12. A method of avoiding some of the high sterility during the process of building the rings.

In this method the different crossovers needed are selected in a series of crosses, all of which may be in progress more or less simultaneously. If the needed crossovers are obtained, the combinations finally required can be obtained by segregation without further crossing over.

The feasibility of this method for producing large chromosome rings at will, by chromosome segregation from intercrosses of permanent ring stocks that have a common translocation (2-3d/2-4b x 2-4b/4-8a ---- 2-3d/2-4b/4-8a), is being tested. The homozygous permanent ring of six 2-3d/2-4b previously isolated by Burnham was crossed with a multiple translocation stock of 2-4b/4-8a believed to be a heterozygous permanent ring of six. Test crosses will be made this winter with standard normals and the progeny will be examined cytologically next summer for a ring of eight.

A search is in progress for a permanent ring of 4-8a/8-9b in order to utilize another permanent ring of six previously isolated by Burnham 8-9b/9-10b to build a ring of twelve. (2-3d/2-4b/4-8a/8-9b/9-10b)

Should the proposed method be successful it is planned to reduce the problem of high sterility associated with the production of large chromosome rings by intercrossing stocks with as many translocated chromosomes in common as possible. Theoretically, the F_1's of all the following should cytologically be two rings of four.

2-3d/2-4b x 2-4b/4-8a.
(2-3d/2-4b/4-8a) x (2-3d, 4-8a/8-9b)
2-3d/2-4b/4-8a/8-9b x (2-3d/2-4b, 8-9b/9-10b)

Theoretically, chromosome substitution lines might be produced by the use of big rings. As an example chromosome 5 from inbred B might be substituted in inbred A as follows:

Cross both inbred A and inbred B with a homozygous stock with chromosomes 1-2-3-4-5 in one ring and chromosomes 6-7-8-9-10 in another ring. Self and isolate from the progeny of the F_1 of inbred A a plant homozygous for the ring 6-7-8-9-10 and the normal chromosomes 1,2,3,4,5. Similarly isolate a plant from progeny of the inbred B F_1 homozygous for ring 1-2-3-4-5 and for normal chromosomes 6-7-8-9-10. Intercross and then self the selections from inbred A and inbred B and recover a synthetic inbred composed of the normal chromosomes 1,2,3,4,5 from inbred A and the normal chromosomes 6,7,8,9,10 from inbred B. Similarly by using a stock homozygous for chromosomes 1-2-3-4-6 in one ring and 5-7-8-9-10 in another ring with the synthetic inbred and inbred A the desired substitution of chromosome 5 from inbred B into inbred A might be achieved.

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