pedition 1932–1933, but is a little lower than the magnitude ratio found by Hawkins and Upton (*Astrophys. J.* **128**, 727, 1958) from super-Schmidt photographic observations. The magnitude ratio probably should not be assumed as constant over a large magnitude range.

Early Results of the 1961 JPL Venus Radar Experiment. DUANE O. MUHLEMAN, *California Institute of Technology, Jet Propulsion Laboratory.*—A strong radar contact with Venus was made during the 1961 Venus conjunction utilizing the Goldstone, California, radar facilities of the Jet Propulsion Laboratory. Observations were made nearly daily from March 10 through May 10. A 12.5-cm CW signal was transmitted with an 85-ft parabolic antenna, and the returned signal was received with a second 85-ft antenna. The transmitted frequency stability was held to within 1 cps for the signal-delay time. This reference signal was used to synchronously detect the returned signal and to determine the Doppler shift with an accuracy of 1 cps which corresponds to 0.07 m/sec. The transmitter was also keyed off and on for purposes of making unambiguous range measurements (time-of-flight measurements). Preliminary results of an astronomical unit determination yield a value approximately 60 000 km larger than the value determined by Rabe (1960). The accuracy of the data suggests the possible improvement of the Venus ephemeris.

Analysis of the returned signal indicates a reflectivity relative to a perfectly conducting sphere of about 10% at this wavelength as compared with the lunar reflectivity of about 2%. Doppler spreading of the returned signal due to the rotation of Venus strongly indicates synchronous rotation of the planet. The spectrum of the Doppler-spread signal is very similar in shape to the spectrum computed from a lunar-reflected signal at the same wavelength indicating similar backscattering characteristics. The analysis of the change in spectral width as a function of time for purposes of determining the Venus rotation axis orientation has not been completed as yet.

A Determination of the Atmospheric Oblateness from the Motion of Two Low Satellites. R. C. NIGAM, *Smithsonian Astrophysical Observatory, Cambridge, Massachusetts.*—An appropriate theory has been developed to derive the effect of the atmospheric oblateness on the acceleration $\dot{n}$, defined as the rate of change of mean motion n . By mean motion is meant the number of revolutions made by the satellite in one day from one perigee to another. This effect is a periodic one, as one would expect, with half the period of the argument of perigee. For small values of eccentricity ($e < 0.2$),

it is expressed by

$$\dot{n} = \frac{3\pi}{2H} f \left[\frac{n^2 a^2 (1-e) k(q) \sin^2 i}{(2\pi\mu)^{\frac{1}{2}}} \right] \left[1 + 2e + \frac{3}{2}e^2 - \frac{15H}{8ae} - \frac{67H}{8a} + O(e^3) \right] \cos 2\omega,$$

where $k(r) = \frac{1}{2}(C_D A/m)\rho(r)$, $\mu = ae/H$, H is the scale height, f the atmospheric oblateness, q the geocentric perigee distance, etc.

In order to get reliable values for the atmospheric oblateness, one needs a few low satellites in polar orbit having a lifetime in which the perigee has made several revolutions of the earth. Further, if the satellites are not spherical, reliable information about the mode of tumbling should also be available from some independent source.

As none of the above-mentioned characteristics could be met in the satellites available for this investigation, we chose satellites 1958 ζ and 1958 γ , both of which had their perigee altitude less than 200 km, for a preliminary check of the derived theoretical expression for the effect of atmospheric oblateness on the accelerations, and to derive the value for the atmospheric oblateness.

The atmospheric oblateness at the altitudes of 176 and 186 km, which are the mean altitudes of the perigee points of the satellites 1958 ζ and 1958 γ , respectively, are obtained as 1/284 and 1/238, respectively. The value of the atmospheric oblateness computed theoretically assuming the solid-body rotation of the atmosphere for an altitude of 176 km is 1/291.

The quantitative results on the atmospheric oblateness are, therefore, far from being exact. These, on taking into consideration the uncertainty inherent in the two determinations, are, however, in conformity with the theoretical atmospheric models near 200 km, as given by T. E. Sterne (*Astron. J.* **63**, 81, 1958) and F. S. Johnson (*J. Geophys. Research* **65**, 2227, 1960). The results therefore appear to suggest that the atmospheric oblateness increases with altitude. An exact determination of the atmospheric oblateness must however await more extensive data.

The Cometary Theory of Tektite Origin. JOHN A. O'KEEFE, *Theoretical Division, Goddard Space Flight Center, National Aeronautics and Space Administration.*—H. C. Urey has proposed a hypothesis that tektites are produced by the outrush of heated gases compressed ahead of a comet. This theory is intended to explain the similarity of tektites to terrestrial materials without invoking the presence of large craters.

The recent discovery by Chao of nickel-iron