From the geometry of an orbit,

$$F = M \sin^2 i \cos^2 \Omega (1 - \sin^2 i \sin^2 \Omega)^{\frac{1}{2}}, \quad (2)$$

and

$$\bar{F} = 0.305 \bar{M} \quad (3)$$

for averages of a large number of cases.

The values of F with unit of mass equal to 10^9 suns derived from these observations range from 0 ± 0.05 to 111 ± 22 , and are distributed roughly as expected from equation (3); i.e., there are a large proportion of small values. From $\bar{F}$ calculated with and without errors added, we find

$$\bar{M} = (5.2 \pm 1.7) \times 10^{10} \text{ suns.}$$

This value depends strongly on the four or five largest values of F ; however, it is not changed appreciably by eliminating the ten observations of lowest weight, or by considering the data in two groups, or by including five previously published measurements of Δv of lower accuracy. Two observed values of F are greater than $\bar{M}$: 111 for NGC 2872-2875 and 76 for NGC 4782-4783. Although the data are neither accurate enough nor numerous enough to warrant an investigation of the variation in M , they are consistent with the assumption that a third of these galaxies have $\bar{M} = 13 \times 10^{10}$ and the other two-thirds, $\bar{M} = 0.4 \times 10^{10}$ suns.

*Yerkes Observatory,
Williams Bay, Wis.,
and McDonald Observatory,
Fort Davis, Tex.*

Pearce, Joseph A. Dimensions of a new eclipsing variable, HD 44701.

The orbital elements of this 7th magnitude star in Monoceros, discovered by the author, were determined from 18 spectrograms on which the velocities of both stars were measured. The observations secured during the years 1927-1951 extend over 7300 cycles of the binary system. Two least-squares solutions were performed to derive the following spectrographic elements:

T	=	Hel. J.D. 2424942.639	± 0.0499
P	=	1.190241	± 0.0000005 days
e	=	0.062	± 0.012
ω_1	=	341° 85	$\pm 15^\circ 44$
V_0	=	+5.50	± 1.88 km/sec
K_1	=	170.90	± 2.28 km/sec
K_2	=	256.85	± 5.16 km/sec

The relative luminosity of the components $\Delta m = 1.31 \pm 0.24$ and the ratio of their radii $k = 0.70 \pm 0.07$ were determined from microphotometric tracings of 6 spectra; these data enable

us to determine the absolute dimensions of the system.

Physical characteristics	Brighter star	Fainter star
Spectral Type	B4	B7
Temperature	17000°K	13000°K
Absolute magnitude	-0.3	+1.0
Mass	6.84 $\odot$	4.54 $\odot$
Radius	2.44 $\odot$	1.71 $\odot$
Density	0.47 $\odot$	0.91 $\odot$

Orbital inclination $i = 71^\circ$; separation $A = 10.62$ solar radii, or 7.39×10^6 km.

These class B stars have normal masses but smaller radii and therefore are considerably denser than stars of this spectral class.

Photometric observations made at the Commonwealth Observatory, Canberra, detected the shallow eclipses of this dwarf binary system.

*Dominion Astrophysical Observatory,
Victoria, B. C.*

Pierce, A. Keith, Robert R. McMath and Orren Mohler. Solar spectroscopy with echelles.

The echelle grating has the advantage of compressing a large spectral range into a small angle about the blaze direction. A 150×75 mm echelle has been installed at the McMath-Hulbert Observatory in an optical system using 14-foot focal length concave mirrors for collimator and camera. The observed resolving power at $\lambda 5000$ is about 250,000 with plate dispersion 2.9 mm/Å. The instrumental profile shows a narrow central peak with a strong satellite line at about .05 Å from the central peak. Photographs of the solar spectrum, prominence spectra, and of a Zeeman triplet in a sunspot magnetic field have been made.

*McMath-Hulbert Observatory,
University of Michigan,
Pontiac, Mich.*

Roach, Franklin E. and Frank Bradshaw Wood. The atmospheric structure of the K component of ζ Aurigae.

A study of the photoelectric observations at the last two favorable eclipses, 1939 and 1947-8, shows the following factors:

1. The eclipse began in the ultra-violet before it did in the blue.
2. At any given time during the partial phases, the fraction of light lost is greater in the shorter wave lengths.
3. A systematic displacement in phase exists between the 1939 observations and those taken, in the same wave lengths, in 1947. This can be most reasonably explained by the assumption of