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Significance Of Aneusomaty In Orchid Speciation

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Aneusomic numbers i.e., 2n = 37, 2n = 21 in *Habenaria cerea* var. *polyanta* 2n = 23 + 2 minutes in *Peristylus goodyeroides*, 2n = 25 ± 2 in *P. densus* and 2n = 36, 2n = 44 in *Platanthera susannae* are encountered in addition to normal somatic chromosome numbers. The karyomophology of the aneusomic cells also varies from the normal karyotype.

Orchids, though sexually reproduced, are characterised by extensive vegetative reproduction as well. The occurrence of aneusomatic cells representing variable chromosome numbers in the root-tip cells suggests the role of aneusomaty in orchid specication.

Eu - and aneu-ploidy are of frequent occurrence in orchids. Intraspecific variation in number also has been noted in many genera and species. The occurrence of aneusomaty is not well established in this plant group, though polysomaty in monocots in general has been described by Sharma (1967). However, in orchids, Chatterji (1966) has observed polysomic condition in *Paphiopedilum venustum* of Cypripediae and *Octochilos alba* of Coelogyniae, and Garg & Jorapur (1980) in *Platanthere susannae* of Orchidiniae. In the present study, *Peristylus densus* (Lindl.) Sant. and Kap., *P. goodyeroides* (D.Don) Lindl., *Habenaria cerea* var. *Polyantha* Blatt. and McC. and *Platanthera susannae* (L.) Lindl. have been found to entertain variation in chromosome number in somatic cells in addition to the normal number. In such cases, the number occurring in the highest frequency is taken as the normal number for particular individual.

MATERIALS & METHODS The plant materials were collected from the following places:

Peristylus densus - Yellapur (Karnataka)
P. goodyeroides - Londa (Karnataka)
Habenaria Cerea Var. Polyantha - Std. Table land Panchagani (Maharashtra)
Platanthera Susannae - Castle-Rock (Karnataka)

Oxyquinoline-aceto-orcein squash method of staining was followed for chromosome study. 8-Hydroxyquinoline 0.002 m at 15°C was used as pretreating agent. The duration of pretreatment for about 2 h was kept constant to minimize the error of condensation. Root tips were hydrolysed at about 60°C in 2% aceto-orcein and 1 N HCl (9:1). Stained root tips were sliced into small pieces and squashed in 1% aceto- orcein. Temporary preparations were immediately photographed. In some cases tips of the freshly developing tubers were utilized. Atleast 5 to 10 well spread somatic metaphase plates were sketched in all species to confirm the somatic counts.

OBSERVATIONS The normal somatic chromosome numbers for *H cerea* var. *polyantha* (Fig. 1), *Peristylus goodyeroides* (Fig.7), *P. densus* (Fig. 9) and *Platanthera susannae* (Fig. 4) were 84, 46, 46, 44 respectively. In addition to the normal number, aneusomic numbers like 2n = 37, 2n = 21 (*H. cerea* var. *polyantha* - Figs.

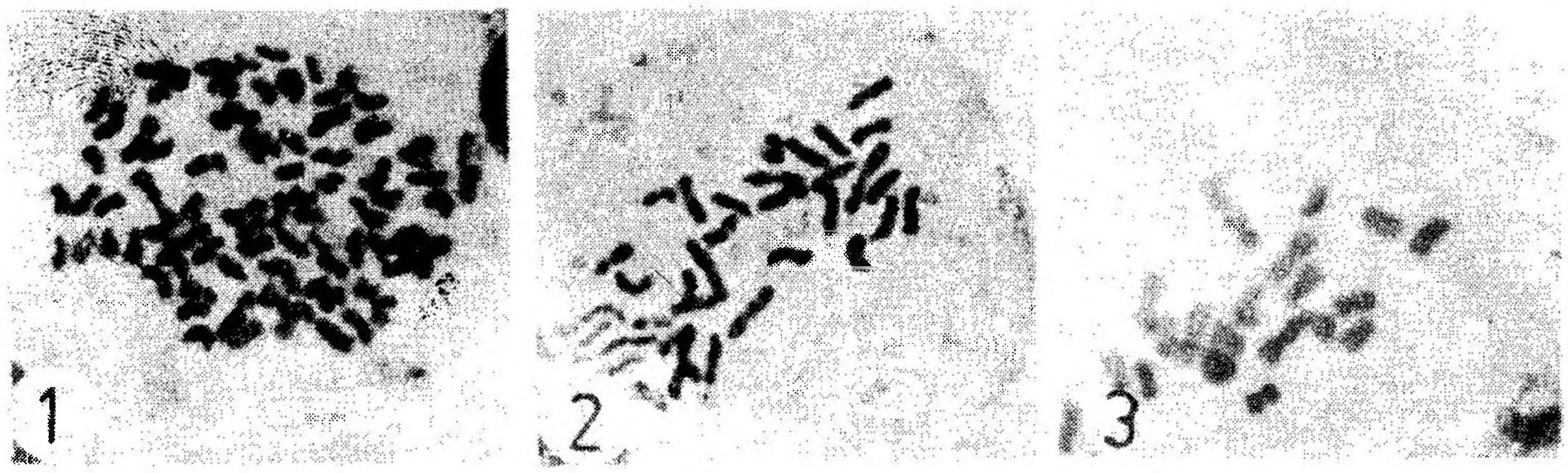
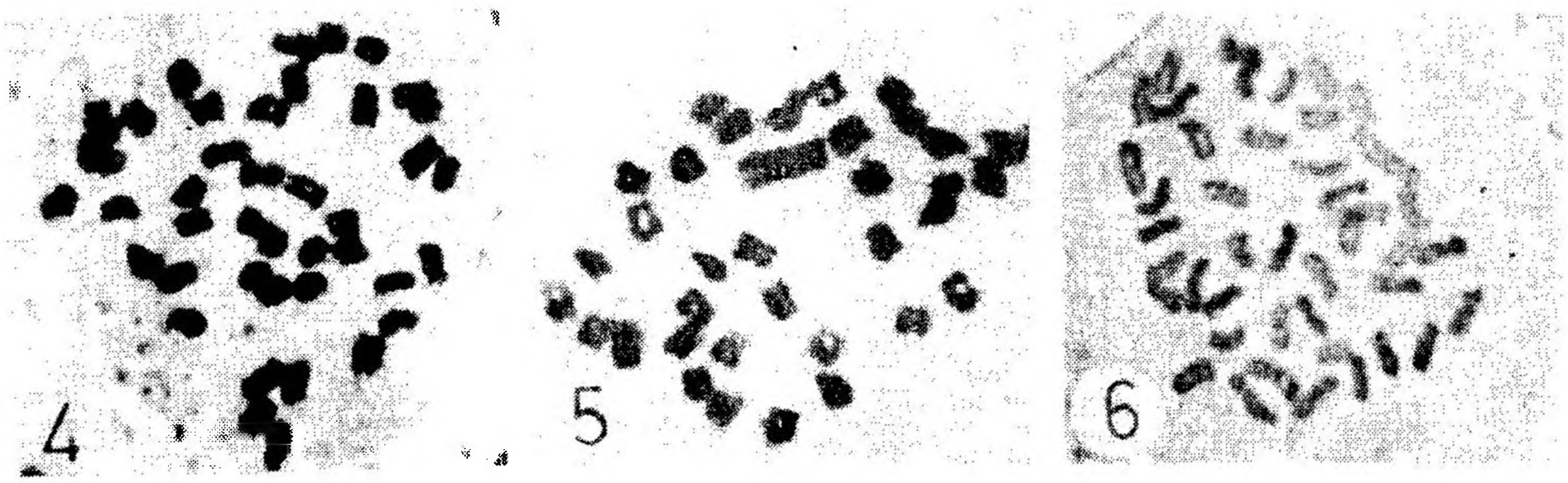
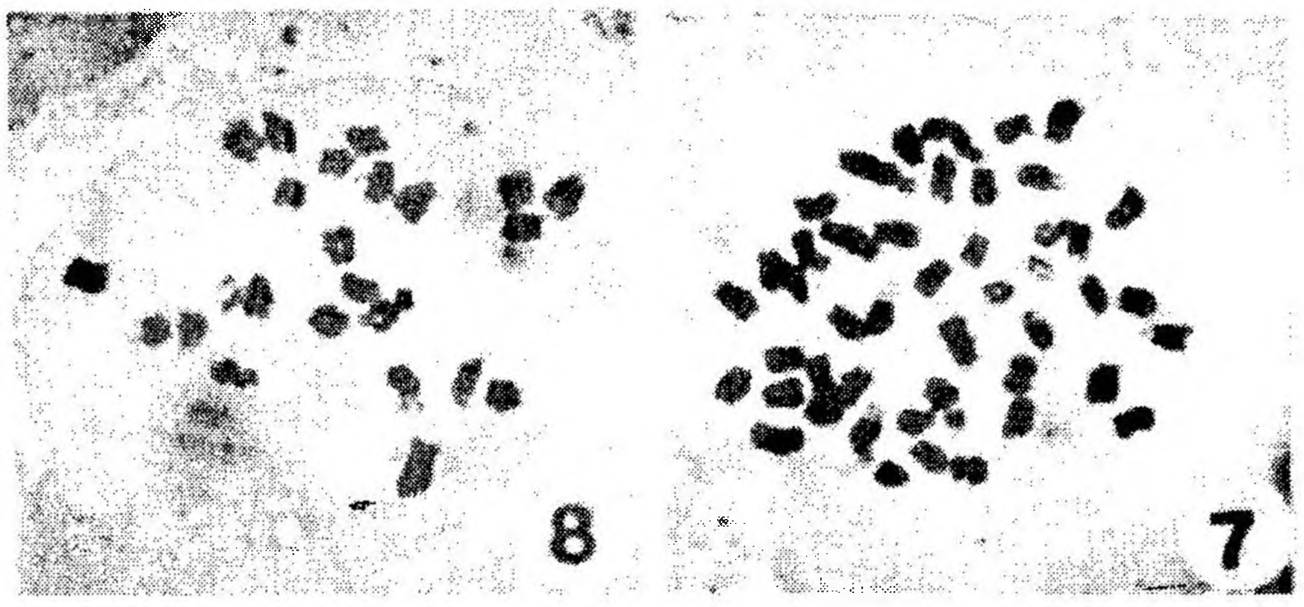


Fig. 1 to 3 *Habenaria cerea* var. *polyantha* showing normal (2n = 84) and aneusomic (2n = 37, 2n = 21) chromosome numbers respectively.



Figs. 4 to 6 *Platanthera susannae* showing normal (2n = 42) and aneusomic (2n = 36, 2n = 44) chromosome numbers respectively.



Figs. 7 & 8 *Peristylus goodyeroides* showing normal (2n = 46) and aneusomic (2n = 23 + 2 minutes) chromosome numbers respectively.

Fig. 9 *Peristylus densus* showing simultaneous occurrence of normal (2n = 46) and aneusomic (2n = 25 ± 2) numbers lying side by side.

2 and 3), 2n = 23 + 2 minutes (*P. goodyeroides* - Fig. 8) and 2n = 36, 44 (*Platanthera susannae* - Figs. 5 and 6) have also been encountered. In *Peristylus densus* simultaneous occurrence of normal (2n = 46) and aneusomic (2n aneusomic (2n = 25 ± 2) numbers in cells lying side by side have also been noticed (Fig. 9). Approximately, 30% cells in *H. cerea* var. *polyantha*, 20% in *P. densus*, 16.6% in *P. goodyeroides* and 31% in *Platanthera susannae* were observed to reveal variable aneusomatic numbers out of 5-13 cells examined.

DISCUSSION Variations of chromosomes in the somatic cells along with the normal ones were recorded in a large number of species reproducing through vegetative means (Sharma, 1956; Sharma & Sharma, 1959; Sen, 1973). An abnormal number in one species was the normal number of another species (Sharma & Sharma, 1959). Therefore, Sharma & Sharma suggested that if an abnormal nucleus with a numerically or structurally altered karyotype enters into the growing apex, which gives rise to a daughter shoot through vegetative means, the new shoot will be formed of the cells containing the altered number. Such new shoots will evidently differ both phenotypically and genotypically from the original individual and new forms may originate through such change. In this reference the variation number 2n = 36 chromosome in *Tainia minor* and the normal number 2n = 36 chromosomes in *T. laxifolia* have already been emphasized as an evidence (Sharma & Chatterji, 1966). Another similar case is the somatic chromosome number 2n = 36 in *Vanda densiflora* (Sharma & Chatterji, 1966). In most of the species of *Vanda* the chromosome number was 38 or its multiple. Significantly the number 36 was also noted by Sharma & Chatterji (1986) in variation nucleus in *V teres*, *V. coerulea* and *V.coerulescens*. The inconstancy in the somatic number noted in the species of the present work also underlines the significance of aneusomaty in orchid speciation. With regard to the origin of these abnormalities nothing can be proposed. However, in the earlier studies on other plant groups it is inferred that non-disjunction and partial endomitotic reduplication have played a role in polysomaty (Sen, 1973). In the present work the reduced chromosome number in aberrant nucleus such as 2n = 21, 37 in *Habenaria cerea* var. *Polyantha*, 2n = 23 + 2 minutes in *Peristylus goodyeroides* and 2n = 30 in *Platanthera susannae* might have arisen either due to non-duplication of mitotic chromosome in the division previous to it or centric fusion as demonstrated by Jones (1978) or by loss of chromosomes due to unequal translocation as described by Stebbins (1971). The aberrant number 2n = 44 noted in a cell of *Platanthera susannae* seems to be a case of partial somatic reduplication. This way aneuploidy may originate in the species of this genus.

The karyomorphology of the aneusomic cells differs from the normal karyotype. The significance of such variation in origin of new genotype needs no clarification. It has been emphasized that structural alterations have more chances of survival compared to numerical variations in the species reproducing principally through vegetative means (Sharma, 1956; Sharma & Sharma, 1959).

A point can be raised against non-disjunction as a possible means for the origin of such variation. We have found no specific zonation. If the origin of these abnormalities through non-disjunction is assumed to be correct, it is also expected that atleast in some cases the two compensatory numbers, one showing deficiency and other showing an increase, would be found side by side. However, no such report is recorded. Though simultaneous occurrence of normal and abnormal numbers has been observed in *Peristylus densus* where the two cells are lying side by side yet the numbers are not compensatory.

In orchids, along with a highly specialized reproductive mechanism, the vegetative mode of propogation is found frequent. As such, variation in chromosome number noted in the root-tip cells points out the significance of aneusomaty in orchid speciation.

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