the cluster. Furthermore, the radial velocity of the cluster is about the same as that of the hydrogen concentration with negative velocity. It seems therefore that the negative velocity concentration may be associated, both in space and in motion, with the cluster.

The increase, near the cluster, in the amount of hydrogen with negative radial velocity is accompanied by a corresponding decrease in the amount of hydrogen with positive radial velocity. It would appear that the hydrogen associated with the Pleiades is there as the result of an interaction between the Pleiades and the interstellar gas.

Adams, W. S. 1949, *Ap. J.* **109**, 354.

*Harvard College Observatory,
Cambridge, Mass.*

Howard, William E., III and Heeschen, David S. A 21-cm study in Sagittarius and Scutum.

Observations in 21 cm were made during the summer of 1955 with the 24-foot paraboloid at the Agassiz Station of Harvard College Observatory. Four scans per position were taken at 5° intervals in the galactic plane, from galactic longitude 335° to 0° , and 5° above the plane from $l = 335^\circ$ to 15° . Two scans per position were obtained at other positions including $b = (\text{approx.}) - 1.5^\circ$, and a strip at $l = 350^\circ$, b between -5° and $+5^\circ$. In the analysis all velocities were reduced to the local standard of rest, and the galactic rotation curves of Kwee, Muller, and Westerhout (1954) were used. The antenna beam width is 1.7° between half-power points, and the band width is 15 kc/sec.

The two-peaked appearance of profiles taken in the plane at the galactic center (Heeschen 1955) persists through $l = 347\frac{1}{2}^\circ$, rapidly changing into a three-peaked profile from $l = 350^\circ$ to the limit of the present study. In this region, the distant arm may first be distinguished clearly from the remainder of the profile at $l = 335^\circ$. Its mean distance from the center of the galaxy is 11 kpc, and at $l = 350^\circ$, at a distance of 18 kpc from the sun, it subtends an angle of $3\frac{1}{2}^\circ$ to the points where the intensity has become half the maximum intensity, indicating a half-thickness of approximately 550 pc. The galactic plane as determined from neutral hydrogen is near $b = -1.5^\circ$ at the longitudes observed, possibly indicating the need for a revision of the Lund pole.

The position of the Sagittarius arm in the vicinity of the sun correlates well with the posi-

tion as determined from optical data (Morgan, Whitford, Code 1953).

Both radio (Kwee, Muller, Westerhout 1954) and optical (Washburn Obs. report 1955) data have suggested the presence of an inner spiral arm, lying interior to the Sagittarius arm. The probability of the existence of this inner arm has been strengthened by this survey. It appears on the profiles taken in the plane at $l = 355^\circ$ and 0° , but is absent on profiles at $l = 5^\circ$. At the former longitudes the line of sight runs along the arm, while at $l = 5^\circ$, it is outside this feature.

Heeschen, D. S. 1955, *Ap. J.* **121**, 569.

Kwee, K. K., Muller, C. A. and Westerhout, G. 1954, *B. A. N.* **12**, 211.

Morgan, W. W., Whitford, A. E. and Code, A. D. 1953, *Ap. J.* **118**, 318.

Washburn Obs. Rep. 1955, *A. J.* **60**, 312.

*Harvard College Observatory,
Cambridge, Mass.*

Jacchia, L. G. On two 1953 Giacobinids and on some physical characteristics of shower meteors.

Two meteors belonging to the Draconid (Giacobinid) shower were photographed simultaneously from the twin meteor stations in New Mexico on the night of October 8-9, 1953, with Super-Schmidt cameras. The two meteors appeared about one hour apart, at 4^h36^m79 and 5^h36^m21 G.M.T., respectively, and are almost identical in length, brightness, and general appearance, which is the most extraordinary of any ever recorded with the Super-Schmidt cameras. Shutter breaks are visible only in the first third of the trail and become progressively narrower; the rest of the trail is a continuous streak of light, although the shutter covers the meteor $\frac{3}{4}$ of the time, at 60 interruptions per second. The obvious explanation is a high degree of fragmentation of the original meteor body. This is confirmed by the results of the geometric reductions, which are also very exceptional. The beginning heights of the two Draconids were 103.8 km and 103.5 km respectively, i.e., 12 km greater than the average beginning height of meteors with the same velocity, 20.1 km/sec. The decelerations were respectively 53 and 91 times the normal, and the fragmentation indices (Jacchia 1955), 1.4 and 2.5, are by far the largest on record. These data confirm the exceptional results obtained by Jacchia, Kopal and Millman (1950) for the 1946 Giacobinid shower.

The extreme fragility of the Draconid meteors may be explained on the basis of Whipple's icy-