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CYTOTAXONOMIC OBSERVATIONS ON MANTISIA WARDII (ZINGIBERACEAE)

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ABSTRACT. Cytological data for *Mantisia wardii* Burtt & Smith (Zingiberaceae) are presented; the species has $2n=20$ and meiosis is regular with the formation of 10 bivalents. Chromosome number and chromosome size support the maintenance of *Mantisia* as a separate genus from *Globba*.

INTRODUCTION

Three species of *Mantisia* (*M. saltatoria* Sims, *M. spathulata* (Roxb.) Roem. & Schult. and *M. wengerii* Fischer) can be distinguished from *Globba* by the radically produced inflorescences. However, a fourth species, *M. wardii* Burtt & Smith, flowers terminally on a leafy stem, apparently bridging the gap between *Mantisia* and *Globba*, although the two genera can still be separated on the position and form of the lateral staminodes (Burtt & Smith, 1968, 1972).

The position of the inflorescence is not constant in several genera of the Zingiberaceae, while flower characters are often less important for generic differentiation than those of the inflorescence, so doubt might be thrown on the distinction of *Mantisia* from *Globba*. In order to obtain further evidence relevant to this problem, the chromosomes of *M. wardii* were examined in root tips and pollen mother cells.

MATERIALS AND METHODS

Root tips were taken around midday from plants growing in the tropical house of the Department of Plant Science, University of Aberdeen. They were pre-treated with a saturated aqueous solution of either alphamonobromonaphthalene or paradichlorobenzene for two or four hours respectively. No constant differences between these pre-treatments were observed. After fixation overnight in a 3:1 mixture of ethanol and glacial acetic acid, the root tips were stored in a refrigerator until required. Staining in either the Feulgen reagent according to standard procedure or Snow's alcoholic hydrochloric acid carmine (Snow, 1963) gave variable but acceptable results, although squashes in the Feulgen reagent tended to fade after a very short time.

For meiotic studies, flower buds were taken at about midday from plants in Aberdeen or the Royal Botanic Garden, Edinburgh, and fixed on the spot in 3:1 fixative. Anther squashes were stained in either lacto-propanoic orcein or propanoic carmine, allowing 10 to 15 minutes in the stain before applying gentle pressure to the cover-slip.

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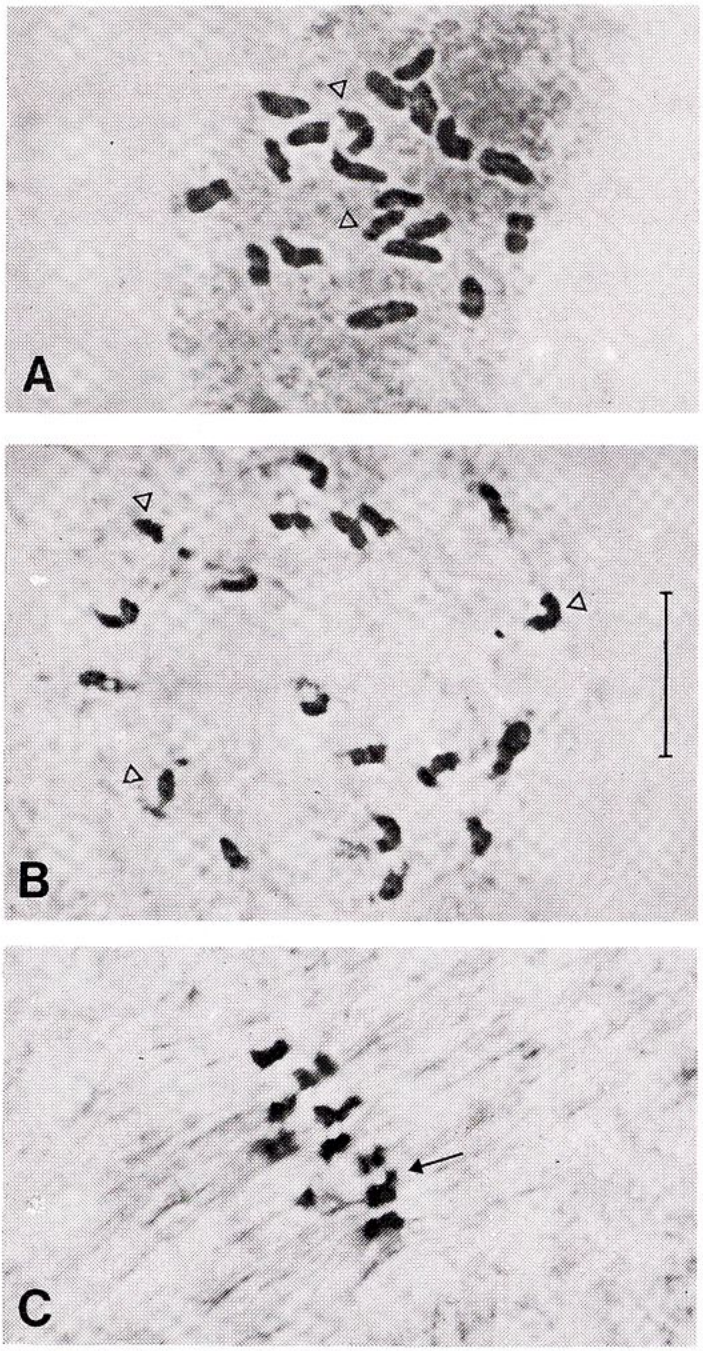

FIG. 1. *Mantisia wardii*: A, Root tip metaphase, $2n=20$; B, Root tip prometaphase, $2n=20$. Open triangles in both figures indicate satellite chromosomes; C, Metaphase I in pollen mother cell, 10 bivalents, one of which (arrowed) shows precocious chromosome separation. Scale = 10μm.

Voucher slides of squash preparations were made permanent according to the quick-freeze method of Conger & Fairchild (1953), but using liquid nitrogen for freezing instead of dry-ice. Material in Edinburgh was cultivated as C5401—originally from *Kingdon Ward* 22356 (Burma, Mt Victoria), and selected as the holotype by Burtt & Smith (1968).

Results and Discussion

The diploid number of *Mantisia wardii* determined in root tips is $2n=20$. The chromosomes are metacentric to submetacentric (Fig. 1A), ranging in size from 2·5 to 4·0μm. It has not been possible to see clearly the centromere of every chromosome in any single, reasonably spread, somatic metaphase examined. Satellites have been observed on up to three chromosomes (Fig. 1B) but it remains to be confirmed that *M. wardii* has indeed more than one pair of satellite chromosomes.

The haploid number is $n=10$ (Fig. 1C). Pollen mother cells (pmcs) at diakinesis or metaphase I occur in very young buds, and are rarely encountered presumably because of the short duration of these stages. Division, however, is synchronous, so that an anther at the desired stage contains many observable pmcs. In at least three such anthers examined, the pmcs contain 10 bivalents, and meiosis is regular.

The chromosome number of *Mantisia wardii* differs from all the published counts in *Globba* (see Table I). In addition, its somatic metaphase chromosomes are considerably larger, 2·5 to 4·5μm compared with 0·7 to 2·5μm for certain Malaysian species of *Globba* (Lim, 1972) and smaller still, 0·6 to 1·7μm in certain Thai species (measurements from drawings in Larsen, 1972). There is at least one pair of satellite chromosomes, possibly two, in *M. wardii*, and while Lim (1972) apparently did not detect any secondary constrictions in Malaysian species of *Globba*, Larsen (1972) reported the occurrence in four Thai species of up to two satellite chromosomes, and in one species up to three

TABLE I

Published chromosome information in the genus *Globba*

	n	*2n*
Section *Marantella*	16[a]	32[a]
	24[a]	48[a]
	32[b]	64[c]
		80[a]
Section *Ceratanthera*	16[a]	32[a]
	24[a]	48[a]
Section *Haplanthera*	12[d]	24[d]
		28[d]
		22[e]
Section *Nudae*	17[d]	

a, Lim (1972); b, Mahanty (1970); c, Mahanty (1965); d, Larsen (1972); e, Sharma & Bhattacharyya (1959).

For names of species and other details see Beltran & Kam (1984).

such chromosomes. The small size of *Globba* chromosomes, however, makes detailed karyotype comparisons difficult. The karyotype of *M. wardii* is clearly symmetrical.

Late in the preparation of this paper, published chromosome counts of *Mantisia saltatoria* and *M. spathulata* came to light (Datta & Sarkar, 1980). In both species, the somatic number was $2n=20$ and one pair of chromosome was reported to be satellited. While no chromosome dimensions, meiotic observations or other details were given, these counts confirm the distinctness of the basic number of *Mantisia*, which on current evidence is taken as $x=10$.

Chromosomally, therefore, *Mantisia* differs from *Globba* in chromosome size and basic number. It can now be clearly distinguished from *Globba* on cytological as well as on morphological differences and it is therefore proposed that the genus *Mantisia* be upheld.

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