

ANATOMY AND MORPHOLOGY OF *EPHEDRA*

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SYSTEMATIC POSITION

- ▣ Division : Gnetophyta
- ▣ Class : Gnetopsida
- ▣ Order : Ephedrales
- ▣ Family : Ephedraceae
 - ▣ Genus : *Ephedra*

Distribution

- The *Ephedra* plant belongs to the Gnetum family (gnetaceae).
- It is an upstanding brushy bush that can grow up to 60 cm high.
- *Ephedra* is an evergreen shrub-like plant native to central Asia, and Mongolia; it also grows in the southwestern United States.
- It is also called commonly as joint pine, joint fir, Mormon tea or Brigham tea) is the only genus in family Ephedraceae and order Ephedrales.
- It is represented by 50 species.
- These species grow in dry climate over wide areas of the Northern hemisphere including North America , Europe, North Africa, and South west and central Asia.
- Eight species of *Ephedra* are known from India. Some of the common Indian species are *E. intermedia*, *E. gerardiana*, *E. sexatilis*, *E.foliata* etc.
- These species are distributed in dry parts of Punjab, Haryana, Rajasthan and parts of Kashmir to Sikkim.

Morphology

- ❑ The plant body is sporophytic and shows xerophytic characters.
- ❑ Mostly the plants are woody shrubs, a very few species are lianas and some species grow into a small tree.
- ❑ Shrubby plant body usually remains less than two meters in height in most of the species.
- ❑ Chamberlain (1935) mentioned that *Ephedra* is a short-lived plant.
- ❑ It resembles Equisetum in its external morphology
- ❑ In some species, its height up to several meters
- ❑ Plant body can be differentiated into three parts – root, stem and leaves.



Root

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Stem

- ❑ Like Equisetum, the stem is green, ribbed, branched, fluted and differentiated into nodes and internodes.
- ❑ It performs the function of photosynthesis and may be called as phylloclade.
- ❑ The branches arise from the axillary buds and are, therefore, in pairs of threes or fours according to the number of the scaly leaves at the nodes in different species.
- ❑ The branches are also green and differentiated into nodes and internodes.



Leaves



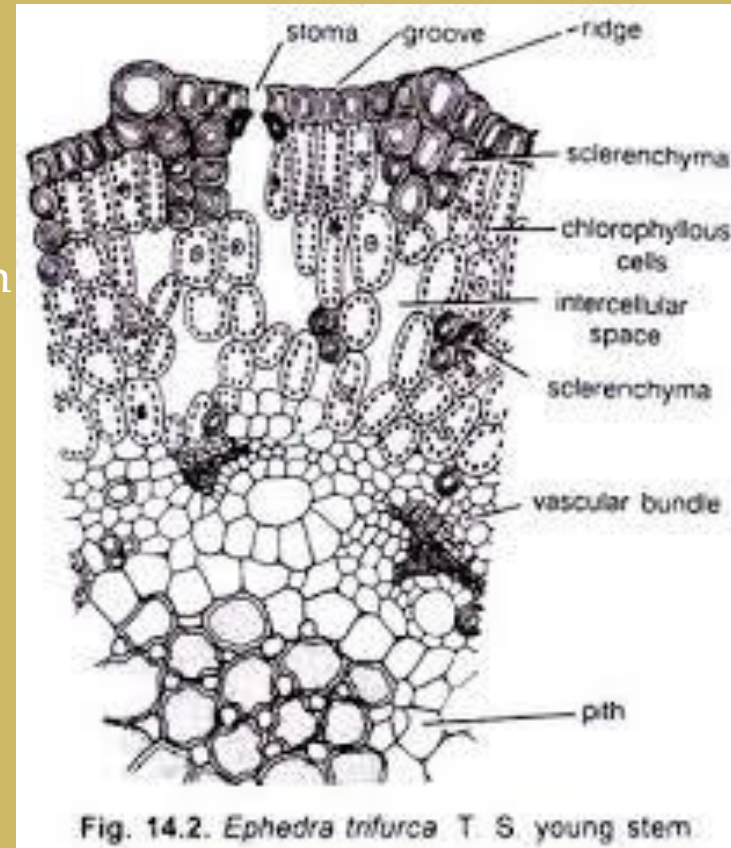
- ❑ Leaves are small scaly, present in pairs at the nodes and are arranged in opposite decussate manner.
- ❑ These leaves unite at the base to form a basal sheath.
- ❑ Each leaf contains two unbranched, parallel veins. They are so minute that they are of no use i.e., unable to perform photosynthesis.
- ❑ The function of photosynthesis is carried by green stem.
- ❑ True foliage leaves are absent.

Anatomical Character

- ▣ Here we discuss about the *Ephedra*,
- ▣ T.s of young stem
- ▣ T.S of Old stem
- ▣ Anatomy of Leaf

T.S OF YOUNG STEM

- ❑ The outline shows many ridges and grooves as shown in figure.
- ❑ Outermost layer in epidermis with a thick layer of cuticle. Continuity of the epidermis is broken by many sunken stomata present in the grooves.
- ❑ The wide zone of thin-walled, chlorophyll-containing green cells is present in between the thick-walled sclerenchyma and the vascular cylinder.
- ❑ Many intercellular spaces are also present in this region.
- ❑ Some sclerenchyma patches are also irregularly distributed in this green region.
- ❑ The vascular cylinder is an endarch siphonostele.



T.S OF OLD STEM

- It is a single-layered, heavily cuticularized epidermis.
- The cortex is also differentiated into sclerenchyma , chlorenchyma & parenchyma .
- Presence of vessels is the characteristic feature of the wood of *Ephedra*.
- Resin canals are absent.
- Parenchymatous pith is present in the Centre.

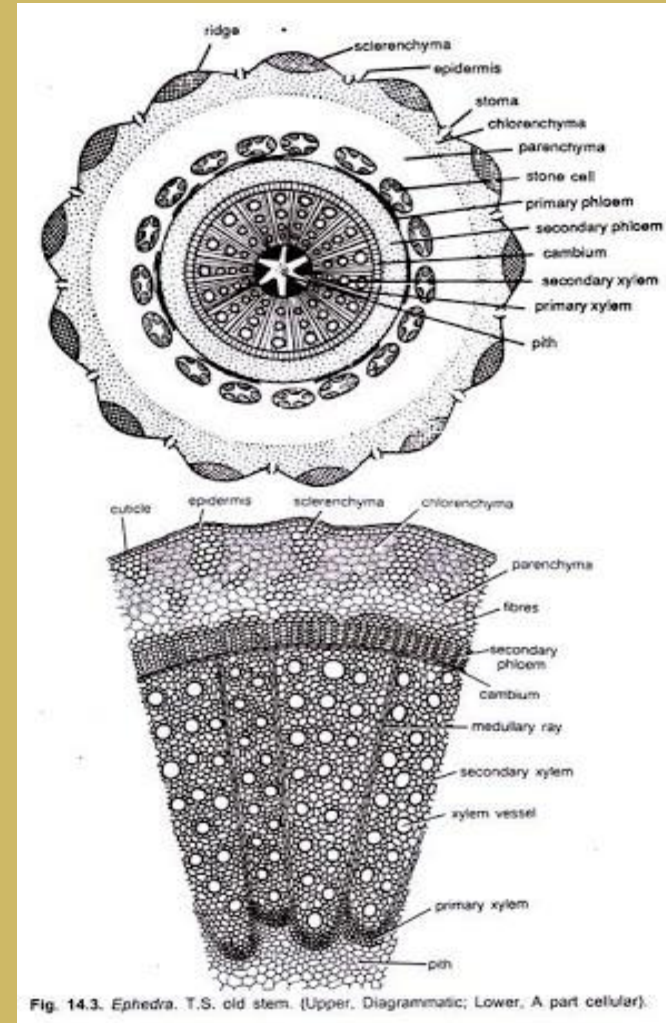
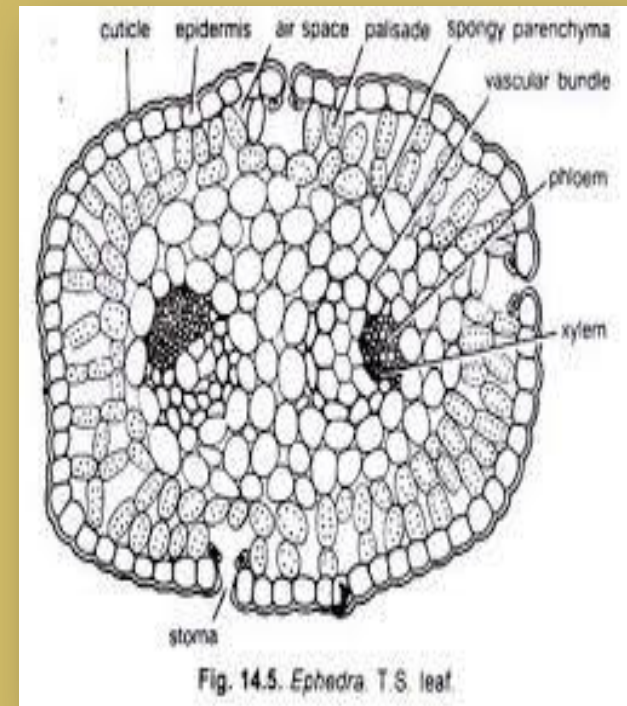


Fig. 14.3. *Ephedra*. T.S. old stem. (Upper, Diagrammatic; Lower, A part cellular).

T.S OF LEAF

- ❑ In T.S , the reduced and membranous scaly leaves are somewhat oval in outline.
- ❑ The epidermis consists of elongated or oval cells. Cuticle is also present.
- ❑ Stomata, when present, are sunken.
- ❑ Many air spaces are present in the parenchymatous and palisade regions.
- ❑ The vascular bundles are two in number.



Economic importance of *Ephedra* :

- ❑ Ephedrine, an alkaloid obtained from several species of *Ephedra*, is used in the preparation of medicines for treating asthma, bronchitis, cough, cold, nasal disorder hay fever and also used to treat kidney disorders.
- ❑ A decoction of stems and roots of several species is used in curing syphilis and rheumatism .
- ❑ *Ephedra gerardiana* tincture is effective as a cardiac and circulatory stimulant.
- ❑ Rhizome of *Ephedra gerardiana* is used as fuel by the people of Tibet.
- ❑ Some species are grown as ornamental plants.