Table 1. Relative mobilities of steroid hydrazones expressed as a fraction of the distance moved by the progesterone derivative using a conducting medium of 0.05*M* sodium borate.

Steroid	Relative mobility
Progesterone	1.00
Androsterone	0.85
Desoxycorticosterone	.83
Methyltestosterone	.77
Ethisterone	.76
Testosterone	.75
Estrone	.53

sterone in the borate system. Dissociation of the hydroxyl group at C_3 of estrone in the borate system probably results in the net charge becoming less positive than that of the testosterone hydrazone, resulting in a slower movement toward the cathode.

The relative mobilities of several steroid hydrazones are recorded in Table 1. There does not appear to be any simple correlation of relative mobilities and charge per unit of weight.

Cortisone acetate was not run in the borate system, but it moves just behind testosterone in a diethylbarbiturate buffer made up in 20-percent methanol (*7*). Hydrocortisone moved as two spots in the borate system with mobilities similar to progesterone and testosterone, suggesting that both di- and monohydrazones were present.

A dihydrazone possessing a greater ratio of net charge per unit of weight is more mobile in an electric field than a monohydrazone. The dihydrazone is more soluble in the stationary aqueous phase on a paper chromatogram and less mobile in a system, such as butanol saturated with water, than a monohydrazone. A combination of these two techniques to give a two-dimensional pattern is a more definite means of identifying steroids in pharmaceutical preparations than either of the two techniques employed alone.

The paper electrophoretic technique is considered superior to partition chromatography for mixtures where one component is present in a much higher concentration than the other components, and also for solutions containing salts or other compounds that effect the partition coefficient. The technique described has been used to separate mixtures of other quaternary nitrogen compounds, such as morphine, codeine, and choline.

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Flowering Hormone in Relation to Blooming in Sweetpotatoes

Shue-lock Lam and H. B. Cordner

Department of Horticulture, Oklahoma A. and M. College, Stillwater

The Jersey varieties of sweetpotato bloom sparsely if at all under ordinary conditions in the continental United States. This handicaps the sweetpotato breeder. Many investigators (*1*) have tried to induce these varieties of sweetpotatoes to bloom but none of them have been successful. However, Cordner and Sorensen (*2*) reported inducing sweetpotatoes to bloom by growing them in gravel culture and Culbertson (*3*) induced blooming by grafting. Recently Kehr, Ting, and Miller (*4*) and Zobel and Hanna (*5*) reported success in inducing flowering of Jersey varieties by grafting them on *Ipomea carnea* and *I. purpurea,* respectively. This result has been attributed to the accumulation of carbohydrates in the sweetpotato scion when it is supported by a root system incapable of forming storage roots.

The purposes of our study were (i) to develop a technique for inducing flowering in Jersey varieties and (ii) to determine the factors that induce flowering in the grafted scions of sweetpotatoes. This study was initiated in September 1953. The cleft graft has been used and the success of the grafts has varied with the different species used as grafted stocks and scions. Briefly our technique has consisted of the following steps:

1) A strong terminal of a sweetpotato shoot about ½ to 1 in. long was cut slantingly on both sides as grafted scion.

2) The stem of the stock was split longitudinally downward about ¼ in. for insertion of the scion.

3) The graft was tightly tied with a sisal fiber until the union was established. The grafted plants were kept in a humid atmosphere in a propagating box for 4 to 10 days, depending on seasonal conditions. The plants were then removed and transplanted to 6-in. pots and kept under favorable growing conditions.

A number of tests have been conducted and four of these are reported in this paper.

Effect of root-stock species. Fourteen related species forming nonstorage roots were used as stocks. A breeding line sweetpotato (P-47) was also used. Orlis (a sport of Yellow Jersey) was used as grafted scion and 5 to 10 plants of each species were grafted. The results of this test (Table 1) suggest that the absence of storage roots in the understock per se will not assure blooming in the sweetpotato scion. All but one of the 15 species used in these grafting tests are of the nonstorage root type. Only two species, *I. tricolor* and *I. hederacea,* were found to be effective in inducing flowering. It seems that various stock species have different abilities to induce blooming.

Effect of defoliation of morning glory stock. Orlis scions were grafted on the morning glory stocks (*I. tricolor*) with varying number of leaves, that is, none, 3, and 7 or more. Five to ten grafts were made in each group. Fruit set on the morning glory stocks was prevented by removal of flower buds. In this test the flower buds appeared on the sweetpotato scion about 30 days after grafting and the first blooms appeared in about 60 days. Flowering was usually initiated at the seventh node of the scion and continued for 3 to 20 nodes, depending on the number and the continued vigor of the leaves on the morning glory stock. As the leaves of the morning glory stock became yellow with age and dropped off the scion of the nonflowering sweetpotato reverted to the vegetative phase and remained so indefinitely. The number of flowers that appeared on the Orlis scions varied directly with the number of active leaves on the morning glory stocks. No flower buds appeared on the grafted scions in the absence of leaves on the stock.

Fruits developing on stock inhibited flowering of scion. The Orlis variety was again used as grafted scion. Fourteen grafts were made and divided into two groups. Fruit set was allowed on the morning glory stock in the first group while in the other fruit set was prevented. Flowering of the sweetpotato scion was greatly favored by the defloration of the morning glory stocks since an average of 46 opened flowers per scion resulted. When fruit set was permitted on the stock, the scions bloomed sparsely (average 5 blooms per scion). It appeared that the growing fruits monopolized the flowering hormone provided by the foliage of the stock to the extent that flowering in the scion was retarded or inhibited entirely.

Flowering response of different sweetpotato varieties when grafted on I. tricolor. The Orlis, Nemagold and P-114 sweetpotatoes, varieties most difficult to induce to bloom, were used as grafted scions. The morning glory stocks were uniform with reference to the number of leaves and total absence of fruit set.

The results (Table 2) show that many more flower buds appeared on scions or Orlis and Nemagold than on those of P-114.

Table 1. Flowering response of Orlis sweetpotato scions as affected by grafting on different related species.

Grafting stock used	Date of grafting	Flowering condition of stock species*	Flowering response in Orlis scion
A. (Nonstorage root)			
I. repens	Oct.	moderate	none
I. tricolor	Oct., Nov.	many	many
I. hederacea	Oct., Mar.	many	many
I. Nil	Mar.	many	none
Quamoclit pennata	Oct., Mar.	many	none
Calyonction aculeatum	Mar.	few	none
Other species (total of 8)†	Mar.	none	none
B. (Storage root)			
I. batatas (P-47)	Oct.	many	none

* Extent of flowering in normal (ungrafted) plants grown as control.
† Plant Introduction Nos. 20916, 209127, 209130, 207818, 207821, 207822, 207823, 209319.

Table 2. Flowering response of scions of three varieties when grafted on *I. tricolor.*

Variety	No. of grafted plants	Node on which the first flower appeared	No. of flowering nodes per scion	No. of flowers per scion
Orlis	10	7 to 13	23	46
Nemagold	5	8 to 13	19	38
P-114	5	8 to 13	12	7

Conclusions. In these experiments there is no indication of direct relationship between flower bud initiation and the accumulation of carbohydrates in the grafted sweetpotato scion. In the terminal shoot ½ to 1 in. in length used as scion, about 6 to 8 nodes are differentiated. The appearance of the first flower bud at the seventh node (or first node differentiated after grafting) indicates a very rapid flowering response in the sweetpotato scion following grafting. The rapid initiation of flowering in the scion, the association of flowers on the scion with the leaves on the stock, the influence of growing fruit on the stock, all point toward the conclusion that a flowering hormone (florigen) originating in the leaves of the morning glory stock is translocated to the meristematic region of the sweetpotato scion where it exerts its morphogenetic effect.

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The Binding Energy of Ammonia in the Calcium and Barium Chloride Ammines

Wesley W. Wendlandt

Department of Chemistry and Chemical Engineering, Texas Technological College, Lubbock

The problem of the bonding between ammonia and metallic cations has been of interest for many years. Biltz (*1*) has correlated the stability of this bonding with the physical and chemical properties of the metal salts. Recently, Katzin and Ferraro (*2*) introduced a method by which it is possible to calculate the binding energies of molecular ligands to various metallic cations. Most of their work was concerned with the hydrates and pyridinates of cobalt (II) salts with