Mr. G. S. Merrill, of the National Electric Lamp Association, Cleveland, Ohio. The properties dealt with are the resistance, melting point, emissivity, and mechanical strength, and the tungsten filament receives most attention. The strength is determined by loading a short length of filament placed on two knife edges half a centimetre apart, at a point half-way between the supports, and measuring the depression under increasing load till the filament breaks. The change in the structure of the filament from a mixture of finely-divided tungsten and binding material, to pure crystalline tungsten as the temperature is raised during manufacture, is well shown by a series of micro-photographs. The effect of use in increasing the size of the crystals and in roughening the surface of the filament is shown in the same way. These changes are accompanied by a decrease in strength of the filament, which occurs mainly in the first 100 hours of use. The conclusion drawn from the observations is that a compact fine-grained structure is most desirable in lamp filaments.

AN extension for a further term of seven years of the major part of Sir Oliver Lodge's patent No. 11,575 of 1897 for "Improvements in Syntonised Telegraphy without Line Wires" has recently been granted as a result of a case argued before Mr. Justice Parker, the extension being allowed mainly on the grounds that the patentee had not been adequately remunerated for his invention. The patent covers the radiating and receiving apparatus of a complete system of wireless telegraphy and the methods of tuning the sending and receiving circuits to the same frequency, and describes how messages may be sent to each of a number of suitably tuned receiving stations by change of the frequency of the oscillations that are generated. The aërials described are of different forms, but all consist of a pair of "capacity areas" connected by inductances the magnitudes of which control the period of oscillation. The eleven claims of the specification are concerned with the insertion of these inductances into the radiating and receiving circuits; with the adaptation of a single aërial for sending and receiving the insertion in turn of inductances of various magnitudes in order to attain the selectivity already referred to; with the details of a coherer consisting of a fine metal point resting on a flat metallic spring; and, lastly, with methods of setting up the oscillations by discharges into the oscillator across air-gaps and receiving through an oscillation transformer, in order to separate both the oscillator and the resonator from metallic connection with other circuits, thus enabling them to vibrate in their own free periods so as to get precise tuning. The whole specification has been extended for the further term except the portions covering the use of the same circuits for sending and receiving, the use of various frequencies to select various receiving stations, and the use of the particular form of coherer. It thus appears that the patentee holds a master-patent covering the tuning of electrical circuits by means of inductances, and as the use of such tuned circuits is common to methods of signalling used by wireless telegraph companies operating in England, the situation will probably give rise to interesting developments.

THE report of the council of the Hampstead Scientific Society for the year 1910 shows that the object for which the society was founded in 1899, namely, the encouragement of a popular interest in science, has been pursued diligently and successfully. During the year eighty new members were elected, the membership rising to 334, the largest in the history of the society. Twenty-nine meetings, general and sectional, were held in 1910, in addition to five vacation meetings, a summer excursion organised by the photographic section, and four Christmas lectures to juveniles. The feature of the society's work for the year was the development of the astronomical section since the establishment of the observatory near the Whitestone Pond. The meteorological station at the same place has been efficiently conducted. An observer attended at 9 a.m. and 9 p.m. every day during the year, without intermission, and the results, after reduction, have been published monthly by the Meteorological Office.

THE Carnegie Institution of Washington has issued a list of the various works which it has published, together with those it has in the press. Copies of each publication, except the Index Medicus, are sent gratuitously to a limited number of the great libraries of the world, and the remainder of the edition is on sale at cost price. As the catalogue shows, this arrangement enables workers in science to obtain accounts of many important researches at a minimum cost. Descriptive lists of the books available will be sent to any interested person on application to the Carnegie Institution of Washington, Washington, D.C.

A SUPPLEMENT—covering works added to the library during the years 1908–9—to the Catalogue of Lewis's Medical and Scientific Circulating Library has been issued from the library at 136 Gower Street, London. The catalogue, the price of which is sixpence, contains a classified index of subjects with the names of the authors who have treated upon them, in addition to the ordinary alphabetical list of titles.

OUR ASTRONOMICAL COLUMN.

NEW MINOR PLANETS.—A Central News telegram of Tuesday states that the Transvaal Observatory reports the discovery of two minor planets. The discovery was made during an attempt to photograph the eighth satellite of Jupiter. The following are the positions of the new planetoids:—No. 1, R.A. 14h. 41m., Dec. 12° 34′ S.; No. 2, R.A. 14h. 48m., Dec. 15° 18′ S. It is stated that these are the first minor planets found by an observatory south of the equator.

NOVA LACERTÆ.—Photometric measures of Nova Lacertæ, made between January 4 and March 15 by Mr. H. Shapley at the Laws Observatory, are recorded in No. 4493 of the *Astronomische Nachrichten*. During that period there was a general decline of brightness from mag. 7·67 to mag. 9·23. Four neighbouring B.D. stars were used for comparison, and it is suggested that one of them, B.D. +51° 3420 (mag. 8·7), is a variable with a range of at least 0·4 magnitude; if this is so, several anomalies in the photometric results may be explained.

In the same journal Dr. Slocum records observations of two coloured B.D. stars near the nova, to which M. Luizet previously directed attention and suggested that B.D. +51° 3414 diminished in brightness by 1·5 magnitudes between January 2 and February 21. The photographic observations at Yerkes, with coloured screens, indicate that both stars are abnormally coloured, B.D. +51° 3416 showing a greater preponderance of red rays and B.D. +51° 3414 a greater preponderance of rays of shorter wave-length than a normal star of the A type.

HALLEY'S AND FAYE'S COMETS.—An observation by Prof. Barnard, using the 40-inch refractor, showed that on March 19 Halley's comet was of magnitude 13·5, and very easy to observe. It was round, and the middle showed a slight brightening, with possibly a faint, but uncertain, nucleus; its measured diameter, probably too large, was 45″ (*Astronomische Nachrichten*, No. 4492).

Dr. Ebell continues his ephemeris, giving places and magnitudes for Faye's comet (1910*e*) up to May 14. At present the comet is about 20 m. and slightly north of

ξ Geminorum, and its calculated magnitude is 15·0. The observation by Dr. Wolf on March 19 showed the actual brightness to be about one magnitude fainter than the ephemeris value (*Astronomische Nachrichten*, No. 4485).

PROPER MOTIONS IN SUN-SPOT GROUPS.—Dr. W. Brunner, Zurich, has an important and interesting paper in No. 3, vol. xl., of the *Memorie di Astrofisica ed Astronomia*, in which he discusses the relations existing between the proper motions observed in spot-groups and the solar activity producing the groups. The discussion is based on the examination of Wolfer's Zurich drawings for the period 1887–1905, and the spots born on the visible hemisphere are considered separately from those which, having first broken out on the invisible hemisphere, are first seen at the eastern limb; only the proper motions in longitude are discussed, and, in general, these are in the sense which makes the various members of the group diverge *inter se*.

The general conclusions, in brief, are that this divergence is not accidental, but is connected with the phase of development of the group. In the early stages of development the diverging tendency is strongly marked, but it rapidly wanes until it disappears seven or eight days after the first outbreak, unless a recrudescence of activity takes place, when the same phenomena reappear. Taking as positive the proper motion, which is in the direction of the diurnal motion, it is found that the groups in which negative motion is dominant are more numerous at the epochs of maxima in the undecennial period. But it is found that the magnitude of the proper motion is independent of the phase of the solar activity and also of the heliographic latitude. As naturally follows from the first conclusion, those spots born on the invisible hemisphere, being several days old when first seen, exhibit the proper motions in a less marked degree than those of which the primary phases of development are observed.

THE RATIO BETWEEN THE DIAMETER OF A PHOTOGRAPHIC IMAGE AND EXPOSURE.—In the measurement of photographic magnitudes by measuring the diameter of the star images it is assumed, in the formula usually employed, that the diameter is proportional to the square of the intensity of the light. Not agreeing with the principle of this assumption, Dr. Kenneth Mees recently made some experiments, under laboratory conditions, in which he produced easily measurable images with greatly differing exposures. He finds that the diameter of the small image of a fine slit or point is proportional to the logarithm of the exposure given, and assuming that increase of exposure is effectively equivalent to increase of intensity, this would mean that the diameter of a star image should be proportional to the logarithm of the intensity of the light-source rather than to its square. Dr. Mees suggests that the astronomical equation is based upon a modification of the true law dependent on the conditions of the formation of images in telescopes (*Astrophysical Journal*, vol. xxxiii., No. 1).

PHOTOGRAPHIC MEASURES OF STELLAR TEMPERATURES AND DIAMETERS.—In No. 4483 of the *Astronomische Nachrichten* Herr Adolph Hnatek publishes an interesting paper on a photospectroscopic method of determining the effective temperatures and relative diameters of stars. The photographic intensities of various parts of the spectrum are compared, and from the resulting data a temperature scale is formed. This ranges from 4000° for η Pegasi to 11600 for Algol, eight stars being considered, and agrees fairly well with the Potsdam values where comparable. It also places the eight stars in the progressive order shown by the Kensington temperature curve. The comparison of diameters shows that α Lyræ is 6·1 greater than the sun, whilst α Aquilæ is but 1·9 times greater.

CANADIAN OBSERVER'S HANDBOOK FOR 1911.—An excellent handbook for amateur and other astronomers is issued by the Royal Astronomical Society of Canada, and edited by Mr. C. A. Chant. The first two numbers were published in 1907 and 1908, and then the experiment of publishing the information in instalments in the society's Journal was tried. This proved unsatisfactory, and the former custom of having a separate volume has been reverted to. The book should prove of invaluable assistance to the rapidly growing body of amateur astronomers in the Dominion, and it is hoped to publish the volume for 1912 before the beginning of the new year.

THE IMPERIAL EDUCATION CONFERENCE.

THE public sessions of the first conference of delegates summoned by the British Government to represent the Overseas Dominions were held in London on four afternoons, April 25–28. The President of the Board of Education welcomed the representatives, and presided at each meeting. Administrative problems were, it is believed, discussed at the morning sessions, to which only the official delegates were invited. The proceedings at these morning meetings were private, the conference agreeing at its first meeting that, in order not to hamper discussion, no report should be made until the close of the conference, when an official summary will be issued. At the time of writing, all that can be said with certainty is that the private sessions are being prolonged into the week following the public meetings. Admission to the afternoon discussions was by tickets issued to representative administrators and teachers. The attendance of the overseas delegates in the afternoons was not large. The programme drawn up by the Board of Education included papers on the teaching of geography, history and arithmetic, manual work, the organisation of secondary education in Scotland, engineering, and vocational education. All the papers were by well-known British workers in the educational field.

Chairman's Prologue.

Mr. Runciman said that the conference originated from requests made in 1907 to the Imperial Government to summon an Imperial Conference to deal purely with educational affairs. ("The Federal Conference on Education," held in 1907, was initiated by the League of the Empire, and was unofficial and highly successful.) Since 1907 the Department of Special Inquiries and Reports had been in direct communication with the Dominions, India, and the Colonies, there had been improved circulation of reports, and memoranda had been compiled during the four years which would be issued shortly. Assistance was being given every day in the week in the selection of teachers, *e.g.* for Alberta, Australia, and South Africa. They had also arranged through the Department that the privileges now given to the teachers in the United Kingdom in French and German schools should be extended to teachers throughout the Empire. Assistance was continually being given to visiting officials. A library of considerable dimensions had grown up containing carefully selected and organised contributions from all over the world. The problems to be faced here and overseas were very similar. There were the difficulties of the supply and training of teachers, the problem of giving freedom of organisation while retaining control of finance. All the subjects of pedagogy were of universal interest. They had to deal with the puzzle of the classification of schools, with rural, urban, and technical problems. The United Kingdom might learn from Canada, Canada from Australia, Australia from South Africa, and so forth. They wished to bring to the common stock the intellectual forces of the whole Empire, and feed the very root of Imperial strength. The Empire was a practical working concern, not merely a sentimental vision, and they were met to discuss practical questions.

Imperial History and Geography.

Mr. H. J. Mackinder, M.P., read a paper on the teaching of geography from an imperial point of view, and the use which could and should be made of visual instruction. He asked for attention to a mode of teaching which might have peculiar value in the consolidation of the Empire, a work in which the part of the teacher must be as great as that of the statesman. The Empire existed by the free consent of the peoples, and this consent must be based on a reasonable agreement in regard to aims and sympathy in regard to difficulties. It was the part of the teacher to exorcise the devils of ignorance and local prejudice. Geography should be taught as a special mode of thought—a special form of visualisation which he would not describe otherwise than as "thinking geographically." He went on to describe the work of the Visual Instruction Committee, and concluded by urging that geography should be the chief outlook subject in our school curriculum, and should be taught by methods which demand visualisation. We should aim at educating the citizens of the many parts of the British Empire to