ON THE STOMATA IN *MURDANNIA* ROYLE (COMMELINACEAE)

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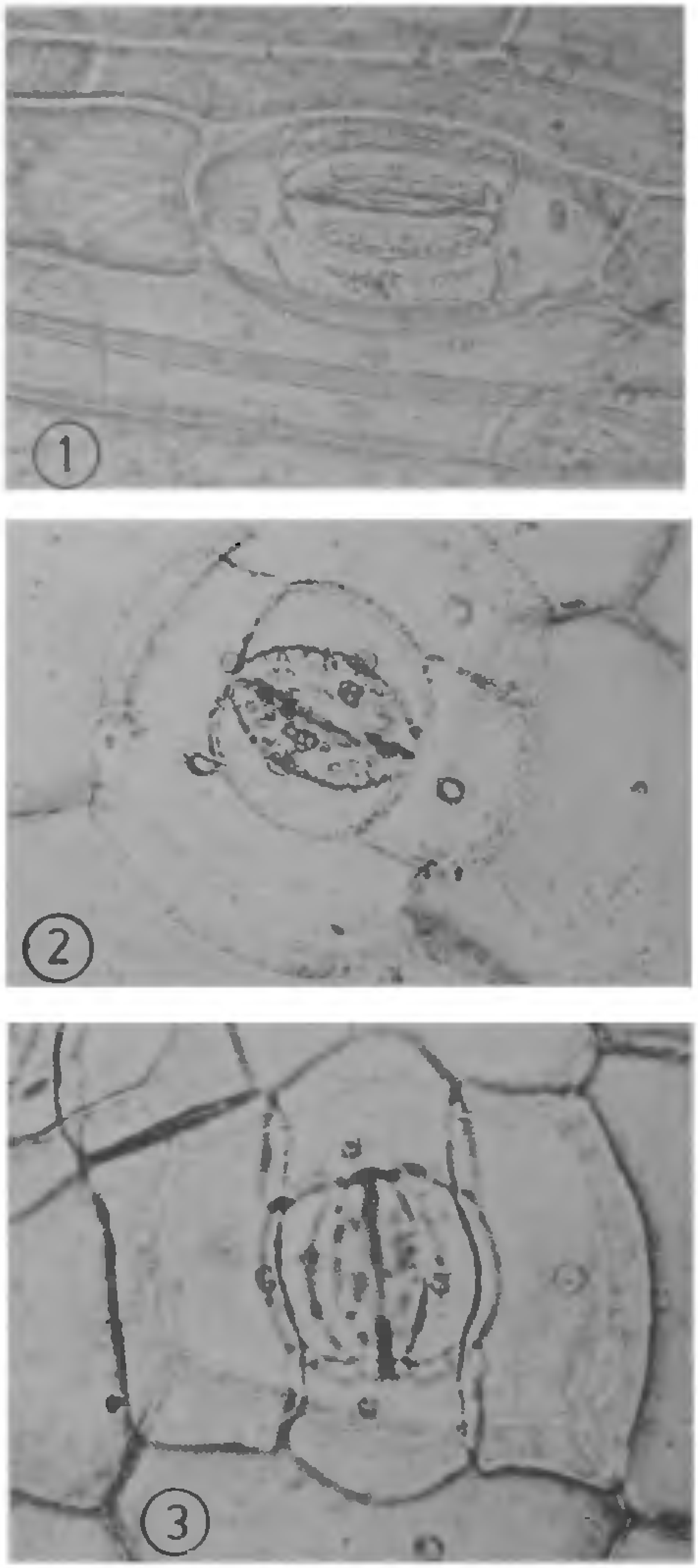
THE stomatal complex in the Commelinaceae is of three types *e.g.* two-celled, four-celled and six-celled[1,2]. The genera of the family have the stomata of one of these types which is constant and characteristic of each genus. The genera are accordingly categorized into three broad groups. The genus *Murdannia* is placed in the group with six-celled stomata.

In our study on three species of this genus, (not studied earlier) (*Murdannia versicolor* (Dalz.) Bruck., *Murdannia lanuginosa* (Cl.) Bruck, *Murdannia semiteres* (Dalz.) Sant., a significant variation is observed in *M. semiteres* which is recorded here.

The material was collected from Khandala and Mahabaleshwar on the Western Ghats of India during September 1984 and deposited in the Herbarium of the Botany Department, Marathwada University, under voucher Nos. 2169–2171. The material was fixed in acetic-alcohol (1:3). The epidermal peels were stained in aceto-carmine (1%).

M. semiteres is hypostomatic. The stomatal meristemoid functions as the guard cell mother cell and divides into the two guard cells. Four subsidiaries (two terminal and two lateral) are derived from epidermal cells. The development is perigenous and the stoma is four-celled (figure 1). *M. versicolor* and *M. lanuginosa* are amphistomatic. The cells lateral to the stoma undergo a longitudinal division so that the stomatal complex is with six subsidiaries (figures 2 and 3). All other species of *Murdannia* are amphistomatic and the stoma is six-celled[2,3].

The present observations reveal that *M. semiteres* is rather unique in that it is hypostomatic and the stomata have only four subsidiaries. *M. malabaricum*, although predominantly hypostomatic with six-celled stomata, has stomata towards the margin on the leaf adaxial which are with four subsidiaries. The four-celled stomatal apparatus is considered as a derivative from one with six cells[4] Kaushik[3] regards *M. malabaricum* as "standing in between" as it has six-celled and four-celled types. It may, therefore, be noted that the genus *Murdannia* does not have a constant stomatal type as described by Tomlinson[1,2] and that it has species which are both hypostomatic and amphistomatic. These observations could be of taxonomic implication in seggregating species of the genus when a larger number of its species are studied anatomically.



Figures 1–3. 1. *Murdannia semiteres* (four-celled stoma); **2, 3.** *M. versicolor* and *M. lanuginosa* (six-celled stoma) × 450.

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STOMATAL MOVEMENT AND BEHAVIOUR AS INFLUENCED BY BASALIN AND SATURN IN SOME WEED SPECIES

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THE direct influence of several biochemical inhibitors on the mechanism of stomatal movements has been well studied[1]. However relatively few studies have been made on the effect of herbicides on the stomatal movements and behaviour. The herbicides, Basalin and Saturn are extensively used in crop fields to control various types of weeds. The effect of Basalin (N-propyl-N-(2' chloro ethyl)-2, 6-dinitro-4 trifluromethyl aniline) and Saturn (S-(-4 chlorobenzyl) N-N-diethyl thiocarbamate) on stomatal movement and behaviour was studied with respect to pore length and stomatal conductance. The high degree of correlation, of the resistance or susceptibility of a particular plant, to a given herbicide with the appropriate changes in the stomatal aperture was observed.

Healthy seedlings of plants were transplanted to experimental plots from their natural habitat and grown under natural photoperiod (28° day/20° night). Four weeks after transplantation, 1000 ppm concentration of Basalin and Saturn were applied as a foliar spray up to the drip point at 8 hr, with manually operated "Aspee" sprayer. Control plants were maintained by the simultaneous spray of deionised water. The stomatal aperture and stomatal conductance were measured at regular intervals of 24, 48 and 72 hr after herbicidal treatment. The width of stomatal aperture was measured using a pre-calibrated ocular micrometer[2]. The stomatal conductance of leaves was also determined[3].

Data presented in table 1 reveal that immediately after herbicidal spray the width of stomatal pore decreased rapidly, and only a few plants recover by opening their stomata after 72 hr. The decrease in the stomatal conductance (table 2) is correlated with the stomatal closure induced by the two herbicides. The role of potassium and ATP in stomatal closure and opening was variously interpreted by several authors[4-7].

Results indicate that stomatal closure occurred in all plants (table 1) and the stomatal closure is permanent in susceptible plants. The authors have also observed that the plants, in which the stomatal closure is permanent result in the desiccation and death of the plants. But in a few plants, the slight stomatal reopening was observed after 72 hr for a few days, showing resistance to the chemical spray at that concentration. It can therefore be concluded that the stomata are effective determinants for the resistant (or) susceptible nature of the plants for a given herbicide.

Table 1 *Effect of Basalin and Saturn on Stomatal opening (in μm)*

Plant Species	Control	Basalin 1000 ppm (hr)			Saturn 1000 ppm (hr)		
		24	48	72	24	48	72
Commelina benghalensis L.	12.3 ±0.2	4.2 ±0.1	3.8 ±0.1	3.5 ±0.1	4.5 ±0.1	2.6 ±0.1	2.0 ±0.1
Digera arvensis Forsk.	4.8 ±0.2	2.2 ±0.1	2.2 ±0.1	3.2 ±0.1	2.5 ±0.1	2.9 ±0.1	3.5 ±0.2
Euphorbia hypericifolia L.	4.2 ±0.1	2.5 ±0.1	2.1 ±0.1	2.1 ±0.1	2.5 ±0.1	2.2 ±0.1	2.1 0.1

(Values are the mean of 5 observations ±S. E)