

hypotheses for the mathematical treatment), the only case of interest may be *the outer magnetic field during magnetic storms*. It would be very interesting to make a careful inspection of the cosmic ray registrations during such a storm (for instance of the order of magnitude of the storm of February 4th, 1872, when auroras were seen almost over the whole earth) in order to discover possible actions due to this field."

It is most interesting that such an effect has just been observed during the recent magnetic storms in April this year, both by Mr. S. E. Forbush in America² and by Prof. Victor F. Hess and A. Demmelmair in Europe³.

We have here an effect analogous to the effect of magnetic storms on auroras, driving the aurora zones away from their usual situations and towards the magnetic equator as the intensity of the storm increases.

The mathematical theory of the motion of electric particles in the earth's magnetic field, which I developed⁴ so long ago as 1904, and which Mr. Forbush attributes to Lemaître and Vallarta, receives by these new facts renewed interest and suggests continual observations of cosmic rays both in high and low magnetic latitudes, because the solar activity and magnetic storms both approach their maximum intensity.

CARL STÖRMER.

Institute for Theoretical Astrophysics,
University, Blindern,
Norway.

¹ "On the Trajectories of Electric Particles in the Field of a Magnetic Dipole with Application to the Theory of Cosmic Radiation, Sixth Communication", *Astrophysica Norvegica*, [ii] 4, 195 (1937).

² *Phys. Rev.*, 51, 1108 (1937).

³ *NATURE*, 140, 316 (1937).

⁴ For details see Oslo University Observatory Publications No. 10, Oslo 1934, and *Phys. Rev.*, 48, 835 (1934).

Points from Foregoing Letters

As an example of the ease with which equilibrium diagrams of alloys containing three elements can be obtained, by means of X-ray analysis, A. J. Bradley, H. J. Goldschmidt, H. Lipson and A. Taylor submit a diagram for the copper-nickel-aluminium system. It shows the phases present at different percentage composition, after a uniform heat treatment (slow cooling at 10° per hour; equilibrium not necessarily established). The X-ray method gives at the same time the number, nature and relative amount of phases present and the lattice space of each phase.

Dora Ilse describes experiments on the response of egg-laying butterflies to coloured papers; these indicate that colour vision in the cabbage butterfly, *Pieris*, is different from that in the hive bee and most other insects and nearer to that of man. The cabbage butterfly in the stage of egg-laying reacted to a range of colours from 'emerald green' to 'oxide blue' and responded also to simultaneous colour contrast (green induced on white background adjacent to purple).

Dr. G. Wald has extracted from chicken retinas rhodopsin and the photo-labile pigment of the cones, heretofore unknown. The shift in visual sensitivity toward the red on light adaptation (Purkinje effect) in the chicken appears to depend upon the spectral characteristics of these pigments. The cone pigment, for which the name iodopsin is proposed, is apparently violet in colour and bleaches to coloured products.

From the data of Barcroft and his associates, Dr. S. R. M. Reynolds has estimated the efficiency of the maternal circulation of the uterus of the rabbit between the fourteenth and twenty-eighth days of gestation. It is found that the minute-volume turnover of blood in the uterus increases until the twenty-second day, after which it decreases sharply. This decrease in the efficiency of the uterine circulation is coincident with a period of diminished uterine growth and accelerating foetal growth. It is suggested that with the onset of increasing distention the uterine circulation is impeded, but as the influence of distention becomes more marked, the circulation through the uterus is aided, chiefly by the increasingly effective contractions of the myometrium which occur as gestation nears term.

Cold-treated ('vernalized') wheat grains, imbibed in water and kept in an atmosphere of nitrogen at 20° C., will survive, according to Prof. F. G. Gregory

and O. N. Purvis, for three weeks, and will become devernalized, as shown by a significant increase in the leaf-number and in the time of flowering. Partially devernalized spring rye may again be vernalized by subsequent exposure in air to 1° C.

The artificial preparation, from pure virus protein, of paracrystalline fibres of tobacco mosaic virus is described by R. J. Best. The properties of these fibres are similar in all respects to the spontaneously formed ones previously described in *NATURE*. Bawden and Pirie's demonstration of the presence of nucleic acid in the virus molecule has been confirmed.

Blood examination of five Veddahs from Ceylon, reported by Prof. W. C. O. Hill, showed two of them to belong to the blood-group *B* and three to blood-group *O*. The author believes that examination of a larger number of individuals will probably show that they are similar to the Australian aborigines. He also gives tables showing the blood-groupings of peoples from the island and the percentage blood-groups in each. In all communities of Ceylon which have been studied, group *O* takes the highest place, except in the Moors, where group *O* and *B* are in equal proportion.

A table is given by M. Mokhtar and Dr. A. M. Mosharrafa showing fourteen recognizable intervals into which an octave, in modern Egyptian music, could be subdivided, compared with the diatonic and the equitempered scales. The notes were obtained by means of a *Qanun*, an instrument consisting of strings on a sounding board, and the frequencies were measured by means of an audio-frequency valve oscillator calibrated with a set of standard tuning forks.

From extensive studies on the absorption spectra of crystals of hydrated sulphates of the rare earths at different temperatures, Spedding and his co-workers have concluded that the crystalline electric fields acting on the rare earth ions in these crystals should have cubic symmetry. Prof. K. S. Krishnan and A. Mookherji now report marked magnetic anisotropy of these crystals, which does not support this conclusion.

Prof. C. Störmer quotes a statement which he published last January, indicating on theoretical grounds the possibility of an interrelation between magnetic storms and the intensity of cosmic rays, which has since been observed by Forbush in America and by Hess and Demmelmair in Europe.