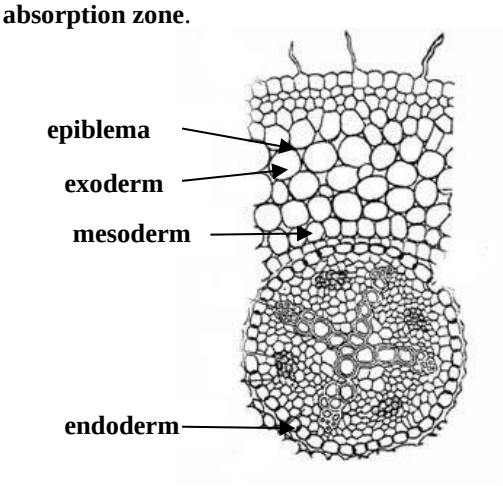
Content submodule 3
ANATOMY OF THE VEGETATIVE ORGANS

1.155.It microscopic structure of the root, in the absorption zone, we distinguish: …
A. **primary cortex, central cylinder**
B. secondary cortex, phloem
C. wood, core
D. primary cortex, periderm
E. secondary cortex, mesophyll

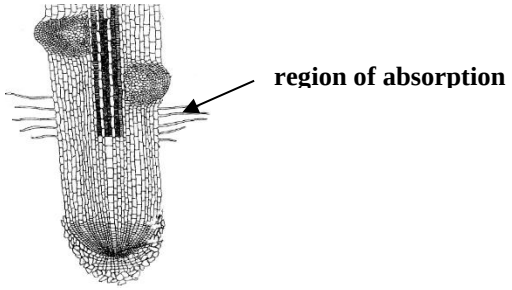
Primary anatomical structure of the root is formed in its **absorption zone**.



1.156. In the root, completion of meristem cell differentiation and formation of primary anatomical structure occur in the zone of...
A. **absorption**
B. cell division
C. conduct
D. growth
E. root cap

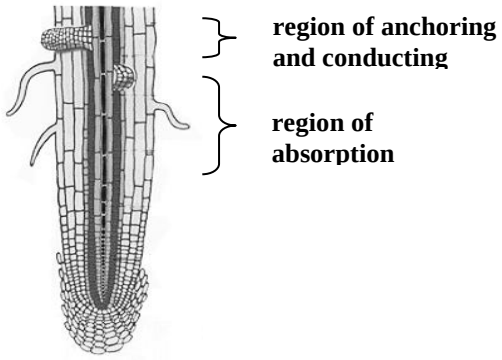
1.157. While considering the root structure we draw attention on the region which is covered by the tissue with root hairs. This is a region of …
A. **absorption**
B. cell division
C. growth and elongation
D. anchoring and conducting
E. root cap

The **absorption** mainly takes place in root hair region. This region lies immediately above the region of cell elongation.



1.158. On cross-section of a root we identify: epiblema, exoderm, mesoderm, endoderm and central axial cylinder. So, section is made through the…
A. **region of absorption**
B. region of growth
C. region of anchoring and conducting
D. region of cell division
E. root cap

1.159. In the root structure a region is covered by the tissue with root hairs. This is a region of …
A. **absorption**
B. cell division
C. growth and elongation
D. anchoring and conducting
E. root cap



1.160 The root of a dicot plant acquires the secondary anatomic structure in theregion …
A. **anchoring and conducting**
B. root hairs
C. growth and elongation
D. cell division
E. root cap

1.161. On the root section of Helianthus annuus a secondary fascicular structure was found. This means that the section was made in the zone of:
A. **fixation and conduction**
B. growth and elongation
C. cell division
D. absorption
E. root cap (pileorhiza)

The **anchoring and conducting** zone of a root is situated above the absorption zone. It provides two currents of substances (water with minerals and organic substances) moving and also strengthening of the plant due to lateral roots creation.

1.162. By microscopical study of the root cross-section we observe cover tissue, which consists of thin-walled, tightly closed cells with root hairs. This is …
A. **epiblema**
B. root cap
C. periderm
D. endoderm
E. epiderm

The external protective covering layer of roots is called **epiblema** (the term epidermis is generally not applied to roots). It is uniseriate and has root hairs. Epiblema fulfills absorbing and protective functions.

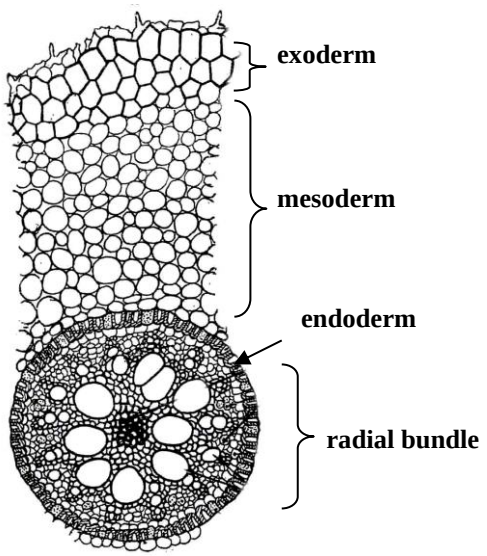
1.163. During microscopical study of the primary cortex of the root we determine that under the epiblema are 3-4 lines of big, multangular, and tightly closed cells with partly suberized cell walls. This tissue is …
A. **exoderm**
B. endoderm
C. mesoderm
D. epiblema
E. phellogen

Under **epiblema** there is a wide primary cortex, which consists of **exoderm**, **mesoderm** and **endoderm**. **Exoderm** has 2–5 layers. Its cells are big, multi-angled, with a corked cell wall, closely joint. It has a protective and conducting function. **Mesoderm**is multi-lined and compounds the main part of the primary cortex. Its cells are alive, big, roundish or multi-lined, with thin cell walls. Its cells situated friable are filled up with grains of starch. It has a protective and conducting function.

1.164. In the root of the primary structure storage substances are reserved in …
A. **mesoderm**
B. pericycle
C. endoderm
D. central cylinder
E. exoderm

1.165. During microscopical study of the primary cortex of the root, it is ascertained that its main mass is represented by multi-layer, alive, friable parenchyma with starch grains. This is …
A. **mesoderm**
B. endodermis
C. exoderm
D. collenchyma
E. phloem

1.166. Microscopic examination of a root cortex in the absorbing zone revealed that it consists mainly of multilayer living loose parenchyma with starch granules. This is:
A. **mesoderm**
B. collenchyme
C. endoderm
D. exoderm
E. phellogen

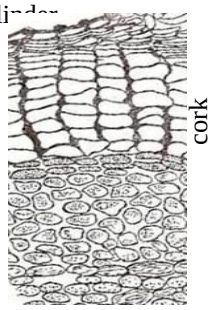


1.167. Rhizomes' underground location determines that the most developed tissue is ...
A**. storage parenchyma**
B. chlorenchyma
C. aerenchyma
D. xylem
E. collenchymas

Rhizomes are underground metamorphosis of the shoot of perennial plants. Nutritional and biologically active substances are accumulated in the **storage parenchyma** of cortex and axial cylinder.

1.168. Rhizomes of dicot plants are covered with ...
A.**periderm**
B. epiblema
C. exoderm
D. endoderm
E. epidermis

Periderma is secondary covering tissue, which typical for underground and overground stems of Dicots.



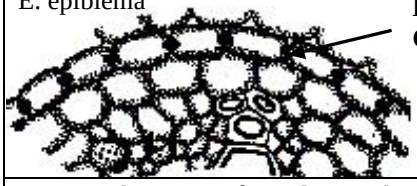
1.169. In the microscopical analysis of the root cross section of a dicot plant made in the absorption region we found a line of cells with lenticular suberizing thickenings – Casparian strips. These are cells of the…

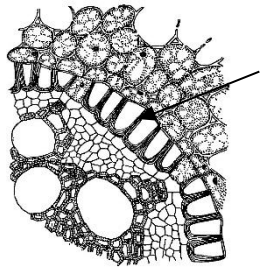
The **endoderm**, present in all roots, is believed to function in regulating the flow of water into the vascular cylinder from the cortex. The cell sides of the endoderm have lens like thickening – Casparian strips (for Dicots)

A. **endoderm**
B. exoderm
C. mesoderm
D. pericycle
E. central cylinder

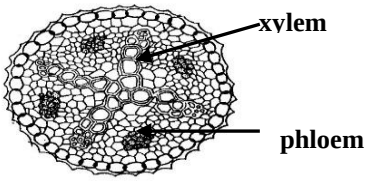
or they have the U-shaped thickening of the cell wall, become corked and die off (for Monocots). Among these dead cells there are an alive passage cells that let water and mineral substances solutions come to vessels.

1.170. During microscopical study of the rhizome cross-section of the monocot plant we determine that cells of the inner layer of primary cortex have U-shaped thickenings of the cell walls. This tissue is …
A. **endoderm**
B. phellogen
C. exoderm
D. pericycle
E. epiblema



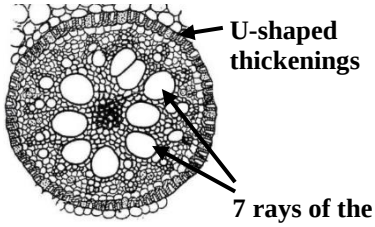


1.171. What type of conductive bundle is typical for primary anatomic structure of the root?
A. **radial**
B. concentric
C. collateral closed
D. bicollateral
E. collateral open



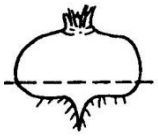
Radial bundles are typical to root.
The phloem parts there are rays of the xylem.

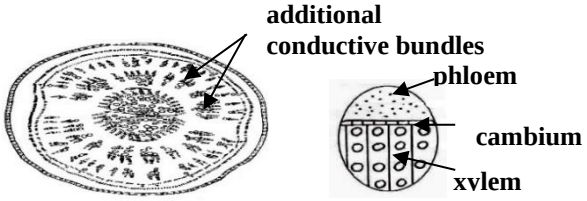
1.172. Duringthe microscopical analysis of the root the following fact has been found: its structure is primary, cells of the endodermis are with the U-shaped thickenings of the cell walls; conductive bundle is radial type with 7 rays of the xylem. Such structure of the root is typical for …
A. **angiosperm monocot**
B. angiosperm dicot
C. gymnospermous
D. mossy
E. ferny



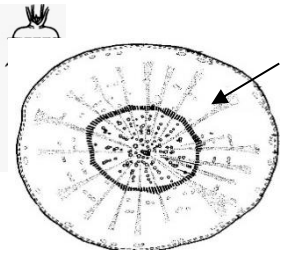
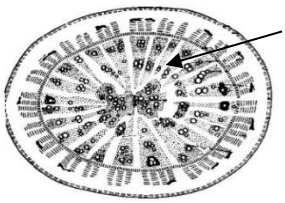
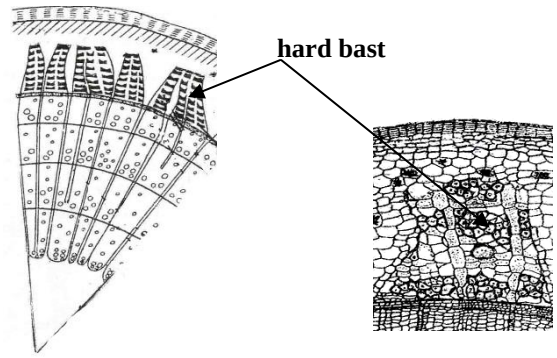
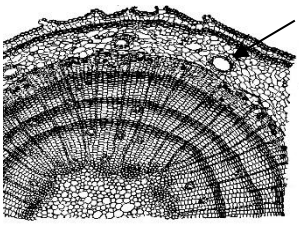
Monocot plants may have more than 6 rays of the xylem, but Dicots up to 6 and endoderm (see Fig. 1.170). The root does not have the real pith. In the centre there can be vessels of the xylem, sclerenchyma sometimes parenchyma. In Monocots and ferns the primary anatomic structure remains in the region of anchoring and conduction for the whole life.

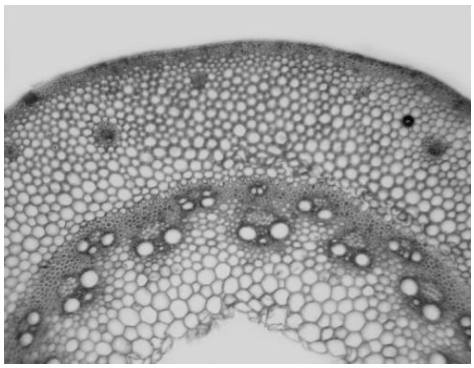
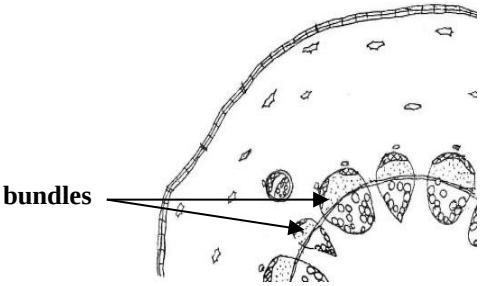
1.173. On the cross section of the beet edible root we see some rings of the cambium. They form additional conductive bundles and storage parenchyma. So, structure of this edible root is …
A. **secondary, polycambial**
B. secondary, monocambial
C. primary, polycambial
D. primary, monocambial
E. transitional, monocambial





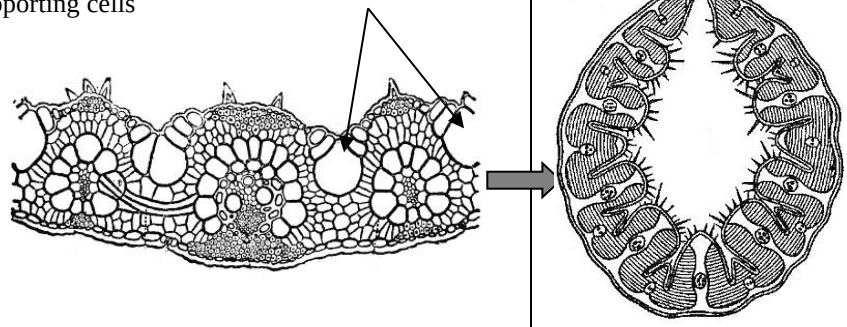
The secondary polycambial thickening of a beet storage root is provided by the cambium which forms from 2 to 18 additional rings. Cambium produces open collateral fibrovascular bundles and interfascicular parenchyma.

1.174. Duringthe study of carrot edible structure it is observed that nutritious substances are stored in more developed, fleshy part of the organ - … A. **bast** B. primary xylem C. secondary xylem D. primary cork E. cambium	 **nutrients accumulate in cortex storage parenchyma** The secondary bark and the bast of a carrot spread especially strongly and accumulate nutrients.
1.175. The senescent root of the garden radish is not so sappy; the storage xylem is becoming harder and porous. This is a result of considerable overgrowth and lignifications of … A. **vessels** B. parenchyma C. bast fibers D. sieve tubes E. companion cells	 **nutrientsaccumulate in secondary xylem** The vessels of xylem enlarge their diameters with the lapse of time and lignify.
1.176. During microscopical analyses of the root cross section it is determined the following: the root has a periderm and annual rings formed by spring and autumn tracheids. Therefore, this is a root of… A. **woody gymnosperm** B. herbaceous dicot C. woody dicot D. herbaceous monocot E. woody monocot	It is typical for axes (e.g. as for roots) of woody plants the presence of secondary integumentary tissue – the periderm; and annual rings the feature of gymnosperms is the presence of tracheids in a xylem.
1.177. On the slides of the bark stem of *Tillia cordata* (small-leaved lime) there were determined dense strands of fiber which are the part of … A. **hard bast** B. soft bast C. spring xylema D. lamellar collenchyme E pith rays	 **hard bast** The **hard bast** representative with bast fibers and sclereids that carry out a mechanical function.
1.178. The stem studied has gum ducts, in bast there are no companion cells and in woods there are no vessels. Spring tracheids perform the conductive function and autumn tracheids – the mechanical function. These anatomic features are typical for … A. **Pinus (pine-tree)** B. Betula (birch) C. Tillia (small-leaved lime) D. Helianthus (sunflower) E. Cucurbita (pumpkin)	 **gum ducts** Gum ducts are intercellular canals in a plant for the secretion or passage of gum.

1.179. On the slice of the rhizome in the central cylinder we can distinguish closed collateral and centrophloem conductive bundles. Thus, plant belongs to the class of… A. **monocot** B. dicot C. ferny D. horse-tail E. moss	Collateral close bundls and centrophloem conductive bundles are typical for rhizom of **monocot** plants. These bundles are situated in confusion. 
1.180. On the slice of the rhizome in central cylinder we can distinguish open collateral conductive bundles are location in a circle. It helps to suppose that plant belongs to the class of… A. **dicot** B. monocot C. ferny D. horse-tail E. moss	**Rhizomes of Dicots** are similar to the stem structure, but have some differences. They are covered by loose periderm, do not contain chloroplasts; the endoderm is storage-bearing. These rhizomes have badly developed mechanical tissues, but have good developed storage parenchyma of the primary cortex. The bundles are not large, open collateral or bicollateral. 
1.181. Columnar parenchyma is adjacent to the upper epidermis of the leaf without stomata. Spongy parenchyma is adjacent to the lower one with stomata. The upper epidermis is more illuminated than the lower one. A leaf with such characteristics is... A. **dorsiventral (versatile)** B.izolateral (versatile) C. izolateral (equilateral) D radial	**Dorsiventral type** of anatomical structure of the leaf blade is characterized by the fact that palisade (columnar) layers are located under the upper epidermis of chlorenchyma and spongy layers are located under the lower one.

1.182. For lessening of evaporation the leaves of the feather grass and other steppes xerophytes convolve due to the presence of special cells in the epidermis. They are called …

A. **motor cells**
B. guard cells
C. subsidiary cells
D. secretory cells
E. supporting cells



Motor cellsare a type of plant cells that acts like a hinge at joints to enable the movement of plant parts, such as the closing and opening of leaflets in response to light intensity or the rapid closure of a leaf in a carnivorous plant. Motor cells adjust their internal concentration of potassium ions (K+) to alter their turgidity, and hence the cell shape.

1.183. During microscopical study of the pine leaf we find that layer thick-walled cells, which carry out protective and mechanical function, is situated under epidermis. This is …

A. **hypodermis**
B. endodermis
C. crystalliferous facing
D. collenchyme
E. sclerenchyma

Hypodermis is one or more layers of cells lying immediately beneath the epidermis in the leaves and other organs of many plants, differing morphologically from the underlying tissues. A true hypodermis develops from the 'ground meristem and therefore has an origin different from that of the epidermis as is evidenced by the noncoincidence of the anticlinal walls of the two tissues. Itcan implement different functions. If the layers are strongly thickened then the cells enhance the isolating properties of epidermis. Besides different biologically active substances can be accumulated in a hypoderm.