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KARYOTYPE ANALYSIS OF *PAPAVER DUBIUM* L.

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PAPAVER DUBIUM L. is an important medicinal plant of the family Papaveraceae. The latex from its immature capsules is known to possess two alkaloids, viz. aporein and aporeidin. Aporein has a physiological action resembling thebaine. The petals of *P. dubium* are sudorific and contain cyanidin-B and pelargonidin-C (ref. 1). The chromosome numbers reported² in this species are $2n=28$ and $2n=42$ (ref. 2). However, in a literature survey we could not find any report on chromosome morphology of *P. dubium*. The karyotype of this medicinally important plant species is described in this communication.

Actively growing roots (1–2 cm long) originating from germinated seeds were fixed in Carnoy's

solution (6 parts absolute alcohol, 3 parts chloroform and 1 part glacial acetic acid) after pretreatment with saturated solution of *p*-dichlorobenzene at 15°C for 3 h, and transferred to 70% alcohol. After fixation, they were hydrolysed in 1 N HCl at 60°C for 5–10 min and then stained and squashed in 2% acetocarmine. Photographs of ten well-spread metaphase plates were made using phase contrast optics on an Olympus Vanox-S microscope from temporary slides and used for analysis. The chromosomes of the haploid complement were numbered 1 to 14 in decreasing order of length. Centromere positions were described following the nomenclature of Levan *et al.*³ The centromeric index was calculated as per cent ratio of short arm length to long arm length.

The morphological characteristics of *P. dubium* chromosomes are presented in table 1. A single metaphase cell and its karyogram are shown in figure 1. The somatic chromosome number of *P. dubium* was found to be $2n=28$, which is in conformity with an earlier report². The haploid complement was measured at 41.46 μm . An easily discernible secondary constriction was associated with the long arm of chromosome 2. The chromosome length varied from 2.45 to 3.52 μm . A narrow range of variation in arm ratio (0.26 to 0.47) clearly indicated that all the 14 chromosomes of the haploid complement are acrocentric with subterminally located centromeres. The centromeric index ranged between 19.05 and 31.40, suggesting that the karyotype is symmetric.

Table 1 Details of chromosome morphology in *Papaver dubium* L.

Chromosome number	Chromosome length (μm)				Arm ratio (s/l)	Centromere position	Centromeric index
	Total	Relative	Short arm	Long arm			
1	3.52 \pm 0.03	100.00	1.03 \pm 0.02	2.41 \pm 0.01	0.43	st	29.26 \pm 0.29
2*	3.38 \pm 0.02	96.02	0.97 \pm 0.01	2.36 \pm 0.01	0.41	st	28.69 \pm 0.18
3	3.28 \pm 0.01	93.18	1.03 \pm 0.01	2.17 \pm 0.02	0.47	st	31.40 \pm 0.20
4	3.21 \pm 0.02	91.19	0.97 \pm 0.01	2.17 \pm 0.01	0.45	st	30.22 \pm 0.22
5	3.14 \pm 0.03	89.20	0.67 \pm 0.02	2.38 \pm 0.01	0.28	st	21.34 \pm 0.32
6	3.07 \pm 0.02	87.22	0.62 \pm 0.01	2.41 \pm 0.01	0.26	st	20.19 \pm 0.20
7	2.97 \pm 0.02	84.37	0.67 \pm 0.01	2.24 \pm 0.01	0.30	st	22.56 \pm 0.15
8	2.89 \pm 0.02	82.10	0.62 \pm 0.01	2.24 \pm 0.02	0.28	st	21.45 \pm 0.22
9	2.86 \pm 0.01	81.25	0.76 \pm 0.02	2.07 \pm 0.01	0.37	st	26.57 \pm 0.24
10	2.79 \pm 0.02	79.26	0.72 \pm 0.01	2.00 \pm 0.01	0.36	st	25.81 \pm 0.21
11	2.72 \pm 0.02	77.27	0.69 \pm 0.02	2.00 \pm 0.01	0.35	st	25.37 \pm 0.38
12	2.66 \pm 0.03	75.57	0.55 \pm 0.01	1.96 \pm 0.01	0.28	st	20.68 \pm 0.54
13	2.52 \pm 0.03	71.59	0.48 \pm 0.02	1.72 \pm 0.02	0.28	st	19.05 \pm 0.39
14	2.45 \pm 0.03	69.60	0.48 \pm 0.01	1.55 \pm 0.01	0.31	st	19.59 \pm 0.26

st, Subterminal.

*Satellited chromosome.

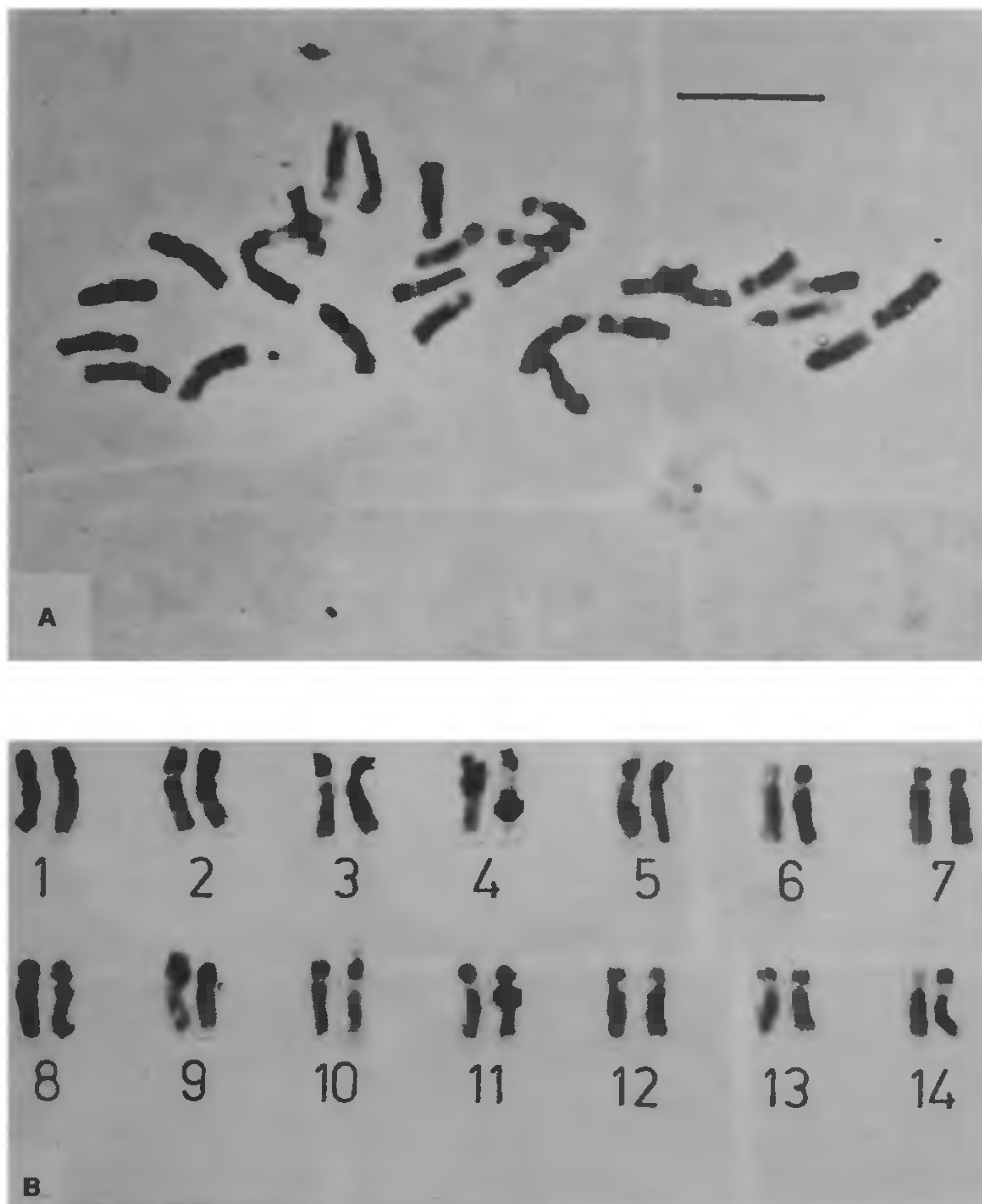


Figure 1A, B. Somatic chromosomes of *Papaver dubium* L. A, Metaphase cell showing 28 chromosomes (bar = 10 μ m). B, Karyogram of the cell in A.

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SHOOT-TIP CULTURE IN *DOLICHOS BIFLORUS* L.

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IN VITRO culture of meristems has wide application in crop improvement programmes. It can be used to