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ROLE OF ANATOMY IN THE STUDY OF STOMATAL COMPLEXES IN NINE MEMBERS OF THE FAMILY PALMAE

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ABSTRACT

The present study includes the study of nine members of family Palmae. The family Palmae is divided into 5 tribes as per the classification given by Hooker. Tribe Areceae has Sub tribe – Caryotideae – to which *Arenga* belongs, tribe Phoeniceae has the genus *Phoenix* in it, tribe Corypheae has the genera *Livistona*, *Raphis*, *Prichardia* & *Sabal* included in it, tribe Lepidocarpeae & tribe Cocoineae. Palmae has great economic important including coconut products, oils, palm syrup, etc. Palm sap is some times fermented to produce palm vine or toddy. Palms are valuable as ornamental plants and used in food, drink, oil and fibre etc. and so the family is of economic importance. The study of stomatal complexes of these members revealed paratetracytic, brachyparahexacytic and parahexacytic. Some members are hypostomatic with stomata absent on their lower surface.

KEYWORDS: Palmae, stomata, paratetracytic, brachyparahexacytic, parahexacytic, hypostomatic.

INTRODUCTION

Nine members of the family Palmae are included in this study. They are *Arenga saccharifera. Livistona chinensis, Livistona rotundifolia, Phoenix sylvestris, Phoenix elius, Raphis excelsa, Raphis humilis, Prichardia pacifica* & *Sabal palmato.* The family Palmae is divided into 5 tribes as per the classification given by Hooker 1883. The stomatal complexes of Angiosperms were first studied by Strasburger (1866) and particularly by Vesque 1889, 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. Structure and ontogeny of stomata in monocots received attention from 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 (1960), 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 *Philodendron* of family Araceae have been studied by Vaidya 2015.

MATERIAL AND METHODS

The plant material for the present work was personally collected from Jijamata Udyan and Kalina Campus. The identification was confirmed in consultation with Indian National Herbarium and B.S.I. Western circle.

For the study of stomata the leaf pieces were boiled in concentrated nitric acid with little potassium chlorate added to it. The leaves turn brown and then yellowish white. They were then transferred to water to separate the epidermal peelings. These peelings were washed thoroughly, stained with aqueous Saffranine or Delafield Haematoxylin and mounted in Glycerine. (Gupta, 1961).

The terminology used in anatomical studies is in accordance with Dilcher (1974).

The photography for the slides was done using Motic Image Viewer in high power.

OBSERVATIONS

1) *Livistona chinensis*

Upper epidermis (Fig. 1) – Stomata are absent. The leaves are hypostomatic.

Fig. 1. Upper epidermis.

Fig. 2. Lower epidermis.

Lower epidermis (Fig. 2) - Stomata are parahexacytic, two elongate lateral cells parallel to guard cell. Narrow polar cells are present.

2) *Livistona rotundifolia*

Upper epidermis (Fig. 3) – Stomata are absent. The leaves are hypostomatic.

Fig. 3. Upper epidermis.

Fig. 4. Lower epidermis.

Lower epidermis (Fig. 4) – Stomata are paratetracytic, two elongate cells lateral and parallel to the guard cells, present two narrow cells.

3) *Pheonix elius*

Upper epidermis (Fig. 5) - Stomata are brachyparahexacytic, two elongate cells lateral and parallel to the guard cells, present two narrow cells.

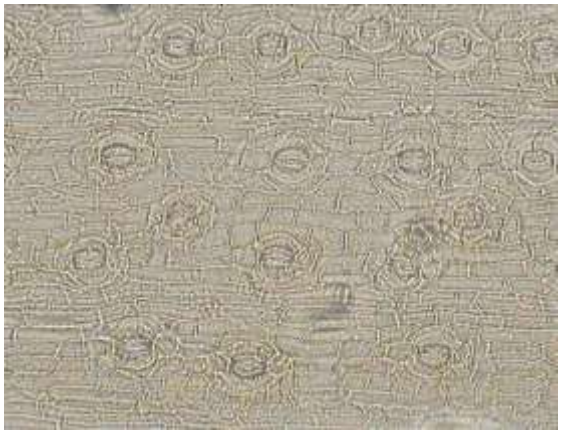

Fig. 5. Upper epidermis.

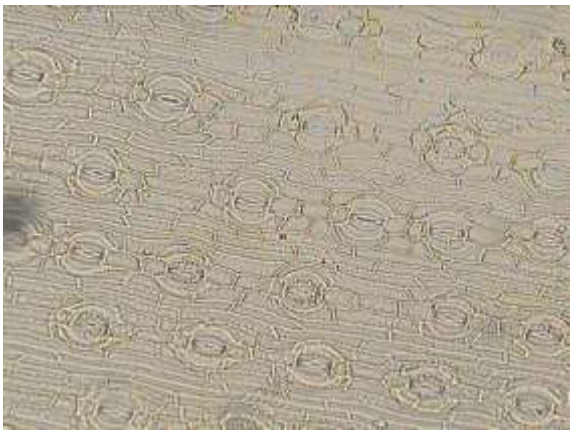

Fig. 6. Lower epidermis.

Lower epidermis (Fig. 6) - Stomata are brachyparahexacytic, two elongate cells lateral and parallel to the guard cells, present two narrow cells.

4) *Phoenix sylvestris*

Upper epidermis (Fig. 7) - Stomata are brachyparahexacytic, two elongate cells lateral and parallel to the guard cells, present two narrow cells.

Fig. 7. Upper epidermis.

Fig. 8. Lower epidermis.

Lower epidermis (Fig. 8) - Stomata are brachyparahexacytic, two elongate cells lateral and parallel to the guard cells, present two narrow cells.

5*) Prichardia pacifica*

Upper epidermis (Fig. 9) - Stomata are absent. The leaves are hypostomatic.

Fig. 9. Upper epidermis.

Fig. 10. Lower epidermis.

Lower epidermis (Fig. 10) - Stomata are brachyparahexacytic, two elongate cells lateral and parallel to the guard cells, present two narrow cells.

6) *Raphis excelsa*

Upper epidermis (Fig. 11) - Stomata are absent. The leaves are hypostomatic.

Fig. 11. Upper epidermis.

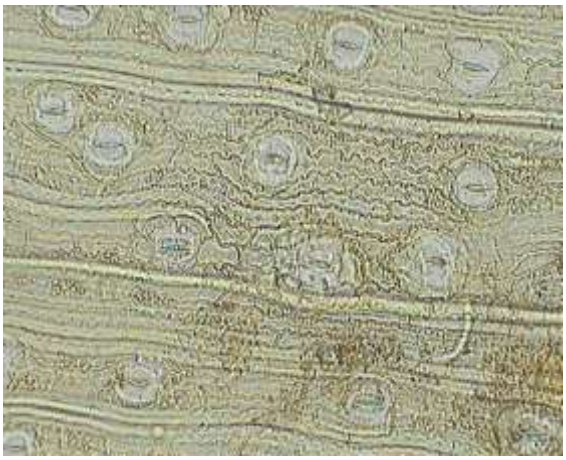

Fig. 12. Lower epidermis.

Lower epidermis Fig. 12 - Stomata are parahexacytic, two elongate lateral and parallel cells to guard cell. Present narrow polar cells.

7) *Raphis humilis*

Upper epidermis - Stomata are brachyparahexacytic, two elongate cells lateral and parallel to the guard cells, present two narrow cells.

Fig. 13. Upper epidermis.

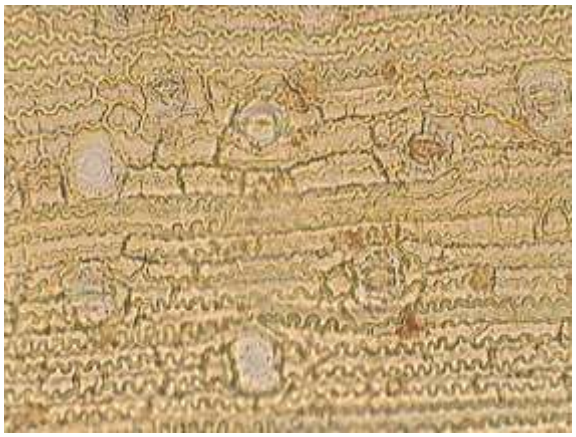

Fig. 14. Lower epidermis.

Lower epidermis - Stomata are brachyparahexacytic, two elongate cells lateral and parallel to the guard cells, present two narrow cells.

8) *Sabal palmato*

Upper epidermis - Stomata are brachyparahexacytic, two elongate cells lateral and parallel to the guard cells, present two narrow cells.

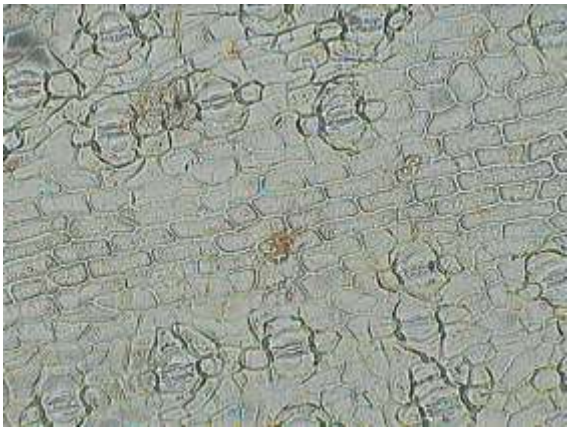

Fig. 15. Upper epidermis.

Fig. 16. Lower epidermis.

Lower epidermis - Stomata are brachyparahexacytic, two elongate cells lateral and parallel to the guard cells, present two narrow cells.

9) *Arenga saccharifera*

Upper epidermis- Stomata are absent. The leaves are hypostomatic.

Fig. 17. Upper epidermis.

Fig. 18. Lower epidermis.

Lower epidermis - Stomata are paratetracytic, two elongate cells lateral and parallel to the guard cells, present two narrow cells.

CONCLUSION

Leaves are hypostomatic in *Livistona chinensis*, *Livistona rotundifolia*, *Prichardia pacifica*, *Raphis excelsa*, *Arenga saccharifera.*

Stomata are found on both the surfaces in *Raphis humilis*, *Pheonix elius*, *Pheonix sylvestris*, and *Sabal palmato*. Three types of stomata are found in the nine members of family Palmae that is brachyparahexacytic, parahexacytic and paratetracytic. Brachyparahexacytic type of

stomata are found in *Raphis humilis*, *Pheonix elius*, *Pheonix sylvestris*, *Prichardia pacifica*, *Sabal palmato*. Parahexacytic stomata are found in *Livistona chinensis* and *Raphis excelsa*. Paratetracytic stomata are found in *Livistona rotundifolia*, *Arenga saccharifera.*

The types of stomata that have been found can be used as a tool in addition to morphology for identification of the correct Genus and species.

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