

Pn° 3: Anatomical study of the stems, roots and leaves of Dicotyledons (or Dicots) plants.

1. Introduction

Monocots are a type of plant in which the embryo has a single cotyledon, or primordial leaf. On the other hand, **dicotyledons** have two cotyledons, i.e. two primordial leaves. The following figure summarises the morphological differences between the two types of mono- and dicotyledonous plants :

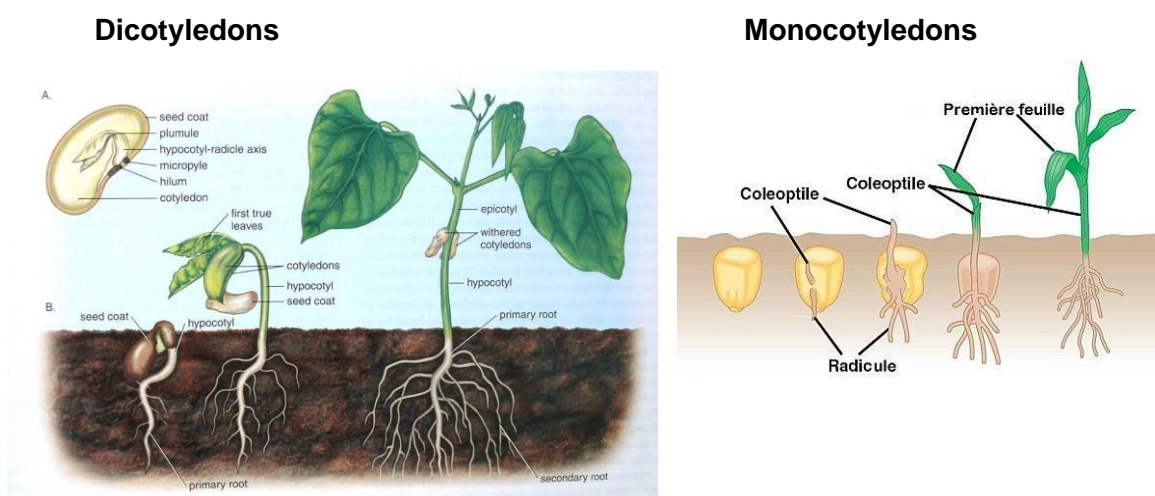


Figure. Morphology of monocot and dicot plants.

There are differences between the [stems, roots, and leaves of dicot plants](#).

The Anatomy of the Roots

- Presence of the **endodermis** and **pericycle**.
- The arrangement of the xylem and phloem is: **Alternate**

- Differentiation of the **centripete** xylem: Near the pericycle, they are young and small (protoxylem). And towards the center, they are tall and old (metaxylem).

Anatomy of a **dicotyledonous root**

- **Small** stele;
 - Sclerified cortical parenchyma;
 - Frame-shaped suberolignification of the endoderm;
 - The cribrovascular bundles are **5 to 6**;
 - Xylem-filled pith;
- Presence of **cambium** between Xylem and Phloem.

L'anatomie de la tige

- Presence of **collenchyma** and **sclerenchyma**.
- Xylem and phloem arrangement: **LAYERED**
- Differentiation of centrifuge xylem : towards the centre, the cells are young and small (protoxylem). Near the periphery, they are large and old (metaxylem).
- Very small bark and large stele.

Anatomy of a **dicotyledonous stem**

- A ring of sclerenchyma surrounding the criblovascular bundles
- **A single circle of** cribrovascular bundles
- Presence of **cambium** between Xylem and Phloem

The anatomy of the leaf

Anatomy of a dicotyledonous leaf

1. **Heterogeneous mesophyll**: made up of 2 types of assimilative parenchyma:
 - A palisade parenchyma towards the upper surface (this parenchyma is rich in chloroplast and chlorophyll);
 - A lacunate parenchyma towards the underside (this parenchyma is less rich in chloroplast and chlorophyll, characterized by the presence of gaps to facilitate gas exchange).
2. The **stomata** are distributed **only** on the **underside** ;
At the level of the veins, **there is a vascular cambium** between the xylem and the phloem that generates the secondary tissue : the secondary xylem (wood) on the side of the primary xylem and the secondary phloem (liber) on the side of the primary phloem.

2. Objective

Study of the tissues of roots, stems and leaves of **dicot plants**.

3. Materials

Plates containing histological sections (See in poster) of stems, roots and leaves of dicot species.

4. Working method

- **Observe histological sections (1 - 2 - 3)** and **identify** cross-sections: is it a cross-section of a stem, root or leaf?
- Using conventional signs (**see Table below**), carefully draw cross-sections of roots, stems **and** leaves **of dicot plants** . Put the titles and captions for each of the drawings observed.

5. Work Required

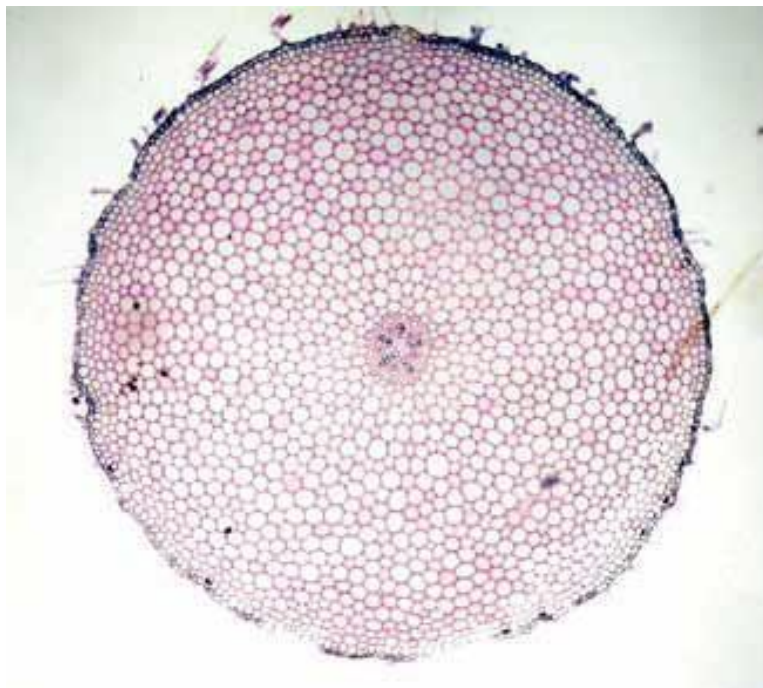
- Drawing of a cross-section of a stem, root and leaf of a dicotyledonous plant (**use of conventional figures: see Table below**)
- Following the drawings made, give a **conclusion** (differences between stem, roots and leaf of dicots)

A



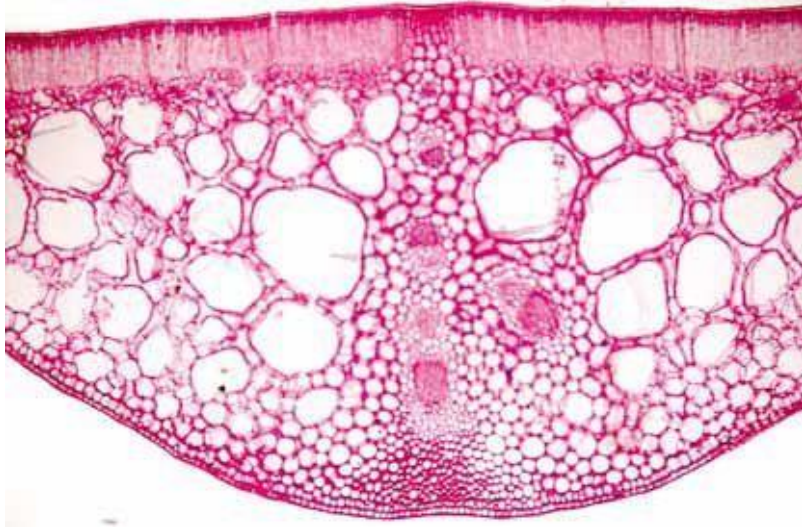
Histological sections (A)

B








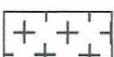


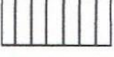

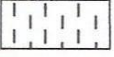
**Histological sections (B)
number 2**

C



Histological Sections (C)
Number 3

Table. Representation of observations by a conventional figurative diagram

Tissus	Figurés correspondants
Parenchymes	Pas de figuré conventionnel
Cambium, phellogène, péricycle, épiderme sans stomates et sans cuticule apparente	
Epiderme à stomates et à cuticule apparente	
Rhizoderme ou assise pilifère	
Endoderme, assise subéreuse	
Subéroïde	
Collenchyme	
Sclérenchyme	
Xylème primaire	métaxylème protoxylème 
Xylème secondaire ou bois	
Phloème primaire	
Phloème secondaire ou liber	
Liège ou suber	