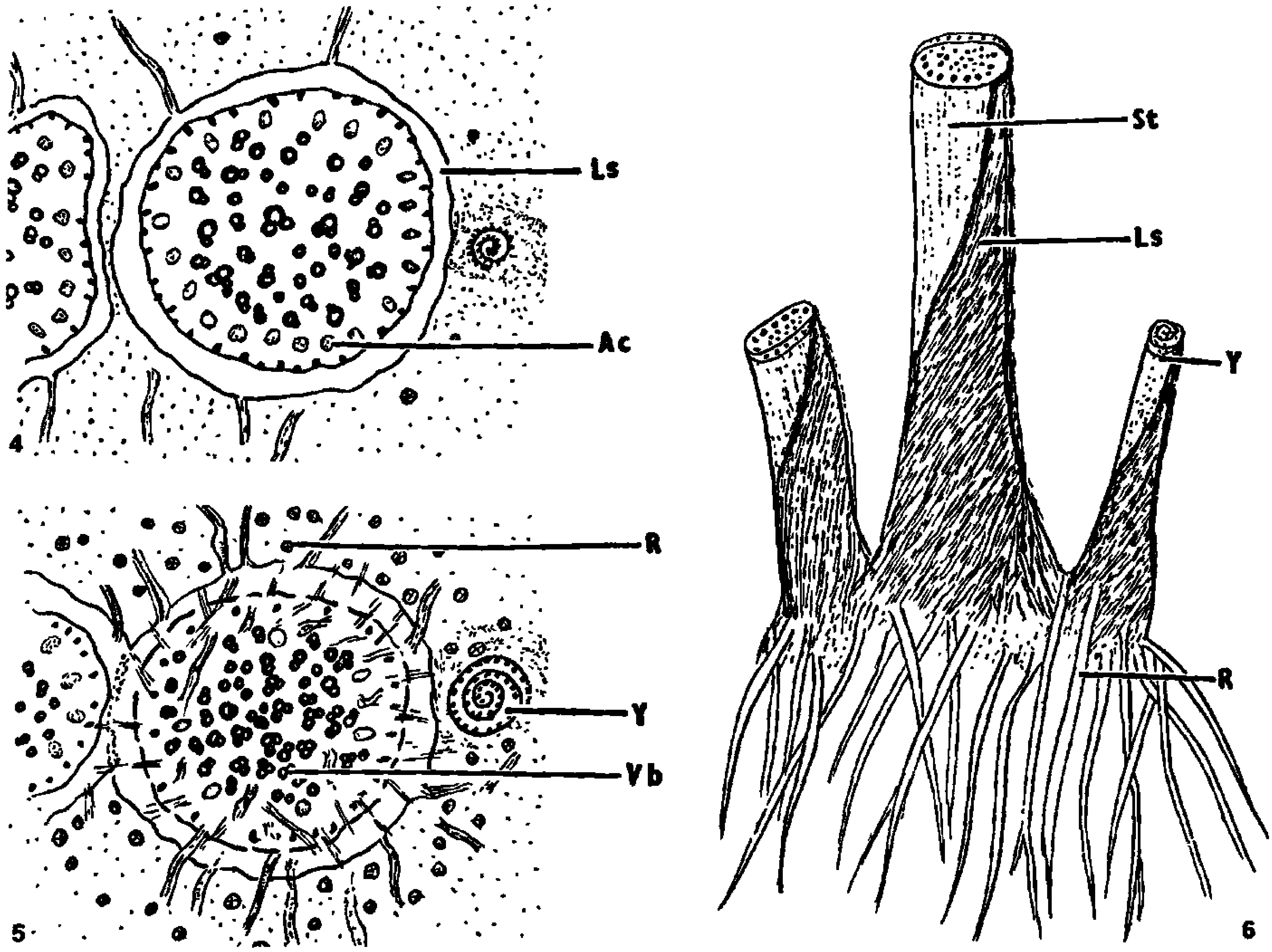

Figures 4–6. **4.** Aerial axis showing distribution of vascular bundles and surrounded by the leaf-sheath; **5.** Basal portion of rhizomatous axis along with young shoot, and **6.** Reconstruction of the basal portion of *Cyclanthodendron*.

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A CASE OF POLYHAPLOIDY IN GUAYULE: *PARTHENIUM ARGENTATUM* GRAY

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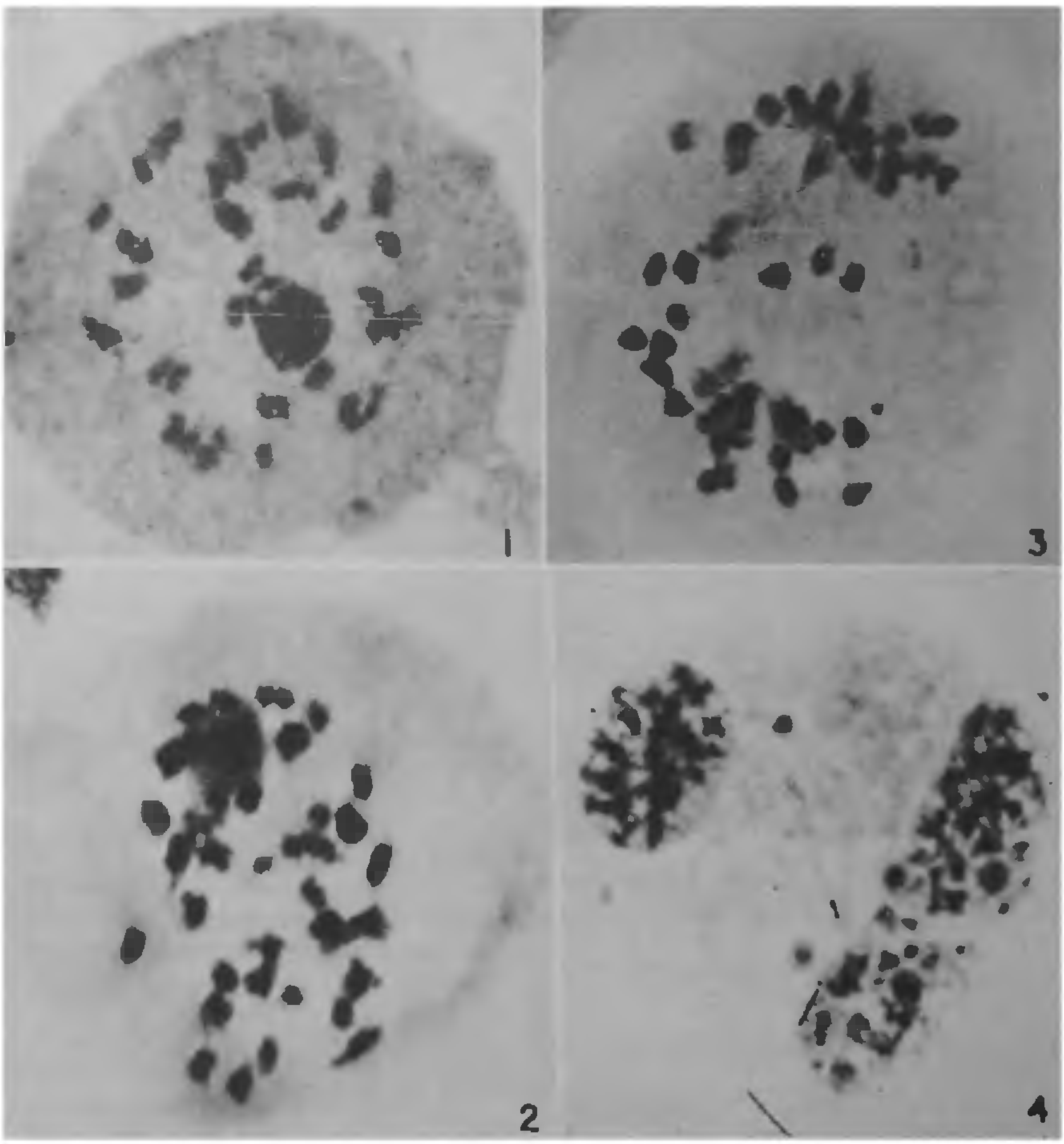
THE occurrence of diploid chromosome number in an individual which is otherwise a tetraploid plant indicates the ulmaut. a haploid of the particular tetraploid species. Katayama[1] observed this phenomenon being operative in *Aegilotriticum* and wheat hybrid. and called it a 'polyhaploid'.

A case of such polyhaploidy has been observed in a guayule variety USS-2x. The seeds of this variety along with a collection of 44 lines representing 32 varieties of guayule were obtained from USA in 1984.

The cytological examination of this polyhaploid variety has revealed the presence of $n = 18$ (figures 1 2) and $2n = 36$ chromosomes from its gamatic and somatic complements, respectively. This indicates that USS-2x is a diploid, based on $n = 18$.

Meiotic behaviour of the polyhaploid was found abnormal. Chromosome pairing at diakinesis and metaphase I was incomplete. Chromosomes in the form of univalents and bivalents were observed. Univalents were rod-shaped with no defined arms. They were scattered throughout the cells. Anaphase



Figures 1–4. (×2000). 1–2. Diakinesis showing $n = 36$ I; 3. Anaphase I 16:16 and 4 laggands, and 4. Telophase II showing a triad formation.

I was characterized by abnormal and unequal distribution of chromosomes to each poles (figure 3). The bivalents, while tended to divide, univalents always lagged behind and were seen lying at equatorial plane. Occasionally one or more lagging univalents were seen going under division. The chromatids of the divided univalents generally moved towards the opposite poles or both were included in the same nuclei. Anaphase II and telophase II were found abnormal and resulted in dyads, triads (figure 4), tetrads and polyoids in variable frequencies at sporad stage.

Plants of guayule var. USS-2x, that produced seeds were observed inspite of showing an extremely abnormal meiosis. Seeds were normal looking and their viability was higher.

This situation clearly indicates the USS-2x being a apomictic variety. Apomixis in guayule has been observed by several workers[2-7]. They had observed that reproductive behaviour in guayule, greatly varies in relation to its genetic structure or level of polyploidy (chromosome numbers). Plants having diploid ($2n=36$) chromosome numbers were found to produce seed sexually, while the tetraploids (or polyploids) were predominantly, a facultative apomict.

With a view to determining the degree of apomixis prevailing in different varieties of guayule grown at NBRI, Lucknow, the author made an experiment[8], as suggested by Tinnery and Aamodt[9]. The results indicated that USS-2x, which was a diploid exhibited 87.3% uniformity in its progenies with regard to their general appearance, growth rates, time of flowering, etc. and concluded that USS-2x was an apomictic variety.

The origin of USS-2x is not clear. However, there may be two possibilities. The first being a species-hybrid evolved from the natural crossing or hybridization with two dissimilar genomes. The other may arise from a haploid-parthenogenesis[10] in *Sisymbrium irio*.

Since meiotic behaviour of guayule USS-2x was highly abnormal and plants were producing seeds, regularly, the possibility of USS-2x being a hybrid had been ruled out, both on cytological and morphological grounds. On the other hand, the chances that USS-2x had originated from haploid-parthenogenesis[10] hold true, as most of the cytological parameters studied in this work are in favour of USS-2x being an apomict and evolved from the development of egg nucleus of a tetraploid plant without being fertilized.

Regeneration, is no problem in the case of guayule variety USS-2x. Being essentially an apomict, seeds are produced, simultaneously.

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ADDITIONAL DNA HOMOLOGY BETWEEN *AGROBACTERIUM* AND *RHIZOBIUM*

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BOTH *Rhizobium* and *Agrobacterium* belong to the family Rhizobiaceae. The two bacteria are similar in properties of infection to dicotyledonous plants. On infection, species of *Rhizobium* form a specialized structure called root nodules on leguminous plants where symbiotic nitrogen fixation takes place. *Agrobacterium tumefaciens*, on the other hand, forms crowngall on many dicotyledonous plants after wound infection. Besides these similarities, relatedness between Ti plasmid of *Agrobacterium* and Sym plasmids of *Rhizobia* has been demonstrated[1]. DNA hybridization studies have shown that T-DNA homology of Ti plasmid is present in diverse species of *Rhizobium*[2]. Sym plasmids genes expression of *Rhizobia* in *Agrobacterium* and expression of Ti plasmid genes in *Rhizobium* has also been shown in many studies indicating close functional relationship[3-6]. In this communication, DNA hybridization experiments are described that demonstrate additional DNA homology between *Rhizobium meliloti*