CYTOLOGICAL BEHAVIOUR OF A SEMI-POLLEN-STERILE PLANT OF *VICIA FABA*

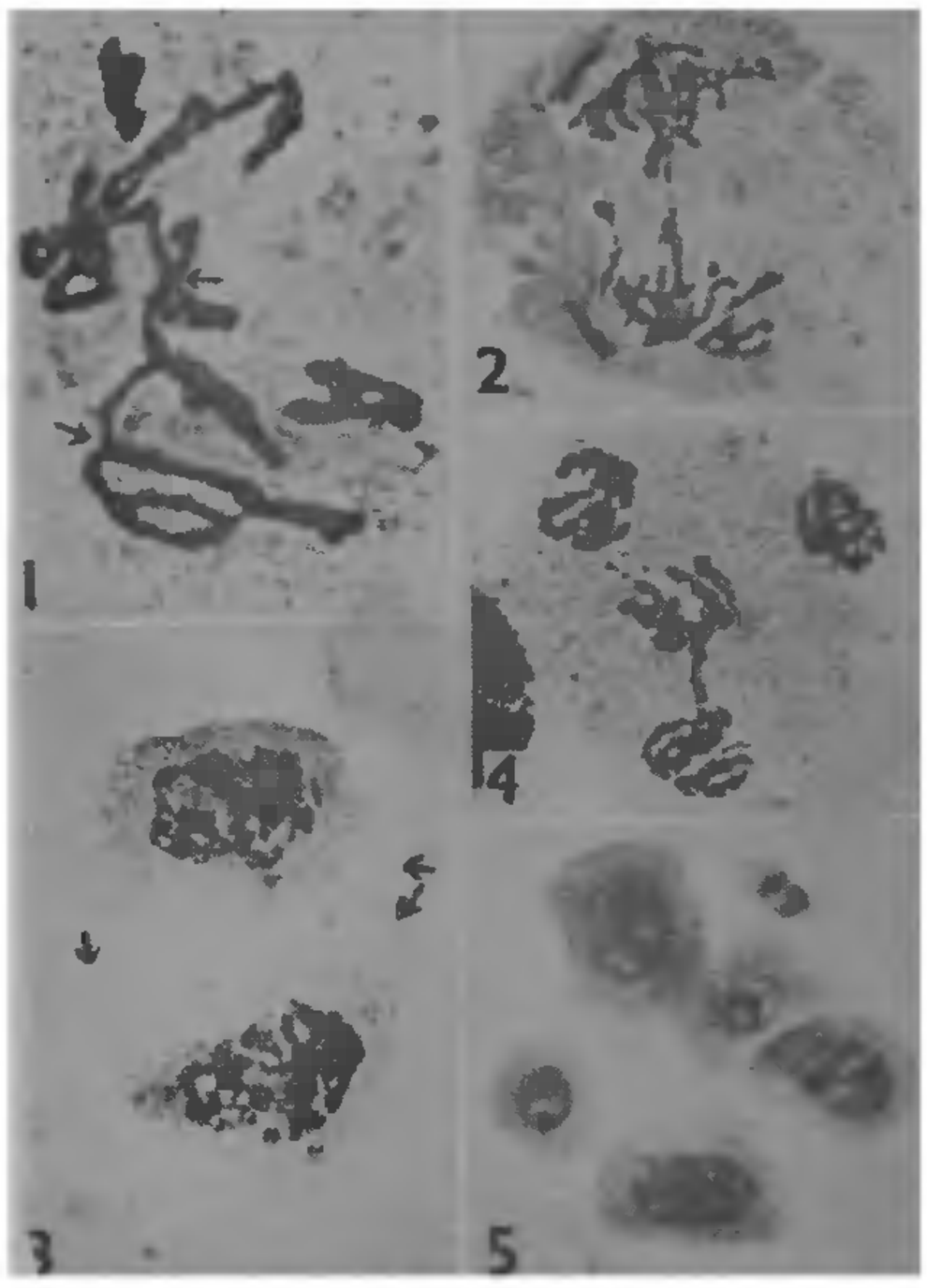
DURING the course of our attempts to isolate male sterile plants in leguminous crops, a semi-pollen-sterile plant was found growing in a bulked culture of *Vicia faba*. Examination of the pollen mother cells of this plant was made to ascertain the causes of sterility.

Young inflorescences of the plant were fixed in acetic acid-ethanol (1 : 3) for 24 hours and stored in 70% ethanol till further use. 0·5% acetocarmine was used for the preparation of squashes. Slides were made permanent through Normal-Butyl-Alcohol series.

Meiosis in some microspore mother cells proceeds normally to form quartets, which further undergo simultaneous type of wall formation to form tetrahedral microspore tetrads. But there were many others, which displayed various types of irregularities during both hetero and homotypic divisions. Multiple chromosome associations were frequent at prophase stage (Fig. 1). Metaphases were rather indistinct, as the chromosomes appeared sticky and therefore could not be separated clearly. Anaphase I was characterised by the formation of bridges and laggards (Fig. 2). After the chromosomes had reached the poles and entered telophase, cytokinesis occurred in some cells resulting in the formation of dyads (Fig. 3). The nuclei of the cells constituting the dyads did not divide at all and evidently the chromatid separation never occurred in such cases. In other microspore mother cells, where cytokinesis did not follow heterotypic nuclear division, the nuclei entered the second division. Chromatin bridges (Fig. 4) and laggards were very prominent during the second division also. Laggards subsequently got transformed into micronuclei, which were either included within one of the four microspores produced after cytokinesis or delimited as separate cells. In the latter case polyspory ensued (Fig. 5).

Multivalent formation at prophase, followed by the development of chromatin bridges and laggards at the first and second anaphase stages together with considerable reduction in pollen fertility, are features suggestive of either structural heterozygosity or stickiness of chromosomes.

In deciding the possible nature of the *Vicia faba* plant under discussion, one is more drawn to accept the second alternative. This is because the development of bridges and laggards speak of the heterozygosity for one or more paracentric



FIGS. 1–5. Fig. 1. Prophase I showing multiple chromosome associations. Fig. 2. Anaphase I showing a bridge and laggards. Fig. 3. Dyad formation (Arrows indicate the outline of dyad cell walls). Fig. 4. Telophase II showing a bridge. Fig. 5. A polysporad.

inversions. But in that case prophase stage would be characterized by the development of loops rather than multivalents. The formation of multivalents and also the presence of chromatin bridges can well be explained if the plant be considered to bear the gene that brings about stickiness. Such a gene has earlier been reported in maize by Beadle.[1]

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1. Beadle, J. W., *Z. Indukt. Abstamm. U-Verbtehre*, 1932, 63, 195.