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STOMATAL COMPLEXES IN SOME SPECIES OF ARACEAE

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ABSTRACT

Araceae, a tropical family. Plants are mostly herbaceous, habit rarely aquatic. Rootstock is rhizomatous or tuberous or cormous. Leaves are simple or compound, parallel or net veined. Laticifers are common. Silica bodies lacking, oxalate raphides present. Inflorescence is simple spadix with a spathe. Flowers are minute, sessile bisexual or more commonly unisexual with reduced perianth or without perianth. Stamens are six in a flower. Carpels are three, syncarpous. Ovules one- many on axile or parietal or basal or pendulous placentation. Fruit is berry. Seeds are with or without endosperm. Endospermous seeds are with fleshy testa. Embryo is straight or curved. The plants are difficult to identify & sothis study was undertaken in which 7 genera have been studied for their stomatal complexes. The types of stomata found are cyclocytic, paracytic, paratetracytic & brachyparahexacytic monopolar. These could be used as a tool in identifying these species.

KEYWORDS: Stomata, Araceae, cyclocytic, paracytic, paratetracytic & brachyparahexacytic monopolar.

INTRODUCTION

Family Araceae consists of 109 genera and about 2,239 species (French and Tomlinson 1981 a,b,c,d, 1983). The stomatal cell complex of Angiosperms was first studied by Strasburger (1866) and particularly by Vesque (1989), who recognised four broad categories based on the presence and arrangement of accessory cells as well as their mode of development. Vesque, however studied only in dicotyledons, while Florin (1931) made a detailed study of stomatal complexes in Gymnosperms, while Dehnel (1957) has amplified the knowledge about dicotyledons. There exists however no comparable study of stomatal complexes in monocotyledons. Considering the above facts the work on stomatal complexes in Araceae

was undertaken. There is less anatomical sotmatal work carried out in Araceae. There are several genera belonging to Araceae whose taxonomic position is not clear w.r.t Engler and Krause (1906-1920) and Hutchinson (1959). So, stomatal complexes study was undertaken in the present work to understand the taxonomic position of the members of Araceae and also to determine taxonomic utilit of anatomical characters. This may throw light on intrafamilial classification of Araceae.

Structure and ontogeny of stomata in monocots received attention as early as 1869 by Strasburger and later by many workers vis duval-Juval (1872), Campbell (1881), Cuttler (1969), Benecke (1892), Solla (1884), and Treviranus (1820). Further considerable work has been done by Solereder and Meyer (1930), Stebbins and Jain (1971), Shah and Gopal (1970,1972), Williams (1975), Atwood and Williams (1979). Comprehensive work on the subject has been done by Metcalfe (1961), Solereder and Meyer (1930), Cuttler (1969), Dunn et al (1965) and Dilcher (1974). Stomata of some species of monocots have been studied by Rubina et al, (2007).

Leaf epidermal features of Araceae have been investigated by Webber (1960), Stebbins and Khush (1961), Grear (1973). Webber (1960), studied 21 genera and concluded that stomata may be present either on lower or both surfaces of leaves and have subsidiary cells varying from 2 to 8 or more.

Pant and Kidwai (1964) have investigated the ontogeny of stomata pain Spathiflorae. Trivedi and Upadhyay (1984) observed the tin Araceae upper epidermal cells are usually hexagonal or polygonal and smooth walled. Striations are frequent. Lower epidermal cells are polygonal irregular smooth or sinuous. They have studied several species of *Dieffenbachia*.

Upadhyay and Trivedi (1987) noted anomocytic tetracytic, cyclocytic type of stomata in Araceae. Abdulrahaman and Oladele (2003) have studied stomata in leafy vegetables in Nigeria. Foliar epidermal morphology in species of *Stachytarpheta* Vahl. (Verbenaceae) from Nigeria have been studied by Chisom et al (2015). Stomatal complexes in some species of *Philodendron* has been studied by Vaidya (2015).

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MATERIAL AND METHODS

All the specimens required for present study were collected from various localities of Bombay and Maharashtra. The details are as shown in the table given below:

Sr. No	Genus	Species	Locality
1	*Scindapsus*	*Aureus*	Ruia College garden
2	*Homalomena*	*Rubescence*	M.V. College garden
3	*Schismatoglottis*	*Picta*	Panvel
4	*Remusatia*	*Vivipara*	Khandala and Amboli ghat
5	*Caladium*	*Bicolor*	Matunga
6	*Caladium*	*Buck*	Matunga
7	*Caladium*	*Candidum*	Matunga
8	*Caladium*	*Debuntate*	Matunga
9	*Xanthosoma*	*lindeni-magnificum*	Khandala
10	*Cryptocoryne*	*Spiralis*	Ghodbunder and Lonavala
11	*Sauramatium*	*Guttatum*	Khandala

The identification was confirmed in consultation with Indian National Herbarium and B.S.I. Western circle.

The leaf cuticles were removed by treating with conc. HNO3 followed by 10 % KOH for 5-10 minutes each. They were washed with water and stained with 1 % saffranine or haematoxylin. The peels were washed again with water and dehydrated through alcohol-Xylol grades and mounted in DPX.

The photographs were taken on Nikon Microphotographic camera at 10x 45X magnification. The terminology followed is as suggested by Dilcher (1974).

OBSERVATIONS

1. *Scindapsus aureus* (Fig. 1)

Stomata are cyclocytic. Guard cells are kidney-shaped with thick inner and thin outer ledge. Subsidiary cells form a ring around the guard cells and are almost rectangular with thick walls. Epidermal cells are polygonal with thick walls. Cell contents are prominent.

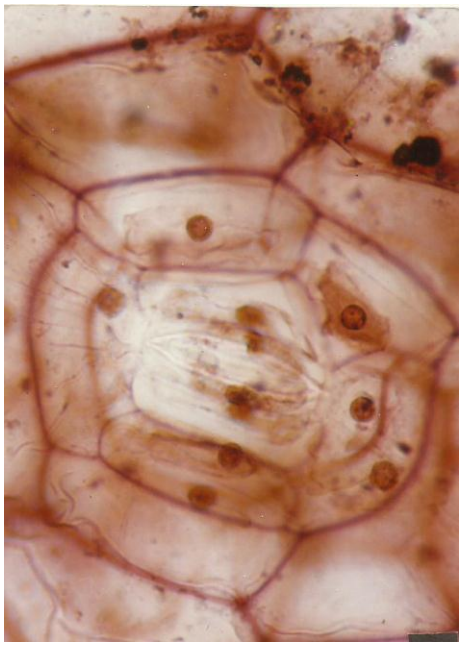

Fig. 1. ***Scindapsus aureus***

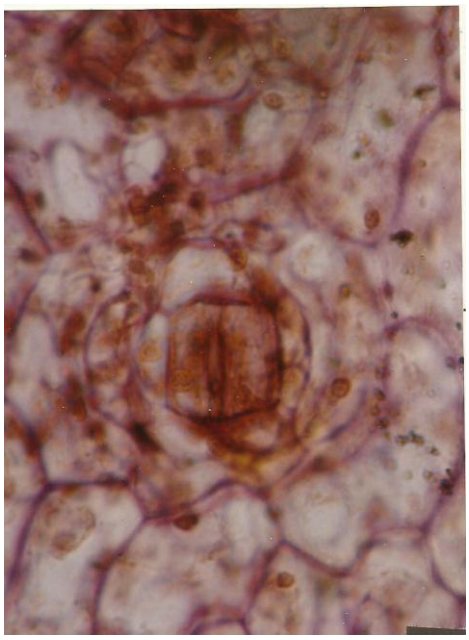

Fig. 2. ***Homalomena rubescence***

2. ***Homalomena rubescence*** **(Fig. 2)**

Stomata are paracytic. Guard cells are kidney-shaped with thick inner and thin outer ledge. Subsidiary cells are rectangular with thick walls. Epidermal cells are polygonal with + - thick walls. Cell contents are prominent.

3. ***Schismatoglottis picta*** **(Fig. 3)**

Stomata are paracytic. Guard cells are kidney-shaped with thick inner and thin outer ledge. Subsidiary cells are rectangular with thick walls. Epidermal cells are rectangular, pentagonal to polygonal with thick walls. Cell contents are prominent.

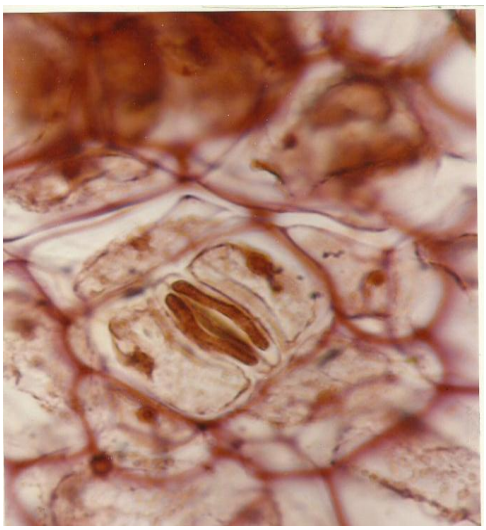

Fig. 3. ***Schismatoglottis picta***

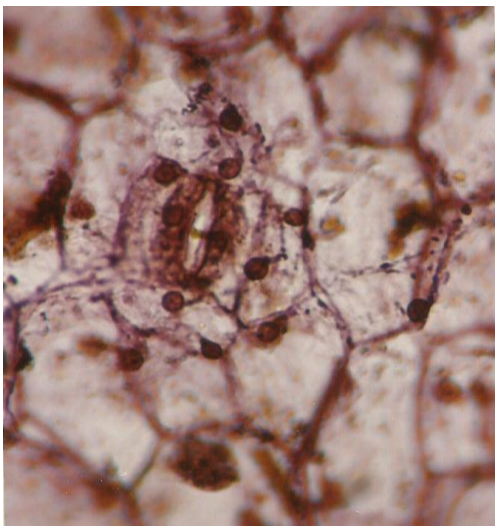

Fig. 4. ***Remusatia vivipara***

4. *Remusatia vivipara* (Fig. 4)

Stomata ar brachyparahexacytic monopolar. Guard cells are kidney-shaped with thick inner and thin outer ledge. Lateral subsidiary cells are almost rectangular and polar subsidiary cells are also rectngular with thick walls. Epidermal cells are polygonal (hexagonal to octagonal) with thick walls. Cell contents are prominent.

5. *Caladium bicolor-wightii* (Fig. 5)

Stomata are paracytic. Guard cells are elongated and ikdney-shaped with thick inner andouter ledge. Subsidiary cells are almost rectangular with thin walls. Epidermal cells are pentagonal & hexagonal with thick walls. Guard cell contents are prominent and granular.

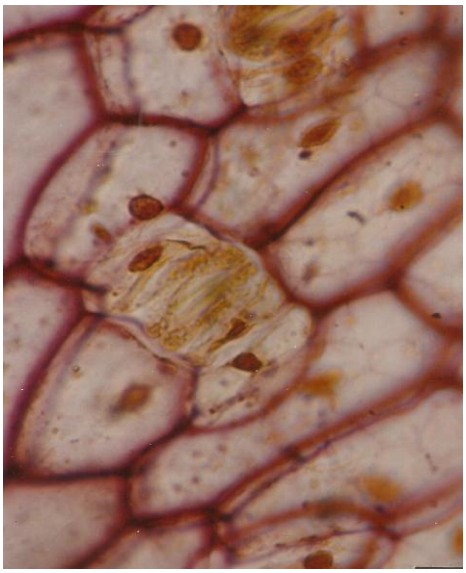

Fig. 3. *Caladium bicolor-wightii*

Fig. 4. *Remusatia vivipara*

6. *Caladium buck* (Fig. 6)

Stomata are paracytic. Guard cells are kidney-shaped with thick inner and outer ledge and dense cytoplasm. Subsidiary cells are rectangular with thin walls. Epidermal cells are pentagonal, hexagonal and heptagonal with thick walls. Cell contents are prominent.

7. *Caladium candidum* (Fig. 7)

Stomata are paracytic. Guard cells are elongated and kidney-shaped with thick inner and outer ledge. Subsidiary cells are cubical and thick walled. Epidermal cells are pentagonal and hexagonal with thick walls. Cell contents are prominent.

Fig. 7. *Caladium candidum*

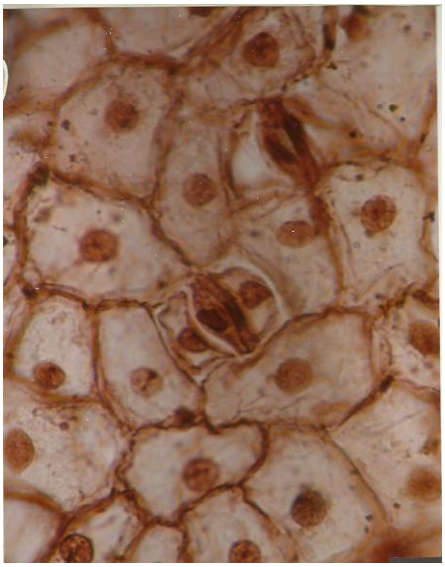

Fig. 8. *Caladium debuntate*

8. *Caladium debuntate* (Fig. 8)

Stomata are paracytic. Guard cells are kidney-shaped with thick inner and outer ledge. Subsidiary cells are rectangular with thick walls. Epidermal cells are pentagonal and hexagonal with slightly wavy outline and thin walls. Cell contents are prominent.

9. *Xanthosoma lindeni-magnificum* (Fig. 9)

Stomata are paratetracytic. Guard cells are kidney-shaped with thick inner and thin outer ledge. Lateral and polar subsidiary cells are rectangular with thick walls. Epidermal cells are pentagonal, hexagona, with thick walls. Cell contents are prominent.

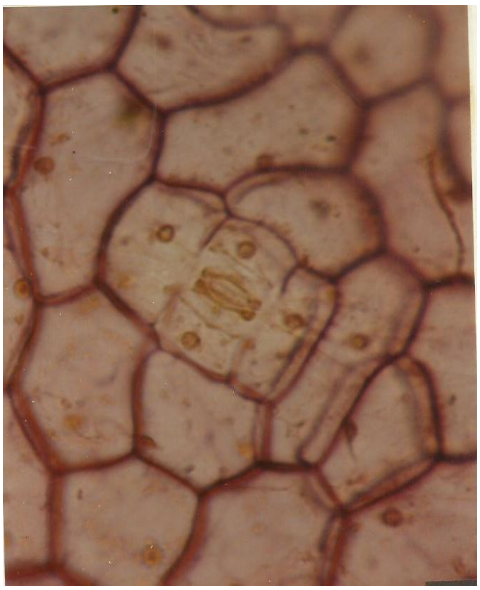

Fig. 9. *Xanthosoma lindeni-magnificum*

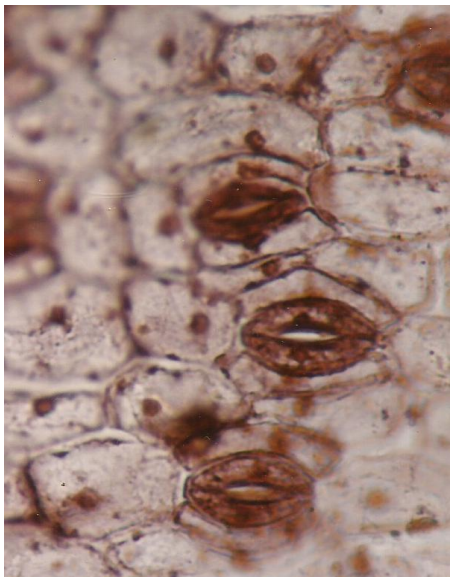

Fig. 10. *Cryptocoryne spiralis*

10. *Cryptocoryne spiralis* (Fig. 10)

Stomata are paracytic. Guard cells are elongated and kidney-shaped with dense granular contents. The guard cells have a thick inner and outer ledge. Subsidiary cells are elongated and semicircular with thick walls. Cell contents are prominent.

11. *Sauramatium guttatum* (Fig. 11)

Stomata are brachyparhexacytic monopolar. Guard cells are kidney-shaped with thick inner and outer ledge. Lateral subsidiary cells are almost rectangular with thick walls. Epidermal cells are polygonal with thin walls. Cell contents are prominent.

Fig. 11. *Sauramatium guttatum*

RESULTS AND DISCUSSION

In the Sub-family Monsteroideae under tribe Monstereae the genus *Scindapsus* is included. *Scindapsus aureus* shows cyclocytic type of stomata.

Under sub-tribe Schismatoglottidinae, the genus *Schismatoglottis* & its species *picta* shows paracytic type of stomata.

Sub-family Colocasioideae under tribe Colocasieae and sub-tribe Steudenerinae genus *Remusatia* shows brachyparahexacytic monopolar type of stomata. In *Remusatia* vivipara brachyparahexacytic monopolar type of stomata are seen.

Under sub-tribe Caladinae the genera *Caladium* and *Xanthosoma* are included. Genus *Caladium* shows paracytic type of stomata. In *C. bicolor, C. buck, C. candidum. C. dubuntate* stomata are paracytic . *In X. lindeni magnificum* paratetracytic stomata are seen.

Sub-family Aroidae under tribe Areae and sub-tribe Arineae the gens *Sauramatium* is included. Genus *Sauramatium* shows brachyparahexacytic monopolar type of stomata. In *S. guttatum* stomata are brachyparahexacytic monopolar. Under sub-tribe Ambrosininae genus *Cryptocoryne* shows paracytic type of stomata. In *C. spiralis* stomata are paracytic.

CONCLUSION

Sub-family: Monsteroideae

Tribe: Monstereae

Genus: *Scindapsus*

Scindapsus aureus cyclocytic

Sub-family : Philodendroideae

Tribe : Homalomeninae

Genus : *Homalomena*

H. rubescence paracytic

Sub-tribe : Schismatoglottidinae

Genus : *Schismatoglottis*

S. picta paracytic

Sub-family : Colocasioideae

Tribe : Steudenerinae

Genus : *Remusatia*

R. vivipara brachyparahexacytic monopolar

Sub-tribe: Caladinae

Genus: *Caladium* paracytic

C. bicolor paracytic

C. buck paracytic

C. candidum paracytic

C. dubuntate paracytic .

Xanthosoma

X. lindeni magnificum paratetracytic

Sub-family : Aroideae

Tribe : Arineae

Genus : *Sauramatium*

S. guttatum brachyparahexacytic monopolar

Sub-tribe Ambrosininae

Genus : *Cryptocoryne*

C. spiralis paracytic.

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