and $\omega''e = 1006$ cm.$^{-1}$, and the triplet separations, it appears that *the new system must involve at least one* $^3\Pi$ *state of the normal* TiO *molecule*. It seems likely that the lower level of the transition is the known $X^3\Pi$ state, and that this is actually the ground state of the molecule. The upper level might be a singlet level (intercombination system) or a previously unobserved triplet level. The latter case is the more probable, and the weakness of the system in emission might be explained if the absorption took place to, say, a $^3\Sigma$ level situated above another $^3\Sigma$ level lying so low that the corresponding bands have wave-lengths too long to have been observed up to now.

The plates used in this investigation were taken with the 200-inch and 100-inch reflectors at the Mount Wilson and Palomar observatories and were made available by the kindness of Drs Bowen and Merrill. The work was supported in part from funds granted to the Ohio State University by the Research Foundation for aid in fundamental research.

19. SUR LA TEMPERATURE DES ETOILES R ET N

Par R. Bouigue

Des mesures spectrophotométriques effectuées aux Observatoires de Haute Provence et de Toulouse ont permis d'établir une relation entre l'intensité des raies D du sodium et la température de vibration déduite des quatre séquences suivantes: séquences +4 et +5 pour CN (syst. rouge) et séquences −1 et −2 pour C^2 (syst. de Swan). Ces deux quantités et la considération de l'intensité de la bande 6260 A. constituent trois critères de classification situés dans une zone spectrale relativement étroite (5400–6800 A.) et toujours observable, ces critères montrent que la classe des étoiles carbonnées se divise en trois sous-classes distinctes qui se raccordent aux environs de C 6.

20. THE VIOLET AND ULTRA-VIOLET REGIONS OF THE SPECTRA OF THE N-TYPE STARS

By P Swings, A. McKellar and K. N. Rao

Introduction

The violet and ultra-violet regions of the spectra of the cool carbon stars are notoriously difficult to photograph. This is so particularly for the late N-type stars with which the present paper deals. The spectra of R-type and early N-type stars can be photographed down to λ3500 by exposures several times as long as for M-type stars of comparable class. However, the later N-type spectra fall so rapidly in intensity from λ4400 and so even more extremely from λ4100 to shorter wave-lengths that the spectra of the brightest stars have not been recorded below λ3900.

The earlier investigators (e.g. Shane, 1920) were well aware that the extreme decrease in intensity toward the violet was much more than expected from a source at the temperature indicated for late N-type stars, but observations did not reveal the source of opacity. In 1947 Shajn and Struve photographed the spectrum of UU Aur (N3) to about λ3900 and by comparing it with an M-type spectrum advanced reasons for supposing the source of extra opacity in the violet and ultra-violet to be at least partly molecular absorptions.

In 1948 McKellar described a survey of the spectra of several N-type stars in the λ4000 region, and noted that a well-marked group of absorption bands occurred in the spectrum of Y CVn. The strongest band was at λ4053, and the group was tentatively identified with the λ4050 group first produced in the laboratory by Herzberg and long known in emission in cometary spectra.

To digress for a moment on the subject of the λ4050 bands, when they were produced in the laboratory in 1942, there appeared good reasons for attributing them to CH_2.

https://doi.org/10.1017/S0251107X00033095 Published online by Cambridge University Press