AN "OEONOTHERA" OR MULTIPLE TRANSLOCATION METHOD OF ESTABLISHING HOMOZYGOUS LINES\textsuperscript{1}

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A METHOD by which a gametic combination could be made homozygous immediately would appear to be of great practical use to the plant breeder as well as of theoretical interest. One such method, the production of haploids from which homozygous lines might be produced by doubling their chromosome number, has been suggested by many workers. Chromosome doubling can now be accomplished by colchicine treatment and other methods. In corn, if plants of a variety or other source of new lines were pollinated by a stock carrying several dominant factors not carried by the variety, as for example: \(C R B Pl\), haploids on the resulting ears could be recognized by the absence of the dominant character, in this case aleurone color. They could be given a second check in the seedling stage by the absence of the \(B Pl\) plant color. According to Randolph’s unpublished data obtained by using a similar method, cited by Einset (10),\textsuperscript{3} haploids occur in corn with a frequency of about 1 in 2,000. A large number of haploids could be obtained if such pollinations were carried out on a large scale. There would undoubtedly be some casualties in the attempt to double their chromosome number. Since fertility would be restored when doubling was accomplished, the recognition of diploids or diploid sectors should not be difficult. In spite of the difficulties it seems to be a feasible method worthy of trial on an adequate scale.

A second method for obtaining homozygous lines, which to my knowledge has not been suggested, is one which I propose to call the “Oenothera” or multiple translocation method. In this method, all the chromosomes of the haploid set are to be involved in translocations in such a way that the \(F_1\) of crosses with normal stocks will have at meiosis a ring containing the entire diploid number of chromosomes. Such a plant should produce two kinds of functional spores corresponding to the two parental gametic combinations of chromosomes. In corn the other combinations abort. Provided no lethals are present, the offspring from selfing such a plant should consist of heterozygotes with the chromosome ring, recognizable by high pollen abortion; and in addition two types of normals, each homozygous for one of the two parental gametic combinations. These two types of normals would have normal pollen, the normal number of chromosome pairs, and could be distinguished by crossing them with the standard normal stocks. The normal type not carrying the translocations would constitute the homozygous line. Possible sources of heterozygosity in this line will be considered later.

The chance of isolating superior lines by this “Oenothera method” should be the same as the frequency with which superior gametes

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\textsuperscript{3}Figures in parenthesis refer to “Literature Cited”, p. 707.