VARIATION IN SOMATIC CHROMOSOME NUMBER AND BEHAVIOUR IN THE SPECIES *SALVIA FARINACEA* BENTH. VAR. ROYAL BLUE.

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THE haploid and diploid chromosome number of the species *Salvia farinacea* are $n = 9$ and $2n = 18$ respectively. However, extreme variations in chromosome numbers and behaviour were noted in the meiotic chromosomes (Haque and Ghoshal[2]). A detailed study on the somatic chromosomes of the species was undertaken and the present paper gives an account of the abnormalities recorded in somatic chromosomes.

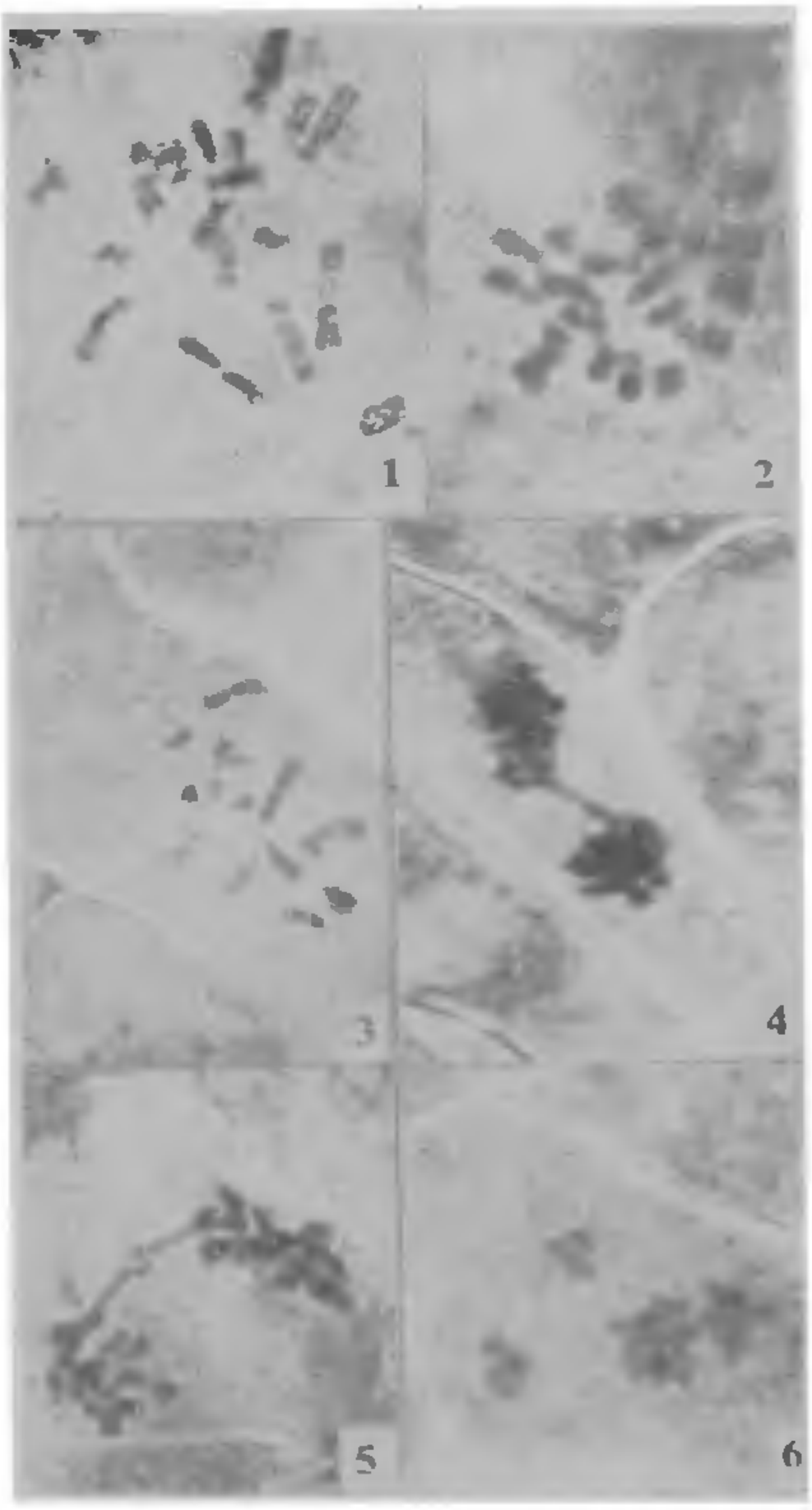
Seeds of the species *S. farinacea* Benth. var. Royal Blue were obtained from the Suttons and Sons, Calcutta. They were germinated in sterilized petridishes lined with moist filter-paper at room temperature. Roots were pretreated with paradichlorobenzene, fixed in acetic-alcohol (1 : 3), hydrolysed with 2% aceto-orcein-HCl mixture and smeared in 1% aceto-carmine. Microphotographs were taken from temporary preparations.

One of the remarkable features in this species is the occurrence of chromosomal variations in somatic tissues. In addition to cells containing normal chromosome complement, variant nuclei with different chromosome numbers have also been found. Most of the cells contain 18 chromosomes, the normal complement. However, cells with chromosome number higher or lower than the normal complement are found in some cases (Figs. 1–3). Out of 109 cells from 40 roots studied, 7 showed deviation from the normal chromosome number. The percentage of abnormality is 6·42 (Table I).

TABLE I

Frequency distribution of somatic chromosome number in metaphase of S. farinacea *var. Royal Blue*

Chromosome number	Frequency
24	1
20	2
19	1
18	102
16	2
14	1
Total	109



FIGS. 1–6. Variation in somatic chromosome number and behaviour in the species *Salvia farinacea* Benth. var. Royal Blue.

Lagging chromosomes and chromatid bridges have been found to occur during anaphase separation. Tripolar and tetrapolar separation of chromosome has also been found in some of the somatic cells (Figs. 4-6). Table II gives the frequencies of abnormal anaphasic separations. Out of 153 cells studied, 23 showed abnormalities in chromosome behaviour and the percentage is 15.

The variation in somatic chromosome number in this species may be due to the irregularities in spindle mechanism. Where there are three or four nuclei in the same somatic cell, one is often very much larger than the other two, indicating the possibility that a tripolar spindle and failure of cell wall formation after telophase may be the cause. That this type of abnormality may lead to variation in chromosome number is, however, evident.

The abnormalities encountered here are similar to those described by Snoad[4] in *Hymenocalli sculp-*

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TABLE II

Anaphase separation in S. farinacea *var. Royal Blue*

Nature of separation	Frequency
Regular anaphase separation	130
Early separation of a pair	1
Late separation	1
Unequal separation	2
Chromosome isolated in one corner	2
Two chromosomes isolated in one corner	3
Chromatid bridge	3
Laggards	2
Tripolar separation	9
Total	153

thinum. Whether they are all due to a single basic cause which upsets the spindle (Vaarama[5]) or whether they arise due to separate causes cannot be stated without inducing them experimentally as has been done by Huskins *et al.*[3] Nevertheless, it is noteworthy that they exhibit a wide range and occur naturally with a high frequency.

From the above observations it can be assumed that the species represents an example of natural abnormalities found in plants. The meiotic studies in this species have also shown the presence of translocation as well as inversion.

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1. Darlington, C. D., *Recent Advances in Cytology*, London, Churchill, 1965.
2. Haque, Md. S. and Ghoshal, K. K., *Indian Agric.* 1975, **19**, 251.
3. Huskins *et al.*, *J. Hered.*, 1950, **41**, 13.
4. Snoad, B., *Heredity*, 1955, **9**, 117.
5. Vaarama, A., *Hereditas*, 1949, **35**, 136.

POLYPLOIDY AND SPECIATION IN *COSTUS SPECIOSUS* (KOEN.) SM.

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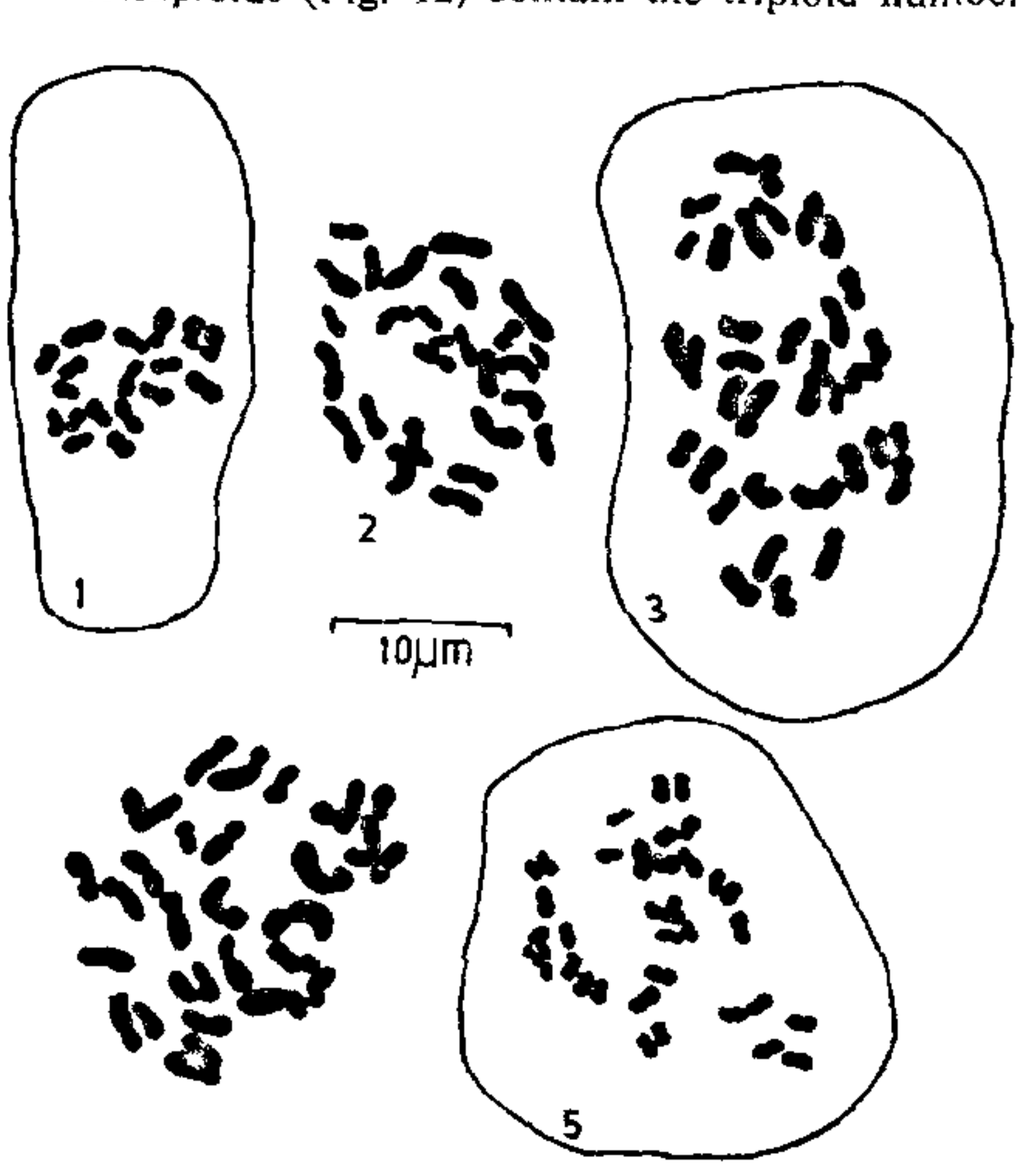
Costus speciosus (Koen.) Sm. belonging to the family Zingiberaceae has attained importance recently as a source of diosgenin, a precursor in the synthesis of steroidal hormones from the rhizome[1]. It has an extensive distribution in India and is more common in Bengal, Konkan[2] and the humid tropics of South India. It thrives well on rich moist soil, in shady localities under mixed deciduous forests. Propagation is usually by means of underground stem cuttings[3].

Occurrence of intraspecific polyploidy in *C. speciosus* has been reported by Subrahmanyam[4]. The cytological characteristics of polyploids of this species are being studied in this centre on a number of clones collected from Kerala and Jammu. Polyploidy, geographical distribution and probable origin of this species in the humid tropics of Kerala are discussed.

Cytological observations were made on races collected from Jammu, Kottayam, Shoranur, Kakkayam and Nedumboyil. Actively growing root tips were pre-fixed in 0·2 per cent aqueous colchicine for 2 h at 4° C and fixed in 1 : 3 acetic acid and ethanol for 24 h at 4° C. Fixed root tips were processed following the usual procedure and stained in 2% acetic orcein and 1 N HCl (9 : 1) mixture. Several metaphase plates were examined for each material and those with well spread chromosomes were drawn at a magnification of × 1,800. Microphotographs were taken from temporary preparations using a ZORKI 4 camera.

Evidently, this species shows intraspecific chromosomal races, namely, diploidy ($2n = 2x = 18$) (Figs. 1, 6 and 7), triploidy ($2n = 3x = 27$) (Figs. 2 and 8) and tetraploidy ($2n = 4x = 36$) (Figs. 3, 4, 5, 9 and 10). Relatively a few cells in the diploids (Fig. 11) as well as in tetraploids (Fig. 12) contain the triploid number



FIGS. 1–5. Camera lucida drawings of somatic chromosomes of *C. speciosus* at metaphase. Fig. 1. Nedumboyil (diploid), Fig. 2. Kakkayam (triploid), Fig. 3. Shoranur (tetraploid), Fig. 4. Kottayam (tetraploid) and Fig. 5. Jammu (tetraploid).