great circle distance between their centers was $7^{\circ} 30'$.

This series of photographs presents an interesting study of the behavior of seeing.

Las Cruces, N. Mex.

Underhill, Anne B. An O5 model atmosphere.

A model atmosphere in radiative and mechanical equilibrium with $T_0 = 35,000^{\circ}$ and $\log g = 4.200$ has been calculated. From the strength of $H\gamma$ and from the electron density the model is found to correspond to spectral type O5 V. The spectral intensity distribution of the emergent flux is computed and it is shown that the integrated flux corresponds to an effective temperature of $44,600^{\circ}$. The emergent flux differs from that of a black body at $44,600^{\circ}$ in the region $\lambda < 1500\text{\AA}$, but the differences are not so large as in the case of an O9.5 V atmosphere. The excess of radiation over that from a black body at the effective temperature of the atmosphere in the wave-length ranges $912 < \lambda < 1500\text{\AA}$ and $228 < \lambda < 500\text{\AA}$ will affect the estimation of the ionization and excitation of interstellar and circumstellar material near O5 stars.

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

Wagman, N. E. and Ellen Jameson. A comparison of present and earlier Allegheny parallaxes.

The increase in accuracy of present Allegheny parallaxes as compared with Allegheny parallaxes of 30 years ago is brought out by recent parallax determinations for 26 stars whose earlier parallaxes were among the first measured here. Averages from the new and the old parallax determinations are shown in the table:

	New Series	Old Series
Plates	33	15.6
No. of comp. stars	4.8	3.6
Mag. of comp. stars	12.4	10
Exposure	194 ^s	23 ^s
Sector opening	0.35%	3.2%
Relative parallax	+ ["] 027	+ ["] 024
P.E. of parallax	± ["] 0049	± ["] 0086
P.E. of unit weight	± ["] 019	± ["] 023
Area	82 cm ²	114 cm ²

The decrease in the probable error of the parallax in the new series is largely due to the increase in the number of plates but there is also a considerable decrease in the probable error of unit weight. This latter decrease may be attributed to better sets of comparison stars made

possible by increased exposures. The last line of the above table shows the decided decrease in the new series in the "area" enclosed by the comparison stars. Large "areas" are a well-known source of error in parallaxes. The "area" is given by $2([X^2] + [Y^2])/n$ where n is the number of comparison stars and X and Y are the coordinates of the comparison stars referred to the parallax star as center.

The average parallax of the new series is in good agreement with that of the old series and would be even better if absolute parallaxes were considered. The average difference between the parallaxes of the new and old series is $^{\circ}.012$. Four of the 26 stars show differences of over $^{\circ}.030$ between the two determinations:

Star	new π	old π	BS π	Sp. π
37 Tau	+10	-22	15	18
Grb. 3215	+56	+21	—	54
111 Her	+18	+51	37	32
24 Vul	+0	-31	7	10

The unit of the table is $^{\circ}.001$ and the parallaxes are relative. The last two columns are the parallaxes given in the *Catalogue of Bright Stars*, 1940, and the spectroscopic parallaxes from the *General Catalogue of Stellar Parallaxes*, 1935, respectively. Over 100 redeterminations of parallaxes are being made.

*Allegheny Observatory,
Pittsburgh, Pa.*

Whipple, Fred L. and Salah El-Din Hamid. On the origin of the Taurid meteors.

The great Taurid (or Taurid-Arietid) photographic meteor streams, as shown previously by Wright and Whipple, persist from October 14 to November 30. The radiants move together along two nearly parallel radiant paths, equidistantly spaced $3\frac{1}{2}^{\circ}$ north and south of Jupiter's orbital plane. The orbital elements of nine doubly-photographed Taurids are largely functions of the longitude of the sun and only slightly dependent, except for Ω and ω , upon the meteors' association with the weaker northern stream or the stronger southern stream. Particularly is this true of the perihelion distance, q . The total observed range in q is large, from 0.24 a.u. to 0.48 a.u., while that in aphelion distance, Q , is from 3.46 a.u. to 4.59 a.u. All inclinations are small, $2^{\circ}.5$ to $6^{\circ}.3$ while the total range in the longitude of perihelion, π , is only from $150^{\circ}.2$ to $160^{\circ}.5$. A previously suggested association of the Taurids with Comet Encke is based on the similarity of orbit shapes, direction of the major

axes and a theory for the perturbations in i , Ω and π .

We have calculated secular perturbations by Jupiter for the nine Taurids and for Comet Encke using Brouwer's extension of the earlier theory but neglecting the eccentricity of Jupiter's orbit. The "periods" for complete revolutions of the nodes, or 2 cycles in i , range from 3200 to 11,000 years. The maximum values of i range from 10° to 23° . For five orbits the values of π tend to converge, not far from the value for Comet Encke, some 6000 years ago. For three orbits π diverges appreciably in the past.

We find that the orbit planes of four meteors coincide reasonably well with that of Comet Encke at an average date 4700 years ago; these orbits include members from both the northern and southern streams. Three other orbit planes, from the southern stream in 1937, coincide roughly with each other, but not with that of Comet Encke, at a time some 1500 years ago. Of the remaining two orbits one is known to be quite uncertainly determined. Furthermore, we find that the orbits of each orbit-set tend to cross, those 4700 years ago, near the solar distance, $r = 3.0$ a.u., before aphelion, and those 1500 years ago near aphelion.

The above facts suggest that the Taurid streams were formed chiefly by a violent ejection of material from Encke's Comet some 4700 years ago but also by another ejection some 1500 years ago, from a body moving in an orbit of similar shape and π but somewhat greater aphelion distance, possibly a component of Comet Encke that split away at an unknown time in the past. On the basis of these suggestions and including only Jupiter's perturbations, we find that the observed range in q and the relatively large ratio of the range in q to that in Q demonstrate that (a) the velocities of ejection were of the order of 3 km/sec, (b) that the ejections occurred at $r \gg q$ and (c) that the changes in π need not have exceeded a few degrees. Deductions (a) and (b) are not consistent, however, with the continuous ejection of meteoritic material from the icy conglomerate comet model proposed by one of us. On the other hand, the Taurid streams are unique in several respects, so that the inconsistency, instead of weakening the theory, contributes basically to an understanding of cometary structure.

We propose tentatively that the violent ejections from Comet Encke and its possible companion(s?) were the result of encounters with

small asteroidal bodies, since the suggested points of ejection lie near the plane of the asteroids and the earlier one near the region of their greatest concentration. The deviations in q and Q of the meteor orbits from the present ellipse of Comet Encke permit the calculation of the velocity vectors in the first encounter. The derived directions and velocities of the ejected meteoroids are entirely consistent with the encounter hypothesis if the asteroid moved in a nearly circular orbit.

Some of the conclusions of the present paper cannot yet be accepted as definitive, however, because (a) approximate perturbations were used, (b) the orbits are small in number and their accuracy difficult to determine, (c) the orbit of Encke's Comet may have changed erratically in the past, and (d) some of the orbits from the earlier ejection might be expected to show larger present-day variations in π . Nevertheless, we are convinced that the most likely process for the origin of the Taurid photographic meteors and fireballs involves encounters of Comet Encke and companion (s?) with asteroidal bodies.

*Harvard College Observatory,
Cambridge, Mass.*

Wood, Frank Bradshaw. Irregular light-fluctuations of UX Monocerotis.

The eclipsing system, UX Monocerotis, has been observed photoelectrically in two colors. The observations were made with Photometer C¹ and the 36-inch reflector of the Steward Observatory. The effective wave lengths were 5200 Å and 4250 Å. While the light curve is not yet completely covered, the following preliminary results may be announced.

Primary minimum has a depth of about 0.95 mag. in the yellow and 1.3 mag. in the blue. Secondary minimum has a depth of approximately 0.15 mag. in both colors and seems centrally located on the present incomplete curve.

Irregular light-fluctuations were found on many nights on which the system was observed; the maximum size of these fluctuations was of the order of 0.2 mag. Observations of a check star and of other eclipsing systems on the same nights, indicate clearly that these are not caused by fluctuations in the photometer or in the sky. In the case of the more rapid fluctuations, it usually takes an hour or two for the system to complete the fluctuation and to regain its original brightness. The nature of the light change is