

## *Eupatorium perfoliatum* L.

### Boneset Aerial Parts

*Herba Eupatorii perfoliati*

Asteraceae

Boneset is native to North America and has a long history of use among Native Americans, Eclectic physicians, and physiomedicalists. It is a strong bitter that acts on the liver and gallbladder, and it has a strong diaphoretic action that gives it great utility in reducing fevers due to influenza.

#### A. Leaf

**Surface view:** Isodiametric epidermal cells, with wavy anticlinal walls more pronounced on the lower surface; anomocytic stomata  $\sim 25\ \mu\text{m}$  long on lower surface; infrequent schizogenous resin ducts containing green secretions occur in the mesophyll and are visible through the surface adjacent to veins; multicellular covering trichomes of two types occur on the upper surface: (1)  $50\text{--}350\ \mu\text{m}$  long, often slightly bowed, consisting of two to seven thick-walled cells, tapered terminal cell, basal cell up to  $70\ \mu\text{m}$  wide, often heavily thickened; (2) up to  $200\ \mu\text{m}$  long, straight or appressed, consisting of a short uniseriate stalk and a transparent terminal region; epidermal cells arranged in a rosette-like pattern around basal cell of trichomes; covering trichomes on lower epidermis dense, of same type as occur on upper epidermis, except often up to  $1,200\ \mu\text{m}$  long; biseriate glandular trichomes are frequent on lower surface—the cuticle of the terminal two cells is detached, with fluid buildup between the cell wall and cuticle, causing the head to form a large sphere up to  $80\ \mu\text{m}$  diameter.

**Transverse section:** Bifacial; palisade cells in one row; dense spongy mesophyll, with schizogenous resin ducts  $\sim 30\text{--}50\ \mu\text{m}$  diameter adjacent to vascular bundles.

#### B. Stem

**Surface view:** Covering trichomes up to  $2,000\ \mu\text{m}$  long and glandular trichomes resemble those found on the leaf lower surface; cuticle is often striated.

**Transverse section:** Collenchyma occurs in a layer beneath the epidermis; stele with numerous vascular bundles arranged circumferentially; phloem is capped by

fibers; schizogenous resin ducts  $\sim 40\ \mu\text{m}$  diameter occur between adjacent groups of fibers.

#### C. Inflorescence and Flower

**Capitulum:** Discoid, with disk florets only; naked receptacle.

**Phyllary:** Epidermal cells elongated with wavy anticlinal walls, a striated cuticle, and anomocytic stomata  $\sim 25\ \mu\text{m}$  long; uniseriate covering trichomes consisting of three to seven cells are frequent on both surfaces,  $50\text{--}300\ \mu\text{m}$  long, with a rounded terminal cell and striated cuticle; frequent glandular trichomes, of the same type found on the leaf lower surface; uniseriate trichomes occurring on the bract margins are composed of numerous very short cells and a rounded terminal cell.

**Disk floret:** Hermaphroditic; pappus of bristles approximately equal in length to the floral tube; five-lobed corolla covered by glandular trichomes similar to those found on the leaves; five connivent, dark brown anthers; tricolporate pollen with a spiny exine  $\sim 15\ \mu\text{m}$  diameter; stigma of two long, slender lobes exerted from the corolla by  $\sim 2\ \text{mm}$ ; the lobes have papillae  $\sim 30\ \mu\text{m}$  long, which become smaller toward the lobe apex.

**Cypsel:** Numerous biseriate glandular trichomes, up to  $30\ \mu\text{m}$  long, enlarged heads are absent; glandular trichomes similar to those found on the leaves occur infrequently.

**Powder:** Yellowish green; sclerenchyma with bast fibers; annular ducts with bordered pits; glandular and nonglandular trichomes; stomata; ellipsoidal pollen.

