

Higher enzyme acid phosphate activity has been reported in the areas of greater metabolic activity, rapid cellular differentiation, protoplasmic synthesis and vascularization<sup>1,8</sup>. In the opinion of the present author the poor enzyme activity in various parts of an anther including malformed tapetum in CMS, GMS and IMS plants, indicated low metabolic activity in these anthers. This supports a suggestion made earlier regarding the problem of abnormal tapetal behaviour including hypertrophy of these cells which caused pollen degeneration<sup>2,9</sup>.

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#### AITRISOMIC NYMPHAEA HYBRID

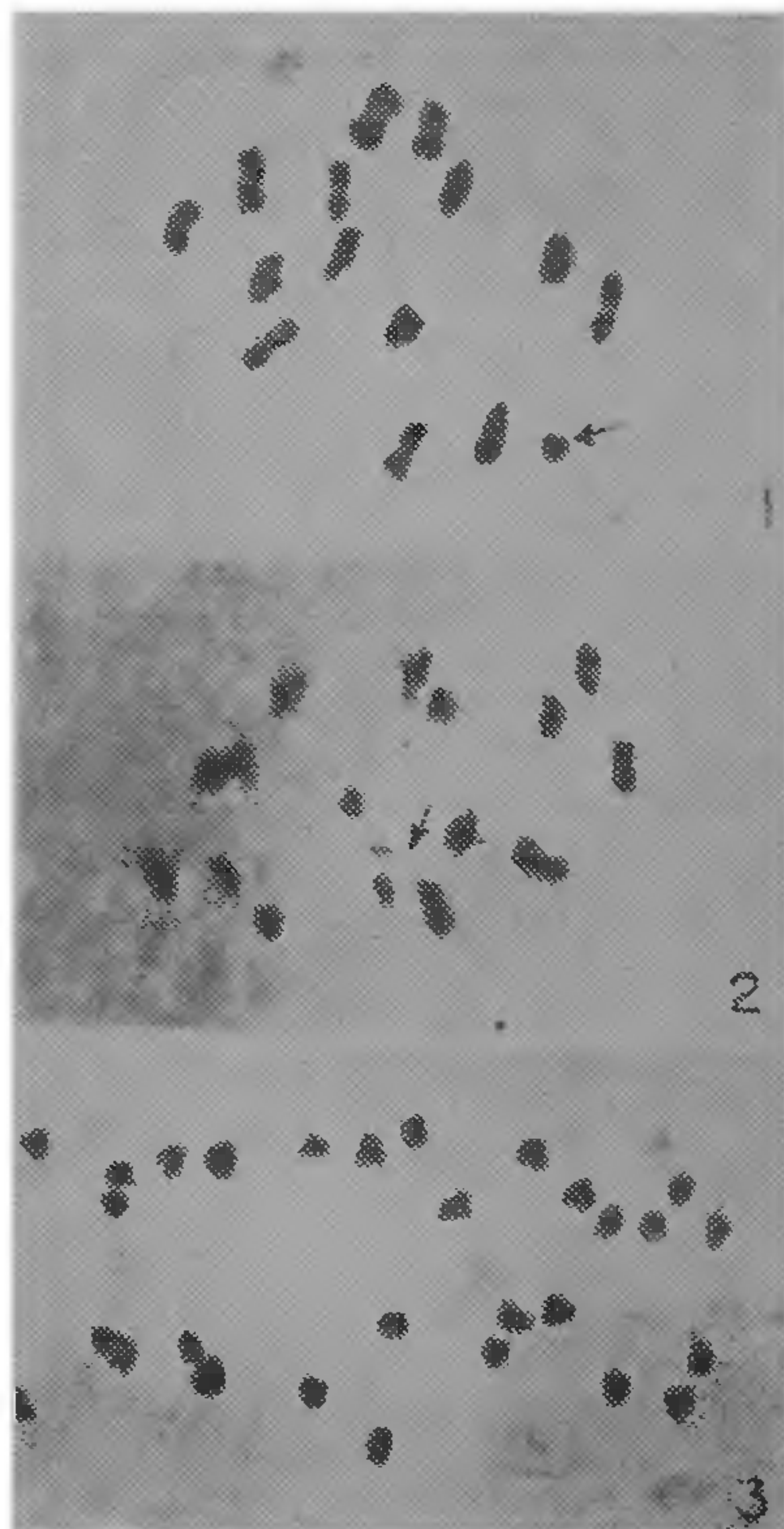
THE genus *Nymphaea* has been subjected to extensive hybridization since about 1850, primarily for the development of new ornamental cultivars. Cultivar 'Director G. T. Moore' is one such hybrid raised at Missouri Botanical Garden by Pring (1941) and was named in honour of the then Director of the Missouri Botanical Garden. One of the parents involved in the origin of this cultivar is *N. colorata* while the other is not known (Innes<sup>5</sup>). The hybrid has been analysed cytologically for the first time, based on the material obtained from Three Springs Fisheries, Lily Pons, Maryland, U.S.A., in 1968.

'Director G. T. Moore' is a day blooming free-flowering tropical water lily, with small fragrant violet flowers 6 to 10 cm across which are carried well above the water level. Leaves are small, numerous and with purplish tinge.

For meiotic studies the anthers were fixed in 1:3 acetic-alcohol and were squashed in 1% acetocarmine

following the usual technique (Darlington and Lacour<sup>3</sup>).

Out of the 40 pollen mother cells at metaphase I, 85% had 14 II + 1 I (Fig. 1), while the remaining 15% had 13 II + 1 III (Fig. 2). The trivalent configuration was organised in the form of V (60%), chain (20%) and frying-pan (20%). The chiasma frequency per cell was 15.6 at anaphase I while the bivalents disjoined normally and reached their respective poles, the extra chromosome was usually observed to pass to one of the poles undivided, thus resulting in unequal distribution of 15:14 (Fig. 3). However, in some of the cells the univalent behaved as laggard and thus was eliminated. The pollen stainability was 65%. The cultivar is, however, completely seed sterile.



FIGS. 1-3. Fig. 1. Metaphase I 14 II + 1 I, Fig. 2. Metaphase I 13 II + 1 III, Fig. 3. Anaphase I 15:14, All figs.  $\times 1,700$ .

As already stated, the present cultivar might have originated through interspecific hybridization. The presence of high number of bivalents is indicative of rather close genetic relationship between the two species involved in the origin of the cultivar. The absence of any ring trivalent, ring univalent and quinquivalent which are characteristic features of secondary and tertiary trisomics respectively points towards the primary nature of the trisomic located in the cultivar.

The primary trisomic studied in the present case could have arisen through fertilization involving pollen or egg with aneuploid chromosome number resulting from non-disjunction and/or non-congression of a bivalent as has been observed in *Datura* (Blakeslee<sup>1,2</sup>), *Antirrhinum* (Stubbe<sup>7</sup>), *Nicotiana sylvestris* (Goodspeed and Avery<sup>4</sup>) and jute (Nandi<sup>6</sup>).

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#### CYTOLOGICAL STUDIES IN THE SEX TYPES OF *MORUS ALBA* L (MORACEAE)

*Morus alba* L., a tree species naturalized in many parts of India<sup>4</sup> with good regeneration capacity, is a source of valuable timber of considerable utility chiefly in the sports industry, besides being the base for sericulture<sup>5</sup>. Plants are dioecious with occasional tendency in some plants to bear catkins of opposite sex<sup>11</sup>. The survey undertaken on the North-West Indian taxa, in this context, has revealed the existence of two sex types, monoecious and male with some female catkins on the same branch (to be referred as monoecious and predominantly male type) in addition to the normal perfectly dioecious trees (to be referred as male and female types). However, female trees with some male catkins could not be located. The trees belonging

to the different sex types are found to retain the specific sex character year after year. Moreover, they grow almost scattered without showing any preference for any specific habitat.



FIGS. 1-3. Fig. 1. Somatic complement ( $2n=28$ ) of the diploid. Fig. 2. Somatic complement ( $2n=42$ ) of the triploid. Fig. 3. Metaphase I showing one large and 13 small bivalents. All figs.  $\times 2,700$ .

Mitotic studies made from leaf tips, separately on the different sex types, show that male, female, monoecious and predominantly male trees have the same chromosome number ( $2n=28$ ) and perfectly identical karyotype (Fig. 1). In these, two chromosomes (BB) measuring about  $1.7 \mu\text{m}$ , are much larger than the remaining 26 chromosomes having size range from  $0.7 \mu\text{m}$  to  $1.0 \mu\text{m}$ . All the 14 pairs of chromosomes, however, are metacentric. The present observations are in perfect agreement with the previous reports about the chromosome number<sup>1, 5, 7, 9, 10, 11</sup>