coefficient of one single term occupies eight pages. More especial attention is paid to the two standard positions of Gauss and the two standard positions of Lamont. These have been treated with more or less completeness by several previous magneticians, amongst whom Lamont and Borgen are specially mentioned; but, according to Leyst, few if any of his predecessors who have given formulæ for all four cases have wholly escaped printers' errors. Expression is given to the belief that the differences between results obtained for the horizontal component of the earth's magnetic force with different magnetometers are due in large measure to insufficiency in the deflection formulæ employed. There seems, however, no reference to the theoretical or experimental work on this question carried out of late years in this country and in India.

The Electrician for April 14 contains an abstract of the last three of Sir J. J. Thomson's Royal Institution lectures on radiant energy and matter. They dealt with the distribution of energy in the spectrum of a black body, the relation between radiation and absorption of a body, the character of the absorption of gases, and the nature of radiation and of light waves. The same number of *The Electrician* contains a summary of the lecture on the deflection of the positive rays of the vacuum tube as a new means of chemical analysis. Since the ratio of the deflections of a particle in the electric and magnetic fields depends on the quotient of the electric charge carried by the mass of the particle, an examination of the deflections allows some deductions to be made as to the composition and charges of the particles. Oxygen, for instance, appears to exist in the tube in nine modifications, and these help us to understand why the same chemical substance is so often capable of giving entirely different spectra under different conditions.

THE illuminating engineers of America appear to have commenced a crusade against the evil of "glare" in artificial illumination, and the subject is given a prominent place in several of the American scientific journals. *The Scientific American* for April 15 contains an article on light and shadows ministering to eye comfort, by Mr. E. C. Chittenden, of the Bureau of Standards. He considers that the present method of lighting large rooms by lamps concealed in recesses close to the ceiling gives too great uniformity of illumination to be pleasant to the eye, and prefers visible lamp fixtures provided with fittings of prism glass, which send the light in the direction required. According to the April number of *The Illuminating Engineer of New York*, an American Association for the Conservation of Vision has been formed, and the editor sums up a few of the questions at issue as follows:—(1) Is glare so injurious to the eyes as is generally believed? (2) Is indirect lighting good or bad? (3) Is the Cooper-Hewitt lamp injurious to the eyes?

A SUPPLEMENT to *The Electrician* of May 12 devotes nearly 200 pages to special articles on the present position of electric power in mining. Since the corresponding supplement was issued three years ago, new rules have been issued by the Home Office dealing with the use of electrical appliances in mines, and one of the articles is devoted to the elimination of risk from explosion and from shock in the use of electricity. Other articles deal with the supply of power, either from a public or from a private station to the colliery, the winding plant, the wiring of the mine, coal-cutting machinery, haulage plant, pumps, switches, and electric hand lamps. Each is written by a man well qualified to deal with his subject, *e.g.* Prof. W. M. Thornton, Mr. H. J. S. Heather, and Mr. W. B. Shaw.

MESSRS. NEGRETTI AND ZAMBRA have submitted to us a pair of folding prismatic binoculars, which we have carefully tested. The chief feature is the manner in which the binoculars may be folded for ease in carrying to fit into a case 3½ inches wide and only *one inch thick*. This is achieved by mounting the prism in which the first two reflections occur separately from the prism producing the last pair of the four reflections of the usual prismatic system. This has not resulted in any sacrifice either in power, aperture, or—so far as we can see—in illumination. We have ascertained that the magnification and field of view as given by the makers, viz. 5·5 diameters and 8·3°, are approximately correct, and these compare very well with the ordinary prism-binocular. The focussing is smooth, the introcular distance can be adjusted, and for a small range the focus can be separately adjusted for each eye. The only criticism we have is of the spring catches which hold it in position for use, which do not appear quite strong enough. Incidentally, the glasses provide very interesting evidence of the power we possess of rotating our eyes in their sockets (by means of the oblique muscles). If the spring catches are released while looking through the glasses, and the bodies are slightly rotated, as in folding them, the images seen by the two eyes rotate in *opposite* directions. It will be found that for a few degrees either way the eyes are able to follow, and to fuse the images into one.

IN the paragraph on a fresh-water rhizocephalan in our last week's issue, the *Records of the Indian Museum* is quoted as *Records of the British Museum*.

OUR ASTRONOMICAL COLUMN.

THE BRIGHT METEOR OF APRIL 30.—Mr. Harrison Hill, of Abbey Road, N.W., writes to say that he also observed the brilliant meteor which was seen, as reported in these columns last week, by the Rev. T. E. R. Phillips. At midnight on April 30 Mr. Hill's attention was arrested by a sudden and bright light, which appeared to be a large star, in the S.W. sky. This object increased rapidly in size and apparent brightness, and then disappeared. Although Mr. Hill has frequently observed "shooting stars," this meteor especially impressed him by reason of its lack of apparent motion and its exceeding brightness.

THE SPECTRUM OF NOVA LACERTÆ.—A comprehensive study of the spectrum of Nova Lacertæ is published in No. 194 of the Lick Observatory Bulletins by Prof. W. H. Wright. Spectrograms were secured early in January with spectrographs attached to the 36-inch and 12-inch refractors, but subsequent observations were prevented by a protracted storm which set in after January 6. Altogether, some 140 wave-lengths are given as positions of lines, or as maxima, minima, or limits of bands. As remarked by Prof. Wright, the interpretation of this complex structure of the spectrum is a difficult problem in which great caution must be used. There is one point to which he directs specific attention, however. In the comparison iron-spark spectrum the air lines appear as usual, and show a large measure of agreement with many of the bright-band maxima in the star. This is shown by a table comparing the nitrogen wave lengths given by Exner and Haschek and Neovius with the stellar wave-lengths. But it should be noted that the strongest nitrogen line, λ 3995, is absent from the star spectrum, as are also some of the fainter lines in the spectrum of the gas; neglecting the lines of intensity two and less, there is, however, a striking agreement except for some discrepancies in wave-length such as might easily occur in the measures of the involved nova spectrum. This is interesting and suggestive, but, as Prof. Wright says,

the existence of nitrogen in the star can hardly be said to be proved.

Bright bands, possibly related to two found in gaseous nebulæ, were seen in the January spectra of the nova, and a spectrogram taken on March 30 shows that the nova had then arrived at the nebula stage; bands at or near λλ 4861, 4959, 5007, 5752±, and 6563 were recorded.

THE RADIAL VELOCITY OF α CYGNI.—The study of thirteen spectrograms taken at the Pulkowa Observatory confirms the variability of the radial velocity of α Cygni, first discovered at the Yerkes and Lick observatories in 1910. In No. 38 of the *Mitteilungen der Nikolai-Hauptsternwarte zu Pulkowo* Herr G. Neuimin publishes the data and results he obtained from the measures, and directs special attention to the fact that the velocities deduced from eighteen metallic lines vary considerably and consistently from those obtained from the measures of the three hydrogen lines Hδ, Hγ, and Hβ. The range of velocities, relative to the sun, as derived from the metallic lines, is from −17·6 to +2·47 km., and from the hydrogen lines −21·1 to +5·5 km.; the mean difference between the two sets of velocities, from seven plates on which both sets were measured, is +9·1±1·21 km. per sec.

Prof. Belopolsky confirmed this result by independent reductions, using seven iron, two each calcium and magnesium, one helium, and four hydrogen lines. Apparently the helium line agrees with the hydrogen lines in differing consistently from the lines of the various metals; the results show a mean difference, metallic−hydrogen, of +7·1±0·9 km. On two of the spectrograms the calcium lines H and K are apparently double.

THE DISTRIBUTION OF VARIABLE STARS.—Plotting the positions of 678 variable stars given in the *Annuaire du Bureau des Longitudes* (1909), M. Anestin, of Bucharest, finds the known agglomeration in the Milky Way and the condensations in Aquila, Lyra, Cygnus, Sagitta, Cepheus, and Cassiopeia. Near the N. pole of the galaxy, between 10h. and 12h. R.A. and +20° to +40° declination, there is but one variable as compared with twenty in a fourth the area in Aquila and Lyra. Long-period variables show a tendency to grouping, but the irregular variables are more evenly distributed except for an agglomeration in Cygnus.

In the southern hemisphere, 664 variables crowd towards the galaxy, but between 6h. and 10h. R.A. there appears a space almost devoid of them, which covers part of the region, 6h. 30m. to 14h., also devoid of novæ. The region thus avoided by the temporary and variable stars is, as M. Flammarion pointed out, the least complex and least dense large area of the Milky Way (*L'Astronomie*, April, p. 184).

THE VARIATION OF S ARÆ.—No. 3, vol. xxxiii., of *The Astrophysical Journal* (April, p. 197) contains an interesting paper by Dr. A. W. Roberts, in which the author propounds a theory to account for the peculiar light-curves of such "cluster-variables" as S Aræ. The general features of this type of light-curve are short period, a long stationary minimum, a very sudden rise to maximum, and a leisurely decline to minimum. After carefully studying the variation of S Aræ, Dr. Roberts suggests that such a light-curve may result from a combination of two distinct variations. The primary curve would be that of a Cepheid variable, depending upon an intrinsic variation of a bright star. The superimposed curve would be that of an Algol variable, and the theory demands that this shall be caused by the eclipse of the very bright, but relatively small, satellite by a larger, dark primary; the satellite is the Cepheid variable. There are various objections to such a theory, but the main observed facts are in favour of it. The great variation of the smaller star might be explained by the fact that the distance separating the pair is very small; thus the smaller companion may be revolving in a path which carries it through the rarer atmosphere of the larger star, the absorption of this atmosphere accounting for the change in apparent brightness.

THE "ANNUAIRE ASTRONOMIQUE" FOR 1912.—The Royal Observatory of Belgium is to be congratulated upon getting this useful *Annuaire*, for 1912, published so early, for although it necessitates omissions from the *revue* section, it facilitates the work of a number of the practical astronomers the book is intended for. The comprehensive list of observatories is omitted from this issue, but is to be republished every two or three years. In addition to the usual tables, ephemerides, "phenomena," &c., there are valuable articles on the tides, the universal time system, and, in a supplement bound with the *Annuaire*, Dr. Stroobant's work on the recent progress of astronomy.

THE ROYAL SOCIETY CONVERSAZIONE.

THE gentlemen's conversazione of the Royal Society was held in the society's rooms at Burlington House on Wednesday, May 10. The fellows and guests were received by Sir Archibald Geikie, K.C.B., president of the society, and many objects and experiments of scientific interest were exhibited. During the evening the Hon. R. J. Strutt gave a lecture on the afterglow of the electric discharge and on an active modification of nitrogen, and Mr. Joseph Barcroft lectured on adaptation to high altitudes in relation to mountain sickness. Experiments were shown by Prof. Strutt to prove that the well-known "afterglow" of Geissler tubes containing air is a phosphorescent flame, produced by the reaction of nitric oxide and ozone formed in the discharge. It was shown that nitrogen gives rise to a different kind of afterglow. The latter is regarded as resulting from the formation of an active modification of nitrogen, which slowly reverts to the ordinary form with luminosity. It was also shown that acetylene is spontaneously inflammable in this active nitrogen, and burns to cyanogen, the flame showing the characteristic spectrum of that gas.

Following our usual custom, we give a summary of the official description of exhibits, related subjects being here brought together for convenience of reference.

The Astronomer Royal.—(1) Model of orbit of Jupiter's eighth satellite. The model shows the path of the satellite around Jupiter from 1908 to 1916 as predicted by Dr. P. H. Cowell from the observations made in 1908 and 1909. The orbits of satellites VI. and VII. and of the inner satellites are also exhibited to scale and in their proper planes. The scale is 80 inches equal 1 solar unit, or 1 inch equals 1,160,000 miles. (2) Globe showing the motions of the two main star streams. The model has been constructed to show how an examination of the directions of motion of the stars reveals the presence of two great streams of stars. The statistics of the motions in different parts of the sky are summarised by the diagrams on the globe; it can be seen that for each region there are two "favoured directions" of motion in which the stars move in greatest numbers. These directions are traced on the globe, and converge to two apices. *The Director, Khedivial Observatory, Helwan, Egypt.*—Photographs of Halley's comet taken with the 30-inch Reynolds reflector by Mr. H. Knox Shaw. The photographs exhibited cover the period from April 16 to June 10, 1910. *Lowell Observatory, Arizona, U.S.A.*—(1) Photographic negatives of Halley's comet taken at the Lowell Observatory, May 4 to June 5, 1910. (2) Plates of slit spectrograms of Halley's comet. (3) Plates of slitless spectrograms of Halley's comet. Three important deductions follow from the photographs and spectrograms:—(i) The identification, by Dr. Slipher, of the three chief bands in the comet's spectrum as those which Mr. Fowler has shown to be the bands of carbon monoxide when under very low pressure. (ii) The totally diverse gaseous constitution pointed out by Dr. Slipher between the emissive constituents of the head and tail—the bright gases of the one being strong where those of the other are weak, and *vice versa*. (iii) Measurements by Prof. Lowell on knots in the photograph showed an accelerated velocity away from the head, as follows:—

	Angular distance from the nucleus to the point measured in the tail	Velocity of the point of the tail away from the nucleus
Knot 1	° 1 28	13·6 miles a sec.
Knot 2	3 12	17·2 ,, ,,
Knot 3	4 36	19·7 ,, ,,
Knot 4	6 15	29·7 ,, ,,

This, taken in connection with the spectrograms, disclosed