

# Stomatal complex in some Indian species of Pandanaceae with special reference to papillae

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Stomatal complex has been described in six Indian species of genus *Pandanus* and one species of the genus *Freycinetia*. It is of tetracytic type in both the genera. However, the species can be distinguished on the basis of presence or absence of papillae, their mode of development and distribution of papillae. The non-papillate stomatal complex appears to be of a primitive type and the species studied can be differentiated into four groups depending upon the degree of distribution and the complexity of papillae. The species where the papillae are simple and restricted to the lateral subsidiary cells appear to be less specialised than those where papillae are not only found on all the subsidiary cells but also on the adjacent epidermal cells. Lobed or dendric type of papillae found in species like *Pandanus kaida* also appear to be an advanced form.

**Key-words-** Stomata, Papillae, Pandanaceae, India.

## INTRODUCTION

STOMATAL complex in Pandanaceae has been exhaustively studied in recent years by Tomlinson (1965), Pant and Kidwai (1966), Kam and Stone (1970), Kam (1971), Chu and Stone (1973), Hyunh (1974), Hyunh and Stone (1971), Chu and Stone (1973), and Govindarajalu and Thanyakumar (1977). Importance of papillae in classification of stomatal complex was for the first time brought out by Tomlinson (1965).

The present paper deals with description of stomatal complex in six Indian species of *Pandanus* and *Freycinetia insignis*, which have remained undescribed. This would help in diagnosis of fossils foliage of Pandanaceae represented in Tertiary beds of India.

## MATERIAL AND METHOD

Small piece of middle part of lamina was boiled with 5% Copper Sulphate for 10-15 minutes. In this 2-3 ml of concentrated Hydrochloric Acid was added and boiled again, till lamina became transparent. The peeled epidermis was stained with haematoxylin, washed in water and passed through alcohol-xylol grades and mounted in Canada balsam.

## OBSERVATIONS

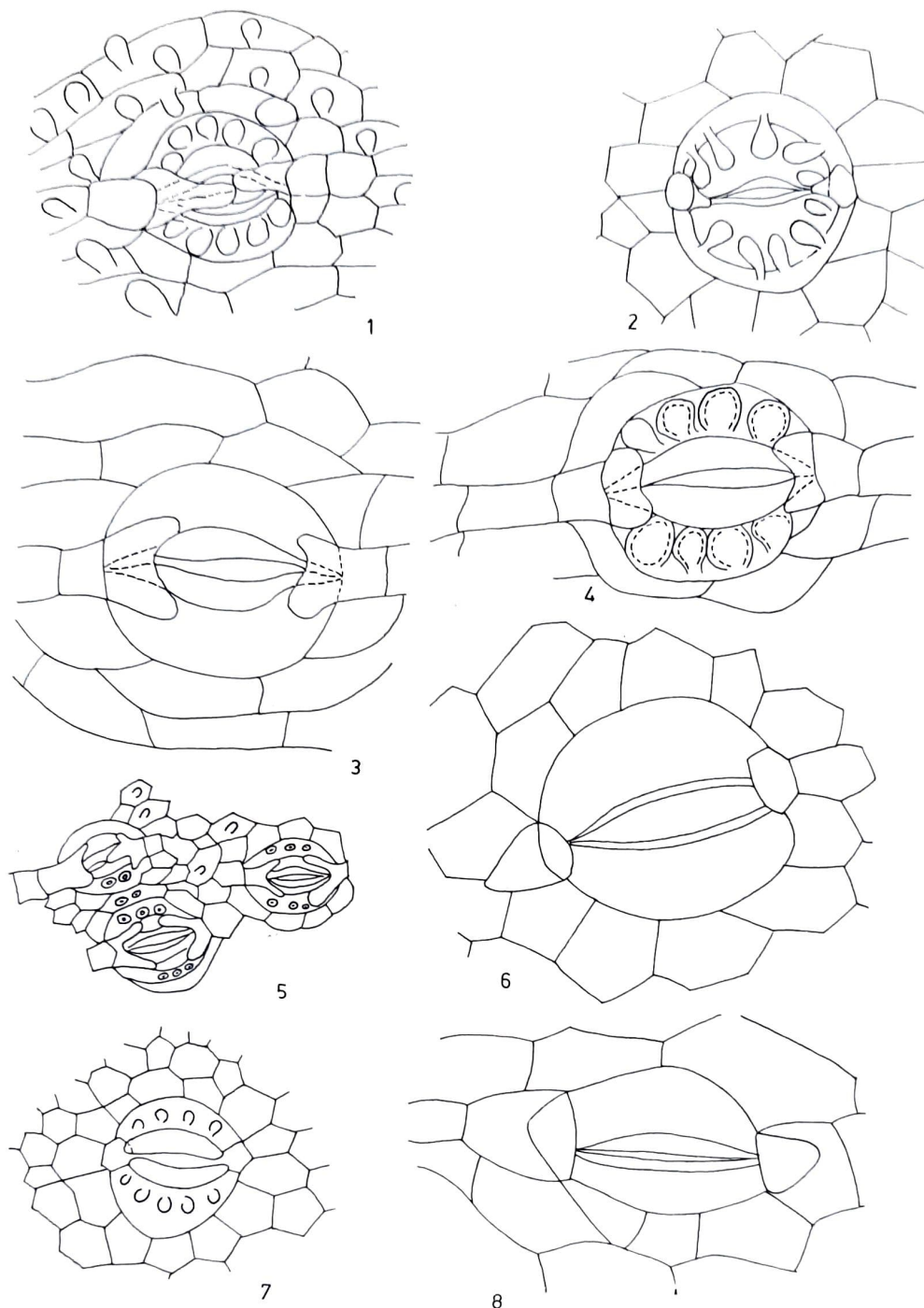
Stomata in the investigated genera of Pandanaceae are tetracytic. The terminal subsidiary cells tend to overarch the guard cells and dome shaped lateral subsidiary cells to varying extent. The neighbouring cells may vary in size and number and may or may not differ from normal epidermal cells. The variation in stomata in *Pandanus* mainly involves the degree of development and distribution pattern of papillae found on subsidiary and neighbouring cells. Based on this the species could be grouped into five classes as recognised by Tomlinson (1965).

*Pandanus amaryllifolius* Roxb. [Fig. 1]

Papillae are developed not only on the subsidiary cells but also on the neighbouring cells. The size shape and frequency of papillae varies considerably. Papillae arising from the terminal subsidiary cells overarch the stomatal aperture. Terminal subsidiary cells tend to overarch the lateral subsidiary cells to a lesser extent. It is of class IV type: papillose neighbouring and subsidiary cells.

*P. andamanensium* Kurz. [Fig. 2]

Papillae occur in a row of four to five on both lateral subsidiary cells. It is of class II type: papillose lateral



**Figures 1-8 :** 1. *Pandanus amaryllifolius*; 2. *P. andamanensium*; 3-4. *P. furcatus*; 5. *P. kaida*; 6. *P. leram*; 7. *P. thwatesii*; 8. *Freycinetia insignis*. (Figs 1-4, 6-8 x 500; Fig. 5 x 225).

subsidiary cells. Terminal subsidiary cells are short and slightly overarch the guard cells and lateral subsidiary cells.

*P. furcatus* Roxb. [Figs 3-4]

Terminal subsidiary cells overarch the guard cells and lateral subsidiary cells to a greater extent. Some stomata are without papillae and belong to class I type

while others have a row of four to five papillae on lateral subsidiary cells and belong to class II type.

*P. kaida* Kurz. [Fig. 5]

Terminal subsidiary cells are short and overarch the guard cells to a greater extent; papillae 2-4 in a row of the outer surface on both lateral and terminal subsidiary cells and neighbouring cells. Papillae arising from the



terminal subsidiary cells are lobed and interdigitate. These stomata belong to class V type: overarching papillae, lobed or dendritic.

*P. leram* Jones [Fig. 6]

Terminal subsidiary cells are short and slightly overarch guard cells and lateral subsidiary cells. Papillae are absent from lateral and terminal subsidiary and also from neighbouring cells. It is of class I type: un-specialised stomata.

*P. thwaitesii* Martelli. [Fig. 7]

Terminal subsidiary cells are short and slightly overarch the guard cells. Papillae 4-5 in a row occur on lateral subsidiary cells. It is of class II type: papillose lateral subsidiary cells.

*Freycinetia insignis* Blume [Fig. 8]

Terminal subsidiary cells are short and slightly overarch the guard cells. Papillae are lacking. The stomatal complex belongs to class I type: un-specialised stomata.

### DISCUSSION

Of the six species of *Pandanus* studied, the stomatal complex belongs to class I type in *P. leram*, class II type in *P. thwaitesii*, and *P. andamanensium*, class IV type in *P. amaryllifolius*, and class V type in *P. kaida* as recognised by Tomlinson (1965). Interesting feature is seen in *P. furcatus* where the single leaf surface shows both class I and class II type of stomata, similar situation was found on single prophyll of *P. corneri* where 3 types of stomatal complexes were observed by Kam (1971). While taxonomic significance of degree of development and distribution of papillae on the stomatal complex in the genus is well recognised, their ecological significance remains to be ascertained. In general they serve to check the stomatal and cuticular transpiration. Stomatal com-

plex in only species of *Freycinetia* studied lacks papillae, though other investigated species (Tomlinson, 1965; Lim & Stone, 1971; Govindarajalu & Thanyakumar, 1977) do show basically the same pattern as found in *Pandanus*. However, dendritic type of papillae have not been observed in *Freycinetia*.

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