

zones, a figure that agrees almost exactly with the computed difference as furnished me by Professor Hastings. A comparison of curves *A*, *B*, and *C* with *D* and *E* shows that this difference, instead of being removed or diminished by the introduction of the correcting-lens has on the contrary been increased by about 0.6 mm, so that the difference in focus between outer and central zones is now about 2.5 mm, which, as before stated, will give a confusion disk nearly 2" in diameter. I wish to point out, before leaving these curves, how the form of the curve is maintained throughout from *F* up to *A* except that the axis of the curve is inclined downward by the chromatic differences in the photographic region, and further tilted by the introduction of the correcting-lens. To show this I have dotted in approximate positions of such axes in the curves *E* to *A* to correspond with the horizontal axis in *F*. It will be noticed that the irregularities in the visual curve are continued throughout, but in an intensified form, as is to be expected when it is considered that the objective was computed and figured for visual work, and its use in the photographic region with an auxiliary corrector was only a secondary consideration.

I see no reason to doubt, however, if sufficient positive aberration were left in the correcting-lens to compensate for the negative aberration introduced by the chromatic differences, that the performance of the system could be much improved, although it is not likely, from the magnifying of the unavoidable zonal aberrations, that it would equal its visual quality. If the curve *A*, Fig. 3, representing the present condition of the system, could be tilted through the angle between the horizontal and dotted lines, by such a change in the correcting-lens, the resulting confusion disk would certainly have a diameter less than half its present magnitude, while the percentage of the incident star light transmitted by the slit would be considerably increased, probably doubled, with a proportionate diminution of the required exposure times for stellar spectra.

Such an improvement would be well worth considerable effort, and I have been in communication with the Brashear Company and with Professor Hastings to that end. With their well-known willingness, I may even say anxiety, to produce the highest quality of optical work and to make any improvements that may be suggested