

slightly prismatic, with the result that each grating produces a slightly different focus. In order to eliminate this defect it was proposed to place all of the replicas between two optically figured glass plates 18 inches in diameter. The difficult task of lining up the replicas on one of these plates is now being undertaken by Professor Wood.

For ultimate perfection two identical and interchangeable Schmidt correction plates should be available. The replicas may then be mounted and lined up on one of these Schmidt plates, the other plate being used for direct photography. This arrangement will do away with the unnecessary losses caused by the additional reflecting surfaces of the two glass plates between which the replicas are now sandwiched.

Our sincere thanks are due to Professor Wood for his very generous co-operation.

CALIFORNIA INSTITUTE OF TECHNOLOGY

PASADENA, CALIFORNIA

June 1941

ON THE EMISSION LINES IN THE SPECTRUM OF
BD + 20° 2465*

BY P. SWINGS AND O. STRUVE

This star is one of the latest-type dwarfs in which emission lines have been observed. Its visual absolute magnitude is 10.8 and its spectrum was classified as M4e at Mount Wilson,¹ as M3+ by Morgan, and as M4 by Kuiper; it is not known to be a variable. Recent spectrograms taken at McDonald Observatory reveal very intense bright *Ca II* lines, besides the Balmer emission lines; H is somewhat stronger than *Hε*, but the latter is of normal intensity being about intermediate between *Hδ* and *Hζ*. Since in the Me variables *Hε* is abnormally faint,² it is

* Cin 1244; α (1900) 10^h 14^m; δ (1900) +20° 22'; $m = 9.4$; $\mu = 0''.49$; $\pi_{tr} = 0.193 \pm .008$.

¹ Adams, Joy, Humason, and Brayton, *Ap. J.*, **81**, 236, 1935. The spectrum has not been described in detail.

² P. W. Merrill, *Ap. J.*, **93**, 40, 1941.

probable that the origin of the emission lines in the few peculiar M-type dwarfs differs fundamentally from that in the Me variables. Although the spectral type of BD + 20° 2465 is much later than that of YY Geminorum (Castor C) which, according to Morgan and to Kuiper, should be classified dK6+, the two bright-line spectra are very similar. YY Geminorum is intrinsically the faintest eclipsing system known (visual absolute magnitude 8.9). The striking similarity in line emission suggests that BD + 20° 2465 may also be double and that the binary character may be responsible for the primary emission. Our recent investigations of binaries combining absorption features of late type and bright lines of high excitation have led to the suggestion that binary character stimulates the formation of emitting shells or layers; it will be interesting to verify whether a similar process is responsible for the line emission in Me dwarfs. In the case of BD + 20° 2465, it is planned to secure additional spectrographic observations at the McDonald Observatory; four determinations of radial velocity have been made at the Mount Wilson Observatory and the value adopted in the *Lick Catalogue* is $V = +9.0 \pm 2.3$ km/sec.

Vyssotsky has recently found³ that the close binary Ross 614 (abs. mag. + 13) is of type M2 and has emission at $H\gamma$; he remarked that "a large proportion of the few known Me dwarfs have been found to be binaries of small separation."

McDONALD OBSERVATORY
June 1941

A DISTANT PLANETARY NEBULA

BY PAUL W. MERRILL

A minute planetary nebula was discovered by means of a well-marked bright $H\alpha$ line on an objective-prism photograph taken by William C. Miller on October 7, 1939, with the 10-inch telescope. The line is probably present, although not very dis-

³ *Harvard Announcement Card*, No. 550, 1940.