TWO INTERCHANGE LINES OF PISUM SATIVUM 'DIPPKS GELBE VIKTORIA' (DGV) STUDIED BY MEANS OF THE C-BANDING TECHNIQUE

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In 1974, Klein (1) published his results on translocation line 488 of DGV. In this genotype he described an interchange between choromosomes 4 and 7, resulting in a large metaphase chromosome with satellites on each end and a small metacentric one. On the basis of measurements and calculations on homogeneously stained chromosomes the breakpoints were presumed proximal on the p-arm of chromosome 4, and proximal on the q-arm of chromosome 7. In 1978 Lamm (2) described the same genotype after application of a modified C-banding technique. To that extent his results concerning the 4/7 translocation were in accord with those of Klein. Yet, he assumed a second translocation (2/3) in this genotype. This was based on the finding of a second ring of four in translocation heterozygous plants, after crossing L 110 to 488.

Figure 1 shows a metaphase of the root-tip meristem from a translocation homozygous plant. Arrows point to the T-chromosomes. Figure 2 gives a schematical drawing of the respective chromosomes. C-banding method was applied according to Wolff (4).

The large interchange chromosome (T1) easily can be deduced from chromosomes 4 and 7: two prominent heterochromatic regions near the secondary constrictions characterize the two ends of this chromosome (Fig. 1; Fig. 2, below). The more prominent region derives from chromosome 7, the other from chromosome 4. Both the arms of Tl carry intercalary bandings. The banding on that arm deriving from chromosome 7 certainly is that also found on normal chromosome 7 (Fig. 2, above). Yet the one on the arm deriving from chromosome 4 normally is not found. With high certainty this banding is that which is usually found on the short arm of chromosome 7 (Fig. 2, above). Thus, under these presuppositions, the one breakpoint lies distal in a small region of the p-arm of chromosome 7, that of chromosome 4 in a similar short region proximal on the q-arm (Fig. 2, below, white sections). The short translocation chromosome (T2) is composed of the p-arm of chromosome 4. The intercalary banding of this arm is present but is hardly visible in Fig. 1. Furthermore, the centromere of chromosome 4 and a short proximal part of the q-arm take part in this T2-chromosome and at least a short terminal part of the p-arm of chromosome 7 (Fig. 2, below).

The proposed second translocation (2/3) (2) in this genotype so far could not be found. It is presumed that this chromosomal deviation is the characteristic difference of both the lines L 110 and DGV. A cytological investigation with regard to this problem is in progress.

The second translocation genotype 562 was described by Muller (3). Here, too, the investigations were done on homogeneously stained chromosomes. In the case of 562 a 5/3 translocation is at hand (Figs. 3,4). The large T-chromosome (Tl) is composed of the q-arm of chromosome 5 (small intercalary banding, proximal [Fig. 4, above]), and with certainty of the centromere of this chromosome. The second arm is characterized by the tiny intercalary distal banding of chromosome 3 (Fig. 4, above). The exact breakpoint in this case, too, cannot he determined. The regions of the probable positions are white in Fig. 4 (below). The T2-chromosome easily can be identified on grounds of the typical p-arm (short arm) of chromosome 3 and the intercalary banding adjacent to the centromere region of the q-arm (long arm) of this chromosome (Fig. 4, above); the distal part of this arm is from chromosome 5.

1. Klein, H. D. and M. Milutinovic. 1974. TAG 44:69-77.
2. Lamm, R. L. 1978. PNL 10:31-32.
3. Muller, D. 1976. Caryologia 29:217-225.
4. Wolff, G. 1985. Nucleus 28:3-7.

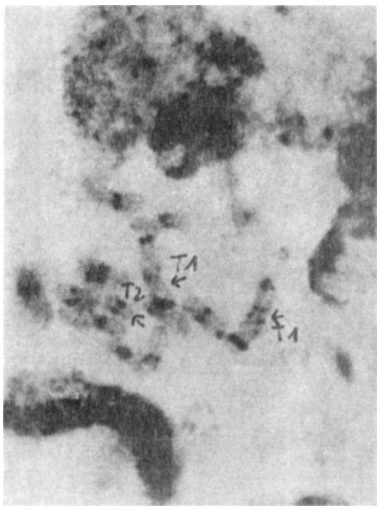

Fig. 1.

Metaphase of root-tip meristem Pisum sativum, cv. 'Dippes Gelbe Viktoria', interchange line 488; C-banding.
Tl=translocation chromosome 7/4
T2=translocation chromosome 4/7

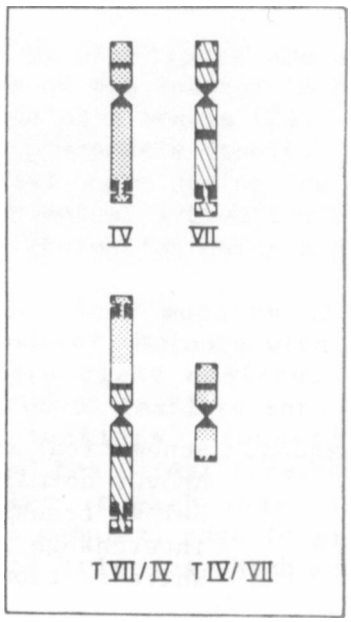

Fig. 2.

Schematical drawing:
Above: Normal chromosomes 4 and 7
Below: Translocation chromosome of interchange line 488; white sections: exchange segments

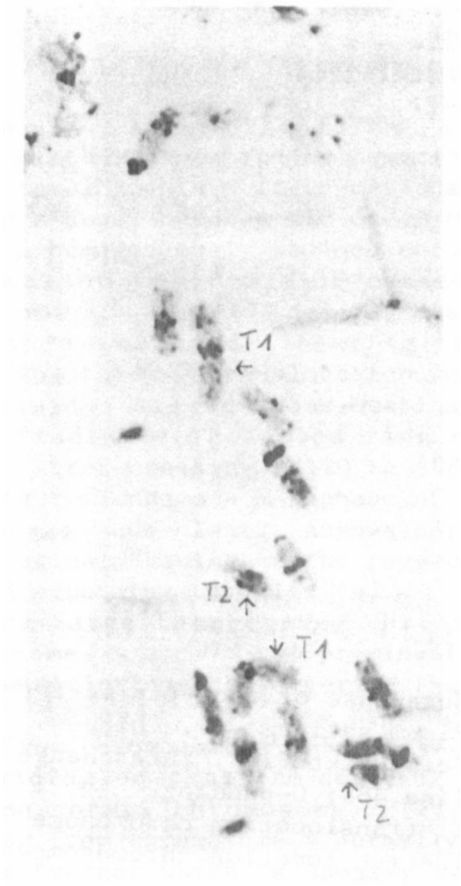

Fig. 3. Metaphase of root-tip meristem Pisum sativum, cv. 'Dippes Gelbe Viktoria', interchange. line 562; C-banding.
T1=translocation chromosome 5/3
T2=translocation chromosome 3/5

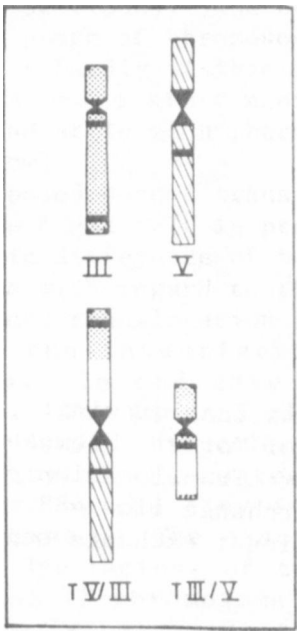

Fig. 4. Schematical drawing:
Above: normal chromosomes 3 and 5
Below: translocation chromosomes interchange line 5
White sections: exchange segment

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