ARTHRITIC (art): A NEW GENE ON CHROMOSOME 6

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In 1978, L. G. Cruger provided me with seeds of a spontaneous mutant he had isolated in the early 60's from the cultivar 'Olympic'. In the seedling stage, mutant plants (Fig. 1) bear some resemblance to plants carrying either un or sil; leaflets and stipules are undulate and partially folded. These phenotypic characteristics are very distinct in pure populations and sufficiently distinct in segregating populations to make the mutant a suitable seedling marker. Unlike un or sil, however, the upper internodes of adult plants become foreshortened and, after the pods have developed, the plants might mistakenly be regarded as fasciated because the pods are clustered at the top. Perhaps, however, the most diagnostic feature of this mutant occurs in the reproductive phase of development. The base of the peduncle becomes swollen and the actual site of attachment to the stem is also more smoothly rounded than in non-mutant plants (Fig. 2). The nodes that mark the union between peduncle and pedicel appear to be abnormally enlarged as well. Thus, the mutant plants can be discerned with comparative ease at virtually all stages of the life cycle. The characteristic swollen joints prompts me to suggest the name arthritic and the symbol art for this mutant.

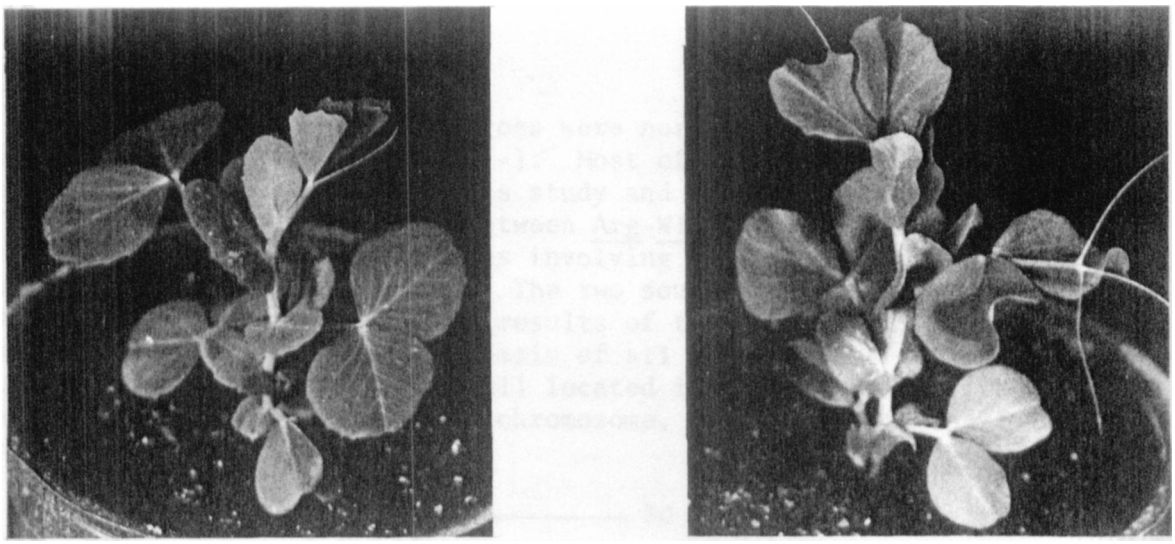

Fig. 1. Normal seedling compared with seedling carrying arthritic (art) mutant (right).

Crosses between art x normal plants bore F1's that were normal, and segregation in F_2 conformed to expectation (Table 1) based on monogenic recessive inheritance. Table 1 (B) also shows evidence of linkage with each of two markers, p and wlo, on chromosome 6.

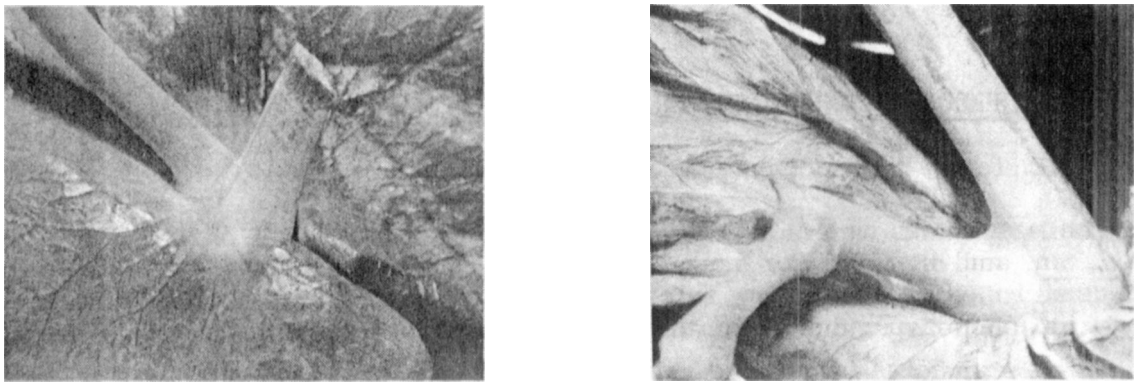

Fig. 2. Axil of normal plant (left) and from art plant (right) showing swollen base of peduncle in art plant (right) vs normal plant (left).

Table 1. Phenotypic distribution in F_2 populations segregating for Art-art. (A) F_2 populations in which Art-art alone segregated, and (B) joint segregation between art and each of two markers on chromosome 6.

A. Art-art F_2 segregation

	Art	art	Total	Chi-square (3:1)
B279-329-341	104	28	132	$1.01^{n.s.}$
B280-469-476	126	33	159	$1.53^{n.s.}$

B. Joint segregation of art with p and with wlo

	Art P	Art p	art P	art p	Total	Chi-square		
						Art-art	P-p	Joint
B280-794-807	169	85	69	7	330	0.91	1.46	15.93**
	Art Wlo	**Art wlo**	**art Wlo**	**art wlo**	**Total**	**Chi-square**		
						Art-art	Wlo-wlo	Joint
B280-477-483	71	34	29	1	135	0.56	0.06	10.25*

Some very preliminary evidence suggests that art may influence the abscission layer of the pedicel (C. S. Pratt, Personal communication). If this is verified, there may be some similarity of gene action between art and the j-2^{in} gene in tomato (1).

The finding that art is located on chromosome 6 in the vicinity of two other excellent markers, together with other recent findings (2, 3), adds to our rapidly improving knowledge of this chromosome.

1. Joubert, T. G. la G. 1965. So. African J. of Agric. Sci. 8:571-582.
2. Marx, G. A. 1978. PNL 10:34-37.
3. Marx, G. A. 1981. PNL 13: