strange to find as the frontispiece to a work on Oxford a touched-up aerial view of White Horse Hill, the 'Mecca' of the men of Berkshire. But it will be realized that if criticism is reduced to such trivial points, the real reaction to this book is one of unstinted welcome; every serious student of stratigraphy, whether he works near Oxford or not, will find its facts indispensable and its arguments stimulating.

H. L. HAWKINS

STRUCTURE OF SPECTRAL LINES

High Resolution Spectroscopy

By Dr. S. Tolansky. Pp. xi+292+4 plates. (London: Methuen and Co., Ltd., 1947.) 21s. net.

THE author of this book has given an account of the experimental techniques used in the investigation of the structure of spectral lines; but he has not stated in the introduction whether it is intended to be primarily a historical account or to be a text-book giving a critical description of methods now in use, and the book suffers from a confusion of these points of view. On one hand, there is lacking an account of the work which has been done in the past with the methods described, and on the other hand, obsolete instruments are described in too much detail; and avoidable inaccuracies seriously reduce the value of the book from both of these points of view. In spite of the length of the book, important experimental details have been omitted, too much space having been devoted to academic theoretical considerations.

The first five chapters contain a detailed account of the light sources used for obtaining narrow spectral lines; but a summarized comparison of the advantages and limitations of the different methods is not given. The description of the hollow cathode tube is concerned too much with complicated and obsolete forms of this light source. In the account of the atomic beam the advantages of the method of observation in absorption have not been fully appreciated. For example, it is stated on p. 82, "it is therefore very easy to miss weak components . . .", while in fact it is one of the merits of this method (as of all absorption methods) that it is specially suited to the observation of weak components (the weak components in the potassium resonance lines, due to the rare isotope K41, have been found in absorption, whereas they are not observable in emission).

The last ten chapters are concerned with the optical instruments used for the examination of the structure of spectral lines. A comparison is made between four instruments, the Fabry-Perot etalon, the Lummer-Gehrcke parallel plate, the echelon grating and the ruled grating. The general superiority and greater scope of the etalon is rather understated, and a quantitative comparison of the intensity of the spectra given by these instruments should not have been omitted. The detailed description of two methods, sputtering and evaporation, for preparing the metallic layers for the plates of an etalon is misleading; the impression is given that the former is a method which would still be used, while it has, in fact, been rendered obsolete by the latter. Though very few, and contradictory, measurements are available concerning the reflecting power of transparent layers of silver and aluminium, this property is made

the basis of six different graphs, thus giving a wrong idea of the facts. The most important part of all of these curves, that referring to dense layers as actually used, has been reproduced from data which do not pretend to a high degree of accuracy, and is unfortunately badly wrong. Thus as a consequence of conclusions drawn from the curve giving the relationship between the reflecting power of a layer of silver and the intensity of the maxima of the fringes, it is stated: "The curve has a steep fall in the important region of 0.85 upwards. It is significant to note that an increase in reflecting coefficient from 0.85 to 0.87 (only two per cent) leads to a 50 per cent reduction in intensity. . . . The region in the neighbourhood of the 0.85 reflecting coefficient is therefore highly critical and considered judgment is necessary in preparing such films." If the curve had been drawn correctly it would have shown that the rapid fall in intensity occurs when the reflecting power becomes greater than approximately 0.95. The use of silver layers of this higher reflecting power is of the greatest importance, since it involves an increase by a factor of three in the resolving power and a reduction by a factor of approximately ten in the intensity of the background. The production of evaporated layers of the correct density is necessary for obtaining high resolving power without loss of intensity, and this can be done without the need of "considered judgment" by photo-electric measurement of the density during the course of the evaporation (using the correct value for the reflecting power); but this method is not described.

In the chapter concerned with the compound etalon, too much space is given to theoretical calculations of the properties of this instrument; a description of some of the results which have been obtained and an account of the experimental details of the methods of adjustment would have been of more value. In the discussion of the limitations with regard to the intensity of the fringes and the strength of the subsidiary maxima, the value of this instrument is much underrated on account of the assumption of wrong values for the reflecting power of silver layers and the corresponding intensity of the fringes, taken from the incorrect curve referred to above. A reflecting power of 0.8 is assumed; in fact, a reflecting power of 0.9 can be used without serious loss of intensity; there is then a reduction of the intensity of the subsidiary maxima to a small fraction of that for a reflecting power of 0.8.

The description of the echelon grating lacks an account of the work which has been done with this instrument, and fails to emphasize the importance of its limitations due to the weakness of the spectra as a result of the need for an objective of very long focal length; the advantage of the simplest form of mounting which reduces loss of light are thus underestimated. The discussion of the aberration which would be introduced by this mounting if an objective of short focal length were used is irrelevant, since the limitations due to the grain of the photographic plate preclude the use of a short focal length.

The scope of the photographs at the end of the book is rather limited, since the author has not reproduced photographs made by other workers.

Although serious errors and omissions reduce its value, this book contains much information useful for workers in high-resolution spectroscopy concerning which no comprehensive treatise has hitherto been available.

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