

own super-galaxy and those in Centaurus, together with an unknown number of others which we have not yet discovered, constitute our super-galaxy of the second order. Beyond the borders of our super-galaxy of the second order there is not limitless unoccupied space. At distances that are enormous in comparison with its diameter there are other super-galaxies of the second order, in a general way similar to our own. These super-galaxies of the second order are not unrelated cosmic masses lying in the vast void of space, but they constitute similarly a super-galaxy of the third order whose diameter may be a million times that of a super-galaxy of the second order. Now the process of ascent is clear. Each cosmic group, however great, is a minute unit in that of the next higher order, and the sequence continues without limit."

Perhaps Kant, and Moulton, are going too far by assuming an infinite number of galaxies. However that may be, the fact that the existence of at least a hundred million disk-like world islands in slow rotation is to-day well established must fill us with admiration for the genius who, correctly interpreting the very few astronomical observations available, believed in such a universe two hundred years ago.

<sup>1</sup> Dingle, H. (Editor), "A Century of Science", 165 (Hutchinson, London, 1951).

<sup>2</sup> Dingle, H., *Annals of Science*, 6, 404 (1950).

<sup>3</sup> Paneth, F. A., *Endeavour*, 9, 117 (1950); *Nature*, 166, 49 (1950).

<sup>4</sup> Hastie, W., "Kant's Cosmogony" (Glasgow, 1900).

<sup>5</sup> Leonard, F. C., *Pub. Astro. Soc. Pac.*, 51, No. 302 (1939).

<sup>6</sup> Moulton, F. R., "Astronomy", 530 (New York, 1935).

## NEWS and VIEWS

### Expulsion of Corpuscular Streams by Solar Flares

A PAPER by F. D. Kahn on the "Expulsion of Corpuscular Streams by Solar Flares" (*Mon. Not. Roy. Astro. Soc.*, 110, 5; 1950) gives the results of his investigation of the minimum momentum density in a corpuscular stream emitted from a solar flare which is responsible for a terrestrial magnetic storm. It has been suggested by K. O. Kiepenheuer, F. Hoyle and also by Kahn that radiation pressure due to the flare may cause the expulsion of the cloud, but now it seems very doubtful if this is the mechanism of expulsion. Kahn shows that, under certain reasonable assumptions, the rate at which momentum is given to the stream by the flare must exceed  $10^3$  dynes/sq. cm; to cause a magnetic storm. While Hoyle obtained a much smaller value than this, he assumed that the particles are emitted radially from the sun, rather than radially from the flare, and he neglected the longitudinal expansion of the stream, which Kahn has taken into consideration. Radiation pressure can act on the particles in two ways: in the resonance process the atoms may absorb resonance radiation coming from the flare, and re-emit at random; in the ionizing process the atoms may be ionized by radiation coming from the flare. It is shown that the former is utterly inadequate to explain the cause of the expulsion, and the efficiency of the latter is next investigated. In the ionizing process, pressure is exerted by ionizing radiation in a way similar to that exerted by resonance radiation, but in the former case the ions which are formed have to re-combine with electrons before they can again be acted on by photons. An upper limit to the effectiveness of radiation pressure can be fixed by the rate of combination, and the acceleration of the cloud by the radiation is investigated, leading to the conclusion that the initial density exceeds  $4 \times 10^{15}$  particles/c.c. if a cloud can be expelled. As the density of the solar atmosphere in the vicinity of a flare is very much less than  $4 \times 10^{15}$  particles/c.c., the ionizing process also fails. It seems, therefore, that some entirely different mechanism of expulsion must be found; and, as the required excess pressure near the flare is only of the order  $10^3$  dynes/sq. cm., such a mechanism should not prove too difficult to find.

### Analysis of Blindness in England and Wales

IN Memorandum No. 4 of the Medical Research Council, "The Causes of Blindness in England and Wales" (pp. 42; London: H.M. Stationery Office, 1950; 1s. 6d. net), Sir Arnold Sorsby discusses the statistics of blindness in England and Wales since

the register of the blind was instituted in 1920. In the twenty years up to 1940 the number of people listed on the register rose from 25,840 to 74,418, with 77,390 in 1948. Since 1937 some 6,000-8,000 new cases of blindness have been registered each year. Sir Arnold records his study of the certificates of 19,149 persons accepted as being blind within the meaning of the Blind Persons Act. They were divided into two groups: 17,430 (91 per cent) showed the same cause for blindness of the two eyes, while 1,719 (9 per cent) showed different causes for the two eyes. Within the former group, 77 per cent were more than fifty years of age when they were registered; but the evidence suggests that the causes of blindness operate most strongly in early and later life. Among the totally blind only 10.2 per cent had remediable blindness, and most of these suffered from cataract. The risk of blindness is substantially the same for both sexes. In the group showing different causes for the blindness of the two eyes, 88.6 per cent were more than fifty years of age, 10.4 per cent suffered from remediable blindness, and men were more often affected than women, because many more men were blinded in one eye by injuries. After a discussion of his analysis, Sir Arnold concludes that, even when full allowance is made for continuing decline of blindness caused by infectious disease and for possible elimination of much blindness due to cataract, more than fifty thousand irremediably blind persons will remain blind, and that this estimate may be too low, because the population nowadays is getting older and senile causes of blindness are prominent in any analysis of the blind population. In the school population the rate of blindness has been almost halved in the past quarter of a century, but it is not likely that much further reduction is possible. After discussing the problems ahead of us, Sir Arnold concludes that we need more intensive hospital administration and better hospital facilities. Further, we still need an understanding of congenital and hereditary anomalies of the eye, of its inflammatory diseases, and of myopia, glaucoma, cataract and 'senile' degenerations.

### Imperial College of Science and Technology: New Chemical Laboratories

FIVE new chemical laboratories, with accessory accommodation, constructed in the space formerly occupied by the elementary analytical laboratory, were opened at the Imperial College of Science and Technology, London, on June 15 by Lord Falmouth, chairman of the governing body of the College. On