region, the medulla and peripheral darkly-stained densely-packed cortex. Small lymphocytes mainly aggregate in cortex and medulla harbours comparatively larger and irregular-shaped lymphocytes. Differentiation into distinct cortex and medulla is very prominent in the thymus of neonates than that of foetuses. In adult thymus, cortex and medulla are not well demarcated.

Moreover, the prominence of medulla in neonatal thymus is accentuated with the presence of well-defined Hassall's bodies. These bodies are aggregates of the epithelial cells in whorled pattern and interestingly are very similar to those seen in primates or human thymus[7]. They stain bright red with eosin. An amorphous substance and degenerating cells in the centre of the Hassall's bodies have been observed. These are not observed in the foetal thymus studied. The diameter of Hassall's bodies in neonatal thymus varies from 47–125 μm. The size and number of these bodies decrease in adults where their diameter varies from 17–48 μm.

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A NOTE ON THE BASIC CHROMOSOME NUMBER OF *GOSSYPIUM* L.

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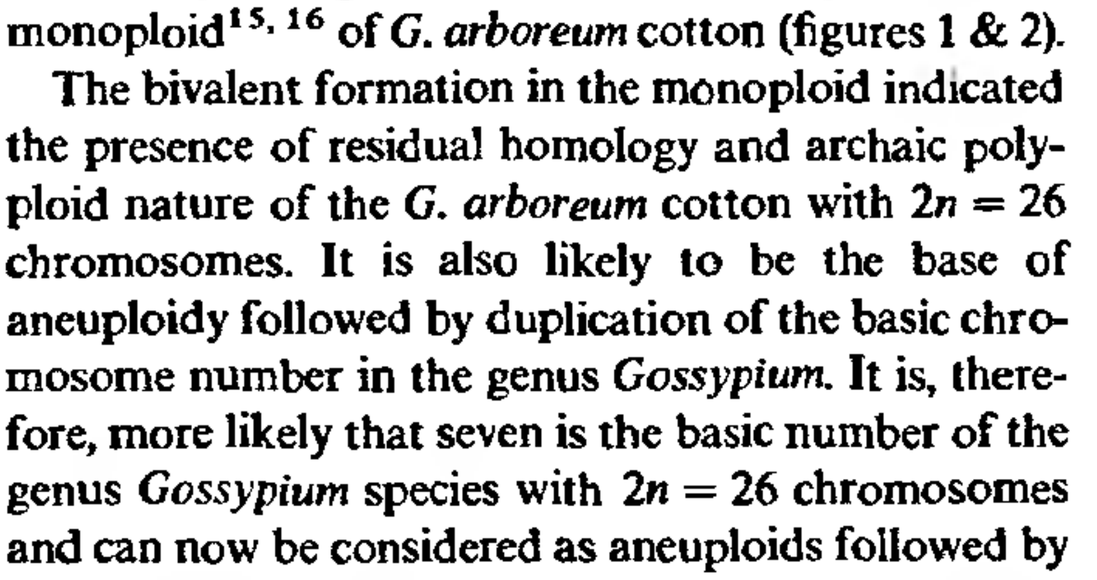
THE genus *Gossypium* L. consists of about thirty diploid and three amphidiploid species[1] belonging to A and G genomes[2] based on their chromosome pairing behaviour.

It has been accepted that the tetraploid cottons originated from interspecific hybridization between cultivated and wild diploids[3]. The origin of amphidiploid cotton, particularly that of *G. hirsutum* has been supported on the basis of geographical distribution of the concerned diploid species, the number of translocations involved in the interspecific crosses[4–9] and banding pattern obtained by gel electrophoretic method[8]. Of the various proofs offered in support of the origin of amphidiploid cottons, the cytological evidences like chromosome pairing behaviour, translocations involved and segregation of marker genes in the induced allopolyploids, are considered as significant source[4–9] evidences. These are however, based on the crosses between various diploids, tetraploids and their amphidiploids.

The present author have reported (allopoly) haploids with $2n = 2x = 26$ chromosomes[10–12] and triploids in tetraploid with $2n = 39$ chromosomes in *G. hirsitum* and *G. barbadense* cottons[13, 14] and monoploid ($n = x = 13$) in *G. arboreum* cotton[15]. While studying the chromosome pairing in all the cases[12, 16] interesting configurations were noted *e.g.* $6^{II} + 1^{I}$ in monoploid[15, 16] of *G. arboreum* cotton (figures 1 & 2).

The bivalent formation in the monoploid indicated the presence of residual homology and archaic polyploid nature of the *G. arboreum* cotton with $2n = 26$ chromosomes. It is also likely to be the base of aneuploidy followed by duplication of the basic chromosome number in the genus *Gossypium*. It is, therefore, more likely that seven is the basic number of the genus *Gossypium* species with $2n = 26$ chromosomes and can now be considered as aneuploids followed by



Figures 1 & 2. 1. Metaphase-I with 13^{II} in *G. arboreum* var., *Jyoti*, **2.** Metaphase-I with $6^{II} + 1^{I}$ in *G. arboreum* monoploid var LD. 132.

duplication of chromosomes. It is thus considered that the basic chromosome number of genus is $x = 7$ rather than $n = x = 13$ or $n = x = 26$ concluded from studies of somatic chromosomes[17] and interspecific crosses respectively[18]. This is also further confirmed from the chromosome pairing in haploids ($n = 2x = 26$), triploids ($n = 39$) obtained by superreduction phenomenon in both *G. hirsutum* and *G. barbadense* cottons[13, 14]. The pairing behaviour in these plants indicated frequent occurrence of $6^{II} + 1^{I}$ in haploids[10] and $19^{II} + 1^{I}$ in triploids[13]. These observations on chromosome pairing in haploids are different from those reported earlier and appear to be of significance in indicating the basic chromosome number of the genus *Gossypium*.

It was possible to obtain and study the meiosis of the hybrids between *G. hirsitum* haploid ($2n = 2x = 26$; $A_h D_h$) × *G. thurberi* ($2n = 2x = 26$, $D_1 D_1$)[19] and *G. anomalum* ($2n = 2x = 26$, $B_1 B_1$)[20]. Specific chromosome pairing, instead of random and closer homology of D chromosomes to A than B was also observed in these hybrids[19–21] as reported earlier[22, 23] on the basis of evidence of bridges and fragment[4, 5]. Previous workers have also reported 7–9^{II} PMC in haploids[24]. Thus, data on chromosome pairing in haploids indicated both homologous[24] and nonhomologous pairing[25]. The bivalents observed in monoploid *G. arboreum* L. might be due to the residual intragenomic homologies and polyploid or an aneuploid origin of the contemporary chromosome number[26, 27]. Thus, certain chromosomes of diploid parent of monoploid might have partially or completely duplicated during the course of evolution. On the basis of trivalent formation the basic chromosome number of this species might be seven and present diploid *G. arboreum* could be considered as an allotetraploid. Secondary allotetraploid nature, with 4b-2 constitution arising by hybridization between species of 7 chromosomes is already discussed[26, 28]. More or less similar observations and $x = 6$ the basic number of the *Gossypium* is also reported[18].

The polyploid nature of the *G. arboreum*[17, 26–28] and basic number $x = 7$[26, 27] have been confirmed from the meiotic studies in monoploid. Similar observations were also reported in *Zea mays*[29] and *Sorghum vulgare.*[30] Further confirmatory evidences were also obtained from the chromosome pairing in the allopolyhaploids of tetraploid (*G. hirsutum* and *G. barbadense*[10, 12, 31] their interspecific crosses[11], and hybrids between *G. hirsutum* haploid × *G. thurberi*[19] and *G. anomalum.*[20] Thus, it is concluded that the present *G. arboreum* is a polyploid species and, $2n = 26$ number might have arisen by loss of one chromosome followed by duplication of the whole genome of $x = 7$.

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MALE STERILITY IN SUGARCANE

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DURING the flowering season (October–November) of 1980, 1981 and 1982, 150 genotypes of sugarcane were studied for pollen fertility and related characters. Anthers from mature but unopened spikelets were squashed in 1% aceto-carmine with glycerine. Pollen fertility was determined on the basis of stainability from a count of about 400 pollen grains in each genotype. Seventeen genotypes were male sterile. These genotypes had either fully sterile pollen grains or very low fertile pollen (2–18%). This character is, however, invariably associated with either non-dehiscence or non-emergence of anthers. While the genotypes showing complete sterility remained stable for the character over the years, those possessing low fertility showed variation between the years. An important characteristic of male sterile genotypes is that they produce small amounts of pollen (20–25%) as compared to highly fertile genotypes. The genotypes identified as male steriles can be classified as in table 1.

The different types of male sterility occurring in sugarcane has been classified by Dutt *et al*[1] into five groups: (a) non-dehiscence of anthers, (b) production of defective pollen, (c) agglutination of pollen grains, (d) protogyny with low pollen fertility and (e) protogyny with non-emergence of anthers. In the present study no distinct morphological association with male sterility was observed, though male sterile genotypes invariably possessed non-dehiscent or non-emergent anthers with small quantity of pollen. Non-dehiscence or non-emergence of anthers in these genotypes, may in all probability, be due to physiological causes which owing to low quantity of pollen in the anthers, fail to exert pressure sufficiently on anther walls to burst open. Even in the genotypes in which pollen fertility has been observed to be 18%, the amount of pollen produced appears to be the determining factor for non-dehiscence or non-emergence of anthers, as even male fertile genotypes with low fertility produce large amounts of pollen and the anthers are, as a rule, dehiscent and emergent. Examination of the pedigree of these genotypes shows that male sterility occurs in F_1 population following a cross in which both parents are male fertile or in which one of the parents is male sterile. The occurrence of male sterility does not follow any orderly pattern in the pedigree. It may occur in a generation in the first line or as distantly as eighth line of a cross in which male sterile genotype had been one of the parents.

Male sterile genotypes are generally high yielding. These genotypes are known to transmit traits like earliness and high yields in crops like pepper[2,3], tomato[4], sunflower[5], jute[6], etc. Although precise information on the performance of these genotypes under different agroclimatic conditions of this country is not available, all the male sterile genotypes possess attributes for yield and sugar content. Apart from the fact that these genotypes are of considerable value in breeding programmes effected by the proven cross method which aims at the production of a large amount of seedling population for selection purposes, these genotypes have by themselves contributed to the evolution of superior and useful types in the F_1 stage of selection. Table 2 shows the number of types selected in crosses in which the female parent used was male sterile.

Among the outstanding cultivars which have been occupying sizable area under cultivation of the crop both in the tropical and sub-tropical regions in this country, mention may be made of Co 740 and Co 1158 which were selections made in crosses in which one of the parents was male sterile. An observation of considerable interest and importance made during

Table 1 *Classification of male sterility*

Genotype	Pollen fertility (%)	Character associated
Co 281, Co 7201, Co 7401, Co 7629 Co 7631, Co 7651, CoA 71–1, Co74–A–96 CoC 771, Co C 779, Co S 673, Q 63	0	Non-dehiscence of anthers
Co 421, Co 7204, Co 7605, CoJ 64	2–9	Non-dehiscence of anthers
Co 603	18	Non-emergence of anthers.