

atmosphere, but also of the absorbing material—the density and constitution at great heights. Neither of these two can be calculated unless the temperature is known, as well as the proportion of light gases in the lower layers.

The author deals first with the aurora and considers there is little doubt that it is due to electric discharge caused by charged particles projected from the sun, and points out that a knowledge of the nature and velocity of the radiations would enable more information to be obtained by spectroscopic means about the layers in which they are being absorbed. However, the presence of some lines due to nitrogen has been established, though the origin of the most prominent green line is still the subject of discussion and experiment in cryogenic laboratories. Reference is also made to the measurements of auroral height by simultaneous photographs from widely separated stations (illustrated by photographs), and to the faint green line observed in the light of the night sky and considered to be unconnected with the polar aurora.

The information obtained from observation of the small particles of iron or stony material known as meteors, while being vaporised by the high speed of their travel through the atmosphere, is next considered. Observation at two stations of the apparent path among the stars enables the height of appearance and disappearance, the length of path, speed and brightness to be determined. By calculation from these, it is possible to infer that the temperature of the isothermal layer (about 220° Abs.) continues to a height of some 55 km. in mean latitudes, while the temperature rises to about that at ground level above 60 km. Confirmation of a discontinuity in the atmosphere at this height is given by the fact that very few meteors disappear about the level of 55 km. The suggestion is that this rise in temperature is due to the formation of ozone from oxygen by the action of ultra-violet radiation from the sun, and by the absorption of some of the sun's rays by the ozone so formed. It is the layers ionised by ultra-violet radiation from the sun, and the electric currents set up in these ionised layers by tidal movement of the atmosphere, which are considered to be responsible for the diurnal variation of the earth's magnetic field. Reference is not made to the large variation observed at stations near the auroral zones and its great enhancement in winter on magnetically disturbed days. The importance of this observation lies in the possibility that the ionisation due to the aurora in these zones may be comparable with that due to sunlight—a matter of possible interest in the transmission of radio signals within and across the polar regions.

The author includes brief references to night lumin-

ous clouds and the propagation to great distances of the sound caused by large explosions, quoting with approval Mr. Whipple's suggestion that the temperature increase above 60 km. may be responsible for the bending down of the sound waves which have penetrated to this height.

The paper naturally does not discuss in any detail the most recent views regarding the effect of the ionised layers and their height on radio transmission. We can, however, regard it as a matter for congratulation that the increasing use of radio is likely to enhance general interest in the study of those natural phenomena which cause ionisation in the upper atmosphere.

### Our Bookshelf.

*Allen's Commercial Organic Analysis.* Edited by Samuel S. Sadtler, Dr. Elbert C. Lathrop, and C. Ainsworth Mitchell. Vol. 4: Special Characters of Essential Oils; Resins, India-rubber, Gutta-percha, Balata, and allied Substances; the Constituents of Essential Oils, and allied Substances; the General Characters and Analysis of Essential Oils. By the Editors and the following contributors: E. K. Nelson, G. A. Russell, Ernest J. Parry, John B. Tuttle. Fifth edition, entirely rewritten. Pp. x+648. (London: J. and A. Churchill, 1925.) 30s. net.

An increase of 174 pages in this volume compared with the corresponding volume in the previous edition, published sixteen years ago, gives some indication of the advance in the chemistry of essential oils in recent years. Except for a short section of 55 pages on rubber, this book is practically confined to the subject of essential oils and resins. In its present form it is indispensable as a reference book. With a more intimate connexion between the sections than in earlier volumes, it has been possible to restrict the number of contributors so that more uniformity in the general treatment might be expected. The only British contributor is Ernest J. Parry, the well-known authority on essential oils. He has written the sections on (a) resins, (b) the constituents of essential oils and allied substances, and (c) the general characters and analysis of such substances. His contributions cover more than half the whole book:

The unsatisfactory arrangement in the fourth edition, with special consideration of hydrocarbons and ketones only, has been changed and a more general treatment of the subject given. Some repetition in methods and descriptions occurs and a fair number of misprints and small errors have been noticed. The statement (p. 68) that spike (lavender) oil is dextrorotatory or that West Australian sandalwood oil (p. 133) "is practically identical chemically" with oil from other sources, does not agree with the reviewer's observations. It is hoped that in later volumes improvements may be made in the index, which is not sufficiently complete for a standard reference book, while some attempt might be made to give cross-references to other volumes in the complete work.

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