years for the new section was obtained when compared with trees 1, 3, and 4. Subsequent to this computation we learned from an eyewitness that the fire occurred in the autumn of 1949, 12·75 years before our sections were taken. This date falls between our computed estimates of 12 and 13 years.

The same computer programme may be used to compute correlograms of tree ring vectors, and we are in the process of interpreting these correlograms in terms of the physiology of the tree.

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Effects of a Night Break of Red Fluorescent Light on Leaf Growth of *Callistephus chinensis* (var. Queen of the Market)

THE results described here are from the initial part of an experiment on the effects of short days of 8 h of natural light with and without an interruption of 1 h red fluorescent (cadmium borate) light in the middle of the 16 h dark period. The plants were grown first in seed boxes and then in pots, on trolleys in a glasshouse (13° C night min, 19° C day min), and had natural daylight from 8 a.m. to 4 p.m. G.M.T. They were then pushed into two dark compartments for the night. The treatments began immediately the seed was sown. The disposition of pots on the trolleys and the orientation of the trolleys were re-randomized weekly and the night break compartment was changed over each week. Thus although some position effect was confounded with treatment the former component should have been small. The total radiant energy during the night break ($4\cdot6 \times 10^{-2}$ cal/cm^2; Kipp solarimeter) was about 0·5 per cent of the visible component of natural radiation in the glasshouse for an 8-h day during January. While the night break light was on the temperature rose gradually to 2° C above the unilluminated compartment and returned to normal again in about 30 min. The oscillation of temperature due to the on–off cycle of the thermostat was ± 0·5° C, so the small rise has been ignored.

The seeds were sown on January 4 in John Innes compost (*J.I.*1) in seed boxes; seedlings emerged on January 11 and were later thinned out. On March 5 they were transplanted to 3·5 in. pots and a harvest of 8 plants per treatment was taken. A second harvest of 8 plants per treatment was taken on May 10. Table 1 shows the results for the first harvest, and the bottom row indicates the probability of obtaining such a difference by chance.

The red light treatment increased the early expansion of the leaves giving a higher specific leaf area, but, as shown by the leaf + cotyledon weight ratio, did not alter the overall distribution of dry weight about the plant. In consequence, the leaf area ratio in the night break treatment was higher and we may infer that the increase in leaf area did not cause a reduction in its photosynthetic efficiency as it was accompanied by a 24 per cent greater total dry weight. This dry weight difference was not quite significant at the conventional level for the first harvest, but at the second 9 weeks later the difference was 116 per cent and highly significant ($P < 0\cdot001$). By this time, however, the simple initial effect on early leaf expansion was overridden by ontogenetic drifts due to increase in size and the onset of flowering of the night break plants. Values obtained for the percentage of the fresh weight remaining after drying at 80° C were not significantly different in the case of leaf + cotyledon and were identical for stem + root.

The special significance of these effects is that a night break of low-intensity red fluorescent light causes greater leaf expansion than occurs in short days alone and that, as a result of this greater leaf surface, the plants increase in dry weight more quickly. Observations have also been made using tungsten light instead of fluorescent with similar results. A present experiment on the variety Dwarf Queen showed significant differences in leaf area (27 per cent increase; $P < 0\cdot05$) after four weeks and in total dry weight (65 per cent increase; $P < 0\cdot01$) after seven weeks of night breaks with tungsten light. The type of effect noted here could, therefore, be of advantage in commercial crop production under glass in winter as the irradiation, using conventional lights, gives faster seedling establishment at a time when growth is normally slow. The interrelations of the leaf growth effects and the promotion of flowering will be discussed elsewhere.

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Interrelationship of the Potato Root Eelworm, *Heterodera rostochiensis* Woll., *Rhizoctonia solani* Kühn and *Colletotrichum atramentarium* (B. and Br.) Toub., on the Growth of the Tomato Plant

MORGAN[1] considered that *Rhizoctonia solani* contributed to the condition known as 'potato sickness', where a potato crop was seriously attacked by *Heterodera rostochiensis*. Miles[2] and Goffart[3], in their investigations of the potato root eelworm, concluded that the root fungus *R. solani* did not play a significant part in causing the potato crop to fail. In recent years there has been a renewed interest in the interrelationship of nematodes and fungi.

In our researches on the potato root eelworm and fungi on tomato plants, it has been shown that there is

Table 1. DATA FROM HARVEST OF MARCH 5, 1963

	Dry weight (mg)			Area of Leaf + Cotyledons (cm^2)	Leaf area ratio (cm^2/g)	Leaf weight ratio	Specific leaf area (cm^2/mg)	% dry weight / fresh weight	
	Leaf + Cotyledons	Stem + Root	Total					Leaf + Cotyledons	Stem + Root
SD	28·2	12·8	41·0	15·6	384	0·69	0·56	10·5	13·4
NB	34·8	16·2	51·0	21·7	432	0·68	0·63	9·7	13·4
P	< 0·1	< 0·25	< 0·1	< 0·01	< 0·02	—	< 0·01	< 0·25	—

SD, 8 h natural daylight; *NB*, 8 h natural daylight with 1 h red fluorescent light in middle of the dark period.