

## STUDY OF STOMATAL COMPLEXES IN SOME SPECIES OF THE GENUS *LITSAEA* LAMK

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### ABSTRACT

The present work deals with the cuticular anatomical studies in the genus *Litsaea* Lamk. The family Lauraceae is commonly called Laurel family which is of great economic importance. Cuticular features of Lauraceae were studied as early as the beginning of the 20<sup>th</sup> Century. There is meagre anatomical work carried out in genus *Litsaea* of Lauraceae. A large number of species are so intimate by their leaf morphological characters; it is often difficult to determine their nomenclature types. Hence attempt has been made to recognize the taxonomic value of cuticular epidermal features of the species growing in India. The leaves are hypostomatic. The types of stomata found on the lower epidermis are paracytic, anomocytic, brachyparacytic,

hemiparacytic and amphiparacytic type of stomata were observed.

**KEYWORDS:** *Litsaea*, stomata, paracytic, anomocytic, brachyparacytic, hemiparacytic and amphiparacytic.

### INTRODUCTION

*Litsaea* belongs to family Lauraceae as suggested by Hooker, (1883). The mature stomata of 15 species of *Litsaea* belonging to Lauraceae are studied. Venation patterns in *Litsaea* have already been studied by Vaidya (2014 & 2015). The leaves are hypostomatic. The stomata are absent on the upper epidermis. The stomata are present only on the lower epidermis. The stomata are paracytic in Lauraceae according to Metcalfe & Chalk (1950). Some species of Lauraceae show predominantly paracytic type of stomata as suggested by Pal (1978a). Very rarely anomocytic type of stomata are met with in some species. The epidermal characters of plants in systematic studies by Ahmad (1964a,b), Ramayya et al (1971) have been used in distinguishing certain groups of plants have been used. The different types of stomata have

been reported on the same surface of an organ in diverse angiospermic families by Loftfield (1921), Pant et al (1964), Paliwal (1965), Inamdar (1969) & Vaidya (2015). Those features of the cuticle that allowed the identification of Lauraceae and placed the 12 species of fossil Lauraceae found in the Eocene Nerriga deposit within the form genus *Laurophyllum* based on cuticular features as described by Hill (1986). The foliar epidermal characters of *Cinnamomum* species have also been studied by Baruah et al (1997).

## MATERIAL AND METHODS

The plant material for the present work was personally collected from Shillong- Meghalaya; Kodaikanal, Kolli Hills-Tamilnadu. The duplicates of herbarium were collected from the herbarium section of B.S.I. Eastern Circle and A.R.I., Pune. The identification of fresh material was checked with the help of Standard Herbaria from B.S.I. Shillong and B.S.I. Yercaud and A.R.I. Herbarium, Pune.

The alphabetical list of the species of *Litsaea* studied and their place of collection with their numbers is as follows.

Sr. No	SPECIES	PLACE OF COLLECTION.
1	<i>Litsaea angustifolia</i> , Wall.	K & J Hills B.S.I. Eastern Circle, Shillong, 25060, 25061.
2	<i>Litsaea chartacea</i> , Wall.	B.S.I. Eastern Circle, Shillong, 30111, 30113.
3	<i>Litsaea chinensis</i> , Lam.	Orissa B.S.I. Eastern circle, Shillong, 17892.
4	<i>Litsaea citrata</i> , Blume.	Shillong B.S.I. Eastern Circle, Shillong, 17818, 27861.
5	<i>Litsaea coriacea</i> , Hook. f.	Mahableshwar, Bhimashankar.
6	<i>Litsaea cubeba</i> , Pers.	K & J Hills B.S.I. Eastern Circle, Shillong, 47279, 47280.
7	<i>Litsaea deccanensis</i> , Gamble	Rareshwar, Karnala, Bhimashankar, Gaganbavda, A.R.I., Pune 6910, 6911.
8	<i>Litsaea elongata</i> , Wall.	Mawsmi, K & J Hills B.S.I. Eastern Circle, Shillong, 24926, 24930, 24933.
9	<i>Litsaea foliosa</i> , Nees.	Mawsmi, K & J Hills B.S.I. Eastern Circle Shillong, 25162, 25163, 25166.
10	<i>Litsaea glutinosa</i> , C.B.Robins.	Kolli Hills.
11	<i>Litsaea Khasyana</i> , Meissn.	K & J Hills 24957, 24964, 24965.
12	<i>Litsaea laeta</i> , Wall.	Shillong B.S I. Eastern Circle, Shillong, 25121, 25122.
13	<i>Litsaea lancifolia</i> , Roxb.	Lakhimpur B.S.I. Eastern Circle, Shillong, 24913, 24906.
14	<i>Litsaea lanuginosa</i> , Nees.	Mawsmi B.S.I. Eastern Circle, Shillong, 50534, 50536, 50538.
15	<i>Litsaea Mannii</i> , King.	Khasi Hills B.S.I. Eastern Circle, Shillong, 25184, 25189.

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 as suggested by Gupta, 1961.

Stomata were observed from the cleared surface of the lamina under the compound microscope. Stomata were sketched by using Erma Camera Lucida at **10 x 45X** magnification.

The standard terminology is used in anatomical studies to describe the stomata is in accordance with Dilcher, 1974.

## OBSERVATIONS

### 1. *Litsaea angustifolia*

Upper epidermis (Text Fig. 1): The stomata are absent on upper epidermis. The epidermal cells are polygonal and irregular in shape.



**TEXT FIG. 1.**



**TEXT FIG. 2.**

Lower epidermis (Text Fig. 2): Stomata are paracytic type. The guard cells are elongated and kidney shaped and epidermal cells are polygonal and irregular in shape.

### 2. *Litsaea chartacea*

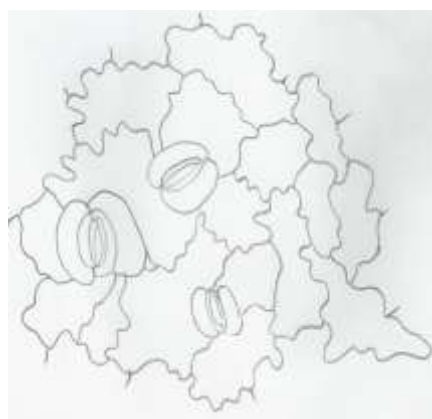
Upper epidermis (Text Fig. 3): Stomata are absent on the upper epidermis. The epidermal cells are polygonal and irregular in shape.

**TEXT FIG. 3.****TEXT FIG. 4.**

Lower epidermis (Text Fig. 4): Stomata are paracytic and anomocytic type. The guard cells are elongated and kidney shaped. Epidermal cells are polygonal and irregular in shape.

### **3. *Litsaea chinensis***

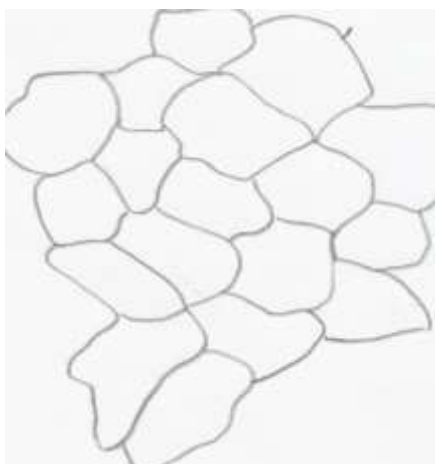
Upper epidermis (Text Fig. 5): Stomata are absent on upper epidermis. The epidermal cells are irregular in shape. The cell wall of the epidermal cells is wavy in outline.

**TEXT FIG. 5.****TEXT FIG. 6.**

Lower epidermis (Text Fig. 6): Stomata are paracytic type. The guard cells are elongated and kidney shaped. The epidermal cells are irregular in shape. The wall of the epidermal cells is wavy in outline.

### **4. *Litsaea citrata***

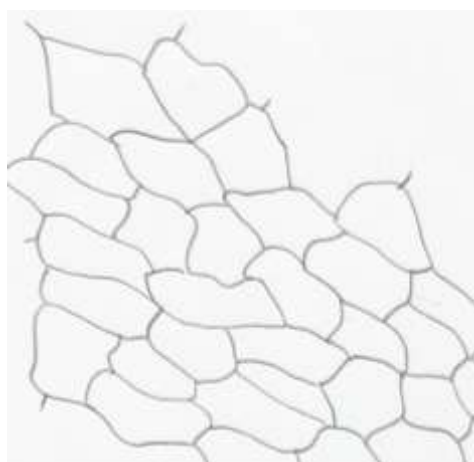
Upper epidermis (Text Fig. 7): Stomata are absent on upper epidermis. Epidermal cells are polygonal and irregular in shape.

**TEXT FIG. 7.****TEXT FIG. 8.**

Lower epidermis (Text Fig. 8): Stomata are paracytic type. The guard cells are elongated and kidney shaped. The epidermal cells are polygonal and irregular in shape.

#### **5. *Litsaea coriacea***

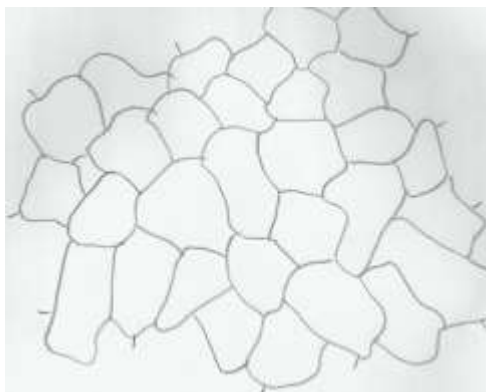
Upper epidermis (Text Fig. 9): Stomata are absent on the upper epidermis. The epidermal cells are polygonal and irregular in shape.

**TEXT FIG. 9.****TEXT FIG. 10.**

Lower epidermis (Text Fig. 10): Stomata are paracytic type. The guard cells are elongated and kidney shaped. Epidermal cells are polygonal and irregular in shape.

#### **6. *Litsaea cubeba***

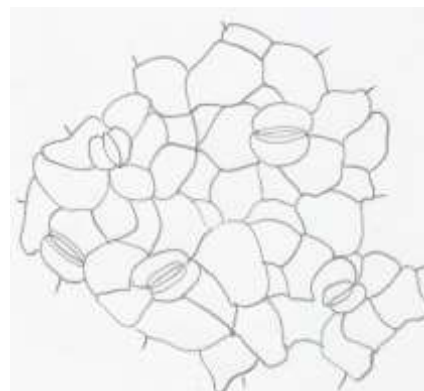
Upper epidermis (Text Fig. 11): Stomata are absent on upper epidermis. The epidermal cells are polygonal and irregular in shape.

**TEXT FIG. 11.****TEXT FIG. 12.**

Lower epidermis (Text Fig. 12): Stomata are paracytic, amphiparacytic and hemiparacytic type. The guard cells are elongated and kidney shaped. Epidermal cells are polygonal and irregular.

#### **7. *Litsaea deccanensis***

Upper epidermis (Text Fig. 13): Stomata are absent on upper epidermis. The epidermal cells are polygonal and irregular in shape.

**TEXT FIG. 13.****TEXT FIG. 14.**

Lower epidermis (Text Fig. 14): Stomata are paracytic type. Guard cells are elongated and kidney shaped. Epidermal cells are polygonal and irregular.

#### **8. *Litsaea elongata***

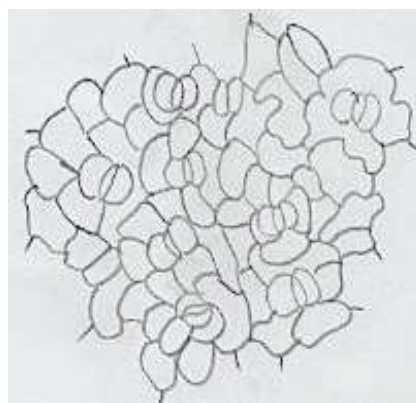
Upper epidermis (Text Fig. 15): Stomata are absent on the upper epidermis. The epidermal cells are irregular. The cell wall of epidermal cells is wavy in outline.

**TEXT FIG. 15.****TEXT FIG. 16.**

Lower epidermis (Text Fig. 16): Stomata are anomocytic type. The guard cells are elongated and kidney shaped. The epidermal cells are irregular and polygonal in shape.

**9. *Litsaea foliosa***

Upper epidermis (Text Fig. 17): Stomata are absent on upper epidermis. Epidermal cells are polygonal and irregular in shape.

**TEXT FIG. 17.****TEXT FIG. 18.**

Lower epidermis (Text Fig. 18): Stomata are anomocytic type. The guard cells are elongated and kidney shaped. The epidermal cells are irregular and polygonal in shape.

**10. *Litsaea glutinosa***

Upper epidermis (Text Fig. 19): Stomata are absent on upper epidermis. The epidermal cells are polygonal in shape.

**TEXT FIG. 19.****TEXT FIG. 20.**

Lower epidermis (Text Fig. 20): Stomata are anomocytic type. The guard cells are elongated and kidney shaped. Subsidiary cells are not distinguishable from epidermal cells. Epidermal cells are irregular and polygonal in shape.

#### **11. *Litsaea Khasyana***

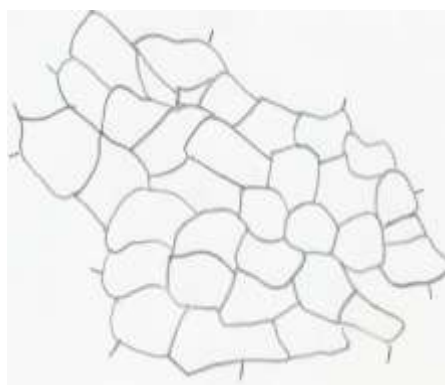
Upper epidermis (Text Fig. 21): Stomata are absent on upper epidermis. The epidermal cells are polygonal and irregular in shape.

**TEXT FIG. 21.****TEXT FIG. 22.**

Lower epidermis (Text Fig. 22): Stomata are paracytic, brachyparacytic and hemiparacytic type. The guard cells are elongated and kidney shaped. Epidermal cells are irregular and polygonal.

#### **12. *Litsaea laeta***

Upper epidermis (Text Fig. 23): Stomata are absent on upper epidermis. The epidermal cells are irregular and polygonal in shape.

**TEXT FIG. 23.****TEXT FIG. 24.**

Lower epidermis (Text Fig. 24): Stomata are anomocytic and paracytic type. The guard cells are elongated and kidney shaped. The epidermal cells are irregular and the outline of epidermal cells is wavy.

### 13. *Litsaea lancifolia*

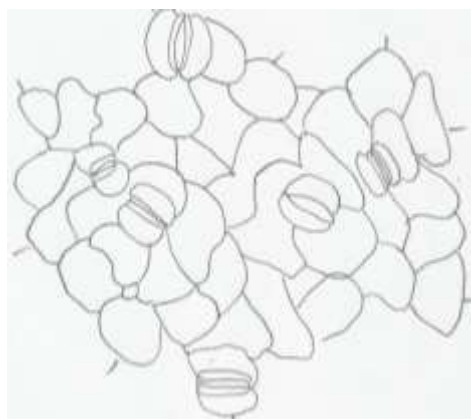
Upper epidermis (Text Fig. 25): The stomata are absent on the upper epidermis. The epidermal cells are polygonal and irregular in shape.

**TEXT FIG. 25.****TEXT FIG. 26.**

Lower epidermis (Text Fig. 26): The stomata are paracytic type. The guard cells are elongated and kidney shaped. The epidermal cells are irregular and polygonal in shape.

### 14. *Litsaea lanuginosa*

Upper epidermis (Text Fig. 27): The stomata are absent on the upper epidermis. The epidermal cells are irregular in shape. The outline of the cell wall is wavy.

**TEXT FIG. 27.****TEXT FIG. 28.**

Lower epidermis (Text Fig. 28): Stomata are anomocytic type. The guard cells are elongated and kidney shaped. Subsidiary cells are not distinguishable from epidermal cells and are arranged around the guard cells. The epidermal cells are polygonal in shape.

**15. *Litsaea Mannii*:** Upper epidermis (Text Fig. 29): Stomata are absent on upper epidermis. The epidermal cells are irregular in shape. The cell wall of epidermal cells is wavy in outline.

**TEXT FIG. 29.****TEXT FIG. 30.**

Lower epidermis (Text Fig. 30): Stomata are of anomocytic and paracytic type. The guard cells are elongated and kidney shaped. The epidermal cells are irregular in shape. The cell wall of the epidermal cells is wavy.

The types of stomata observed in the studied species of *Litsaea* are Paracytic, Anomocytic, Anisocytic, Brachyparacytic, Hemiparacytic, Brachyparatetracytic and Amphiparacytic type.

Anomocytic type of stomata are observed in *Litsaea angustifolia*, *L. elongata*, *L. foliosa*, *L. glutinosa* and *L. lanuginosa*.

Paracytic type of stomata are observed in *Litsaea chinensis*, *L. citrata*, *L. coriacea*, *L. deccanensis* and *L. lancifolia*.

Paracytic and anomocytic type of stomata are observed in *Litsaea chartacea*, *L. laeta* and *L. Mannii*. Paracytic and Brachyparacytic type of stomata are observed in *Litsaea Khasyana*.

Paracytic, Hemiparacytic and Amphiparacytic type of stomata are observed in *Litsaea cubeba*.

### KEY TO STOMATA

#### A. Anomocytic type -----

1. *Litsaea angustifolia*.
2. *Litsaea elongata*.
3. *Litsaea foliosa*.
4. *Litsaea glutinosa*.
5. *Litsaea lanuginosa*.

#### B. Paracytic type -----

6. *Litsaea chinensis*.
7. *Litsaea citrata*.
8. *Litsaea coriacea*.
9. *Litsaea decanensis*.
10. *Litsaea lancifolia*.

#### C. Paracytic and Anomocytic type -----

11. *Litsaea chartacea*.
12. *Litsaea laeta*.
13. *Litsaea Mannii*.

#### D. Paracytic and Brachyparacytic type -----

14. *Litsaea Khasyana*.

#### E. Paracytic, Hemiparacytic and Amphiparacytic type -----

15. *Litsaea cubeba*.

## RESULT AND DISCUSSION

According to the intrageneric classification of *Litsaea*, Section I-Tomingodaphne which consists of *Litsaea citrata* paracytic type of stomata were observed. In Section II- Eulitsaea Paracytic type of stomata are observed in *Litsaea chinensis* and *L. deccanensis* and in *L. glutinosa* anomocytic type of stomata were observed. In Section III- Conodaphne, paracytic type of stomata were observed in *Litsaea lancifolia*. In Section IV - Cylicodaphne consists of *Litsaea coriacea*, in which paracytic stomata were observed; *L. angustifolia* & *L. elongata*, in which anomocytic stomata were observed; *L. Khasyana* in which paracytic and brachyparacytic type of stomata were observed; *L. chartacea* and *L. laeta* in which paracytic and anomocytic type of stomata; *L. cubeba* in which paracytic, hemiparacytic and amphiparacytic type of stomata were observed. Section V - Neolitsaea which consists of *Litsaea foliosa* & *L. lanuginosa*, in which anomocytic type of stomata were observed; *L. Mannii* in which paracytic and anomocytic type of stomata were observed.

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