

EPIDERMAL STUDIES IN THE GENUS *ELAEOCARPUS* L.

S. RAJA SHANMUKHA RAO* AND N. RAMAYYA**

**Department of Botany, Sardar Patel College, Secunderabad-500 025, India*

***Department of Botany, Osmania University, Hyderabad-500 007, India*

ABSTRACT

Epidermal elements including trichomes in two species of *Elaeocarpus*, viz., *E. munronii* and *E. oblongus* have been studied on the vegetative parts. The stomata are predominantly anomocytic but occasionally tetracytic also occur. Only unicellular conical hairs are seen on the vegetative parts. Occurrence of this trichome type in all the families of the Malvales indicates their closer phylogenetic affinity.

INTRODUCTION

Though a large number of the plant fossils, so far known, are represented by angiosperm leaf impressions, their identification has not been possible due to lack of basic information about the epidermis and cuticle of the extant flowering plants (DILCHER, 1974). This makes it imminent to build up our knowledge about the epidermis of the living angiosperms just it has been done in regard to their pollen. It is in the above context the present work dealing with the epidermis of vegetative parts of *Elaeocarpus munronii* (Wt.) Mast. and *E. oblongus* Gaertn. has been undertaken.

MATERIAL AND METHODS

Both the species, *Elaeocarpus munronii* and *E. oblongus* were collected from Ooty, South India, during the last week of December, 1973. Epidermal peels were prepared from the herbarium material by boiling it in 5 per cent glacial acetic acid and stained either with anilin-blue in lactophenol or safranin and mounted in 70 per cent glycerin.

The terms described for stomatal types are after METCALFE AND CHALK (1950) and as redefined by SHANMUKHA RAO AND RAMAYYA (1977), and for trichomes after SHANMUKHA RAO (1980).

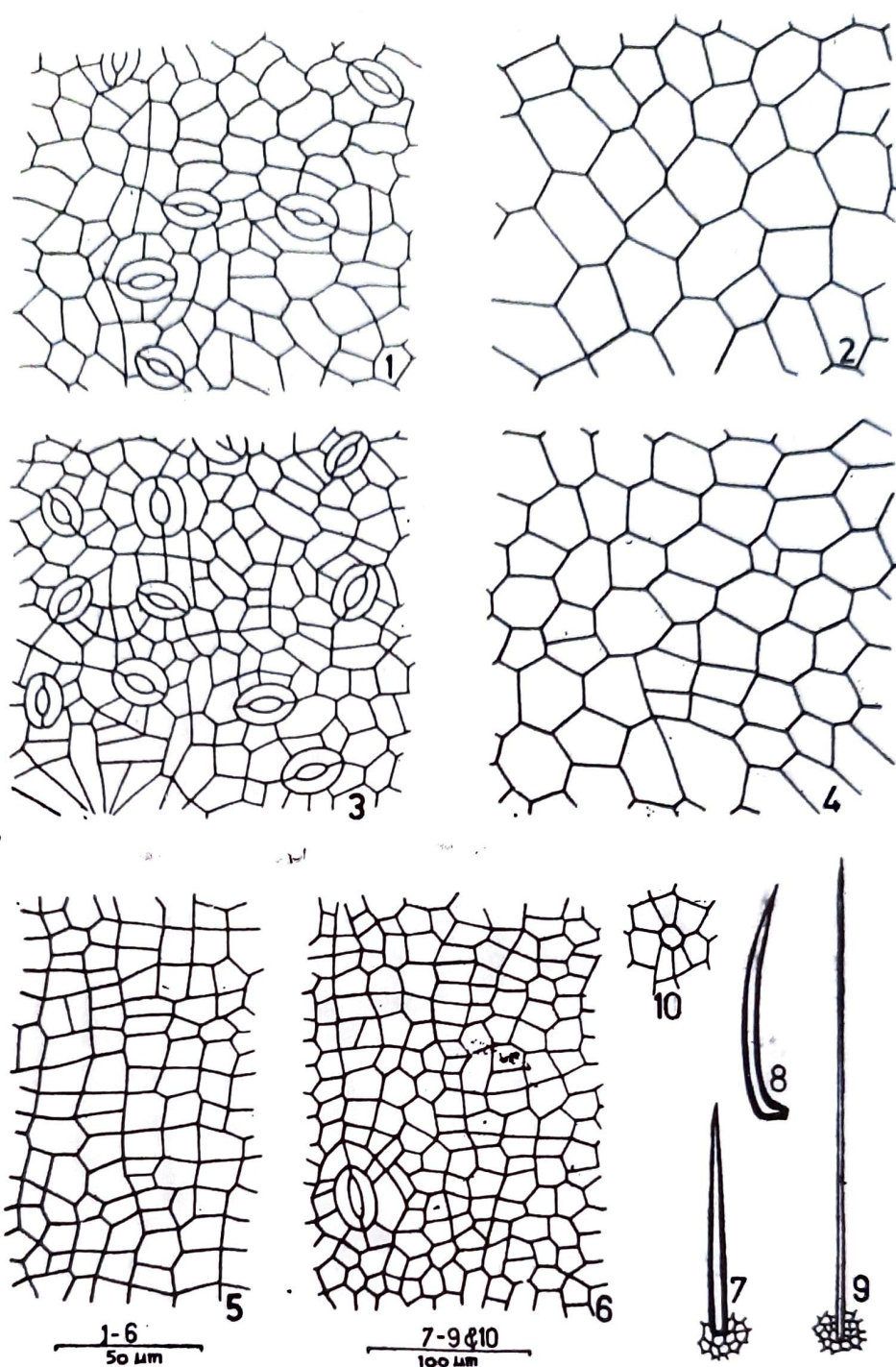
Details of epidermal cell frequencies, stomatal types, their frequencies, indices, and also the frequencies of trichomes of the leaf are also presented in table 1.

OBSERVATIONS

EPIDERMAL CELL COMPLEX

Leaf—Epidermal cells on both the surfaces of the leaf are nearly similar, the details are as follows :

Epidermal cells—4 to 6-sided, iso- or anisodiametric; contents absent; sides thick, straight, occasionally curved (only in *E. munronii*); surface smooth. Distribution : Con-



Text-figs. 1-10. *Elaeocarpus munronii*, 1, 2 & 5. Surface views of epidermis of leaf abaxial, adaxial and petiole respectively. 9. Unicellular conical hair from leaf abaxial. 10. Neighbouring cells of foot of unicellular conical hair from leaf adaxial. *Elaeocarpus oblongus*, 3, 4 & 6. Surface views of epidermis of leaf abaxial, adaxial and petiole respectively. 7 & 8. Unicellular conical hair from leaf abaxial.

finned to the interstices, variously oriented (Figs. 1-4). *Costal cells* : Mostly 4-sided, occasionally 5-sided, square to linear; contents absent; sides thick, straight; surface smooth. *Distribution* : Oriented parallel to the veins, diffuse.

Petiole and stem—*Epidermal cells* : Similar to the costal cells of the leaf, but 4 to 6-sided, squarish, rectangular or linear (Figs. 5 & 6).

STOMATAL COMPLEX

Leaf—*Stomata* anomocytic (*E. munronii*, *E. oblongus*) and tetracytic (*E. munronii*). *Subsidiaries* 4-10, monocyclic, unequal, similar to the epidermal cells. *Distribution* :

Hypostomatic, variously oriented (Figs. 1-4). *Petiole* : Stomata in *E. oblongus* similar to its leaf but rare in occurrence, whereas in *E. munronii* stomata absent (Figs. 5 & 6).

Stem—Stomata absent in both the species examined.

TRICHOME COMPLEX

Unicellular conical hair is the only trichome type observed in these species, details are as follows :

Leaf—Unicellular conical hair. *Foot* : Consisting of the basal end of the hair, not distinct from the body; contents absent; wall thick. *Body* : Representing extension of the foot, conical, distally tapering, apex pointed, lying parallel to the epidermis, directed towards the apex of the leaf; contents absent; wall thick; surface smooth (Figs. 7-9). *Distribution* : Common on the abaxial, adaxial and margins and caducous in the older leaves of *E. oblongus*. Neighbouring cells of foot of the hair usually distinct in leaf adaxial of *E. munronii* (Fig. 10).

Petiole and stem—As on the leaf. *Distribution* : Frequently observed.

DISCUSSION

METCALFE AND CHALK (1950) reported only anomocytic stomata in the Elaeocarpaceae. The present study shows that while the stomata are predominantly anomocytic, tetracytic also occur in the leaves of *E. munronii* (Table 1).

Table 1—Numerical data of foliar epidermal characters in *Elaeocarpus*

Species	Leaf Abaxial					Leaf Adaxial*		
	E.C.F. per cm ²	S.F. per cm ²	S.I.	Anomo- cytic	Tetra- cytic	Unicellular conical hair frequency per cm ²	E.C.F. per cm ²	Unicellular conical hair frequency per cm ²
<i>Elaeocarpus munronii</i>	6,18,670	30,220	4.2	97.1%	2.9%	720	2,38,220	320
<i>Elaeocarpus oblongus</i>	4,88,890	44,450	5.2	100 %	..	1,040	3,35,110	240

*Leaves hypostomatic

E.C.F.=Epidermal cell frequency ; S.F.=Stomatal frequency ; S. I. Stomatal index.

The leaves of *E. munronii* and *E. oblongus* are hypostomatic while the stems astomatic. On the other hand, the petiole of *E. munronii* is astomatic whereas that of *E. oblongus* stomatic (Table 1).

Elaeocarpus is known to possess only unicellular conical hairs (DUMONT, 1887; GEHRIG, 1938), which is presently confirmed. GEHRIG (1938) reported glandular hairs in *Sloanea*, another genus in the Elaeocarpaceae but no such hair type has been seen in *Elaeocarpus* spp. studied.

GEHRIG (1938) noted that the leaves of *E. oblongus* are devoid of hairs but in the present study the leaves of *E. oblongus* show unicellular conical hairs. This hair is very common in young foliage, but being caducous it is less frequently observed in the older ones. It is, therefore, desirable to study young plant parts in general in making epidermal investigations to ascertain whether they are trichiferous or not.

The unicellular trichome type has been recorded in all the families of the Malvales, viz., Malvaceae, Bombacaceae, Sterculiaceae, Tiliaceae, Elaeocarpaceae and Scytopetalaceae (METCALFE & CHALK, 1950; SHANMUKHA RAO, 1980). Therefore, the universal presence of this trichome type indicates a closer phylogenetic affinity between the families in the Malvales. With reference to the epidermal characters presently studied, the two species can be identified as shown below (see also Table 1).

Stomata exclusively anomocytic on the leaf abaxial; stomata in greater frequency	.. <i>E. oblongus</i>
Stomata occasionally tetracytic in addition to the occurrence of anomocytic on the leaf abaxial; stomata in lesser frequency	.. <i>E. munronii</i>

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