mission was reduced during continued exposure of the snow layer to the sun to less than one-half the value obtained in an earlier observation, due to slush forming from melt-water. In another comparison on the same day, where 4 inches of similar fine, granular, compact snow was used for study, transmission through freshly uncovered snow of uniform texture amounted to 1.8 percent of the total solar and sky radiation, whereas after exposure to the sun for about 30 minutes the same type of snow developed a dense ¼-inch thickness of slush at the bottom of the 4-inch layer and reduced transmission to an unmeasurable value.

It may, therefore, be expected that, as snow melt increases near the surface of a firm snow pack at a rate faster than it drains away into the snow, thus forming slush and ice layers, the relative amount of radiation transmitted to greater depths will decrease.

To determine the radiation absorption effect of extraneous matter on snow surfaces, 6 circular plots 18 inches in diameter were each covered with 1 ounce of standard paint pigments. Table 2 lists the pigments used, and shows the relative effects of the various colors. The green showed an absorption nearly equal to that of the black, although the blue showed a greater drop during the first 3 days. One difficulty of this method of test was the uneven distribution of coloring matter after the first few hours. We hope to repeat the experiment under conditions which will minimize many of the errors of this first trial.

TABLE 2.—*Differential absorption tests—Standard paint pigments.*

Date and time	Depth drops in inches											
	General snow cover	Chrome yellow	Venetian red	Lamp black	Chrome green	Ultramarine blue	Orange mineral	Temperature min.	max.	6 p. m.	Wind velocity	Total solar and sky radiation
May 14:								°F.	°F.	°F.	m. p. h.	gr. cal.
11:45 a. m.	0	0	0	0	0	0	0	31	52	40	3.03	-------
5:40 p. m.	1	1.9	2.9	2.9	2.5	2.0	1.9	----	----	----	--------	301.0
May 15, 5:47 p. m.	3	4.8	5.6	7.8	6.8	6.9	4.3	25	48	42	2.85	584.0
May 16; 6 p. m.	7	8.5	10.2	14.0	13.1	11.0	9.1	28	55	51	3.31	-------
May 18, noon	8.9	12.0	14.4	20.7	19.5	15.0	12.1	----	----	----	--------	-------

NOTES AND REVIEWS

BERNHARD HAURWITZ. **Dynamic Meteorology.** New York (McGraw-Hill Book Co.), 1941. 365 pp.

It is of interest to recall that the first general treatise on meteorology to present the subject from the dynamical viewpoint was the *Lehrbuch der Meteorologie* of A. Sprung, published in 1885; this work remained the only treatise of the kind until the *Dynamische Meteorologie* by F. M. Exner, the second edition of which was published in 1925. Since the appearance of Exner's treatise, notable advances have occurred in theoretical meteorology, and encouraging progress has been made in adapting many of them to daily meteorological practice; and several books on physical and dynamical meteorology have appeared in recent years, although few are in English.

This book collects into one volume, that may be used either as a textbook or as a reference work, a comprehensive account of theoretical meteorology which includes the results of many recent investigations hitherto available only in the widely scattered periodical literature. Numerous references enable the reader to locate further details on nearly every topic; and for the benefit of the student a large number of problems are included. Insofar as any previous knowledge of meteorology is necessary, it is presupposed; and although for convenience brief recapitulations of the needed principles of physics are given, it is likewise presupposed that the reader has been trained in general physics, and in mathematics through the calculus and elementary differential equations.

After an opening chapter occupied by preliminary topics, two chapters are devoted to meteorological statics, including the adiabatic equations and theory of atmospheric stability for both dry and saturated air, and a discussion of surface pressure variations due to advection aloft. The following chapter discusses the energy of thermodynamic processes, equivalent and wet-bulb potential temperatures, convective instability and thermodynamic charts.

Chapter 5 treats the fundamental actuating factor in the physical processes of the atmosphere—solar radiation, its geographical distribution and atmospheric depletion, and the heat balance of the earth; the recent work of Elsasser and others on atmospheric water vapor absorption is included. The next two chapters are devoted to the general dynamical equations of motion of the atmosphere, the fundamental circulation theorems, and the theory of geostrophic winds and other simple types of air motion. In chapter 8, surfaces of discontinuity are discussed; and chapter 9 considers the kinematical analysis of pressure fields.

The next two chapters take up atmospheric turbulence, with its effects on the variation of wind with height and the diurnal variation of the wind, and the effect of turbulent transport of heat, water vapor, and momentum. The following chapter is devoted to the energy of atmospheric motions, and its transformation and dissipation.

The final three chapters consider, respectively, the general circulation; the perturbation method of representing atmospheric motions; and air masses, fronts, cyclones and anticyclones.

CHARLES P. OLIVIER. **Long Enduring Meteor Trains.** Publications of the University of Pennsylvania—The Flower Astronomical Observatory, Reprint No. 60.

This paper, reprinted from *Proc. Amer. Philosophical Soc.* 85: 93–135, 1942, is a catalogue of 1,336 meteor trains which either remained visible for at least 60 seconds or, if of shorter duration, showed actual drift; the catalogue tabulates the salient facts about all the trains, and a further table gives detailed data on heights and drifts for 583 of them.

The data were collected both from the immense number of original records available to the author and from a search of the published literature. The paper provides a fundamental and convenient source of existing information on the phenomena of meteor trains; and as such, it is of importance to the meteorologist interested in any problem involving the motions of the atmosphere at very high levels.