

DISPERSED XYLEM (Fissure stems)

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Dispersed xylem, also known as fissured stems, can be identified by the presence of a few to numerous discrete islands of vascular tissue separated from each other by a matrix of parenchyma (Fig. 1). Each island has xylem, a cambial layer and a substantial amount of phloem wedges (Fig. 1, especially visible in D).

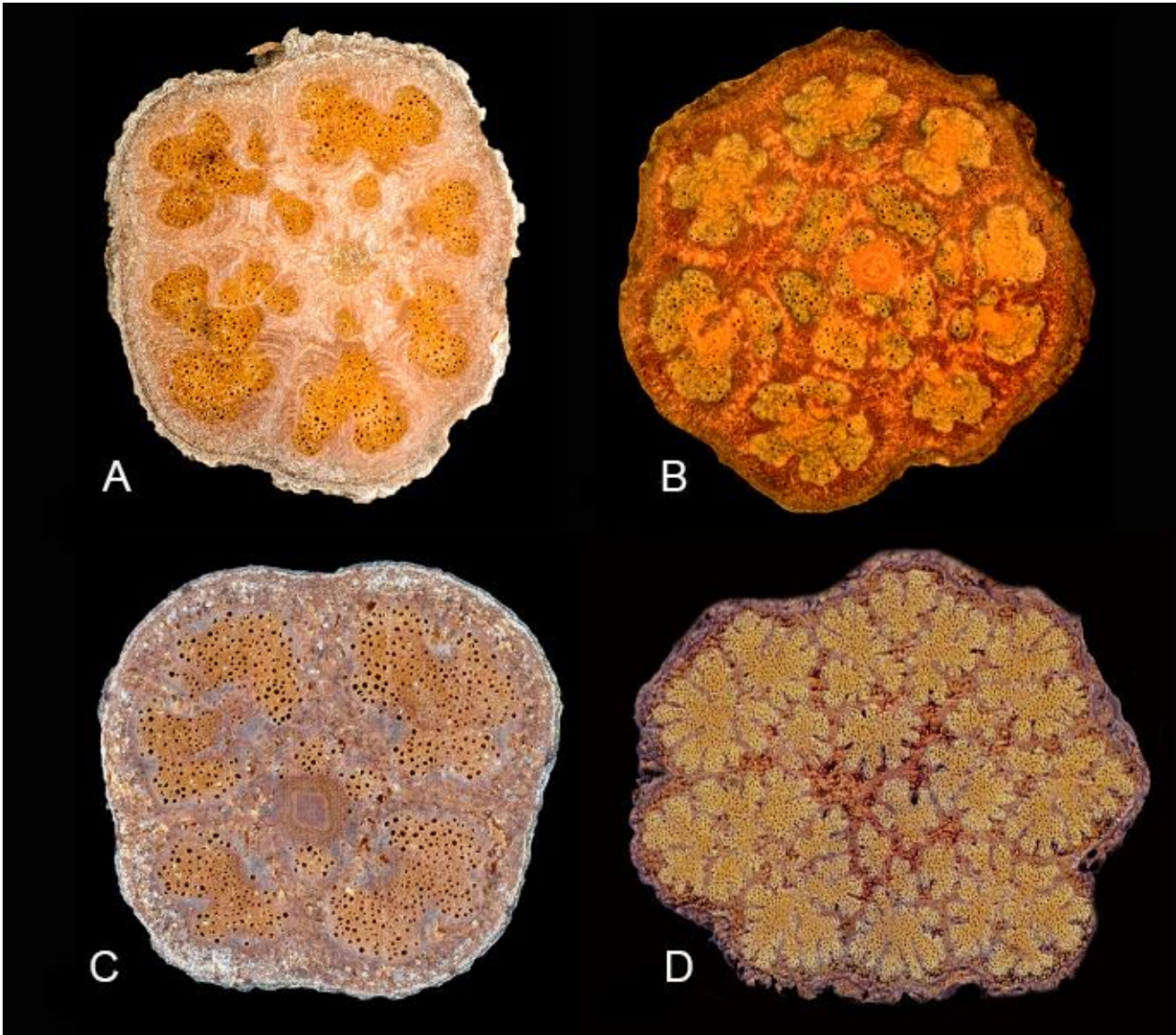


Fig. 1. Stems cross-sections of four genera of Malpighiaceae with fissured stems. A. *Alicia anisopetala*, B. *Malpighiodes bracteosa*, C. *Mezium mariposa*, D. *Flabellaria paniculata*.

Fissured stems are most common and emblematic of several Malpighiaceae genera (Fig. 1), but can be found in members of Acanthaceae (*Mendoncia*) and Passifloraceae (*Passiflora*; Ayensu & Stern 1964). They usually are noticeable in stems thicker than 1.5-2 cm, but can be found in young stems of *Mendoncia*. All species with fissured stems are characterized by stems with regular growth during early stages of development that produce some

non-lignified parenchyma in the wood (Fig. 2), followed by production of phloem wedges in the periphery of the xylem (Fig. 2). Eventually, the non-lignified wood parenchyma divide and merge with the edges of the phloem wedges, dispersing the vascular cylinders and merging the wood parenchyma with the phloem, cortex, and rarely with the pith (Fig. 2). Cabanillas et al. (2017) have referred to this parenchyma matrix as “disruptive parenchyma”.

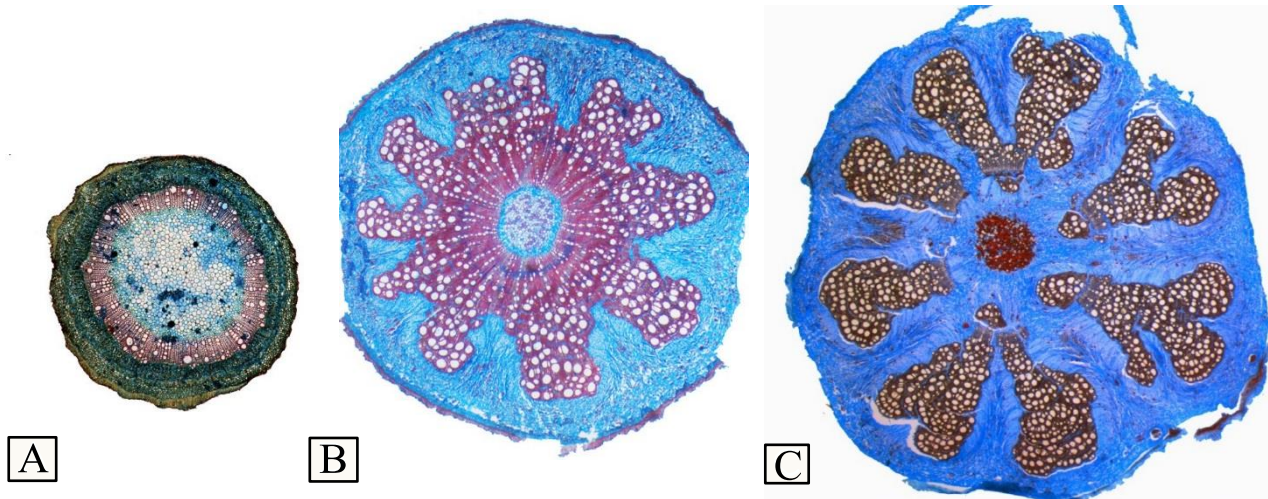


Fig. 2. Ontogeny of *Alicia anisopetala* (Malpighiaceae) stem with dispersed xylem. Showing progressive development from young (A) to mature (C). In early stages, the stem has a regular structure, soon followed by the production of phloem wedges, and subsequently, non-lignified wood parenchyma start dividing and dissecting the xylem. In *Alicia* this dissection can be so extreme that parenchyma from the cortex, phloem, xylem and medulla become interconnected.

Malpighiaceae with fissured stems can be distinguished from other families with fissured stems by the early oxidation where the stems become reddish within a few minutes after being cut.

Seven genera of Malpighiaceae in the New World have fissured stems. These include *Alicia*, *Callaeum*, *Christianella*, *Diplopterys*, *Jubelina*, *Malpighiodes*, and *Mezia*. The distinction of these based on wood anatomy is only possible for three of the genera. *Alicia* and *Callaeum* have the pith merged with the proliferating parenchyma (Fig 2), while *Diplopterys* has a large central cylinder, surrounded by smaller vascular cylinders, resembling at first sight a compound stem of Sapindaceae. This is because in *Diplopterys*, the formation of this cambial variant occurs in later stages.

References

- Ayensu, E.S., and W.L. Stern. 1964. Systematic anatomy and ontogeny of the stem in Passifloraceae. *Contributions from the United States National Herbarium* 34: 45-72.
- Cabanillas, P.A, Pace, M.R., and V. Angyalossy. 2017. Structure and ontogeny of the fissured stems of *Callaeum* (Malpighiaceae). *IAWA Journal* 38: 49-66.