(Table 2). Thus, all growth inhibition of untreated plants was due to chlorflurenol since the plastic chamber atmosphere contained no factor(s), e.g. increased ethylene levels (10), that limited growth. Growth inhibition occurred in beans placed in the greenhouse within 30 cm of chlorflurenol-treated plants (Table 2), indicating the importance of the volatility effect. More chlorflurenol-induced growth inhibition was observed in plastic chambers than in the greenhouse (Table 2). This may be due to volatile chlorflurenol concentrating within the confines of the plastic chamber.

These results indicate that chlorflurenol can be transferred from treated to untreated bean plants presumably by volatilization. The apparent volatility effect of chlorflurenol is suggested since other factors such as photochemical and/or microbial breakdown of the retardant were not investigated (9). Future work may show differences in plant responses due to environment and species; however, the chlorflurenol volatility effect was observed on *Acer rubrum* L. and *Fraxinus pennsylvanica lanceolata* Marsh. seedlings grown in the greenhouse (J. R. Frank, unpublished data).

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Peanut Plants from Single De-embryonated Cotyledons or Cotyledonary Fragments[1]

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Abstract. **A method has been developed to produce normal peanut plants from de-embryonated peanut cotyledons and cotyledonary fragments without the use of liquid nitrogen.**

Peanut plants have been successfully produced from de-embryonated cotyledons (1). Cotyledons which are razor-cut or simply broken by hand tend to show damage and autolyze readily. The liquid nitrogen caused the cotyledonary material to separate or cleave under shock with minor or no damage to individual cells, thus minimizing or eliminating autolyzation. I now report a cotyledon culture technique that eliminates the need for liquid nitrogen.

I observed that if peanut seeds were placed in a moist chamber until the cotyledons turn green and the embryo sprouts, the cotyledons will develop a leathery-feel or texture. The embryo may then be safely removed and by slowly and gently applying breaking pressure to a cotyledon, it will separate or cleave without damage. The whole or broken cotyledons, when placed again in the moist chamber, produce leaves and roots and develop into normal plants. Fourteen of these plants were transferred out of doors where they grew to maturity and produced normal peanuts.

The moist chamber was a square glass box 20 x 20 x 7 cm with a tight lid. The seeds were placed between double layers of paper toweling thoroughly dampened with tap water. The temperature ranged from 16-21°C and the lighting was a 100 watt frosted bulb at about 1.2 cm distance from the box.

The only strain of peanut used was a small Spanish-type identified as number 6212 by Burpee Seed Company. An average of 80 to 90% of whole cotyledons will produce plants. Only 1 to 2% of small fragments are successful.

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Floral Anatomy of *Phaseolus vulgaris* L. cvs. Gallatin 50 and Oregon 58[1]

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Abstract. **Anatomical and morphological studies were made on 'Gallatin 50' and 'Oregon 58' bush snap beans. The first leaf primordium was observed 3 to 4 days after planting. Four or 5 leaf primordia were formed in spiral phyllotaxy with plastochrons lasting 1 day or less. The first floral primordium occurred in the axil of the uppermost leaf 7 to 9 days after planting. Floral parts became discernible 5 days later.**

Anatomy of determinate cultivars of *Phaseolus vulgaris* have been reported previously (1, 2, 3, 5, 7, 8). Ojehomon (7), and Ojehomon and Morgan (8) found the floral primordium in the axil of the uppermost leaf differentiated into the first triad on the plant irrespective of the no. of leaves on the main stem. However, Leopold (5) reported that floral initiation started from the cotyledon and progressed upwards. On the contrary, Inoue and Shibuya (3) showed the flower buds formed simultaneously throughout the plant.

In spite of the fact that many (1, 2, 3, 5, 7, 8) have reported on morphology and anatomy of beans, no information was available on developmental anatomy of a shoot and contradictory

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results were reported on floral anatomy. The present study was therefore undertaken to illustrate developmental anatomy as well as floral anatomy.

'Gallatin 50' (G50) and 'Oregon 58' (Ore58) were grown in a growth chamber, 21.1°C (day), 15.6° (night). Full light intensity at plant level was 19.4–21.5 klx. Fluorescent light was supplemented with incandescent light. The chamber was set for a 16-hr photoperiod. Plants were grown in vermiculite and a standard nutrient solution (6) was used alternately with tap water. Two days after planting, 5 plants were sampled randomly at 1 day intervals for 17 days to study bud development. Tissues were dehydrated, infiltered with paraffin, sectioned at 8μ, and stained with Heidenhain's iron haematoxylin (4).

Anatomically, 'G50' and 'Ore58' were similar. The dome-shaped apical meristem in the seed averaged 180–200μ high (Fig. 1). In samples taken 1 or 2 days after planting, a dense staining occurred in 3 portions of provascular tissue located near the dome-shaped meristem. The staining could be seen easily through the microscope. Two portions differentiated into 2 opposite stipule primordia (Fig. 2). Above the pre-existing stipules a leaf primordium was initiated (Fig. 3). The meristem gave rise acropetally to 4 or 5 leaves (Fig. 4) including stipule primordia. Plastochrons lasted 1 day or less and the leaves were arranged in spiral phyllotaxy. Occasionally, decussate phyllotaxy (Fig. 5) was observed.

Axillary bud primordia were observed approx 24 hr after their subtending leaf primordia were distinguishable. A bud primordium at the axil of the uppermost leaf was considered a floral primordium or a triad primordium (Fig. 4) since it developed directly into a triad. The triad primordium was a floral primordium which would develop into 3 floral primordia. Bud length was 50-60μ. The floral primordium was observed 7 to 9 days after planting. After the formation of the leaf primordia, stipule primordia, and axillary buds, the meristem formed 3 bracts including axillary buds (Fig. 6). These axillary buds were triad primordia of a terminal raceme. The triad primordia differentiated at about the same time as subtending bracts.

Two lateral branches were formed per node. Generally, meristems initiated 1 or 2 leaf primordia before forming terminal racemes (Fig. 7, 8).

Floral initiation began simultaneously in the axil of the uppermost leaf and in the first triad primordium of the terminal raceme of the main shoot. Initiation of floral primordia next occurred in the upper triad primordia of the terminal raceme of the main shoot, the triad primordium of the uppermost leaf, and the terminal raceme of the most advanced branch at each node.

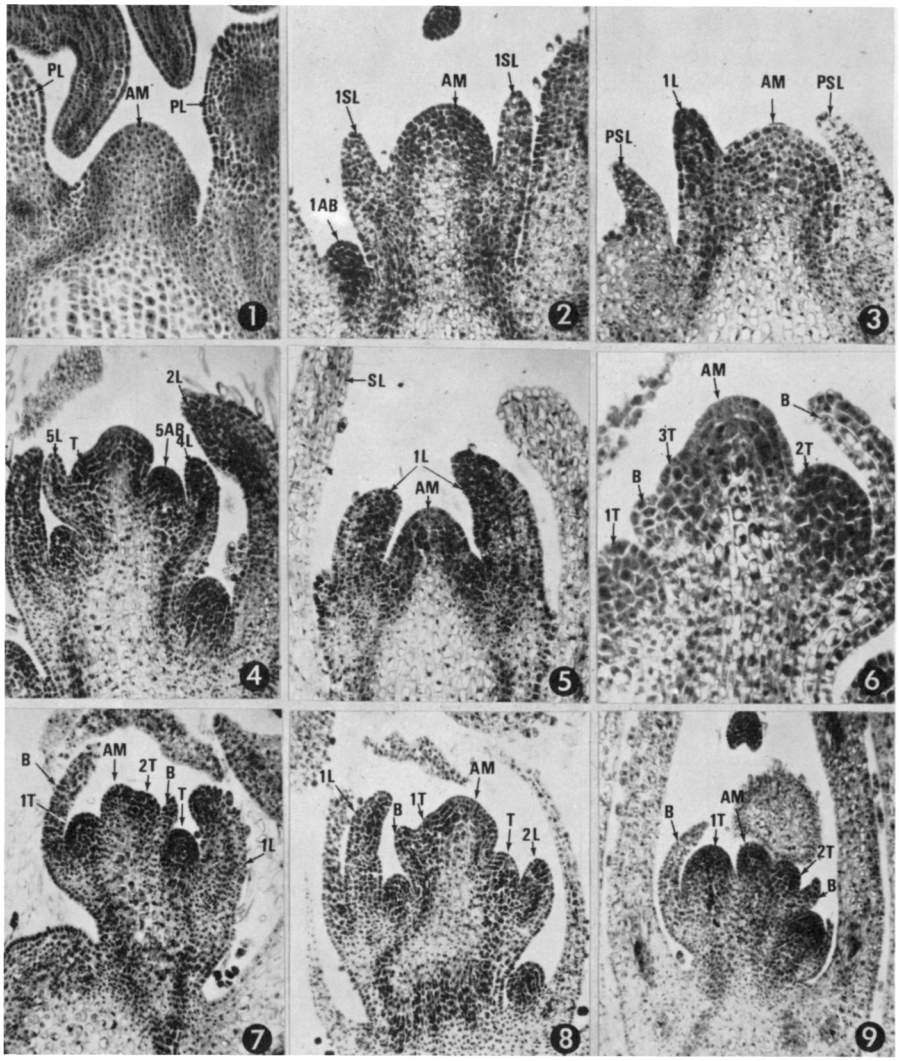

Fig. 1-9. Longitudinal sections of a shoot apex and lateral buds. 1) Apical meristem. 2) Formation of stipulate primordia from the apical meristem. 3) First leaf primordium. 4) Leaf primordia and a triad primordium. 5) Two leaf primordia, initiated at the same node. 6) Three triad primordia of a terminal raceme. 7) Lateral bud showing 1 leaf primordium and a terminal receme. 8) Lateral bud showing 2 leaf primordia and a terminal raceme. 9) Lateral bud showing only terminal raceme formation. (1, 2, 3, 4, 5, 7, 8, 9 x 95; 6 x 237.5) AB-axillary bud (no. indicated the position of AB on the plant); AM-apical meristem; B-bract; L-leaf (no. indicated the position of L on the plant); PL-primary leaf or 1st leaf; PSL-pre-existing stipule of primary leaves; SL-stipule of leaf (no. indicated the leaf which it belonged to); T-triad primordium (no. indicated the position of T on the terminal raceme).

Generally, 5 to 7 days were required for a primordium to differentiate floral parts. The time required depended on the position of the primordium on the plant; for example, the primordium of the uppermost leaf required 5 days; whereas the first 1 of the terminal raceme required 6 or 7 days.

Sequence of opening of flowers is shown in Fig. 10. First open were 1 or 2 flowers of the triad at the uppermost leaf. These flowers were classified into the first group of opened flowers. The second group of opened flowers were those of the first triad of the main terminal raceme, those of triads of non-leaf branches, and those of one-leaf branches. The triads of a 2-leaf branch could be classified into this second group when there was only 1 branch per node. The third group of flowers opened at the first node and at nodes with 2 or more branches.

The axillary bud of the uppermost leaf of the main stem was the site of the first open flower which agrees with the observations of Ojehomon (7), and Ojehomon and Morgan (8). However, this differs with reports by Leopold (5) and Inoue and Shibuya (3).

A lateral branch developed none, 1, 2 or more leaves before terminal raceme differentiation. Triad primordia of the

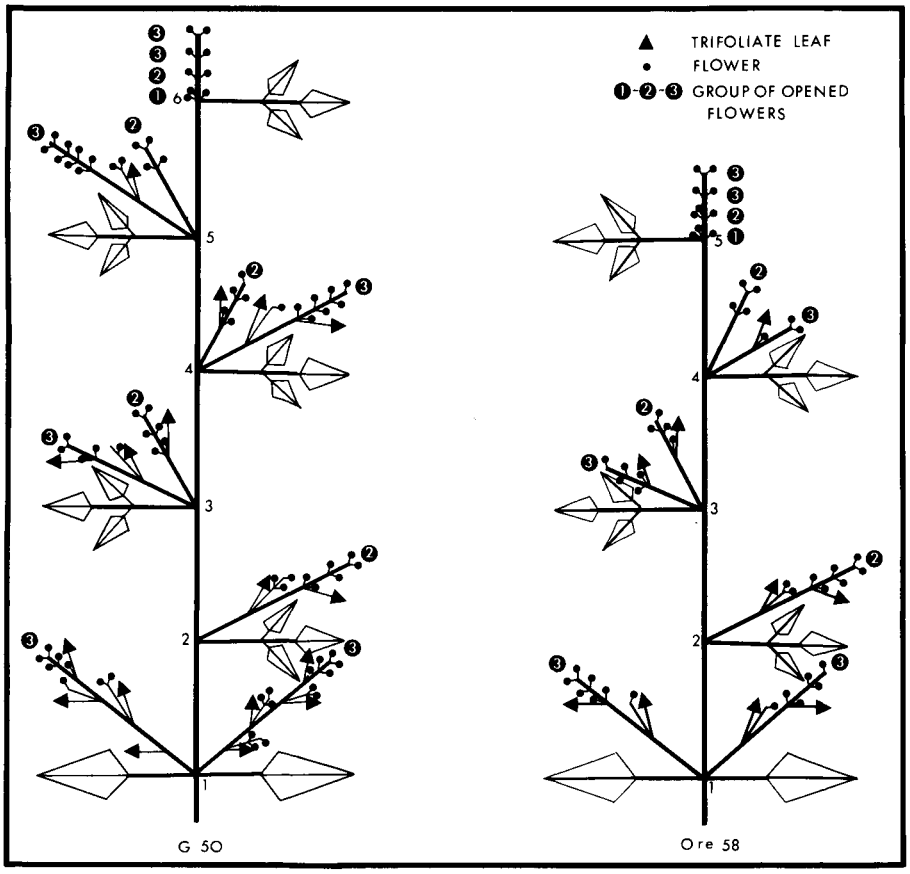

Fig. 10. Sequence of flowering on 'Gallatin 50' and 'Oregon 58' bean plants.

lateral branches did not appear simultaneously, as indicated by Ojehomon (7). One branch always developed before the others at the same node and the triad primordia of the branch were not observed at the same time as comparable branches at different nodes.

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Inheritance of Light Yellow Corolla and Leafy Tendrils in Gourd (*Cucurbita pepo* var. *ovifera* Alef)[1]

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Abstract. **Two independent monogenic recessives in *Cucurbita pepo* var. *ovifera* are described: light yellow corolla (*ly*) and leafy tendril (*lt*).**

Two new phenotypic characters (light yellow corolla and leafy tendril) were found in gourd. In a single plant of one breeding line a plant with light yellow corolla was associated with normal tendrils. The light yellow color is described as Y6 by the Fisher Color Chart (2) and normal color as lighter orange yellow or OY5. In another separate breeding line a plant was found with leafy tendrils and normal corolla color. The leaf blades of the leafy tendrils were small and produced on the ends of the branched tendrils borne in the axils of the leaves. They are not identified with the leaf, because the vascular supply from the axis comes entirely from the bud trace.

These 2 plants were selfed and intercrossed. Each plant bred true but the F_1 plants were all normal corolla color and normal tendrils. The subsequent F_2 segregated 79 normal corolla color to 29 light yellow and 84 normal tendril to 24 leafy tendril. Each was not significantly different from a 3:1 ratio (p = 50-70%). The combined F_2 ratio was 60 normal colored corolla, normal tendril, 19 normal colored corolla, leafy tendril, 24 light yellow corolla, normal tendril, and 5 light yellow corolla, leafy tendril which does not differ significantly (p = 70-95%) from a 9:3:3:1 ratio indicating that the traits are independently inherited. The gene symbols proposed are *ly* (light yellow corolla) and + (orange yellow corolla); and *lt* (leafy tendril) and + (normal tendril).

No other corolla color variants have been reported in *Cucurbita*. The only reference to color variation of corolla in the Cucurbitaceae is a report by Hutchins (1) who found a green flowered sterile variant in *Cucumis sativus* L. inherited as a simple recessive. No previous reference to leafy tendrils is known in the Cucurbitaceae. Tendrils are generally associated with squash having a vine habit (3) but tendrils are also found in bush or dwarf lines.

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