Kowles, R. V. ond R. L. Phillips. Preliminary characterization of six I - IV single translocations ond their intercrosses.

A series of six single reciprocal translocation stocks that involve linkage groups I and IV were crossed (1) with wild-type, (2) with each other in various intercross combinations, and (3) with multiple genetic marker stocks for both linkage groups. Data were obtained relative to ascospore abortion frequencies, unordered projected ascospore patterns, linkage between marken, ond linkage between markers ond translocation breakpoints. The objective of this work was to produce two-chromosome double translocations between linkage groups I and IV (Kowles 1972 Ph. D. Thesis, University of Minnesota, Diss. Abstr. Int. 338: 60-61). In o chromosome rearrangement of this type, each of the two chromosomes would be characterized by two separated breakpoints and two reciprocally exchanged segments. The establishment of these chromosome rearrangements depends upon simultaneous crossovers in the two differential segments formed in on intercross between single translocation stocks, each with breakpoints that involve the some two chromosomes. Further tests ore needed to determine whether these rearrangements were actually synthesized or whether other aneuploid derivatives hod occurred.

TABLE 1. Ascospore abortion percentages and frequencies of unordered octet types from single translocation stocks crossed with normal, and from intercrosses between the single translocation stocks.

Translocation stocks crossed with a normal stock (either 74A or 297a)	Ascospore abortion in percent (based on random collections of a minimum of 500 ascospores)	Total number of octets observed	Unordered octets (frequency in percent)				
			8:0	6:2	4:4	2:6	0:8
T(I;IV) D304	37.4	102	50.0	3.9	18.6	1.0	26.5
T(I;IV)NM119	40.9	110	25.5	1.8	39.0	0.9	32.8
T(I;IV)NM140	42.9	121	29.0	2.5	44.6	1.6	22.3
T(I;IV)NM144	40.7	86	22.0	3.5	62.9	0.0	11.6
T(I;IV)NM164	45.7	106	32.1	12.2	45.4	0.9	9.4
T(I;IV)NM172	32.2	139	29.5	5.8	46.0	3.6	15.1
*Intercrosses							
304 x 119	33.7	97	14.4	8.2	38.0	10.6	28.8
304 x 140	42.7	131	32.8	5.3	33.5	4.6	23.7
304 x 144	43.5	166	29.5	5.4	35.5	6.6	23.0
304 x 164	43.4	107	48.5	0.0	14.0	1.9	35.6
304 x 172	26.3	132	37.1	12.9	36.4	3.7	9.8
119 x 140	35.4	157	18.4	23.6	39.5	8.3	10.2
119 x 144	30.3	108	12.1	30.5	42.5	2.8	12.1
119 x 164	26.6	206	24.3	4.4	41.7	4.8	24.8
172 x 119	3.8	292	93.9	3.8	1.7	0.3	0.3
164 x 140	27.7	138	32.6	22.5	27.6	6.5	10.8
172 x 140	24.4	163	21.5	62.0	15.3	1.2	0.0
164 x 144	28.7	228	25.4	5.3	50.4	5.3	13.6
172 x 144	24.4	144	17.4	59.0	19.4	4.2	0.0
172 x 164	39.2	131	30.6	5.3	36.6	3.9	23.7

* 140 x 144 intercross is missing because protoperithecia would not develop.

TABLE 2. Recombination values between genetic markers and between markers and partial sterility (breakpoints) in crosses between multiple genetic marker strains and single translocation stocks.

LINKAGE GROUP I

Translocation	Sequence*	mt-al-2	al-2-os-1	mt-P.S.**	al-2-P.S.	os-1-P.S.
T(I;IV) D304	mt T al os	18.3	32.3	4.3	16.1	39.8
T(I;IV)NM119	mt al os T	20.0	24.3	35.7	30.0	17.1
T(I;IV)NM140	mt al os T	34.5	10.4	32.2	13.8	3.5
T(I;IV)NM144	mt al os T	30.8	15.4	46.1	14.8	13.4
T(I;IV)NM164	mt T al os	20.8	36.6	16.8	14.8	40.5
T(I;IV)NM172	mt al os T	36.7	16.2	35.3	22.1	16.1

LINKAGE GROUP II

Translocation	Sequence	cys-10-trp-4	trp-4-mat	cys-10-P.S.	trp-4-P.S.	mat-P.S.
T(I;IV) D304	cys T trp mat	42.1	22.0	42.1	11.6	31.6
T(I;IV)NM119	cys T trp mat	50.0	26.5	36.5	23.5	33.7
T(I;IV)NM140	cys T trp mat	32.3	20.2	26.2	11.1	26.2
T(I;IV)NM144	cys T trp mat	50.0	24.4	48.1	22.4	40.7
T(I;IV)NM164	cys T trp mat	50.0	16.2	48.4	20.4	29.0
T(I;IV)NM172	cys T trp mat	46.8	28.6	43.0	23.3	35.0

* T denotes translocation breakpoint.

** P.S. denotes partial sterility (translocation breakpoints).

The results show a somewhat lower frequency oscospore abortion than the 50% often expected when single reciprocal translocations stocks ore crossed with wild-type stocks, In addition, many of the abortion frequenciesfrom these intercrosses were considerably lower than the overage of the two parental translocation stocks crossed with normal. These low oscospore abortion frequencies observed in the intercrosses can be explained in terms of viable duplications and/or deficiencies.

Four-point recombination data were obtained with three marker genes and partial sterility to aid in the placement of the breakpoints for each of the translocation stocks. These translocations mop with their breakpoints in the right arm (R) of both linkage groups I and IV, making intercrosses between them of the same-arms type. The only possible exception is T(I;IV)D304. This translocation has one breakpoint that mops very close to the centromere of linkage group I. If, in these some-arms intercrosses, each translocation involves one exchanged segment shorter and one exchanged segment longer relative to the other translocation, progeny con result that carry a duplication for both segments between the breakpoints without ony deficiencies. Indications are that many of these combinations might be viable in Neurospora (Perkins 1971 Genetics 68: s50).

Duplication-producing intercrosses of the type described ore often recognized by the frequencies of unordered octets, particularly by on abundance of 6:2 ratios. A high number in this class is indicative of viable duplications since theoretically there is no other woy to obtain such octets from reciprocal translocations. In intercrosses where one translocation hos both exchanged segments shorter than the other translocation,or where the breakpoints are in opposite arms, all duplications would also be accompanied by deficiencies. Results show that several of these intercrosses are generating high frequencies of 6:2 octets. Compatible with these data ore the low oscospore abortion results gained from random collections; certainly what one would expect with viable duplication situations. Breakpoints of T(I;IV)172 and T(I;IV)119 mop extremely close to each other and the ascospore abortion frequency from the intercross between them was only 3.8%. These two tronslocotions hove breakpoints that are either identical or at very nearly the some positions.

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