Apical dominance and similar phenomena are considered as special cases of metabolic correlations representing the basic principle of the totality of plant organism.

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Flower Initiation in the Carnation in Response to Photoperiod

In 1932, Laurie and Poesch[1] reported that for glasshouse carnation an increase in photoperiod during the winter months led to earlier production of flowers in the spring. There have been a number of similar reports since, but views have differed as to whether photoperiod affects the time of flower initiation or only the rate of subsequent development of the flower. Post[2] and more recently Rünger[3] have claimed that only the latter stage of development is affected. Blake[4], however, working in the laboratories here, demonstrated an effect on flower initiation such that plants grown in short days of 8 hr. had more leaves below the flower than plants grown in long days where an additional 9 hr. of illumination was given. The object of the present communication is to report results from three glasshouse experiments which show unequivocally that time of flower initiation in carnation is affected by photoperiod and that this effect can occur independently of the total radiation received by the plant.

In experiments 1 and 2, plants were grown from normal shoot cuttings. These were cut back about one month after planting and one axillary shoot was allowed to develop. In experiment 3, plants were grown from 'leaf-bud cuttings' comprising an axillary bud, its subtending leaf and a small portion of stem. The variety White Sim was used throughout. The basic treatment was 8 hr. of natural daylight (short day). In the other two treatments this was supplemented by 2 hr. of light from 'daylight' fluorescent tubes plus tungsten filament lamps, given either as 1 hr. at either end of the day (extended day) or as 2 hr. at the middle of the dark period (interrupted night). In each of the three experiments sampling of the plants and dissection of their apices showed that flowers had been initiated in the 'interrupted night' treatment, while plants in the other treatments were still vegetative (Table 1).

Table 1

Experiment No.	Date of planting	Date of sampling	No. of plants with flower primordia out of six sampled		
			Short day	Extended day	Interrupted night
1	28.1.60	26. 5.60	None	None	5
2	15.6.60	12.10.60	None	None	6
3	23.4.60	6.10.60	None	None	3

Further treatments in the experiments quoted, and further experiments now in progress here indicate that a number of factors can interact with photoperiod in effects on flower initiation. An understanding of these factors is desirable in considering any possible applications of photoperiodic treatments to the growing of carnations for cut flowers.

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Measurement of Leaf Colour

Leaf colour is a valuable index of nutrient status in flowering plants. Yellowing of the leaves is associated with deficiencies of nitrogen, magnesium, iron, manganese, zinc and molybdenum in many species.

The severity of leaf chlorosis has been recorded by subjective description, by colour photography and by estimation of the chlorophyll content. Chlorophyll estimations yield unambiguous results and have proved most satisfactory in experiments requiring a high degree of accuracy.

In many investigations it is desirable to measure the changes in colour which occur during maturation of the leaf. Chlorophyll estimations involve the destruction of the leaf, and, in consequence, large-scale experiments must be carried out in order to provide an adequate replication in each sample of leaves. As an alternative to this rather laborious procedure, a system of colour matching suitable for attached leaves has been adopted in recent experiments on lime-induced chlorosis, carried out at Sheffield.

A comparator has been made. The colours were prepared by mixing oil paints, which were applied to squares of absorbent paper (thick filter paper is suitable). The colours were arranged in series and matched against the Ridgway[1] colour standards (Table 1). Through the colour series there is a regular change in spectral composition. In order to match chlorotic leaves more easily (they are often bleached in addition to being yellow in colour) the colours at the yellow end of the comparator are of lower intensity.

Colour matching is carried out under standard conditions of white lighting provided by a Siemens-Ediswan Daylight Blue 60-W. lamp. Where leaves show an intervenal chlorosis, the colour matched is that of the intervenal areas.

The error involved in matching leaf colours varies according to the characteristics of the leaf. Species with waxy or glossy leaves are the most difficult subjects. In *Lathyrus montanus* and *Betonica officinalis*, the leaves of which have a matt surface, the error was found not to exceed 5 per cent in the 10–25 range of the colour series and 3 per cent in the 26–33 range.

Even in the standardized environment of a growth cabinet, the rates of leaf appearance in a population of seedlings germinated at the same time are not