 22). Examiners in the following subjects for the Matriculation Examination of the University of London for 1931: Chemistry, French, Geography, German, Latin, Modern History, Physics, Spanish—The Secretary of the Matriculation and School Examinations Council, University of London, South Kensington, S.W.7 (Mar. 27). A professor of pathology and bacteriology at the Calcutta School of Tropical Medicine—The Secretary to the High Commissioner for India, Education Department, India House, Aldwych, W.C.2 (Mar. 27). A chief sanitary officer for the Asansal Mining Settlement under the Asansal Mines Board of Health, Burdwan District, Bengal—The Secretary to the High Commissioner for India, General Department, India House, Aldwych, W.C.2 (Mar. 29). An assistant horticultural instructor at the Hertfordshire Agricultural Institute, Oaklands, near St. Albans—The Clerk of the County Council, 28 Castle Street, Hertford (Mar. 29). A woman lecturer in biology at the Avery Hill Training College, Eltham—The Education Officer (H.2/1), County Hall, Westminster Bridge, S.E.1 (Mar. 31). A Bernard Baron research student in the Ferens Institute of Otolaryngology of Middlesex Hospital—The Secretary, Middlesex Hospital Medical School, W.1 (April 7). A professor of physiology at Bedford College for Women—The Academic Registrar, University of London, South Kensington, S.W.7 (April 15). A lecturer in the chemistry of cellulose at the Manchester Municipal College of Technology—The Registrar, College of Technology, Manchester (April 21). A woman assistant lecturer and demonstrator in botany at the Royal Holloway College—The Principal, Royal Holloway College, Englefield Green, Surrey (April 24). A whole-time medical registrar for the Society of Apothecaries of London—The Clerk, Apothecaries Hall, Water Lane, Blackfriars, E.C. (April 30). A director of the Institute of Plant Industry, Indore, and Agricultural Adviser to States in Central India and Rajputana—The Secretary to the Board of Governors, Institute of Plant Industry, Indore, India (Aug. 31). An assistant master (a graduate in engineering with emphasis on electrical engineering) in the Junior Technical School of the Maidstone Technical Institute, and for evening classes—The Principal, Technical Institute, Maidstone. An assistant secretary of the British Association for the Advancement of Science—The Secretary, British Association, Burlington House, W.1.

Our Astronomical Column.

Comets.—*Popular Astronomy* for February contains a photograph by Prof. G. van Biesbroeck of Wilk's comet taken on Dec. 31, 1929. The tail extends as a narrow ribbon to the edge of the plate 1° 36′ from the nucleus. There are fainter tails, about 40′ long, on each side of it. There is a bright circular coma, some 4′ in diameter, with a fainter border. On Jan. 22 the tail lagged 5° or 6° behind the prolongation of the line from the sun to the comet.

Prof. van Biesbroeck is still observing two other faint comets, 1927 IV, Stearns, the magnitude of which is now 16, and 1925 II, Schwassmann-Wachmann (1). A photograph on Dec. 28 showed it as a circular nebulosity 1′ in diameter with a brighter central condensation 20″ in diameter. Its magnitude was 15. A visual observation with the 40-inch refractor on Dec. 30 gave a diameter of 25″, the faint outer border being invisible to the eye.

Saturn.—*L'Astronomie* for January contains an illustrated article on Saturn by M. E. M. Antoniadi. Most of the drawings were made by him with the great Meudon refractor between 1927 and 1929, but a few older ones are reproduced. Stress is laid on the dusky polar caps; the author concludes that the irradiation produced by the brighter regions between the poles and the temperate zones causes them to appear to bulge out beyond the elliptical outline and so produce the 'square-shouldered aspect' noted by Sir William Herschel and by many later observers. Drawings made in July and August 1927 show some spots, both bright and dusky, breaking the regularity of the belts; some of these look definite enough to use for obtaining values of the rotation period, of which there are not very many determinations; this question is not, however, discussed in the article. It is noted that these markings are much less permanent than on Jupiter, where the Great Red Spot has now persisted more or less visible for half a century.

Plans for the 200-Inch Telescope.—The *Scientific Monthly* for January contains an article by Dr. Elihu Thomson on the plans and experiments that are now in progress with regard to this proposed gigantic telescope. The use of glass for the great mirror is considered impracticable; hopes are entertained that fused quartz will prove suitable; one great advantage is the much smaller coefficient of expansion. Dr. Thomson describes some experiments on a small scale in which mirrors of glass and quartz were compared; the image of an artificial star was almost instantly shattered on applying heat to the back of the glass mirror; the quartz one reached a much higher temperature before the image was much distorted. The main body of the proposed great mirror would be formed by fusing a great mass of quartz sand in an electric furnace at a temperature of 1700°-1800° C. This would contain bubbles on cooling, but it is not considered that these would do much harm. On this block a surface of clear glass-like fused quartz, or silica glass, would be deposited. A method of doing this has been arrived at; a quantity of finely powdered crystal quartz is poured through a very hot oxy-hydrogen jet, which melts it. It falls in this state on the face of the mirror, where it solidifies in a transparent deposit. The process is compared to the deposit of clear ice on objects during a sleet storm. Small mirrors have already been successfully made, and some of these may be of use as the subsidiary mirrors which will be required in the proposed telescope. It is thought that at least three years will be necessary for the production of the great mirror, even before the figuring begins. There will be the advantage in the figuring that the heat produced by friction will not distort the figure so much as in the case of glass; in that case, frequent pauses have to be made to allow the glass to cool. Dr. Thomson states that the General Electric Company at West Lynn has offered to make the mirror merely at the cost of the labour and material.

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