

3. Variability in length and arm ratio of pachytene chromosomes.

Absolute length measurements of all chromosomes from each of 271 pachytene microsporocytes from 89 anthers of 31 related corn plants have been made in the course of various studies over a period of two years. Arm ratios were calculated where centromeres could be identified. These data are listed below:

| Chromosome | Mean length (μ) | Standard deviation | Mean arm ratio | No. observations of arm ratio | Standard deviation |
|------------|-----------------------|--------------------|----------------|-------------------------------|--------------------|
| 1 | 83.5 | 19.4 | 1.33 | 52 | .200 |
| 2 | 69.2 | 14.9 | 1.42 | 56 | .251 |
| 3 | 64.5 | 14.9 | 2.16 | 48 | .558 |
| 4 | 59.8 | 12.6 | 1.59 | 73 | .259 |
| 5 | 58.4 | 12.9 | 1.16 | 56 | .145 |
| 6 | 48.3 | 12.0 | 3.10 | 20 | .841 |
| 7 | 49.6 | 10.8 | 2.83 | 57 | .587 |
| 8 | 46.3 | 10.1 | 3.06 | 52 | .584 |
| 9 | 44.5 | 10.7 | 1.86 | 63 | .375 |
| 10 | 37.0 | 8.8 | 2.70 | 55 | .498 |

Statistical studies indicate that longer chromosome arms have greater variances but smaller coefficients of variability and that chromosomes with larger arm ratios have inherently more variable arm ratios. These greater variabilities in arm ratio are not correlated with corresponding greater variabilities in length of the chromosomes involved. The results are consistent with the interpretation that the chromosomes have two kinds of variability: one which seems to contribute approximately uniformly per unit length to variability throughout the genome while the other kind of variability may be a characteristic property of each chromosome unrelated to length in any consistent way. Chromosome knobs do not appear to influence variability in length of chromosome arms in which they occur. *Tripsacum* chromosome material does not appear to differ in its length variability from corresponding corn chromosome material for which it has been substituted.

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4. Further studies on pachytene pairing failure.

Pairing failure in pachytene chromosomes was studied against a genetically constant background. Very significant negative correlations were found between total chromosome length per cell on the one hand and number of terminal pairing failures and their total extent (percent length) on the other, and between number of terminal failures and their average extent (percent length). No significant correlation was found, however, between total chromosome length per cell and the average extent (percent length) of pairing failure. If the pairing failures are dissociations increasing in extent and number during the pachytene stage studied, the simplest reconciliation of the results requires that the average rate of their extension be roughly proportional to total chromosome length or that certain constants be related to each other in specific ways. An alternate interpretation, that the pairing failures were present before pachytene and that chromosomes