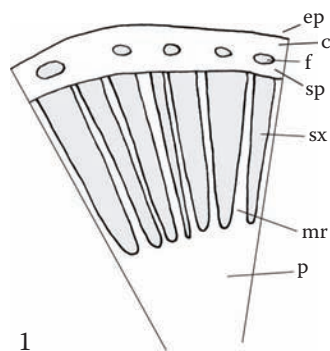


***Eupatorium fistulosum* Barratt****syn. *E. purpureum* L.****Gravel Root*****Rhizoma cum radix Eupatorii fistulosi******Asteraceae***

Gravel root is one of the primary botanicals used in Western herbal tradition for dissolving kidney stones. Scientific substantiation for this use is largely lacking, though many clinical herbalists are convinced of its utility. *E. maculatum* L. may also be traded interchangeably as gravel root. *E. fistulosum* was used to develop the characterization provided.

**A. Rhizome**

**Transverse section:** Narrow bark; epidermis may be present in young growth; narrow cortex is composed of parenchyma, with intercellular spaces frequently filled with phytomelanin; secretory cavities may be present; fiber bundles occur along the border between cortex and secondary phloem; narrow secondary phloem; wide secondary xylem, with narrow cuneiform regions of fibers and few vessels; vessels up to 80  $\mu\text{m}$  diameter; medullary rays three to seven cell rows broad—cells rectangular and radially elongated, slightly thickened, and pitted; wide pith, roundish, pitted cells; triangular intercellular spaces frequently filled with phytomelanin; fibers, vessels, medullary ray, and pith cells lignified; starch and crystals are absent.



1

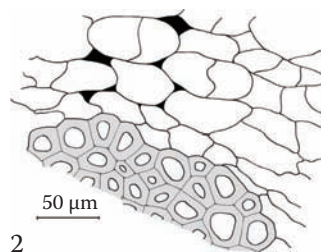
**Longitudinal section:** Vessels embedded in fibers; vessels with small bordered pits or reticulate and helical wall thickenings.

**B. Root**

**Transverse section:** Epidermal cells with horseshoe-shaped lignified wall thickenings, the thickest portion lying along the outside wall; just interior to the epidermis is a row of thin-walled cells; outer cortex consists of collenchyma-like tissue; inner cortex is composed of thin-walled parenchyma, with intercellular spaces frequently filled with phytomelanin; secretory cavities up to 100  $\mu\text{m}$  diameter occur near the endodermis; endodermis with Casparian strip; anomalous stele consists of xylem only a few cell rows wide, forming a more or less continuous narrow ring around a large pith, with phloem in numerous separate bundles outside the xylem; fibers are scattered among vessels in the xylem; thickened, pitted, and lignified pith cells; starch and crystals are absent.

**Longitudinal section:** Vessels embedded in fibers; vessels with small bordered pits or reticulate and helical wall thickenings; pith cells axially elongated.

**Powder:** Fragments of fibers; thickened and pitted parenchyma; parenchyma with phytomelanin in intercellular spaces; few vessels.



2