forms appear and all the ratios were consistent with the 1:1 expected from a back-cross. The results are thus fully in agreement with the hypothesis that *carbonaria* and *insularia* are controlled by allelomorphs at the same locus and that *carbonaria* is dominant to *insularia* and both are dominant to typical.

There is thus good evidence that at least some of the genes controlling *insularia*, both from Oxford and from Cheshire, are allelomorphic with those determining *carbonaria*. It is, therefore, clearly desirable to investigate *insularia*, both darker and lighter than those studied in the present investigation, to ascertain how many loci are concerned. If several are found, this will be of considerable importance in investigations into the evolution of industrial melanism in *B. betularia*.

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Graft-induced Sex Changes in *Cucumis melo* L.

In normally monœcious melons (bearing both male and female flowers) the occurrence of andromonœcious (mostly staminate with fewer perfect flowers), hermaphroditic (all perfect flowers), and even gynomonœcious (mostly pistillate with fewer staminate or perfect flowers) plants have been reported¹. The latter type would be of considerable value in genetic work. Previous attempts to establish genotypically pure female lines have failed owing to the difficulty of obtaining pollen for inbreeding. In the recorded work here, it is reported that grafting of a gynomonœcious scion to selected andromonœcious understocks will temporarily induce formation of male flowers on the gynomonœcious scion.

Regulation of sex expression in musk-melon plants by various environmental treatments² and in plants related to the melon by hormonal treatments³⁻⁵ has been reported. The plants used in the present studies did not, however, respond to such treatments. A previous report of a graft-induced change in sex expression of hops⁶, and studies from this laboratory⁷ on the effects of grafting on pollen-style compatibility in *Oenothera*, together with the recent report of Pringle on a specific male sex inducing substance⁸, suggested grafting as a possible means of inducing sex changes in melon plants. The graft-induced formation of male flowers on a gynomonœcious plant here reported could be explained by the diffusion of either a macromolecular substance or a low molecular weight hormone across the graft union.

Seedlings of Spartan Rock, an andromonœcious variety of *Cucumis melo* L., of *Cucurbita pepo* L., or rooted clonal cuttings of the gynomonœcious musk-melon were used as understocks. A cleft graft was made at the twentieth node of the stock by inserting a 5-7 cm long scion from the gynomonœcious plant in a manner such that the cut end of the scion could be dipped into a vial containing water. The graft union was normally established in 2-3 weeks, after which time the vial and the cut end of the scion could be removed.

A gynomonœcious musk-melon plant was found by Dr. C. E. Peterson among the F_2 progeny from a cross between monœcious $\times$ hermaphroditic plants and was multiplied by vegetative propagation. Gynomonœcious seedlings for grafting experiments were selected from the inbred population of each successive generation. The scions were detached from the mother plant and grafted to the andromonœcious seedlings of musk-melon or of pumpkin. The results of such graftings are presented in Table 1. Usually three replicate grafts of each treatment were made. One can conclude from Table 1 that grafting

of a gynomonœcious musk-melon scion to andromonœcious seedlings of the same species or of pumpkin greatly increased the induction of staminate flowers. The induction was generally higher in grafts on seedlings of the same species and decreased as the homozygosity of the scions increased, levelling off in the F_4 generation. The absence of staminate flowers in the F_4 and F_5 of control plants may be explained by the small number of plants observed. The reappearance in the F_6 controls is roughly one-twentieth of the calculated value to be expected in an inbred population, assuming bifactorial inheritance¹.

Table 1. EFFECT OF GRAFTING ON THE INDUCTION OF STAMINATE FLOWERS IN SELECTED GYNOMONŒCIOUS MUSK-MELONS

Treatment	Generations of inbreeding for the gynomonœcious scion				
	F_2	F_3	F_4	F_5	F_6
1. <i>Ungrafted control</i>					
(1) No. of clonal plants	3	1	1	1	5
(2) No. of nodes observed	141	43	54	76	172
(3) Per cent staminate flowers formed	0.7	0.5	0	0	0.2
2. <i>Control—grafted to gynomonœcious musk-melon</i>					
(1) No. of clonal plants	2	1	1	—	—
(2) No. of nodes observed	87	48	32	—	—
(3) Per cent staminate flowers formed	0.5	0	0	—	—
3. <i>Grafted to andromonœcious musk-melon seedlings</i>					
(1) No. of clonal plants	3	1	1	4	3
(2) No. of nodes observed	150	65	41	285	159
(3) Per cent staminate flowers formed	31	23	13	11	10
4. <i>Grafted to andromonœcious pumpkin seedlings</i>					
(1) No. of clonal plants	—	—	—	2	3
(2) No. of nodes observed	—	—	—	80	75
(3) Per cent staminate flowers formed	—	—	—	5	4

In addition to the induction of staminate flowers on a previously pistillate scion by means of grafting, the distribution pattern of the staminate flowers also changes. This is illustrated by data from four representative plants (Table 2). In general, the induction of staminate flowers occurs at an earlier node as compared to the spontaneous occurrence of male flowers in control plants.

Table 2. DISTRIBUTION OF STAMINATE FLOWERS FORMED ON REPRESENTATIVE GYNOMONŒCIOUS MUSK-MELON SCIONS AS A RESPONSE TO UNDERSTOCK

Treatments	Sex of flowers formed on main axis after grafting (Node No.)		
	Pistillate	Staminate	Pistillate
(1) Ungrafted control	1-39	40	41-43
(2) Control—grafted to gynomonœcious musk-melon	1-37	38	39-48
(3) Grafted to andromonœcious musk-melon seedling	1-17	18-33	34-65
(4) Grafted to andromonœcious pumpkin seedling	1-10	11-12	13-44

It is also of interest that the graft-induction of male flowers is a temporary effect, in this respect being similar to the graft effects reported for *Oenothera*⁷. The induction effect usually begins and ends with the formation of nodes with hermaphroditic flowers or nodes bearing pistillate and staminate flowers simultaneously. Cases where the succession of staminate nodes is interrupted by mixed or pistillate ones also occur, especially at both ends of an induced portion of the axis.

This work was supported in part by the Michigan Agricultural Experiment Station, by the U.S. National Science Foundation (G 22069) and the U.S. Public Health Service (AM 05916). We thank Dr. C. E. Peterson for providing us with the original F_2 plants and Dr. R. S. Bandurski for his advice.

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