M. Feldman

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A new trisomic type in barley

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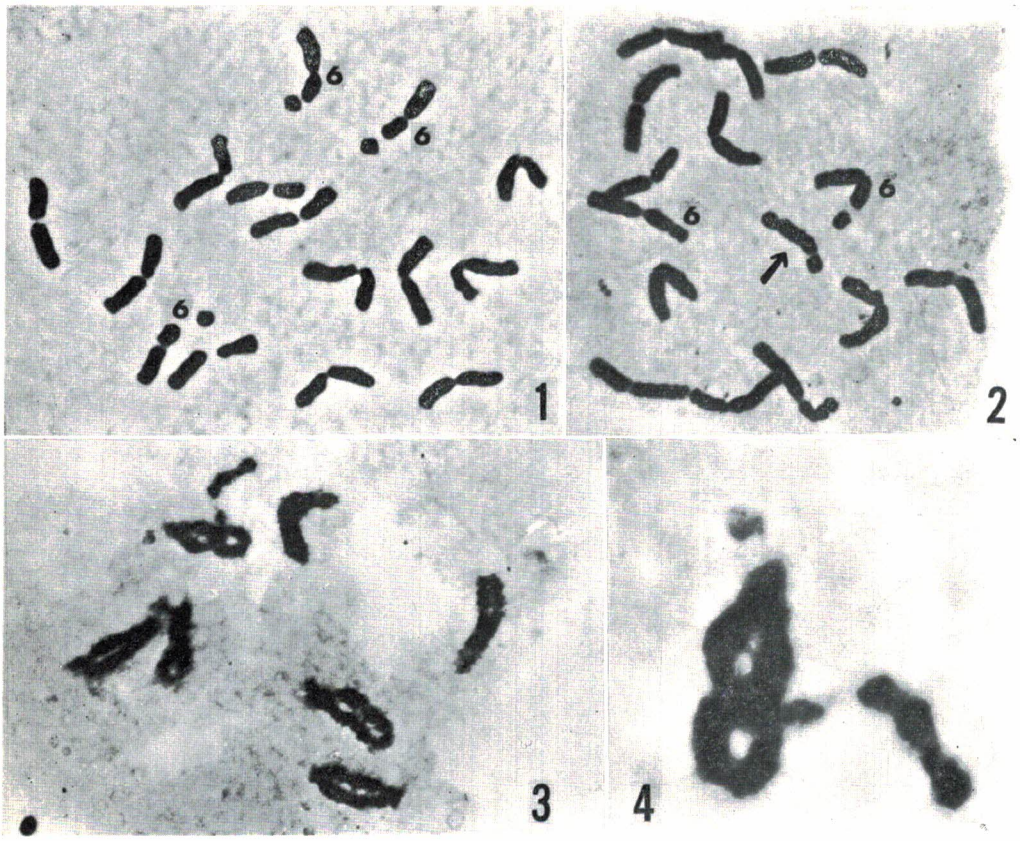
In 1954 seven types of primary simple trisomics were produced from autotriploids of a wild two-rowed barley variety, *Hordeum spontaneum* C. Koch var. *transcaspicum* Vav. (Tsuchiya 1960, Jap. Jour. Bot. 17: 177). Purple is the trisomic for chromosome 6 having large satellite (Fig. 1, ×1400). A new trisomic type which had a peculiar shape of extra chromosome has been found in the 4th generation of one of 3 original Purple trisomics (53–3–1, cf. Tsuchiya 1958, Seiken Ziho 9: 69). The extra chromosome had two constrictions each of which located at subterminal positions of opposite end of the chromosome therefore seemed to be a dicentric chromosome (Fig. 2, × 1400, indicated by an arrow). From the study of mitotic chromosome behaviors it has been demonstrated that the one of the two constrictions is the kinetochore and the other the secondary constriction of the chromosome 6. Thus the changed chromosome was assumed to be derived from chromosome 6.



Further the length of the changed chromosome was shown to be about 18% shorter than that of the original chromosome 6.

At diakinesis and MI of meiosis in new trisomic plants, chromosome behaviors were almost normal and similar to those of primary Purple trisomics (cf. Tsuchiya 1960, Jap. Jour. Bot. 17: 177) with the one exception of diplotene-diakinetic configurations of chromosomes. Ring trivalent or pentavalents at MI were almost normal showing, V, Y, ring-and-rod, and triple arc. The trivalent, as had been expected from the results of karyotype analysis, usually associated with the nucleolus at diakinesis (Fig. 3, ×1400). This finding supports the assumption that the new chromosome is derived from chromosome 6. From the meiotic behavior of chromosomes, especially of chromosome associations and the shape of trivalents, the possibility of occurrence of dicentric chromosomes or secondary or tertiary nature of the extra chromosome could be excluded. No peculiar abnormalities such as bridge-fragments or others have been observed so far. Based on the somatic chromosome morphology and meiotic behaviors at meiosis it has been assumed that the structural change which occurred to chromosome 6 in the new Purple trisomic has been a pericentric inversion accompanied by a deletion. Ring (bivalent) part of a ring-and-rod trivalent which was associated with the nucleolus at early diakinesis (Fig. 3) showed a peculiar figure of 8 (Fig. 4, ×3800) which is very similar to the bivalent configurations of pericentric inversion in *Zea mays* shown by Zohary (1955, Genetics 40: 874). This finding may be strong cytological evidence for the nature of the changed extra chromosome: Pericentric inversion (accompanied by deletion). The new Purple trisomics showed vigorous growth, intermediate characteristics between normal diploid and primary Purple trisomics, and also almost normal pollen and seed fertility. In the sibling and/or progeny of the new trisomic plants tetrasomics and other chromosomal variants have been obtained.