Observations and data strongly support the three gene hypothesis. At worst, the basis of perennialism cannot be very complex.

D. L. Shaver

2. Modification of the id/id phenotype.

The id phenotype is commonly thought of as being photoperiod-dependent for floral initiation, and as being almost invariably earless. In a previous report the author has shown that in his stocks, id/id segregates have not been photoperiod-controlled in outdoor experiments since floral induction can occur during the summer solstice and, in winter nurseries, may fail to occur during the winter solstice. In no case has any factor other than simple age of the culm (as a function of the inherent earliness of the specific stock involved) appeared to affect time of flowering in outdoor culture. However, when the author cultured one of his perennial plants as a houseplant during the winter of 1965-1966, by spring it had become highly induced, to the extent that new basal branches were prematurely flowering at a very small size, producing mixed, seed-bearing terminal inflorescences. To all appearances, the plant was "running out" in the manner previously described for the pe/pe gt/gt phenotype. Upon the return of summer weather, however, the plant was reset out-of-doors April 1966 whereupon it immediately resumed producing indeterminant and totipotent growth and continues to do so at the present time, January 1967. It is to be remembered that another propagule of this same clone was grown in the winter nursery concurrently, and showed no signs whatever of premature induction at any time. Since most of the reported work with id deals with greenhouse culture, it is possible that light quality, perhaps UV content, is critical in the expression of id.

Earlessness of id/id maize is obviously of great concern, since all perennial maize is homozygous id. Accordingly perennial maize has never produced ears. The several instances of seed production have been cases of tassel seed formation. However, a homozygous id synthetic has been established by the simple procedure of recombination among rare segregates which were successful in producing ears. The main segment of this population is only in its S_2 generation, but was successful in producing ears on 243 plants in a population of 313, a proportion of nearly 78%. Moreover, the ear fertility of this population was nearly doubled between the S_2 and the S_3 generation. Ear conformation is normal and ear size occasionally exceeds what one might expect from normal plants of this background. It is certain that earlessness of the id/id phenotype is another example of effects that are completely under the control of modifying genes. By inference, the perennial phenotype would produce ears normally if it were transferred to this background.

D. L. Shaver

3. Decussate phyllotaxy in maize.

Among the id/id segregates of a progeny grown in 1965, several plants had irregular patterns of leaf placement. In one case, a plant had a completely regular decussate phyllotaxis, beginning with the 5th node.

Leaves were borne oppositely, 2 per node, those of one node being rotated 90° to those of the preceding node, in perfect symmetry. Leaves were of normal size and conformation, with the nodal pair being of equal rank to each other. Being id/id, the plant was not ear fertile, but it produced pollen which was used to outcross. Selfed progeny is available for observation in the summer of 1967.

D. L. Shaver

4. When is hybrid vigor? (a)

Maize workers are accustomed to the fact that the F_1 between two inbred parents is not only much larger because of hybrid vigor, but flowers 10 to 14 days earlier than its parents.

In two summers of work in the unique Salinas Valley climate, it has been found that earliness is not an aspect of hybrid vigor. While F_1 progenies show the typical increase in plant size, they flower at the same time as their inbred parents. If a cross is made between an early and a late line, the F_1 flowers at a time intermediate to its two parents. Rather than condition of vigor, the number of plant parts to be cut off, in other words, leaf number, is the more reliable index to maturity.

A typical midsummer day in the Salinas Valley has a high of 82° which occurs as a rather sharp temperature peak soon after midday. Nightly temperature invariably drops into the low 50's. It would appear that this regime imposes a limitation upon the growth cycle which is not relieved by heterosis.

Only one important exception to this generalization has been found. F6, an apparently heat-loving Florida line, grows more slowly than its leaf number would predict. It spends much of its juvenile period in a condition of nearly stagnant terminal growth while tillers are freely produced. These grow out rhizome-like, showing little or no geotropism. Finally both the primary and secondary culms become geotropic, elongate rapidly, and flower, the tillers being equal in size to the first culm, each bearing two normal ears. The production of 10 large ears per seed planted was not unusual.

D. L. Shaver

5. When is hybrid vigor? (b)

Crosses between Florida teosinte and maize are typically freely tillering. The Salinas Valley environment accentuates this tendency both in maize and in its hybrids with Florida teosinte. In one case, however, the F_1 of a cross between Mangelsdorf tester and Florida teosinte produced no tillers at all among a progeny of 15 plants. Each leaf produced by this hybrid had limited viability. As judged by the formation of anthocyanin, sugar translocation was so impeded that each leaf died in turn, and only 4 or 5 functioning leaves were present at one time. Both parents were growing in the nursery in adjacent locations. The teosinte parent (Shaver's Florida teosinte inbred 2) grew normally, though slowly, and produced a typical