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RESEARCH ARTICLE

Leaf architecture in A*ctinodaphne* and *Cryptocarya* species

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Abstract: Anatomical studies and leaf architecture are the important tools for the study of plants. They also help in the correct identification of genera and species which are morphologically difficult to delimit. Identification of members of the family Lauraceae are also such morphologically challenging genera and species but of economic value. Hence, the present study was undertaken. The leaves were cleared and stained with saffranine to study the venation pattern and unique feature to find out anatomical marker by using a microscope. Four species of *Actinodaphne* and three species of *Cryptocarya* were collected and their venation pattern was studied. *Cryptocarya* is valued for its timber and other medicinal uses, *Actinodaphne hookeri* Meissn. is one such medicinal plant whose leaves have been traditionally used for diabetes and disorders of the urinary tract. Based on the leaf architecture, the species could be separated. A key to separate the species was also provided herewith. Three types of venation patterns were found namely Pinnate camptodromous Eucamptodromous, festooned brochidodromous and Acrodromous type. The highest vein orders were 5° and 7°.

Keywords: Venation, Pinnate Camptodromous, Eucamptodromous, festooned brochidodromous, Acrodromous.

Introduction

The system of descriptive terminology and leaf architecture have been presented by Madler and Strauss (1971) Ferguson (1971) Walther (1972) and others Krusmann (1960), Stace (1965) and Mouten (1960, 1967). An authentic terminology of leaf architecture has been given by Hickey (1973, 1979). Dilcher (1974) presented the outline of the leaf architecture of dicot leaves. Hickey and Wolfe (1975) and Melville (1976) have revised the data and classified the architecture of leaves of dicotyledonous plants. Hall and Melville (1951) proposed a veinlet termination number as a technique for testing the purity of fragments of a particular leaf type for pharmacognostical properties. Thus, anatomy and leaf architecture study can be used as an additional tool to help in the correct identification of a species. The morphological characters of Lauraceae are well explained but key to members of the Lauraceae and *Cryptocarya* is based on the development of anther and stamens, which makes the correct identification difficult (Hooker 1883) and hence the present study was undertaken.

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Material and methods

The collection of plant material for *Cryptocarya* was done from the species growing naturally at Shillong- Meghalaya. The collected plant material was identified and checked with the help of Standard Herbaria from A.R.I. Herbarium, Pune and B.S.I. Eastern Circle, Shillong.

The method described by Payne, (1969) and Mohan Ram and Nayyar (1978) in which both fresh as well as dried material was used for the study of leaf architecture. The material was dried between blotting papers and then used. The leaves fresh or dried were first cleared by keeping them in 5% sodium hydroxide solution at room temperature for 1-2 days. The decolored leaves were washed and transferred to 5% sodium hypochlorite till they were transparent. The leaves were then thoroughly washed to remove traces of hypochlorite and stained with aqueous saffranine by keeping them in it for 10-15 minutes and mounted in glycerine jelly. For anatomical studies, the terminology used as

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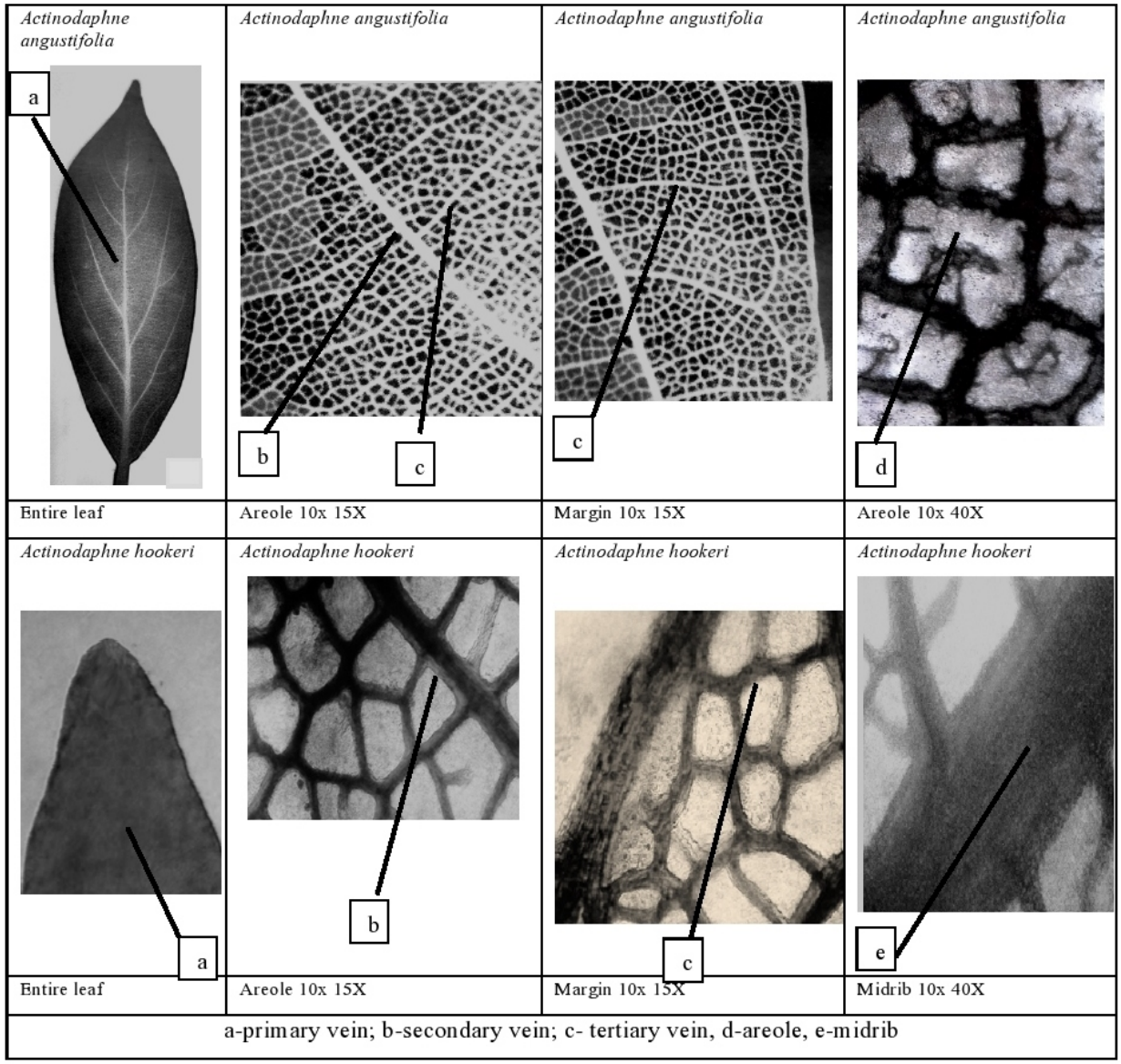
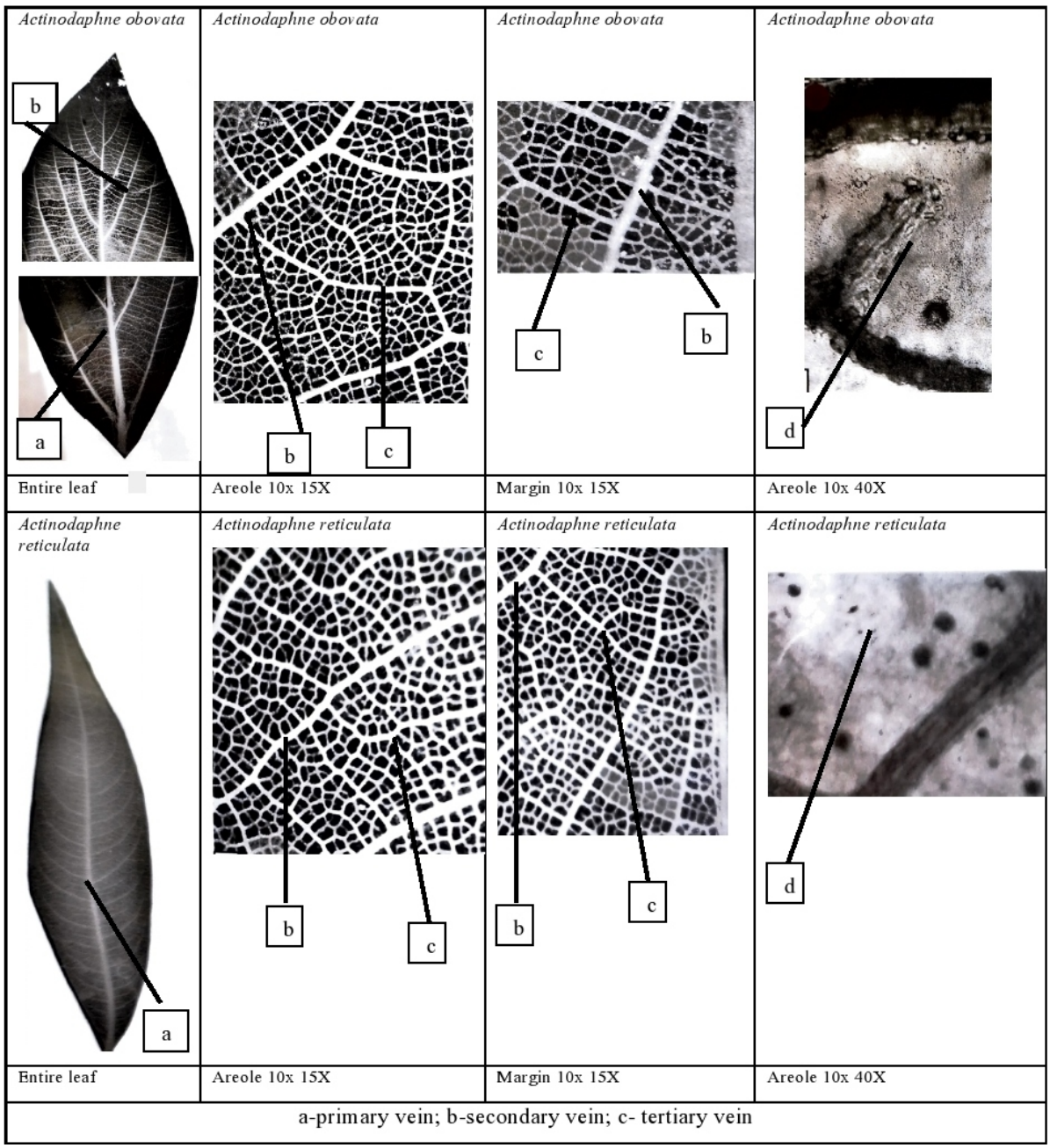


suggested by Hickey (1973, 1979), Hickey and Wolfe (1975), Dilcher (1974) and Melville (1976).

Observations

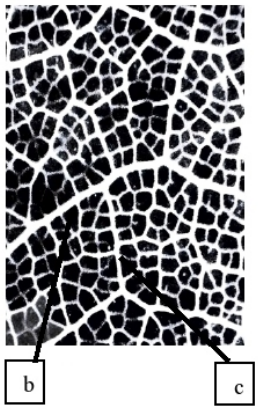
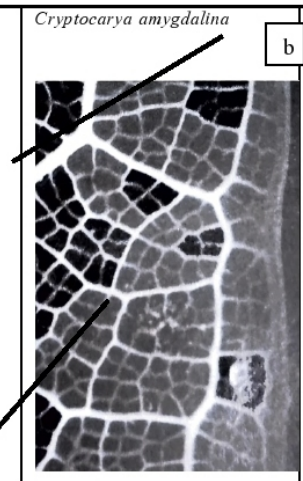
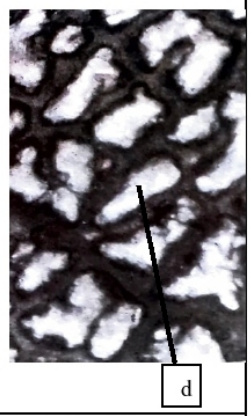
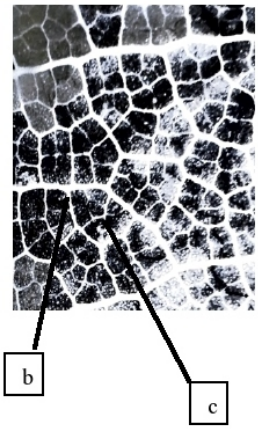
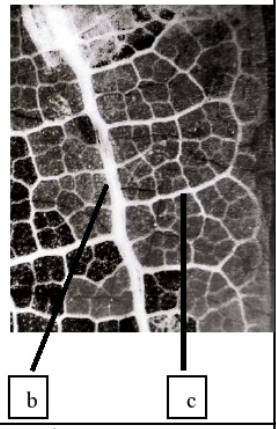
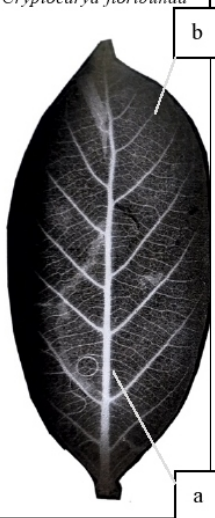
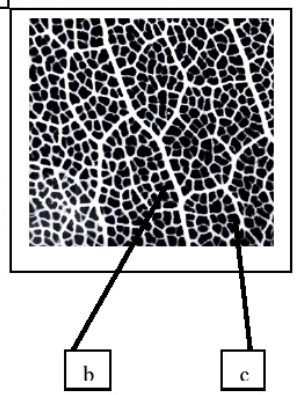
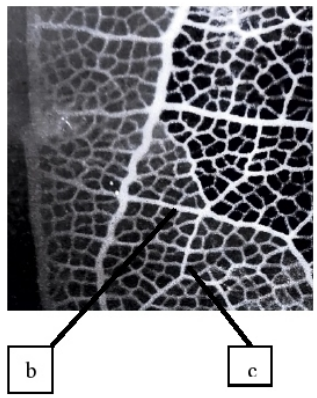
Four species of *Actinodaphne* are studied namely *Actinodaphne angustifolia*, *A. hookeri*, *A. obovata* and *A. reticulata*. Three species show Pinnate Camptodromous eucamptodromous secondaries. The highest vein order is 5°. The angle of divergence of secondary veins is acute moderate in *A. reticulata*, while it is acute narrow in *A. obovata* and *A. angustifolia*. Further, these species have random reticulate pattern of tertiary veins. The angle of origin of tertiary veins seen is RR/AR/AO/AA in *A. reticulata*, and tracheoids are absent. Pattern is percurrent in *A. obovata* and *A. angustifolia*. These are separated on the basis of angle of origin of tertiary veins which is RR/AR/RA/OR in *A. obovata* and AA/AR/RR/RA/OA in *A. angustifolia* with tracheoids present in both. Thus, the three species are separated from each other on the basis of the leaf architecture patten in the genus *Actinodaphne*. *A. hookeri* has Acrodromous venation. The highest vein order is 5°. The angle of divergence of secondary veins is acute narrow. The angle of origin of tertiary veins seen is RR/RO/RA in *A. hookeri*.

Key to separation of species of *Actinodaphne*:



Pinnate Camptodromous
Eucamptodromous secondaries
Secondary veins angle of divergence acute narrow
Highest vein order 5°
Pattern of tertiary veins percurrent
Tracheoids absent
Angle of origin of tertiary veins AA/AR/RR/RA/OA ------ *A. angustifolia*
Angle of origin of tertiary veins RR/AR/AO/AA ---------- *A. reticulata*
Tracheoids present
Angle of origin of tertiary veins RR/AR/RA/OR ---------- *A. obovata*

Acrodromous
Secondary veins angle of divergence acute

Cryptocarya amygdalina 	*Cryptocarya amygdalina* 	*Cryptocarya amygdalina* 	*Cryptocarya amygdalina* 
Entire leaf	Areole 10x 15X	Margin 10x 15X	Areole 10x 40X
Cryptocarya andersonnii 	*Cryptocarya andersonnii* 	*Cryptocarya andersonnii* 	*Cryptocarya andersonnii* 
Entire leaf	Areole 10x 10X	Margin 10x 15X	Areole 10x 40X
Cryptocarya floribunda 	*Cryptocarya floribunda* 	*Cryptocarya floribunda* 	
Entire leaf	Areole 10x 15X	Margin 10x 15X	
a-primary vein; b-secondary vein; c- tertiary vein, d-areole			

narrow

Highest vein order 5°

Pattern of tertiary veins percurrent

Tracheoids absent

Angle of origin of tertiary veins RR/RO/RA ---------- *A. hookeri*

Three species of *Cryptocarya* are studied namely *Cryptocarya andersonni*, *C. floribunda* and *C. amygdalina*. The type of venation is pinnate Camptodromous with festooned brochidodromous secondaries. Secondary veins angle of divergence acute narrow and pattern of tertiary veins percurrent. Tracheoids are absent in all three species. However, these species can be separated from each other on the basis of angle of origin of tertiary veins RR/OR/RA/OO/AA/OA in *C. andersonni* and AR/AA/RR/RA in *C. floribunda* and the highest vein order is 5° in both. *C. amygdalina* shows RR/RO/OR/OO/RA/OA with an additional character of the highest vein order being 7°. [A-Acute angle, R-Right angle, O-Obtuse Angle]

The three species of *Cryptocarya* can be separated on the basis of venation and the key to their separation is:

Pinnate Camptodromous

Festooned brochidodromous secondaries

Secondary veins angle of divergence acute narrow

Highest vein order 5°

Pattern of tertiary veins percurrent

Angle of origin of tertiary veins RR/OR/RA/OO/AA/OA--------- *C. andersonni*

Angle of origin of tertiary veins AR/AA/RR/RA---------- *C. floribunda*

Highest vein order 7°

Pattern of tertiary veins percurrent

Angle of origin of tertiary veins RR/RO/OR/OO/RA/OA --------- *C. amygdalina*

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