

duced as a direct consequence of changed conditions, and he adds, "I do not accept mutations at all, neither as a direct consequence of changed conditions, nor spontaneously, as being sufficiently proven." The writer of the notice regrets that he should have misrepresented Dr. Sirks's opinions. The criticism arose out of passages in chap. xiv., and referred in particular to the confident narration of Tower's alleged discovery of a sensitive period in the life of a beetle, during which its germ-cells could be modified by external conditions. Dr. Sirks summarised the account in a statement which may be translated thus. "In other words: without any doubt Tower succeeded, by means of very abnormal conditions of life, in breeding from the original form *Leptinotarsa decemlineata* offspring which had lost one hereditary factor; he called these 'mutants,' the name which is generally given to forms suddenly arising which exhibit hereditary variations." Nothing could be more explicit. In continuation, however, Dr. Sirks

definitely dissociates himself from the interpretation of the alleged new forms as mutants. The objection should therefore have been expressed differently. It was not the interpretation which seemed to the reviewer unfortunate or uncritical, but rather the unqualified repetition of sensational reports which, though they have attained some currency, are gravely in need of confirmation.

MESSRS. BENN BROS., Ltd., announce a new series of monographs dealing with gas and fuel. The first three volumes will be "The Administration and Finance of Gas Undertakings, with Special Reference to the Gas Regulation Act, 1920," by G. Evetts; "Gasworks Recorders," by Dr. L. Levy; and "Modern Gasworks Chemistry," by Dr. G. Weyman. The same firm will also publish shortly "Practical Optics for the Laboratory and Workshop," by B. K. Johnson, and "The Bronze Age and the Celtic World," by H. J. E. Peake.

### Our Astronomical Column.

SEPTEMBER METEORS.—Though September is not a month in which any rich shower of meteors is periodically visible, a considerable number of meteors and many radiant points of moderate activity should be seen. Fireballs are also particularly abundant during the month, especially on September 13-15, and again on September 24-28. The principal systems of meteors at this time of the year radiate from Aries, Perseus, Auriga, and other constellations in that part of the heavens. At the middle of September there is usually a strong display of  $\epsilon$  Perseids from  $61^\circ + 36^\circ$ ; there is also a prominent shower from near  $\alpha$  Cygni, at  $314^\circ + 48^\circ$ , and swift, streaking meteors from the Lynx frequently manifest themselves. September is, in fact, usually a productive period for the meteoric student, and further watching may reveal a somewhat rich annual display that hitherto has not received the notice it merits.

INVISIBLE SUNSPOTS.—In the year 1908 Dr. G. E. Hale published (Contributions from the Mount Wilson Solar Observatory, vol. i., No. 26) his discovery of solar vortices. This vortex hypothesis assumes that a sunspot resembles a vast tornado in which electrified particules, due to ionisation in the solar atmosphere, are rapidly whirled. The invariable presence of a magnetic field, caused by the revolving charges, confirmed this view, but it was also supported by other results of observation with the spectrograph and spectroheliograph. It was found also that most sunspots were associated in pairs of opposite magnetic polarity, and 61 and 33 per cent. respectively of 970 spots were observed as bipolar and unipolar. The fact that some groups oscillated between unipolar and bipolar types, one or more small spots appearing and disappearing within the mass of calcium flocculi, suggested to him the idea of looking for invisible spots. That these might be found seemed most probable, there being vortices giving appreciable magnetic fields without any actual visible sunspots. Dr. Hale now describes his recent investigation in this direction (Proc. Nat. Acad. of Sciences, U.S.A., vol. 8, No. 7). The method he adopts is a device for rendering feeble magnetic fields visible by the Zeeman effect, and details of the procedure are given in his paper. Suffice it to say that he has found a great number of cases in which

a local magnetic field was observed where no spot was recorded. He points out the importance of making systematic observations of invisible spots, especially during the periods preceding and following the visible life of those that reach maturity, in order to assist in revealing the cause of sunspot formation.

ABSOLUTE MAGNITUDES OF STARS.—Several years ago Prof. H. N. Russell produced a striking diagram of absolute magnitudes, on which the theory of giant and dwarf stars was based; it met at first with some opposition, but has gradually won its way to general acceptance. The number of stars of which trustworthy parallaxes (photographic, spectroscopic, and hypothetical) have been obtained, has now been greatly increased, and Dr. Heber D. Curtis has prepared a revised diagram, which is reproduced in the Journal of the R.A.S. of Canada for July-August. It contains 2375 stars, and shows the division into giants and dwarfs very plainly. The gap between them is complete in type M, but begins to be filled by a few stragglers in type K0, suggesting that this may be the maximum temperature attained by stars of small mass. In types G and K the giants outnumber the dwarfs, but the reverse holds in type F. The giants here are comparatively few, but they include some of remarkable luminosity.

Broadly speaking, the regions of maximum frequency form two straight lines; that of the giants forms a horizontal line at magnitude +1; that of the dwarfs slopes downwards from +1½ at type A0 (the giants and dwarfs being here mingled) through +5 at type G5 (so that the sun is an average star of its type) down to 8 or 9 for M.

The diagram suggests to Dr. Curtis the conclusion that a sensible number of B-stars have parallaxes of the order of 0".02; he notes that stars of this type are being put on the working lists at the Allegheny and Leander McCormick Observatories. These stars cannot as yet be investigated for parallax by the spectroscopic method, so that the results of these measures will be awaited with interest. It will be remembered that the results have a bearing on the adopted distances of the globular clusters. The fainter the absolute magnitude found for the average B-star, the nearer we must put the clusters.