KARYOMORPHOLOGICAL STUDIES ON *PIPER ATTENUATUM* HAM. A NEW RECORD

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Piper attenuatum, Ham. is a wild species, an evergreen glabrous shrub belonging to the family Piperaceae which includes 9 genera and about 1400 species, of which more than one half belongs to the genus Piper[1]. This member is a dioecious one found in the tropical and subtropical forests of the Eastern and Western Ghats. Despite the very great commercial, economic and medicinal importance of this group, it is remarkable that so little attention has been so far paid to the chromosome constitution. The important factors in the neglect of this genus cytologically, may be due to the high number of the chromosome biotypes with intraclonal variations, very small sizes and also due to the difficulties in obtaining clear metaphase plates. The cytological investigation of the genus Piper had been started by Johnson in 1910 by reporting the chromosome number of *P. betle* Linn. as $2n = 32$[2].

The detailed cytological studies were carried out with a view to understand the chromosome constitution, from temporary squash preparations of root tips of *Piper attenuatum*, Ham. female, and planted in the experimental garden of the University. The root tips were pretreated in a mixture of saturated solution of paradichlorobenzene and aesculin for 3·5 hours. at 12–15° C and fixed in acetic alcohol (1 : 2) for 1 h and treated in acetic acid (45%) for 10 minutes, stained for 2 h in 9 : 1 acetic orcein and squashed in 45% acetic acid[3].

The detailed homogeneous karyotype complement shows the somatic chromosome number is $2n = 52$. There were clearly 2 pairs with secondary constrictions, 1 pair with satellite and 1 pair slightly slender which may be the sex chromosome and all the other 22 pairs progressively diminishing in size which seem to be thick and stout. These chromosomes range from 1·9 μ to 0·75 μ in length. The following table shows the detailed karyotype. (Figs 1, 2*a*, 2*b* and Table I).

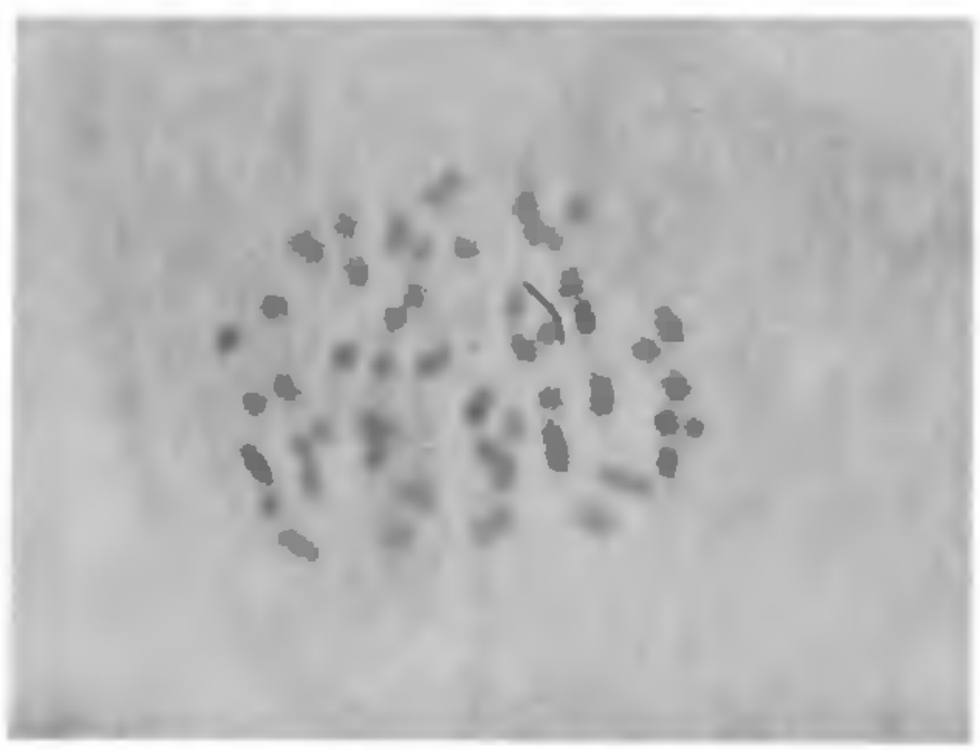

FIG. 1. X = 1325 approx.

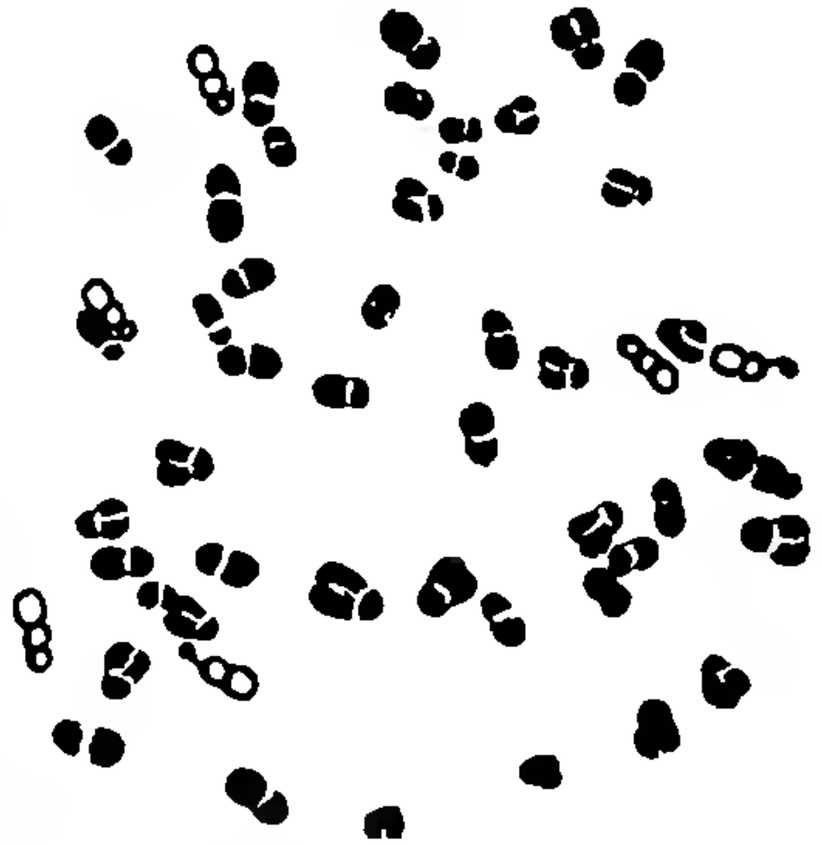

FIG. 2*a*. X = 2650.

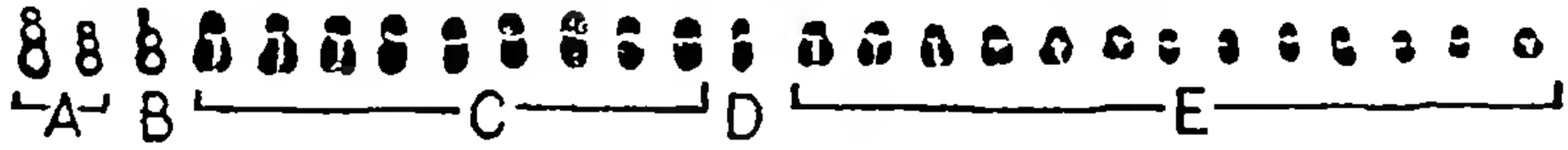

FIG. 2*b*

TABLE I

Measurements of somatic chromosomes of P. attenuatum *Ham. at metaphase*

Chr. type	Chr. No. pairs	Total length in μ	Short arm in μ	Centromeric index (i) F %	Secondary constriction	Remarks
A	2	1·9	0·38	20	Present	Nearly sub median
B	1	1·7	0·56	33	Satellite	Sub median
C	9	1·5	0·56	37·5	Absent	Sub median
D	1	1·5	0·56	37·5	Absent	Sub median
E	13	1·0	0·3	33·3	Absent	Sub median

As far as the cytology is concerned, the genus Piper is highly controversial. In view of the fact that a large number of species constitute the genus Piper, the cytological data seem to be very meagre. Including the present report only 13 species of Piper have been cytologically worked out[4–9]. The base number $x = 13$ tallied with observations on other members of the genus Piper were $x = 12$, 13 and 14 chromosomes, has been recorded earlier[10].

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STUDIES IN THE LAMIACEAE

X. A Note on the Sporogenesis and Gametogenesis in *Nepeta hindostana* (Roth.) Haines.

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Nepeta hindostana belongs to the tribe Nepetae of the family Lamiaceae. Schnarf[1] and Davis[3] have reviewed the earlier embryological work on the family. A survey of the literature indicates that very meagre work has been done so far, on sporogenesis and, gametogenesis. The investigations on sporogenesis and gametogenesis in this family include those of Jaitly[4] on *Hyptis*, *Pogostemon*, *Salvia*, *Ocimum* and *Leucas*, Tiagi[5] on *Leucas* and *Leonotis*, and Joshi and Dwivedi[6] on *Plectranthus*. The present note deals with the sporogenesis and the development of gametophyte in *Nepeta hindostana* (Roth.) Haines.

The anther is tetrasporangiate. In transection, the young anther is rounded in outline and comprises a homogenous mass of cells bound by well defined epidermis. It soon reveals a four lobed appearance and in each lobe some hypodermal cells become more prominent than the rest because of their larger size, radial elongation and conspicuous nuclei (Figs. A, B). These cells undergo periclinal division and produce an outer layer of primary parietal cells and an inner layer of primary sporogenous cells. Periclinal division in the primary parietal layer results in the formation of two secondary parietal layers. The outer secondary parietal layer divides again to cut outer endothecium and inner middle layer, while the inner one functions directly as the tapetum. Thus the anther wall consists of four layers, *e.g.*, epidermis, endothecium, middle layer and tapetum (Fig. C). During later stages of sporangial development the tapetal cells enlarge, vacuolate, enrich in cytoplasmic contents and soon become binucleate (Figs. D–F). In this taxon two types of tapetal cells are present. The connective tapetal cells are comparatively larger than the parietal tapetal cells (Fig. F). The middle layer starts degenerating during the meiotic divisions of the pollen mother cells. The endothecial cells elongate radially and tangentially and acquire characteristic fibrillar thickenings (Fig. G).

The primary sporogenous cells by further divisions give rise to pollen mother cells which undergo meiotic divisions to produce tetrahedral and decussate types of microspores tetrads (Figs. D–F). The microspore nucleus divides asymmetrically to form a small generative cell and a large vegetative cell (Figs. H, I). The pollen grains are hexaporate and shed at two celled stage (Fig. I). Dehiscence of the anther occurs at the junction of the pollen sacs. The endothecial cells at this region lack fibrillar thickenings and the epidermal cells are smaller in size.

The ovular primordia differentiate as outgrowths from the placenta and develop into anatropous, unitegmic tenuinucellar ovules (Figs. J, K). A hypodermal archesporial cell enlarges and functions directly as the megaspore mother cell. The latter undergoes two successive meiotic divisions and forms a linear tetrad of megaspores (Fig. L). Usually the chalazal megaspore functions to form megagametophyte but in addition to that occasionally micropylar (Fig. N),