



ANATOMY

Nodal anatomy

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Nodal anatomy





In the angiosperms and especially in dicots, the primary vascular cylinder is interrupted at each node by the exit of one or more bundles that enter the leaves

The stelar bundles ,which are the continuation of the bundles in the leaf bases, are called leaf traces.

“ A vascular bundle located in the stem but directly related to a leaf , to represent the lower part of the vascular supply of this leaf , is termed leaf trace.”

The leaf trace is a vascular bundle that connects the vascular system of the leaf with that of the stem





At each node, portions of the vascular system are deflected into the leaf, which is attached at this node.

A vascular bundle located in the stem but directly related to a leaf, to represent the lower part of the vascular supply of this leaf, is termed the leaf trace.





Immediately above the diverging trace, a parenchymatous tissue is being differentiated instead of vascular tissue in the vascular region of the stem for a limited distance .

The parenchymatous regions in the vascular system of the stem located adaxially from the diverging leaf traces are called leaf gaps or lacunae



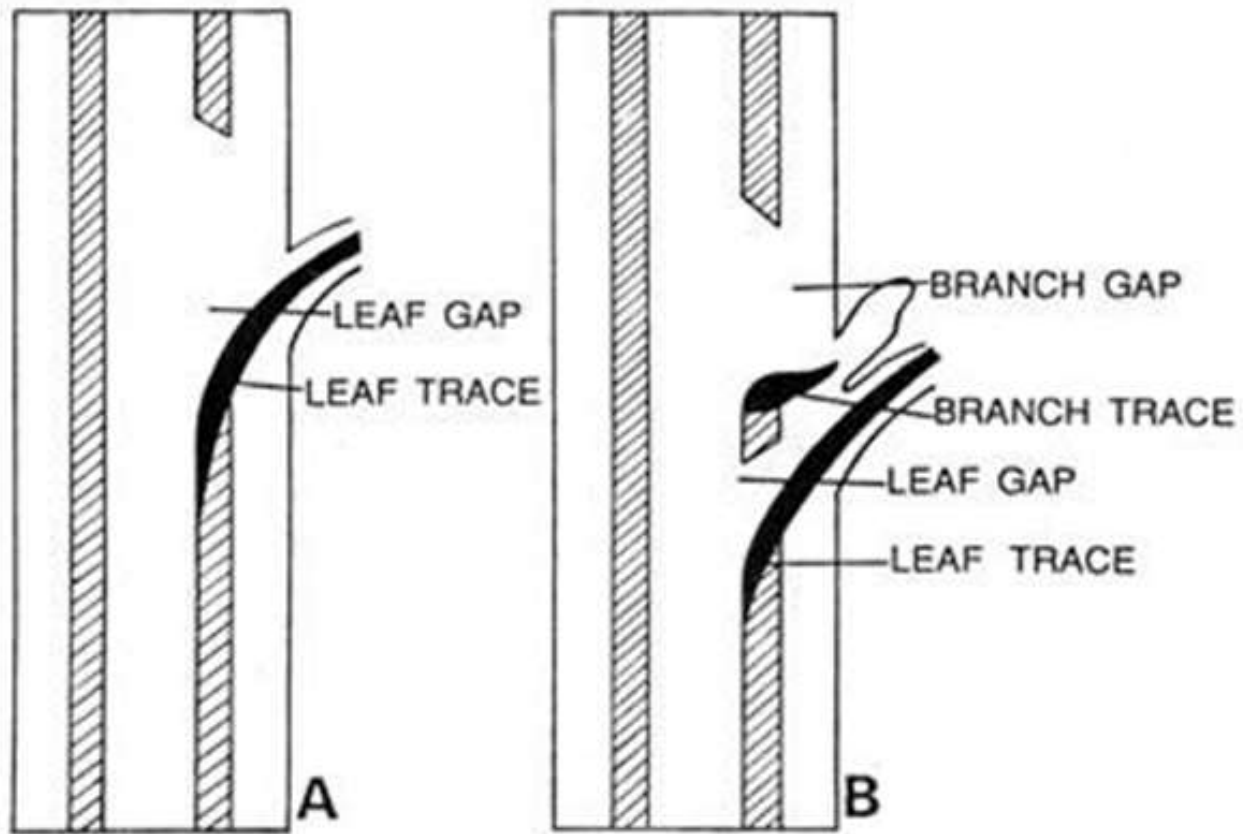


Fig. 38.1. Leaf and branch traces and gaps. A, L.S. of node through leaf trace and gap; B, L.S. of node through branch trace





The transverse sections of such stems show a circle of vascular bundles with the parenchymatous leaf gaps

There are three common types of nodes in dicots:

- 1. Unilacunar**
- 2. Trilacunar**
- 3. Multilacunar**





UNILACUNAR NODE

The node with a single gap and a single trace to a leaf is known as unilacunar .

Eg: ocimum, eucalyptus

TRILACUNAR NODE

the node with three gaps and three traces to a leaf (one median and two lateral) is known as trilacunar. Eg.

Brassica, Annona etc

MULTILACUNAR NODE

the node with several to many gaps and traces to a leaf is known as multilacunar.

Eg:Rumex,Aralium



Types of Node

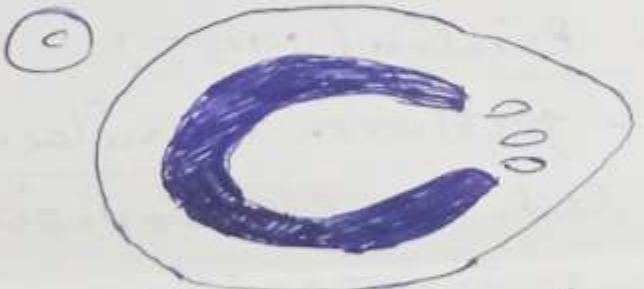
Unilacunar node



Unilacunar node with one leaf trace



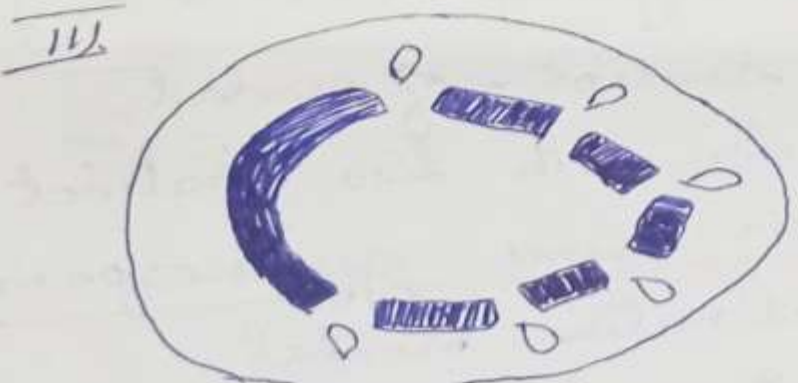
Unilacunar node with 2 leaf trace



Unilacunar node with 3 leaf trace



Trilacunar node with three leaf trace



Multilacunar node with many leaf trace

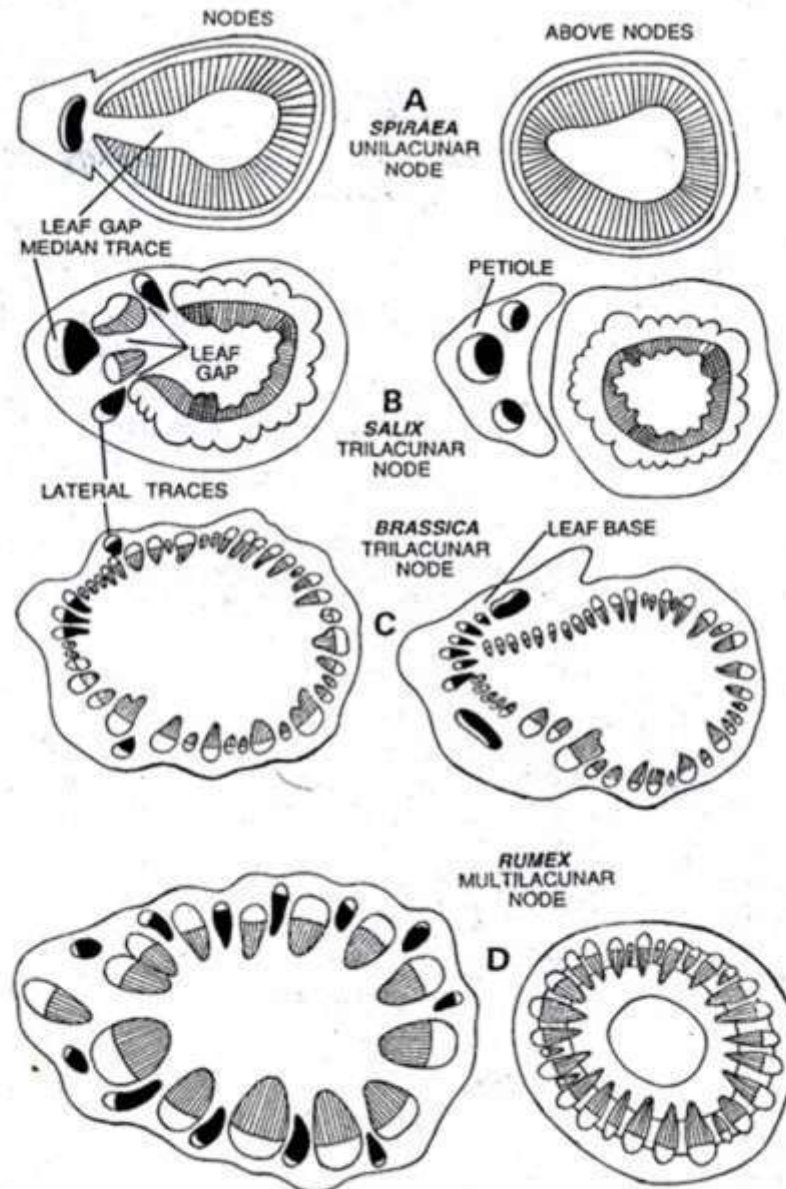


Fig. 38.3. Nodal anatomy of dicotyledons. A. *Spiraea*— each leaf has one leaf trace and one leaf gap (unilacunar node); B, *Salix*— each leaf has three leaf traces and three leaf gaps (trilacunar node); C, *Brassica*— three leaf traces and three leaf gaps per leaf (trilacunar node); D, *Rumex*— many leaf traces and many leaf gaps per leaf (multilacunar node).



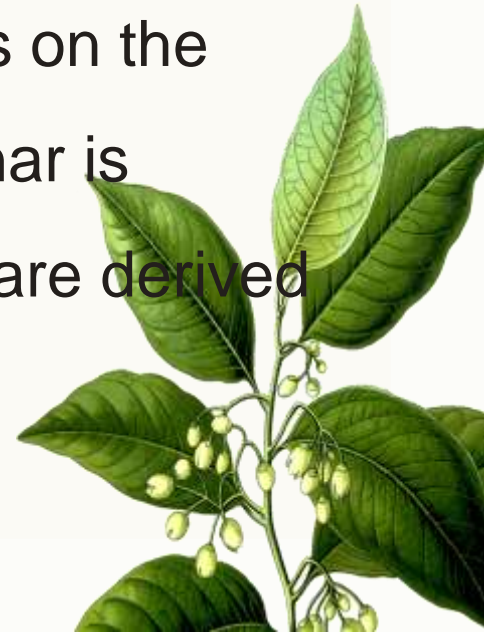


PHYLOGENETIC CONSIDERATIONS:

There are three major views regarding the phylogeny of nodal patterns

1. Sinnotts view :

Sinnot recognised 3 fundamental types of nodal anatomy in dicots unilacunar, trilacunar and multilacunar. he put forward views concerning the phylogeny of angiosperms on the basis of nodal organisation. He believed trilacunar is primitive and that unilacunar and multilacunar , are derived from trilacunar type, are more advanced





Ozenda – considered multilacunar node as primitive . According to him three nodal types reported in angiosperm form a retrogressive series- multilacunar-trilacunar-unilacunar





2. Marsden and Baileys view:

- Marsden and Bailey(1955) discovered a new type of nodal pattern – unilacunar node with two leaf trace.
- This led to the revision of concepts of phylogeny of nodal patterns.
- They considered unilacunar two trace condition as primitive nodal type of angiosperm . Many anatomists supported this concept of nodal evolution.





- Unilacunar node with two distinct traces is characteristic of some gymnosperms and ferns
- From this primitive nodal type, unilacunar node with single trace originated by the fusion of two leaf traces.

- **Trilacunar and multilacunar types** originated by the addition of lateral traces arising from new gaps in vascular cylinder



3. TAKHTAJAN'S VIEW:

Takhtajan 1964 proposed a hypothetical nodal pattern – trilacunar node with two traces from the central gap . He considered this is the basic type of angiosperm node and other types of nodal patterns were derived from this by reduction and amplification

The most accepted concept is that the trilacunar condition is primitive in dicots and unilacunar and multilacunar have been derived from it . Several monocots plants with sheathing leaf bases and nodes with a large number of leaf traces separately inserted around the stem





The most accepted concept is that the trilacunar condition is primitive in the dicotyledons and that the unilacunar and the multi-lacunar have been derived from it





Thank You

