proposed by Ambartsumian for T-associations as well as O-associations. However, it is not unlikely that some of the stars, particularly those in the outer regions of the nebula, are ordinary stars that have collided with the denser clouds and filaments that compose this nebula, and that the interaction of these stars with the interstellar matter has affected their spectra and constancy of light. This explanation of the T Tauri stars has been proposed by Greenstein² and others and, although it does not appear applicable to all of the members of this central cluster, it may well explain at least a few of the stars in the region of the nebula where there appears to be a deficiency of non-variable stars without emission lines.

1. See *Astronomical News Letter*, No. 64 for a summary in English and for references to the original literature.
2. *Pub. A. S. P.* **62**, 156, 1950.

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Whitford, A. E. Colors of distant spiral and elliptical nebulae.

Additional two-color photoelectric measurements of elliptical nebulae in clusters have been obtained with the 100-inch telescope of the Mount Wilson Observatory. The results, which include objects with velocities up to 60,000 km/sec, confirm the color-velocity relation previously found by Stebbins and Whitford.¹ The calculated color change derived by the displacement of the energy curve of M32 accounts for only half of the observed effect. Four late-type spirals with velocities in the range 22,000 to 27,000 km/sec are found to be very blue, with observed international colors from +0.32 to +0.50; the excess found in the ellipticals seems definitely to be absent. This observation gives support to the age-effect explanation of the excess in ellipticals. If the spiral-elliptical distinction is found to be a general effect, very great difficulties are placed in the way of the Bondi-Gold-Hoyle cosmologies based on continuous creation.

A multicolor photoelectric study of the brightest elliptical nebula in the Corona Borealis cluster yields a differential energy curve relative to M32 over the range 3400Å to 8300Å. The result is definitely not that to be expected from the death of red giants, as in the first age-effect explanation suggested by Schwarzschild. The observed differences are not to be explained by addition or subtraction of any one type of star. The observed two-color excess, however, could

arise from additional radiation in the distant systems of a quality like that of a Type I Go supergiant. Preliminary results on the brightest system in the Boötes cluster, where the effect is larger and should be less affected by random intrinsic color differences, are consistent with this view.

1. *Ap. J.* **108**, 413, 1948.

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Wright, Frances W. and Fred L. Whipple. The photographic Perseid meteors.

The trails of 115 Perseid meteors on Harvard photographs have been analyzed. Observations extend over the years 1893 to 1952 in the seasonal interval July 28 to August 24, and include 23 meteors photographed simultaneously at two stations and 92 at one station only. The mean radiant of the stream moves eastward $43' \pm 2'$ per day and northward $7' \pm 2'$, through $\alpha = 45^\circ 56'$ and $\delta = 57^\circ 45'$ (corrected) at longitude of sun = 139 (Eq. 1950).^o An extended single trail deviates from the instantaneous mean radiant with an average scatter $\pm 38'$ (p. e.). Perseid activity attains its maximum on August 12 UT, with 62 per cent of the meteors appearing on the four days August 10–13 inclusive. No significant deviation in the radiant or its motion appears to exist among photographic, radar, or visual observations except that the scatter is probably greater for faint than for bright meteors; this magnitude effect amounts to $7'$ over the photographic range. The average scatter for 30 meteors before and after the four days of maximum activity increases to $48'$. The photographic meteors appear to be relatively more numerous near maximum activity than the fainter radar Perseids observed at Manchester, England.

The ratio of Perseid to sporadic meteors appears to decrease with luminosity in the photographic range. Comparing seven meteor showers studied photographically, we find that the average scatter increases linearly with the width of the spacial stream of meteors. The correlation is excellent; the scatter increases from 6.6 for a zero stream-width at a rate of 0.87 per million miles of stream-width. The fact that the Taurid and Geminid streams follow the scatter-duration relationship shown by such recognized cometary streams as the Draconids, Orionids, and Perseids, casts doubt on Hoffmeister's proposal that the Taurids and Geminids are "ecliptical currents," different in character from the cometary streams.