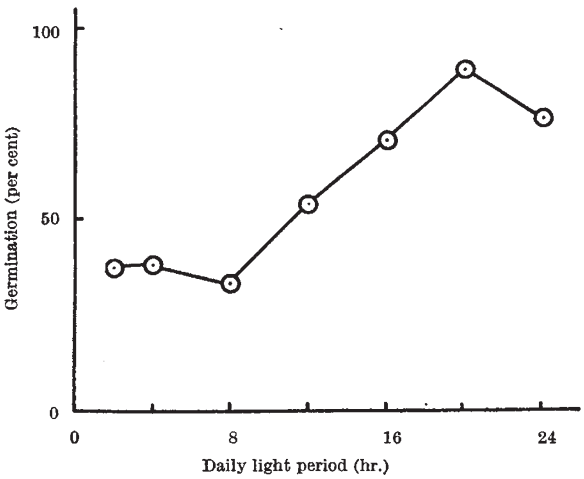

Fig. 1. Effect of day-length upon germination of unchilled birch seed. (Illumination with red light at 1,000 ergs/cm.²/sec. Temperature during both light and dark periods, 15° C.)

seeds to various lengths of photoperiod. For this purpose red light (falling within the range 5800–7000 A.) derived from red fluorescent tubes in conjunction with red 'Perspex' (*R*.400) was used, the intensity at the level of the seeds being approximately 1,000 ergs/cm.²/sec. It was found that the germination is markedly affected by the conditions of day-length, but that this photoperiodic response is profoundly modified by the prevailing temperature conditions.

Fig. 1 illustrates the effect of varying lengths of photoperiod, within 24-hr. cycles, at 15° C. The number of germinated seeds in each treatment was counted daily and the treatments continued until there was no further increase in germination, that is, for 12–14 days. (A considerable proportion of the seeds were found to lack embryos and these were excluded from the germination percentage.) It is seen that a high percentage germination is obtained with photoperiods of 16 hr. or longer, but under short-day conditions the maximum germination is only of the order of 30 per cent. A number of further experiments have been carried out which confirm that this is a true photoperiodic effect and that the final germination percentage is not governed by the total quantity of light received. For example, the percentage germination following exposure to seven cycles consisting of 8 hr. light/8 hr. dark was 60 per cent compared with 30 per cent following the same number of cycles consisting of 8 hr. light/16 hr. dark, although the total period of illumination (56 hr.) was the same for both treatments.

With higher temperature conditions (20°, 25° C.) the final germination was 93 per cent under both 8-hr. and 20-hr. photoperiods (with 24-hr. cycle) and the photoperiodic nature of the response is thus not apparent. At these higher temperatures even a single light-exposure followed by storage in the dark resulted in considerable germination (Table 1), whereas at 15° C., with corresponding periods of illumination, only a very low percentage germination was obtained.

Table 1. Effect of Single Light-exposure on Percentage Germination at 20° C.

Duration of light period (hr.)	0	0·25	1·0	4·0	8·0	20·0	24·0
Percentage germination	0	37·5	42·3	47·2	54·0	66·6	68·9

The effect of a single 4-hr. period of illumination with red light at 20° C. may be nullified if followed by illumination for 30 min. with infra-red radiation (intensity 3,000 ergs/cm.²/sec.) within the range 7200–10,000 A., and in this respect the responses of birch seeds resemble those of lettuce seeds[3].

Seed which had been soaked and stored in the dark at 5° C. for six weeks was found to germinate rapidly in darkness on transfer to a temperature of 15° C. Chilled birch seed has apparently, therefore, no light requirement. There is thus a close parallel between the responses of both resting-buds and embryos of birch, for both structures show a requirement for long photoperiods to overcome dormancy when unchilled, but show no light-requirement after chilling[2].

These effects in birch provide direct evidence in support of the hypothesis, put forward by Borthwick[4] and his co-workers, that the same photo-reaction is involved in both light-sensitive seeds and in photoperiodic effects observed in the later stages of development.

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Magnetic Observations at Quetta during the Total Solar Eclipse of June 30

With the view of studying the effects of the total solar eclipse of June 30, 1954, on the magnetograms at Quetta, the Ruska magnetograph was set to run at 80 mm./hr., instead of the normal speed of 20 mm./hr. The Quetta Magnetic Observatory was approximately three miles south of the northern rim of the shadow belt. The beginning of totality was 13h. 58·8m. G.M.T. and hence the corpuscular eclipse was to be expected at approximately 11h. 59m. G.M.T.

The day was magnetically almost quiet. The horizontal force curve (*H*-trace) is entirely smooth a few hours before and after the eclipse period. At 12h. 1·6m. G.M.T. (2·6 min. after the expected corpuscular eclipse time), a full oscillation of a period of 1·3 min. and an amplitude of 0·8 γ appears in the *H*-trace. The onset is towards the positive side. The trace remained slightly disturbed until 12h. 47m. G.M.T. At the same time a slight increase of declination (*D*) by 0·1′ (1·0 γ) also occurred.

At 13h. 57·2 m. a very minute onset towards the positive side of *H* occurred. The amplitude of the onset is approximately 0·4 γ and consists of a sequence of irregular oscillations which last for 0·8 min. only.

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