To sum up, on the centre line of the path of the eclipse the shadow bands were at a tangent to the eclipse shadow both before and after totality. At locations off the centre line, but still within the path of totality, the shadow bands were only roughly tangential to the eclipse shadow and, in one case, they rotated considerably during the approximately 1 min period of shadow band activity before totality. Shadow bands tangential to the shadow might suggest some type of diffraction as the cause, but with the variations described this is certainly in question. Perhaps there are two or more competing causes. We estimated that the centre to centre spacing of the bands was approximately 10 cm, and from photoelectric results we suggest that the shadow bands came at frequencies varying from 4 to perhaps 30 Hz with a corresponding variation in spacing. The velocity of the bands seems to be 2–3 m s^{-1}. Relative to the elliptical shadow itself (moving at about 1,000 m s^{-1}) the bands moved toward the shadow before totality and away from the shadow after totality.

We hope to have developed improved techniques in time for the eclipse of July 10, 1972, in Nova Scotia.

S. Hults, R. Hults, C. Hults, S. Morrow, Dr N. Sprague, Professor J. Vidal (visiting lecturer from Pelotas, Rio Grande do Sul, Brazil), Ronald Presdorf, Rita Presdorf, T. Rettig, N. Rettig, and R. Hackeney made visual observations. J. Hults, B. Warn, and Lloyd and Laura Mitchell carried out photographic work. D. Puntenney helped with the photoelectric measurements. This project was supported by the Atmospheric Sciences Section, US National Science Foundation.

MALCOLM E. HULTS
ROGER D. BURGESS
DANIEL A. MITCHELL
DUANE W. WARN

Department of Physics,
Ball State University,
Muncie, Indiana 47306

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Meteorological Phenomenon called Crown Flash

Gall and Graves[1] described a ground observation of a sudden brightening effect around the top of an active cumulonimbus cloud. Each brightening began concurrently with a lightning stroke in the main cloud mass and rippled upward and outward during a substantial fraction of a second.

Subsequent to this report, brief prior discussions of unusual optical phenomena of this kind have been noted in the literature[2–4]. These observations deal with the sudden disappearances of apparent cloud streamers which sometimes seem to reform. References to earlier "flachenblitz" observations imply that such reports may have a long history.

A very tenable explanation of this class of visual sighting was proposed by Vonnegut[5] in terms of changes in orientation of ice crystals, with their mirror-like reflexions, around the crests of thunder clouds. Such changes are postulated to occur when a relatively strong electric field induces electric dipoles in the ice crystals, with their resulting tilting forces. For example, if the visual effect is a streamer disappearance, a rapid, lightning-induced change in ice crystal orientation has taken place, destroying a slowly built up electric field and ice crystal alignment.

Two types of special observations carried out by Vonnegut[5] support this explanation. First, a laboratory cold box experiment duplicating the conditions described confirmed the transitory nature of reflexions from ice crystals in a changing electric field. Second, photo-tube measurements of light changes in solar-illuminated cumulonimbi showed that both increases and decreases can occur at the time of lightning flashes.

Fig. 1 An illustration of the crown flash, taken from ref. 1.

The report by Gall and Graves seems to be accounted for by a momentary increase in brightness, which progresses away from the cloud top as the ice crystals change their orientation, passing through an angle of tilt giving optimum reflectance. Even when the brightening appears to extend beyond the cloud streamer into "blue sky" (as noted by them during their observation) the presence of invisible cirrus could account for this effect. As was pointed out by Vonnegut[5], such visual sightings may provide useful information concerning the electrical processes associated with thunderstorms.

MAURICE E. GRAVES
JOHN C. GALL, JUN.
BERNARD VONNEGUT

Department of Meteorology and Oceanography,
University of Michigan,
College of Engineering,
Ann Arbor, Michigan 48104

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Persistent Water Vapour Contamination and Stratospheric Measurement

WATER vapour profiles in the stratosphere have long been a subject of controversy because of the difficulties involved in measuring extremely small water vapour concentrations. Such information is important both intrinsically and because of the influence of water concentration on the radiation budget of the Earth. But the determination of these profiles is expected to arouse even greater interest and activity because of the