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Morpho-Taxonomic Structure and Value of the Petiole in *Schisandra grandiflora*

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The morpho-taxonomic of the petiole structure of *Schisandra grandiflora* is presented. The petiole, in cross-section, is characterized by epidermis, cortex, and three vascular bundles. Pith is absent. No kind of sclerenchymatous cells occurs in the cortex, and the phloem contains 'mucilage cells'. The petiolar anatomy provides fresh evidence for the separation of *Schisandra* and *Kadsura* from the Magnoliaceae and putting them into Schisandraceae.

Key Words - Cortex Mucilage Petiole Vascular bundle

Schisandra grandiflora Hook. f. & Thoms. has work on its exomorphology (Smith, 1947), stomata (Jalan, 1962), embryology (Kapil & Jalan, 1964), carpellary vascularization (Jalan, 1966) and nodal anatomy (Jalan, 1968) but the anatomy of the petiole of this species is yet uninvestigated. Accordingly, this study was undertaken to understand the morpho-taxonomic structure and value of the petiole in *S. grandiflora*.

MATERIALS & METHODS The petioles of *S.grandiflora* were collected from plants in Rambara (Uttar Pradesh) in May 1961 and fixed in F.A.A. They were washed and preserved in 70 per cent ethyl alcohol. Pieces of petiole were dehydrated in alcohol-xylol series and embedded in paraffin-wax. Before microtoming, the embedded material was soaked in water for about a month. The sections were cut between 7-15 um and stained with safranin-fast green combination.

OBSERVATIONS The petiole is semi-circular and solid without intercellular spaces (Fig.1). The outermost layer is epidermis and consists of compactly arranged cells. The epidermal cells are rectangular but somewhat uneven in size. In other words, the epidermal cells on the dorsal circular side are little larger while the ones toward the flat and slightly concave side are smaller (Fig.1). The cuticle is not well developed. The hypodermis is absent. The cortex consists of about 12 layers of polygonal and parenchymatous cells and is divisible into an outer region and inner region. The outer region comprises 4 or 5 layers of cells and is more prominent as compared to the inner region (Fig.1). Sclerenchymatous cells do not occur in the cortex. Therefore, Matsuda's (1893) report on the sclerenchymatous cells bearing crystals in their walls in the cortex around the vascular bundles in *Schisandra chinensia*, *S.nigra* and *Kadsura japonica* needs confirmation. The vascular bundles of the petiole are arranged in a semi-lunar form with their concavity turned towards the upper side of the petiole (Fig. 1). In the section cut from the upper or middle portions of the petioles, these bundles appear in three distinct groups (Fig. 1). The primary phloem of each vascular bundle contains 'mucilage cells' (Fig. 1). The latter may be 4 to 6 in an individual vascular bundle. The 'mucilage cells' occur discretely or in groups of two-cells each (Fig. 1). They are large, dilated and more or less circular in comparison to other cells of the phloem. In 1893, Matsuda observed 'large intercellular spaces (passages) containing mucilage' in the phloem in *S. chinensis*, *S. nigra*, and *K. japonica*. This author is unable to establish these mucilage canals' in *S. grandiflor* a and therefore it appears that what Matsuda saw were also 'mucilage cells'.

DISCUSSION The petioles may be single-traced or multi-traced. The petiole of *S. grandiflora*, as the present study has revealed, conforms to the second category. In other words, the petiole in *S. grandiflora* is characterised by three vascular bundles. A similar pattern of vasculature of the petioles has been observed in *S. nigra* and *K japonica* (Matsuda, 1893), *S.chinensis* (Bailey & Nast, 1948), and *S. Renryi* (Ozenda, 1949). On the basis of the present work and earlier data on *S. chisandra* and *Kadsura*, therefore, it is to be concluded that these genera are homogeneous in the number and arrangement of the vascular bundles in their petioles.

The present work on the petiole is also important in respect to the systematic position of *S.chisandra* and *Kadsura*. The genus *S.chisandra*, to which belongs *S. grandiflora*, and the

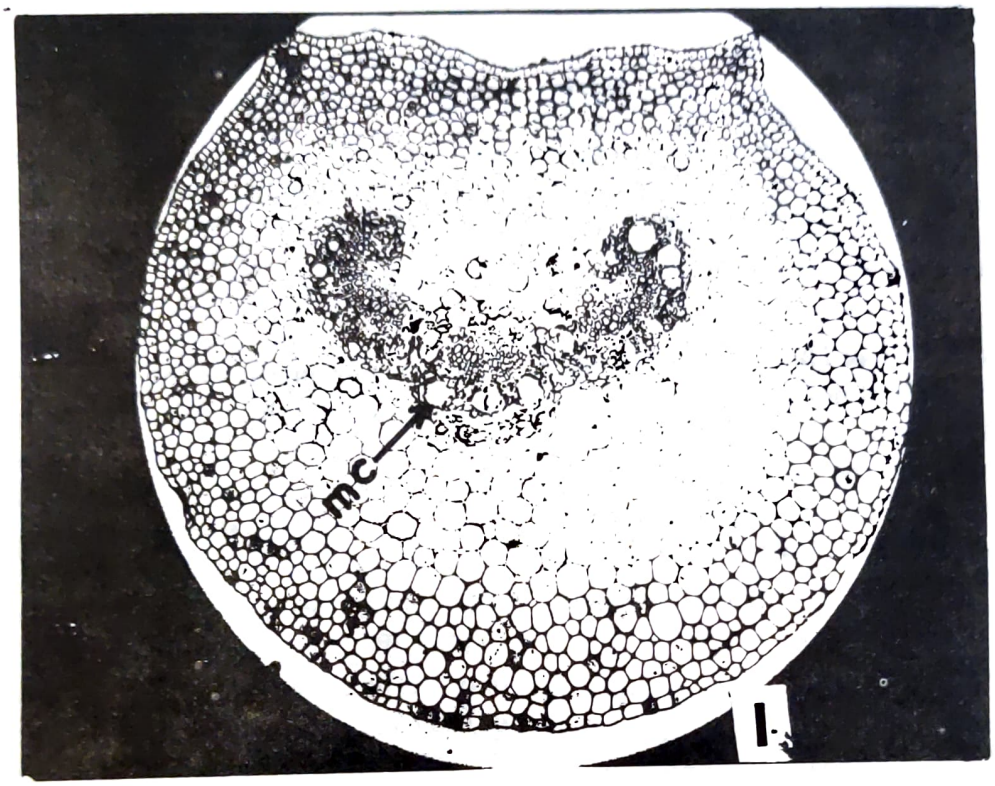

Fig. 1. Transverse section of the petiole of *Schisandra grandiflora* Hook. f & Thoms. showing three separate strands of vascular tissues. x 33. mc, mucilage cell)

Table 1 Anatomical Characters of the Petiole of Schisandra and Kadsura and Magnoliaceae

Characters of the petiole	*Schisandra* and *Kadsura*	Magnoliaceae *(sensu stricto)*
Epidermis	Hairs absent	Hairs present
Cortex	Stone-cells absent	Stone-cells present
Vascular bundles	Semi-circularly arranged, bundle-sheath absent	Circularly arranged, bundle-sheath present
Phloem	Mucilage cells present	Mucilage cells absent
Pith	Absent	Present with diaphragms of sclerenchymatous cells

allied genus *Kadsura* were placed in the family Magnoliaceae by Bentham & Hooker (1862), Engler & Prantl (1889-1897) and Rendle (1952). However, on the basis of their exomorphology (Smith, 1947), cytology (Whitaker, 1933), and embryology (Kapil & Jalan, 1964) both *Schisandra* and *Kadsura* are now placed in *Schisandraceae*. A comparison of the anatomical features of the petiole of *Schisandra* and *Kadsura*, and Magnoliaceae (sensu stricto) is given in Table 1. In all the important anatomical characters of petiole, i.e., epidermis, cortex, vascular bundles, and pith, *Schisandra* and *Kadsura* differ from the Magnoliaccea (*sensu stricto*). In other words, the petiolar anatomy supports separation of *Schisandra* and *Kadsura* from the Magnoliaceae and putting them into Schisandraceae.

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