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## Fruit Size and Shape Genes on the First Chromosome of the Tomato

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## FRUIT SIZE AND SHAPE GENES ON THE FIRST CHROMOSOME OF THE TOMATO

E. W. LINDSTROM

Genetic evidence has demonstrated the presence of a major factor for fruit size in the first linkage group of the tomato, linked inheritance being exhibited between fruit size and the genes for the tall-dwarf and the smooth-peach (pubescent) characters. In this same linkage group a major gene for fruit shape (ovate) has been found.

Fruit shape (ovate-round-oblite) and fruit size have shown high (positive) correlation in  $F_2$  generations from crosses of ovate and oblate tomato varieties. This correlation has heretofore always been in the direction of small fruit size and ovate shape (or large size and oblate shape) being associated. Two possible explanations for such a correlation are available, (1) due to a morphological correlation between shape and size, perhaps caused by the structure and development of the tomato flower, or (2) due to a genetic linkage between shape and size genes.

If the first explanation is the correct one, this correlation should *always* be in the same direction (positive). If the genetic basis is the true one, it should be possible to reverse the correlation, making it negative.

Experimental data are now available from two hybrid generations involving 400 plants in which the larger size (medium size actually) was introduced by the parent with the ovate shape. The correlations between fruit size and shape (as measured by a shape index) are as follows:

$F_2$ - Yellow Cherry (small) $\times$ Dwarf Pear (ovate, medium size)	$r$
	$= -0.45 \pm 0.04$
$F_2$ - Red Currant (small) $\times$ Medium size-Ovate type	$r$
	$= -0.31 \pm 0.05$

This means that the larger size can be associated with ovate shape, and small size with the round (or oblate) shape, and proves that the correlation between shape and size in tomato fruits is based on a genetic linkage. This affords further verification of the fact that a major size and a shape gene reside on the first chromosome of the tomato and undergo the linkage phenomena characteristic of the simpler Mendelian genes.

It also affords hope that the production of a very large sized ovate tomato variety is possible. This highly desirable type is non-existent as far as records or experience go, all ovate varieties being small or at most medium sized. The isolation of the proper cross-over combination should produce this new and very desirable variety.

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