## DIOECIOUS MAIZE

IN contrast to the higher animals most seed plants are hermaphroditic, having male and female sex organs either in the same flowers or in different flowers on the same plant. There are a number of species of plants, both cultivated and in the wild, that have the two types of flowers in different individuals and correspond, functionally, to the situation in the higher animals. How this condition may have been brought about naturally is illustrated by the change that has been made under experimental control whereby the normally monoecious maize has been changed to a dioecious plant.

A recessive gene called silkless, found in a self-fertilized progeny of flint corn, renders the normal pistillate inflorescence, commonly called the ear, devoid of silks. The ovaries with their styles and stigmas are aborted and the result is a barren cob enclosed in the usual husks. These silkless plants have normal tassels and good pollen and are functionally male plants.

Another hereditary factor is known which changes the terminal staminate flower or tassel of corn into a seed-bearing structure. These "tassel-seed" plants, since they produce good seed but no pollen, are functionally female plants.

Crossing these pistillate and staminate individuals gives normal hermaphrodites in the first generation. These plants, when self-fertilized, segregate in the following generation as expected of such a dihybrid. A majority of the resulting plants are normal hermaphrodites; a smaller number are typical silkless or male in function; and approximately an equal number are typical tassel-seed plants, female in function.

What form the double recessive, silkless-tassel-seed plants would have, with both abnormal factors in the homozygous condition, was a matter of much speculation. Such individuals might be sterile in both types of flowers and consequently neuter in function. They might be sterile in the lateral inflorescence and fertile in the terminal inflorescence. There were other possibilities but the latter result seemed to be the most probable outcome. If this proved to be the case it was thought possible to produce a dioecious corn.

In a large number of progenies segregating for both factors, grown in successive years, no plants which looked like a recombination of both genes were found. All the tassel-seed plants produced at least a vestige of a lateral ear and when these were examined they were all seen to have silks. This particular tassel-seed factor was known to be on a different chromosome from the one carrying silkless so that linkage did not prevent the recombination.

A number of second generation tassel-seed plants, carrying silkless either in one or two doses, were crossed by silkless plants heterozygous for tassel-seed. Forty-one progenies of such matings were grown and five were found to give only two types of plants—male and female. These five families were entirely dioecious, their seed parent having produced only seed and their pollen parent only pollen. In a total of 86 plants, 37 were female type and 49 male type.

From these results it was quickly apparent that the reason the doubly recessive plants, having both silkless and tassel-seed genes, were not recognized was due to the fact that they were no different in appearance from the singly recessive tassel-seed plants. Apparently tassel seed has the ability to nullify the action of the silkless gene and allows the plants to produce seed both in the tassels and in the lateral ears. On this assumption such a plant would carry silklessness in double dose and when crossed by a silkless plant that was otherwise normal would give all silkless plants. This result has practically been obtained. Out of 30 plants from such a cross, 29 were all completely silkless. There was one exceptional plant, possibly due to contamination. It would be difficult to account for it by segregation since, in that case, half of the plants should have been silkless.

There seems to be no other way to account for the five families of dioecious corn than that the mother plants with seeds in the tassel were also homozygous for silkless. Whatever the explanation, the fact is that a dioecious strain has been produced from a monoecious species. The female plants are homozygous, the male plants are heterozygous, and natural pollination of one by the other is expected to continue to give only male and female plants in approximately equal numbers. In this way an hermaphroditic organism has been changed to a separate-sexed organism.

DONALD F. JONES

CONNECTICUT AGRICULTURAL EXPERIMENT STATION

## BOOKS RECEIVED

BOONE, LEE. *Bulletin of the Vanderbilt Marine Museum.* Volume III, Scientific Results of the Cruises of the Yachts "Eagle" and "Ara" 1921–1928, William K. Vanderbilt, Commanding. Pp. 221. 83 plates. Vanderbilt Marine Museum, Huntington, Long Island, New York.

DELPORTE, E. *Atlas Céleste.* Pp. 26. 13 plates. Cambridge University Press, Macmillan. $3.00.

DULL, CHARLES E. *Modern Chemistry.* Pp. xii + 776. 392 figures. Henry Holt. $1.80.

NORTHROP, F. S. C. *Science and First Principles.* Pp. xiv + 299. Macmillan. $3.00.

OLDEKOP, EWALD. *Über Das Hierarchische Prinzip In Der Natur Und Seine Beziehungen Zum Mechanismus-Vitalismus-Problem.* Pp. 64. F. Wassermann, Reval.

PHILLIPS, E. P. *South African Grasses.* Pp. 224. 121 plates. Central News Agency, South Africa.

POOR, VINCENT C. *Electricity and Magnetism.* Pp. ix + 183. Wiley. $2.25.