

Saras

Bio-Botany

Volume - 2



Only Book having Questions framed line by line from the Text Book

This book contains 1058 solved Questions

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11th Bio-Botany

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This book contains

Book Back Solved Questions - 1 Mark	- 35
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Book Back Solved Questions - 5 Marks	- 17
Additional Solved Questions - 1 Mark	- 457
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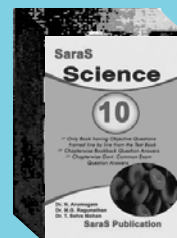
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10 Secondary Growth

Book Back Solved Questions - 1 Mark

I. Choose the Correct Answer

1. Consider the following statements

In spring season vascular cambium

- i. is less active*
- ii. produces a large number of xylary elements*
- iii. forms vessels with wide cavities of these,*

a. (i) is correct but (ii) and (iii) are not correct

b. (i) is not correct but (ii) and (iii) are correct

c. (i) and (ii) are correct but (iii) is not correct

d. (i) and (ii) are not correct but (iii) is correct.

2. Usually, the monocotyledons do not increase their girth, because

a. They possess actively dividing cambium

b. They do not possess actively dividing cambium

c. Ceases activity of cambium

d. All are correct

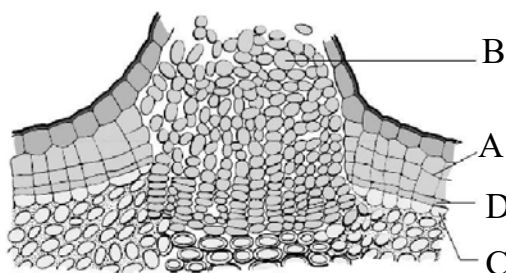
3. In the diagram of lenticel identify the parts marked as A,B,C,D

a. A. phellem, B. Complementary tissue, C. Phelloderm, D. Phellogen.

b. A. Complementary tissue, B. Phellem, C. Phellogen, D. Phelloderm.

c. A. Phellogen, B. Phellem, C. Phelloderm, D. Complementary tissue

d. A. Phelloderm, B. Phellem, C. Complementary tissue, D. Phellogen



4. The common bottle cork is a product of

a. Dermatogen c. Xylem

b. Phellogen d. Vascular cambium

5. What is the fate of primary xylem in a dicot root showing extensive secondary growth?

a. It is retained in the center of the axis

b. It gets crushed

c. May or may not get crushed

d. It gets surrounded by primary phloem

Book Back Solved Questions - 2 Marks

1. In which season the vessels of angiosperms are larger in size, Why?
1. In *spring* season.
 2. *Spring* season is the *favourable season* for the *cambium*.
 3. So cambium is *very active*.
 4. Hence *large vessels* are *produced*.

Book Back Solved Questions - 3 Marks

1. In a forest, if the bark of a tree is damaged by the horn of a deer, How will the plant overcome the damage?
1. The tree seals the wound from the *outside environment*.
 2. It *prevents microbial infection*.
 3. A *reaction zone* is created. This alters the chemistry of the wood to avoid *microbial infection*.
 4. The tree builds a *barrier zone* called '*callus*' to *compartmentalize the wounded area*.
 5. The *callus grows* and *covers/seals* the wound. This allows new uncontaminated wood to *grow* on it.

Book Back Solved Questions - 5 Marks

1. Continuous state of dividing tissue is called meristem. In connection to this, what is the role of lateral meristem?

1. Lateral meristem is present on the *lateral sides* of the *plant body*.

2. It produces the *secondary growth*.

3. It is of *two* types:

1. *Vascular cambium*

2. *Cork cambium*

Role of Lateral Meristem

1. The lateral meristem produces the *secondary vascular tissues* (i.e), *secondary xylem* and *secondary phloem*.

2. It *increases the girth of a plant*.

3. It produces *cork* (phellem).

4. It produces *pericycle*.

5. It produces *medullary rays*.

6. It produces *growth rings* or *annual rings*.

7. Growth rings are due to *discontinued activity* of vascular cambium.

2. A timber merchant bought 2 logs of wood from a forest and named them A and B. The log A was 50 years old and B was 20 years old. Which log of wood will last longer for the merchant why?

Last Longer

Log A, 50 years old, will last longer.

Reason

1. The 50 years old log has the *hardest heart wood*.

2. The heart wood is formed by *tyloses*.

3. Tyloses make the wood as follows

- * Coloured
- * Dead
- * Hardest wood.

5. It is more **durable**.

6. It is **more resistance** to the **attack** of **microorganisms** and **insects**.

7. 50 years old log has **more heart** wood and less **soft wood**.

8. Log B which only 20 years old has lesser heart wood and more soft wood.

3. A transverse section of the trunk of a tree shows concentric rings which are known as growth rings. How are these rings formed? What are the significance of these rings?

Formation of Growth Rings

1. Growth ring is a layer of wood formed in a season.

2. Growth rings are the following:

1. *Annual rings*
2. *Pseudoannual rings*

3. Annual rings are a combination of two types of **wood** formed in a year. They are

1. **Spring wood** - formed during (or) **Early wood** spring

2. **Autumn wood** - formed during (or) **Late wood** autumn

4. Additional growth rings formed in a year due to adverse environmental conditions, are called **pseudo annual rings** or **false annual rings**.

5. Annual rings are formed by the **activity of vascular cambium**.

6. The activity of vascular cambium is under the control of many **physiological** and **environmental** factors.

7. The climatic conditions are **not uniform** throughout the year.

8. Growth rings different during the different seasons-Spring, winter etc.

9. In the spring season, cambium is very **active**.

10. It produces large number of **xylary elements** having **vessels/tracheids** with **wide lumen**.

11. The wood (xylary elements) formed during this reason is called **spring wood** or **early wood**.

12. The tracheary elements are fairly **thin walled**.

13. In winter, the cambium is **less active** and forms **fewer xylary elements** that have **narrow vessels/tracheids**

14. This wood is called **autumn wood** or **late wood**.

15. The tracheary elements are with narrow **lumen very thick walled**.

16. The spring wood is **lighter in colour** and has a **lower density**.

17. The autumn **wood is darker** and has a **higher density**.

Significance of Growth Rings

- ✳ **Age** of wood can be calculated.
- ✳ The **quality** of timber can be ascertained.
- ✳ Provides evidence in **forensic** investigation.
- ✳ **Radiocarbon dating** can be verified.
- ✳ **Past climate** and **archaeological** dating can be made.

Additional Solved Questions - 1 Mark

Choose the Correct Answer

1. The increase in girth is called

- a) *Primary growth*
- b) *Secondary growth*
- c) *Longitudinal growth*
- d) *Tertiary growth*

2. In monocots, usually there is no secondary growth and so they are

- a) *Soft* b) *Hard*
- c) *Thick* d) *Thin*

3. The vascular cambium produces the secondary vascular tissues and.....

- a) *Primary xylem and secondary phloem*
- b) *Secondary phloem and primary xylem*
- c) *Secondary xylem and secondary phloem*
- d) *Secondary xylem and primary phloem*

4. Interfascicular cambium joins with the intrafascicular cambium on both sides to form a continuous ring. It is called a.....

- a) *Vascular cambial ring*
- b) *Intrafascicular cambial ring*
- c) *Cork cambial ring*
- d) *Stratified cambial ring*

5. Consider the following statements
Organization of vascular cambium

- (i) *The cells of vascular cambium do not fit into the usual description*
- (ii) *Vascular cambium possesses*

cells with large central vacuole surrounded by a thin, layers of dense cytoplasm

(iii) *The vascular cambium is the presence of three kinds of initials*

- a) *(i) is correct but (ii) and (iii) are not correct*
- b) *(i) and (ii) are correct but (iii) is not correct*
- c) *(i) and (ii) are not correct but (iii) is correct*
- d) *(i) is not correct but (ii) and (iii) are correct*

6. The cells which are produced outward form in vascular cambial ring is

- a) *Secondary xylem*
- b) *Secondary phloem*
- c) *Primary phloem*
- d) *Primary xylem*

7. The secondary xylem is also called

- a) *Leaf* b) *Root*
- c) *Wood* d) *Bark*

8. The study of wood by preparing sections for microscopic observation is termed as:

- a) *Histology* b) *Phloemtomy*
- c) *Anatomy* d) *Xylotomy*

9. The axial system consists of vertical files of

- a) *Treachery elements, fibers and wood parenchyma*
- b) *Treachery elements and fibers*

I. 1. (b) 2. (a) 3. (c) 4. (a) 5. (b) 6. (b) 7. (c) 8. (d) 9. (a)

c) Treachery elements and sieve elements

d) Phloem parenchyma and treachery elements

10. Pinus has

a) Porous wood

b) Non-porous wood

c) Spring wood d) Hard wood

11. Apical meristems produce

a) The primary plant body

b) The secondary plant body

c) The tertiary plant body

d) All of these

12. The activity of vascular cambium is under the control

a) Many physiological factors

b) Environmental factors

c) a and b d) None of these

13. The determination of the age of a tree by counting the annual rings is called

a) Dendroclimatology

b) Dendrochronology

c) Chronology d) Climatology

14. The age of American, sequoia-dendron tree is about.

a) 530 years b) 3,500 years

c) 3,700 years d) 3,505 years

15. Which one of the following is an example for diffuse porous wood?

a) Quercus b) Pinus

c) Morus rubra d) Acer

16. The wood of Quercus plant is

a) Diffuse porous b) Central porous

c) Ring porous d) None of these

17. In the resin ducts are blocked by tylose like ingrowths.

a) Angiosperms b) Gymnosperms

c) a and b d) none of these

18. In Bombax

a) the resin ducts are blocked by tylose like out growths

b) the sieve tubes are blocked by tylose like ingrowths.

c) the sieve tubes are blocked by tylose like out growths

d) the resin ducts are blocked by tylose like in growths

19. In any tree the outer part of the wood, which is paler in colour, is called

a) sap wood b) heart wood

c) Porous wood

d) ring porous wood

20. When is destroyed, the plant will die because conduction of water will be blocked.

a) heart wood b) hard wood

c) sap wood d) soft wood

21. The vascular cambial ring produces or bast on the outer side of the vascular bundle.

a) primary xylem

b) secondary xylem

c) secondary phloem

d) primary phloem

22. Whenever stems and roots increase in thickness by secondary growth, which part replaces the epidermis?

a) periderm b) phellem

c) phellogen d) phelloderm

10. (b) 11. (a) 12. (c) 13. (b) 14. (b) 15. (d) 16. (c) 17. (b) 18. (b)
19. (a) 20. (c) 21. (c) 22. (a)

23. Consider the following statements Phellem is

- (i) the protective tissue.
- (ii) replace the epidermis in older stems and roots of many seed plants.
- (iii) characterized by irregularly arranged tiers and rows of cells.

a) (i) is correct but (ii) and (iii) are not correct.

b) (i) is not correct but (ii) and (iii) are correct.

c) (i) and (ii) are correct but (iii) is not correct

d) (i) and (ii) are not correct but (iii) is correct

24. Which tree has scale bark?

- a) *Quercus* b) *Pinus*
- c) *Morus rubra* d) *Guava*

25. is helpful in exchange of gases and transpiration.

- a) Bark b) Lenticel
- c) Periderm d) Phellem

26. The phellem layer of bark tissue is harvested for commercial use primarily from

- a) *Cinnamomum zeylanicum*
- b) *Quercus suber*
- c) *Hevea brasiliensis*
- d) *Acacia senegal*

27. Turpentine obtained from bark of

- a) *Hevea brasiliensis*
- b) *Quercus suber*
- c) *Cinnamomum zeylanicum*
- d) *Conifers*

28. Gum arabic obtained from

- a) *Acacia senegal*

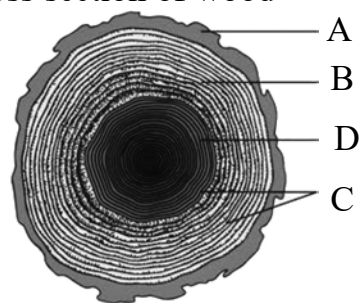
b) *Cinnamomum zeylanicum*

c) *Quercus suber* d) *Pinus*

29. growth in dicot roots is essential to provide strength to growing aerial parts of the plants.

- a) Secondary b) Primary
- c) Tertiary d) None of these

30. Identify the parts marked as A,B,C and D in the given diagram showing the cross section of wood



a) A. Sap wood, B. Bark, C. Annual rings, D. Heart wood

b) A. Annual rings, B. Heart wood, C. Sap wood, D. Bark

c) A. Bark, B. Sap wood, C. Annual rings, D. Heart wood

d) A. Heart wood, B. Sap wood, C. Bark, D. Annual rings

31. Phelloderm is otherwise called as

- a) Secondary cortex
- b) Cork cambium
- c) Primary cortex d) Cork

32. The roots and stems grow in length with the help of

- a) Lateral meristems
- b) Apical meristems
- c) Intercalary meristems
- d) Primary meristems

23. (c) 24. (d) 25. (b) 26. (b) 27. (d) 28. (a) 29. (c) 30. (a) 31. (a) 32. (b)

33. The secondary growth in dicots and gymnosperms is brought about by and cork cambium.

- a) *Vascular cambium* b) *Phloem*
c) *Xylem* d) *Phellogen*

34. cambium is present inside the vascular bundles.

- a) *Vascular* b) *Interfascicular*
c) *Intrafascicular* d) *Stratified*

35. Non-stratified cambium is otherwise known as

- a) *Fascicular cambium*
b) *Interfascicular cambium*
c) *Non-storied*
d) *Stratified cambium*

36. The vascular cambial ring, when active, cuts off both towards the inner and outer side.

- a) *New cells*
b) *Lateral meristem*
c) *Longitudinal cells*
d) *Ray cells*

37. and get gradually crushed due to the continued formation of secondary xylem and phloem.

- a) *Primary xylem*
b) *Primary phloem*
c) *Secondary xylem*
d) *Secondary phloem*

38. is an example of porous wood.

- a) *Red wood* b) *Pinus*
c) *Quercus* d) *Morus rubra*

39. Annual rings are less distinct in plants.

- a) *Dicot leaf* b) *Species*
c) *Temperate* d) *Desert*

40. Annual rings are called

- a) *Growth rings* b) *Ring bark*
c) *Scale bark* d) *Phelloids*

41.word is used by the wood anatomists to refer the vessels as pores in transverse section.

- a) *Tyloses* b) *Porous*
c) *Vessels* d) *Fibers*

42. Diffuse porous wood and wood are the two main types of angiosperm woods.

- a) *Porous* b) *Ring bark*
c) *Ring porous* d) *Sap wood*

43. are tylose like ingrowths found in gymnosperms and angiosperms.

- a) *Phellogen* b) *Tylosoids*
c) *Complementary tissue*
d) *Sap wood*

44. wood is more durable.

- a) *Sap* b) *Hard*
c) *Heart* d) *Spring*

45. Heart wood is also known as

- a) *Sap wood* b) *Duramen*
c) *Alburnum* d) *Soft wood*

46. *Abies balsamea* produces from its resin ducts.

- a) *Amber* b) *Canada balsam*
c) *Gum* d) *Resin*

47. Growth rings are produced by the activity of

- a) *Meristem* b) *Xylem*
c) *Phloem* d) *Cambium*

33. (a) 34. (c) 35. (c) 36. (a) 37. (a and b) 38. (d) 39. (d) 40. (a) 41. (b) 42. (c)
43. (b) 44. (c) 45. (b) 46. (b) 47. (d)

48. Vascular cambium is the meristem. a) Primary b) Lateral c) Intercalary d) Apical	a) Ring porous b) Pseudo rings c) Ring barks d) Growth rings
49. consists of phellem, phellogen and phelloderm. a) Cambium b) Lenticel c) Periderm d) Cork	52. is an example for ring bark plant. a) Quercus b) Pinus c) Morus d) Guava
50. Quercus is an example for a) Rhytidome b) Duramen c) Tylosoids d) Diffuse porous wood	53. Lenticel is formed during in stems. a) Primary growth b) Secondary growth c) Tertiary growth d) None of these
51. If the phellogen forms a complete cylinder around the stem, it gives rise to	54. is an alkaloid found in Cinchona bark. a) Nicotine b) Morphine c) Strychnine d) Quinine

Match the Following

a.	Ans
1. Porous wood - Pinus	- Morus rubra
2. Non-porous wood - Acer	- Pinus
3. Diffuse porous wood - Quercus	- Acer
4. Ring porous wood - Morus rubra	- Quercus
b.	Ans
1. Vascular cambium - Medullary ray	- Secondary vascular tissues
2. Cork cambium - Longitudinal growth	- Phellogen
3. Apical meristem - Phellogen	- Longitudinal growth
4. Interfascicular cambium - Secondary vascular tissues	- Medullary ray
c.	Ans
1. Hard wood - Duramen	- Porous wood
2. Soft wood - Alburnum	- Non-porous wood
3. Sap wood - Non-porous wood	- Alburnum
4. Heart wood - Porous wood	- Duramen
5. Spring wood - Late wood	- Early wood
6. Autumn wood - Early wood	- Late wood
d.	Ans
1. Growth rings - Spring and autumn wood	- Spring autumn wood and false growth rings

48. (b) 49. (c) 50 (a) 51. (c) 52. (a) 53 (b) 54. (d)

2. Annual rings	- <i>Quercus</i>	- Spring and autumn wood
3. Pseudo annual rings	- Lateral meristem	- Additional growth rings
4. Cambial ring	- Additional growth rings	- Lateral meristem
5. Ring porous wood	- Spring autumn wood and- false growth rings	- <i>Quercus</i>

e.			Ans
1. Phellem	-	Secondary cortex	- Cork
2. Phellogen	-	Cork	- Cork cambium
3. Phelloderm	-	Cork cambium	- Secondary cortex

f.			Ans
1. Quinine	-	<i>Hevea brasiliensis</i>	- <i>Cinchona</i>
2. Cork	-	<i>Cinchona</i>	- <i>Quercus suber</i>
3. Rubber	-	<i>Pinus</i>	- <i>Hevea brasiliensis</i>
4. Turpentine	-	<i>Acacia senegal</i>	- <i>Pinus</i>
5. Curry powder	-	<i>Quercus suber</i>	- <i>Cinnamomum zeylanicum</i>
6. Gum Arabic	-	<i>Cinnamomum zeylanicum</i>	- <i>Acacia senegal</i>

Additional Solved Questions - 2 Marks

<p>1. What is secondary growth?</p> <ol style="list-style-type: none"> 1. Increase in <i>girth</i>. 2. Increase in <i>thickness</i> of stems and roots. 3. It is also called <ul style="list-style-type: none"> * <i>Latitudinal growth</i> * <i>Growth in girth</i> 4. It is brought about by <ol style="list-style-type: none"> 1. <i>Vascular cambium</i> 2. <i>Cork cambium</i> 5. It occurs in <i>Gymnosperms</i> and <i>Angiosperms</i>. <hr/> <p>2. What are the two types of lateral meristem?</p> <ol style="list-style-type: none"> 1. <i>Vascular cambium</i> 2. <i>Cork cambium</i> <hr/> <p>3. What is vascular cambium?</p> <ul style="list-style-type: none"> ♦ <i>A lateral meristem.</i> 	<ul style="list-style-type: none"> ♦ It produces <i>secondary vascular tissues</i> such as <ol style="list-style-type: none"> 1. <i>Secondary xylem</i> 2. <i>Secondary phloem</i> <hr/> <p>4. What is vascular cambial ring?</p> <p>The vascular ring formed by joining the <i>interfascicular cambium</i> with the <i>intrafascicular cambium</i>.</p> <hr/> <p>5. What are the two types of vascular cambium recognized based on the arrangement of the fusiform initials?</p> <ol style="list-style-type: none"> 1. Storied cambium or stratified cambium 2. Non-storied cambium or non-stratified cambium <hr/> <p>6. What are fusiform initials?</p> <ul style="list-style-type: none"> • <i>Vertically elongated cells</i> of <i>vascular cambium</i>.
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☉ They give rise to the **longitudinal** or **axial** system of **secondary xylem** and **phloem**.

7. Write notes on storied cambium.

1. A type of **vascular cambium** containing **short fusiform initials**.
2. It is also called **stratified** cambium.
3. **Fusiform initials** are arranged in **horizontal tiers**.
4. The ends of the cells of one tier appear at the **same level**.

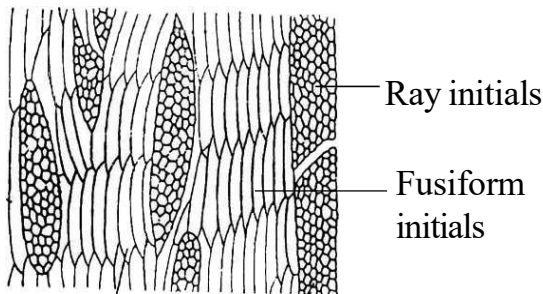


Fig. TLS of storied cambium.

8. What is non-storied cambium?

1. A type of **vascular cambium** containing **long fusiform initials**.
2. It is also called **non-stratified cambium**.
3. The ends of the cells **overlap** one another.
4. The cells are not arranged in tiers.

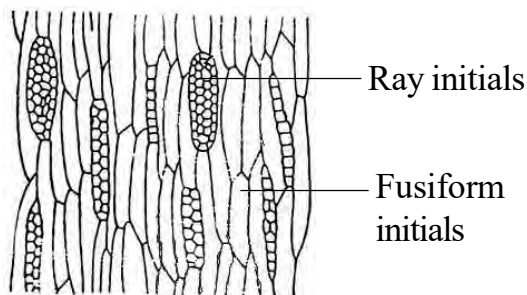


Fig. TLS of non-storied cambium.

9. Define xylotomy

The study of **wood** by **preparing sections** for microscopic observation.

10. What is spring wood?

1. The wood produced during **spring season** is called spring wood.
2. It is also called **early wood**.
3. It is produced by **cambium**.
4. In spring season, cambium is **very active**.
5. Cambium produces a large number of **xylary elements**.
6. This wood is **lighter** in colour.
7. It has less **density**.
8. It is a **growth ring** or **annual ring**.

11. Define dendrochronology.

The determination of the **age** of a tree by **counting the annual rings**.

12. Define dendroclimatology.

☉ The study of **past climates** and **climatic events** by the analysis of **growth rings**.

☉ It is a branch of **dendrochronology**.

13. What is diffuse porous wood?

In diffuse porous wood the **vessels** or **pores** are **uniform** in **size** and **distribution** throughout an annual ring.

14. What is ring porous wood?

☉ The pores of the **early wood** are **larger** than those of the **late wood**.

☉ Thus rings of **wide** and **narrow vessels** occur in the growth ring.

15. What is tyloses?

1. The lumen of the **xylem vessels** is **blocked** by **many balloon-like** in-

growths from the **neighbouring parenchymatous cells**.

2. These **balloon-like structures** are called **tyloses**.

3. They are found in **dicots**.

4. They are formed in **secondary xylem** or **heart wood**.

5. They contain

1. *Starchy crystals*

2. *Resins*

3. *Gums*

4. *Oils*

5. *Tannins or*

Coloured substances

16. Mention some plants from which bast fibres are obtained.

1. Flax - *Linum usitatissimum*

2. Hemp - *Cannabis sativa*

3. Sun hemp- *Crotalaria juncea*

4. Jute - *Corchorus capsularis*

17. What is periderm?

◦ A secondary protective layer replacing epidermis and primary cortex.

◦ It is made up of

1. *Phellem* - Outer

2. *Phellogen* - Middle

3. *Phelloderm* - Inner

◦ It develops in **stems** and **roots** as a result of **secondary growth**.

18. What are phelloids?

Phellem **like cells** which **lack suberin** in **their walls**.

19. What is rhytidome?

1. Rhytidome is an **outer dead bark** which consists of **periderm** and **isolated cortical** tissues or **phloem tissues**.

2. It is formed during **successive secondary** growth.

20. What is polyderm?

◦ Polyderm consists of **uniseriate suberized** layer alternating with **multiseriate nonsuberized** cells.

◦ It is a **special type** of **protective periderm**.

◦ It is found in the **roots** and **underground stems**. Eg. *Rosaceae*

21. What is phelloderm?

1. Phelloderm is the **secondary cortex**.

2. It is the **inner most** layer of **periderm**.

3. It is produced by the **phellogen centripetally** (inward).

4. The tissue resembles **cortical** living **parenchyma**.

5. It is found in the **stems** and **roots** of seed plants.

22. What is scale bark?

Overlapping scale like **layers of bark** produced by phellogen.

Eg. *Guava*



Fig. Guava tree showing scale bark.

23. Define lenticel.

Lenticel is raised opening or pore on the epidermis or bark of stems and roots involved in lenticular transpiration.

24. What is complementary tissue?

• A mass of **loosely** arranged **thin-walled parenchyma cells** present in the region of lenticel.

<ul style="list-style-type: none"> • It is produced by <i>phellogen</i>. • It is also called <i>filling tissue</i>. 	tissue B containing lenticels and inner tissue D which has loosely arranged cells containing chloroplast.
25. Mention the functions of lenticels.	Identify A,B,C and D
1. <i>Exchange of gases</i>	Ans
2. <i>Lenticular transpiration</i>	A- Periderm
26. A secondary tissue A is formed of three components namely outer B, middle C and inner D. C is a lateral meristem producing an outer protective	B- Phellem-Cork
	C- Phellogen-Cork cambium
	D- Phelloderm-Secondary cortex

Additional Solved Questions - 3 Marks

1. What are pseudo annual rings?

♣ *Additional growth rings* developed within a year due to adverse *natural calamities* like

- | | |
|----------------------|----------------------------|
| ❖ <i>Drought</i> | ❖ <i>Flood</i> |
| ❖ <i>Frost</i> | ❖ <i>Mechanical injury</i> |
| ❖ <i>Defoliation</i> | ❖ <i>Biotic factors</i> |

♣ It results in the formation of *more than one annual rings* in a year.

♣ Such rings are also called *false annual rings*.

2. The table given below describes the intrafascicular cambium and interfascicular cambium. Identify the missing words.

Intrafascicular cambium	Interfascicular cambium
1. Present ----- the vascular bundles.	1. Present in ----- the vascular bundles.
2. Originates from the -----	2. Originates from the -----
3. Initially it forms a part of the -----	3. From the beginning it forms a part of the -----

Ans: 1. *inside, between*
 2. *procambium, medullary rays*
 3. *primary meristem, secondary meristem*

3. What are tylosoids?

Tylose like ingrowths blocking resin ducts in Gymnosperms and sieve tubes in Angiosperms are called tylosoids.

In Gymnosperms, they are formed from the resin producing *parenchymatous cells*. They *block* the *resin ducts*

In Angiosperms, they are formed from the *parenchymatous* cell. They block the *sieve tubes*.

♣ Example - *Bombax*

4. Write short notes on secondary phloem.

1. *Secondary phloem* is *bast*.
2. It is a *living tissue*.
3. It is formed on the *outer side* of the *vascular bundle*.
4. It is produced by the *vascular cambial ring*.
5. It has *two tissue systems*.
 - i) The *axial* system - vertical
 - ii) The *radial* system - horizontal
6. The axial system is derived *from vertically elongated fusiform initials* of vascular cambium.
7. It represents the following:
 - * *Sieve elements*
 - * *Phloem fibre*
 - * *Phloem parenchyma*
8. The radial system is derived from *horizontally* elongated *ray initials* of vascular cambium.
9. It represents the *phloem rays*.
10. Life span of secondary phloem is *less* compared to secondary xylem.
11. It *transports soluble organic compounds* made during *photosynthesis* to various parts of plant.

5. Write short notes on phellem.

1. Phellem is the *outer* layer of *periderm*.
2. It is a *protective tissue*
3. It is composed of *non-living cells* with *suberized* walls.
4. It is formed *centrifugally* by the *phellogen*.
5. It is formed by *secondary growth*.

6. It replaces the *epidermis* in older *stems* and *roots* of *many seed plants*.

7. It has *regularly arranged tiers* and *rows* of cells.

8. It is *broken* here and there by the presence of *lenticels*.

6. Write short notes on phellogen.

1. Phellogen is a *secondary lateral meristem*.

2. It comprises *homogenous* meristematic cells.

3. It is the *middle* layer of *periderm*.

4. It is *extrastelar* in origin.

5. It arises from the following

* *Epidermis* * *Phloem*

* *Cortex* * *Pericycle*

6. Its cells divide *periclinally* and *produce radially* arranged files of cells.

7. The *cells* towards the *outer side* differentiate into *phellem*.

8. The cells towards the inside differentiate into *phelloderm* (secondary cortex).

7. Explain bark. Write its uses.

Bark

Bark refers to all the tissues outside the vascular cambium of stem.

1. It includes the following:

* *Periderm*

* *Cortex*

* *Primary phloem*

* *Secondary phloem*

2. It has *lenticels*

3. It is of two types:

i) Ring bark

ii) Scale bark

4. Ring bark forms when the phellogen forms a complete *cylinder* around the stem. Eg. *Quercus*.

5. Scale bark forms, when the bark is formed in overlapping *scale like* layers. Eg. Guava.

Uses

1. Bark protects the plant from *parasitic fungi* and *insects*.

2. It prevents water loss by *evaporation*.

3. It *guards* against variations of *external temperature*.

4. It is an *insect repellent*.

5. It is *decay proof*.

6. It is *fire proof*.

7. It is used in *obtaining drugs* or *spices*.

8. The *phloem* cells of the bark are involved in *conduction of food*.

9. Secondary cortical cells are involved in *storage*.

Additional Solved Questions - 5 Marks

1. Which life process is responsible for the annual rings in tree trunks? Explain this process.

Life process

Secondary Growth

Explanation

The increase in girth and thickness of stem and root is called secondary growth.

It is also called *latitudinal growth*.

It occurs in *Dicots* and *Gymnosperms*.

Secondary growth is brought about by two *lateral meristems*. They are

1. *Vascular cambium*
2. *Cork cambium*

1. Vascular Cambium

1. Vascular cambium is formed from *procambium* and *medullary ray*.

2. The procambium is called *intra-fascicular cambium* or *fascicular cambium*.

3. The medullary ray has *inter fascicular cambium*.

4. The intrafascicular cambium joins with interfascicular cambium to form a ring called *vascular cambial ring*.

5. The cambial ring has *two* types of *initials* namely,

1. *Fusiform initials*
2. *Ray initials*

6. Fusiform initials give rise to *axial system* of secondary xylem and phloem.

7. Ray initials give rise to *radial system* of secondary xylem and phloem.

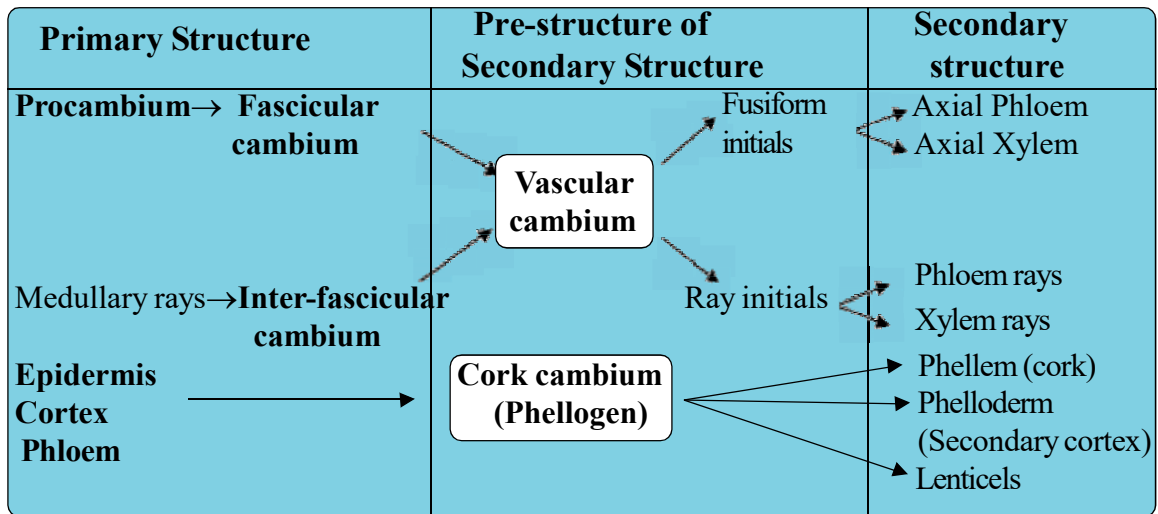
8. Due to the formation of secondary xylem and phloem, the primary xylem and phloem get *crushed*.

9. The secondary xylem is called *wood*.

10. It becomes *porous wood* or *hard wood* in dicots and *non-porous wood* or *soft wood* in Gymnosperms.

11. The wood produces *growth rings* or *annual rings*.

12. The wood formed during *spring* season is called *spring wood* or *early wood*. It is *lighter in colour* and has *lower density*.



13. The wood produced during *autumn* is called *autumn wood* or *late wood*. It is *darker* in colour and has *higher density*.

14. Additional growth rings devel-

oped within a year are called *pseudo annual rings* or *false annual rings*.

15. The outer part of the wood is called *sap wood* or *alburnum*.

16. The inner part of the wood is called *heart wood* or *duramen*.

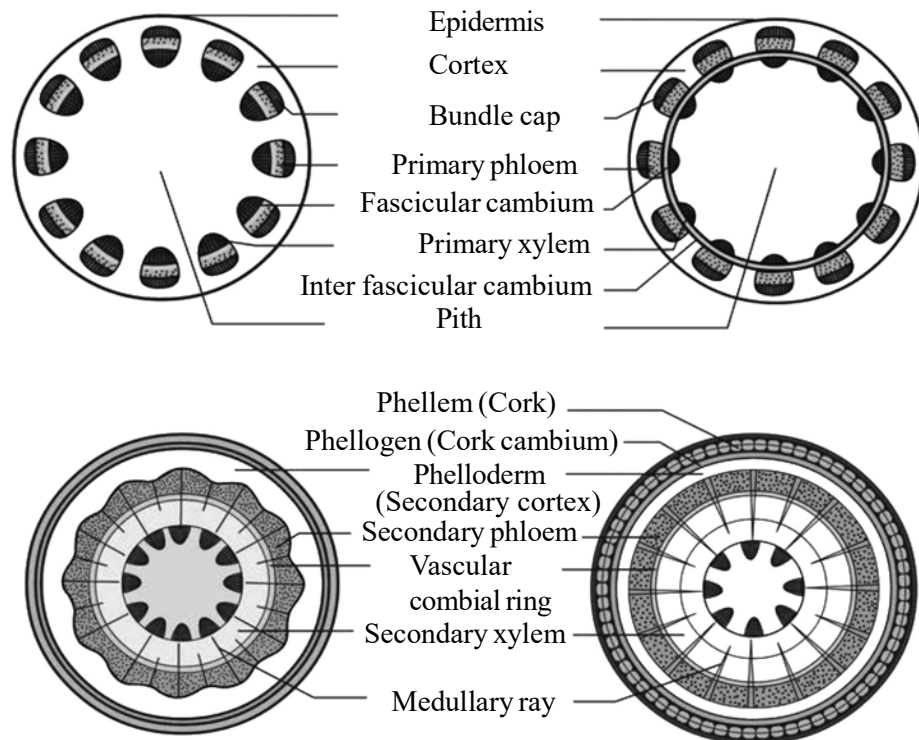


Fig. Secondary growth in dicot stem (diagrammatic)-stages in transverse section.

17. The *fusiform* initials produce *axial system of secondary phloem*.

18. The ray initials produce *horizontal* system of secondary phloem.

2. Cork Cambium

1. Cork cambium is the *secondary lateral meristem*.

2. It is also called *phellogen*.

3. It has *extrastelar origin*.

4. It arises from

- *Epidermis*
- *Cortex*
- *Phloem or pericycle*

5. It divides *periclinally*.

6. It produces *radially* arranged files of cells.

7. The cells towards the outer side differentiate into *phellem* (cork).

8. The cells towards the inside differentiate into *phelloderm* (secondary cortex).

9. The tissues formed outside the vascular cambium is called *bark*.

10. Bark consists of

1. *Periderm*
2. *Cortex*
3. *Primary phloem*
4. *Secondary phloem*

11. The bark contains *lenticels*.

2. Describe the origin and formation of vascular cambium.

The vascular cambium is the *lateral meristem* that *produces* the *secondary vascular tissues* i.e *secondary xylem* and *secondary phloem*.

1. The vascular cambium originates from *procambium* and *medullary rays*.

2. Procambium is present between xylem and phloem of the *vascular bundle* as a *strip*.

3. This cambial strip is known as *intrafascicular* or *fascicular cambium*.

4. A few parenchymatous cells of the *medullary rays* become *meristematic* and form *interfascicular cambium*.

5. Interfascicular cambium is in *line* with intrafascicular cambium. It lies in *between* the vascular bundles.

6. This *interfascicular* cambium *joins* with the *intrafascicular* cambium on both sides to form a *continuous ring*.

7. It is called *vascular cambial ring*.

3. Describe the organization of vascular cambium.

♣ The cells of vascular cambium possess cells with

1. *Large central vacuole*

2. Vacuoles are surrounded by a thin layer of dense cytoplasm

♣ It has two kinds of initials, namely

1. *Fusiform initials*

2. *Ray initials*

1. Fusiform Initials

▪ These are *vertically elongated cells*.

▪ They give rise to the *longitudinal* or *axial system* of the *secondary xylem* and *phloem*.

▪ Based on the arrangement of the fusiform initials, *two types* of vascular cambium are recognized.

▪ They are:

1. *Storied cambium* or *Stratified cambium*

2. *Non-storied cambium* or *Non-stratified cambium*

▪ In **storied** (stratified) **cambium** the fusiform initials are short and are arranged in **horizontal tiers**, with the end of the cells of one tier appearing at approximately the **same level**, as seen in tangential longitudinal section (TLS).

It is the characteristic of the plants with **short fusiform initials**.

In **non-storied** (non-stratified) **cambium** fusiform initials are **long**, and they **strongly overlap** at the ends.

2. Ray Initials

♣ These are **horizontally elongated cells**.

♣ They give rise to the **ray cells**.

♣ They form the elements of the **radial** system of **secondary xylem** and **phloem**.

4. Write notes on the activity of vascular cambium.

1. The vascular cambial ring, cuts off **new cells** both towards the **inside** and **outside**.

2. The cells which are produced **outward** form **secondary phloem**.

3. The cells which are produced inward form **secondary xylem**.

4. At places, cambium forms some **narrow-horizontal bands** of **parenchyma**. They pass through secondary phloem and xylem. They are the **rays**.

5. Due to the continued formation of secondary xylem and phloem both the primary xylem and phloem get gradually **crushed**.

5. Describe secondary xylem.

1. Secondary xylem is formed from the **secondary growth**.

2. It is also called **wood**.
3. It is formed by **vascular cambium**.
4. The axial system consists of vertical files of

* **Treachery elements**

* **Fibers**

* **Wood parenchyma**

5. The radial system consists of **rows of parenchymatous cells** oriented at **right angles** to the **longitudinal axis** of xylem elements.

The secondary xylem is of **two** types namely,

1. **Porous wood**

2. **Non-porous wood**

1. Porous Wood

1. The wood with **vessels** is called **porous wood**.

2. It is also called **hard wood**.

3. It is found in **Dicots**.

Example: *Morus rubra*

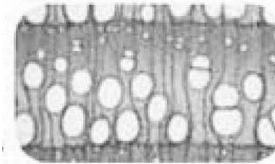


Fig. Structure of porous wood.

2. Non-Porous Wood

1. Non-porous wood has **no vessels**.

2. It is also called **soft wood**.

3. It is found in **Gymnosperms**.

Example: *Pinus*

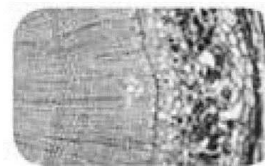
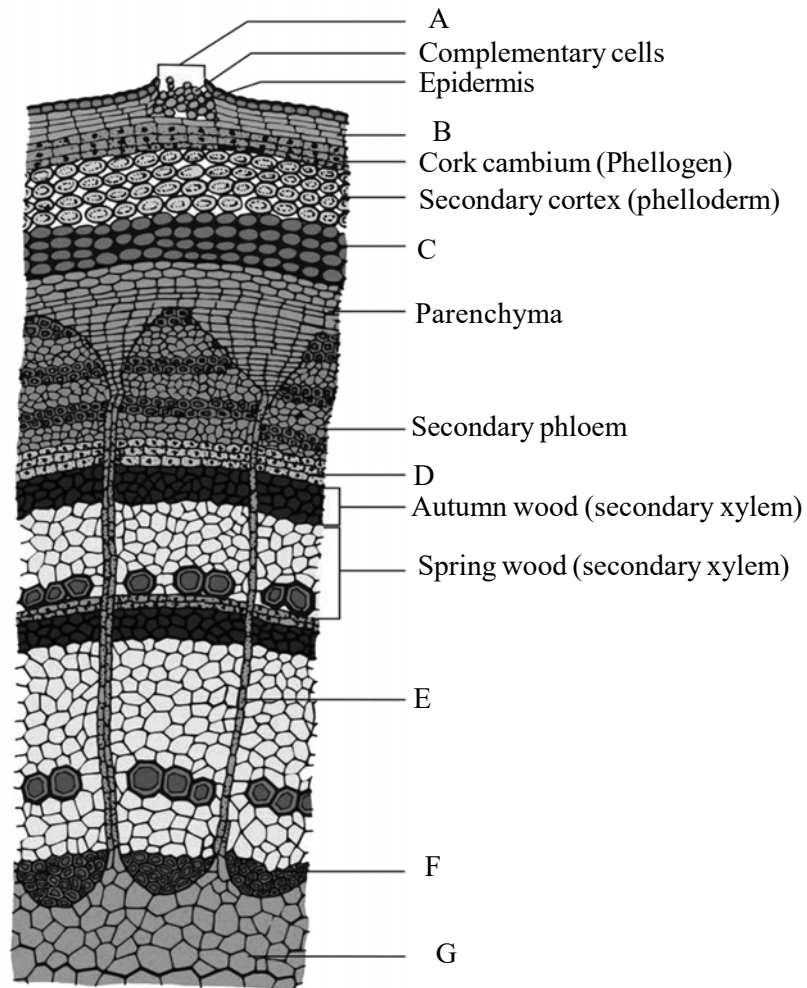


Fig. Structure of non-porous wood.

6. Label A,B,C,D,E,F and G in the following dicot stem.



- Ans: A- Lenticel
 B. Cork or Phellem
 C. Collenchyma
 D. Cambium
 E. Secondary Medullary ray
 F. Primary xylem
 G. Pith

7. Write down the economic importance of wood.

1. Haematoxylin

The dye, *haematoxylin* is obtained from the *heart wood* of *Haematoxylum campechianum*.

It is used to *stain nucleus*.

2. Canada balsam

1. It is a *mounting medium* produced by the Gymnosperm plant, *Abies balsamea*.

3. Microscopic slide

A slide of 60 years old holotype specimen of a *flatworm* (*Lethacotyle fijiensis*) is permanently *mounted* in *Canada balsam*.

4. Fossil resins-Amber

1. Plants *secrete resins* for their *protective* benefits.

2. Amber is a **fossilized tree resin** especially from the **wood**.

3. It has been **appreciable** for **colour** and **natural beauty**.

4. Much valued from **antiquity** to the present as a **gemstone**.

5. Amber is made into a **variety** of **decorative objects**.

6. Amber is **used** in **jewellery**.

7. It has also been used as a **healing agent** in **folk medicine**.

8. It **preserves** the **fossil animal**.

Eg. *Ant*

8. Write down the economic importance of barks.

a) **Quinine**

Cinchona bark is medicinally active, containing a **variety of alkaloids** including the **antimalarial** compound **quinine**.

b) **Cork**

1. Cork is an **impermeable buoyant material**.

2. Primarily it is harvested from the **phellem** layer of *Quercus suber*.

3. It is composed of **suberin**, a **hydrophobic substance**.

4. It has the following properties:

- * **Impermeable** * **Elastic**
- * **Buoyant** * **Fire retardant**

5. It is used as a **bottle stoppers**.

c) **Shuttle Cocks**

* Cork is also used as an **essential element** in the production of **badminton shuttle cocks**.

Example: *Quercus suber*

d) **Rubber tree**

Rubber is obtained from **latex ves-sels** of **inner bark**.

Eg. *Hevea brasiliensis*

e) **Turpentine**

1. Turpentine is obtained from **bark of conifers**.

2. It is also called **resin**.

3. It is used as **thinner** for **oil based paints** and **organic solvents**.

Example : *Pinus*

f) **Cinnamomum bark**

1. **Cinnamon** is an **oldest spice**.

2. Its **bark** is used as ingredients of **curry powder**.

3. Used as medicine for

- * *Cardiac stimulant*
- * *Diarrhoea*
- * *Vomiting*.

Example: *Cinnamomum zeylanicum*

g) **Gum Arabic**

1. Transverse incisions are made with a small axe and **thin strip of outer bark is torn off**.

2. From that, gum slowly exudes as a **viscous liquid**, collects in a **drop** and **hardens**.

Example: *Acacia senegal- Gum Arabic*

9. Explain and draw the secondary growth in dicot root.

The increase in girth and thickness of stem and root is called secondary growth.

It is also called **latitudinal growth**.

It occurs in **Dicots** and **Gymnosperms**.

Secondary growth is brought about by two **lateral meristems**. They are

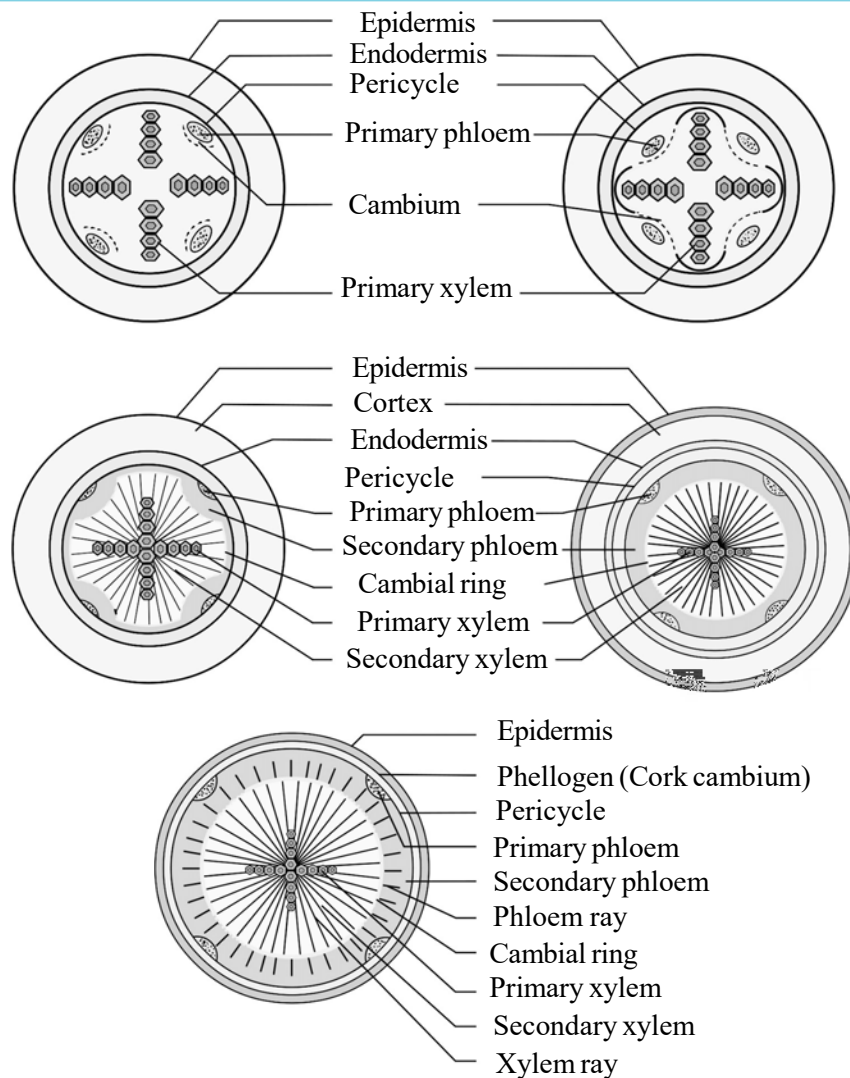


Fig. Different stages of the secondary growth (diagrammatic) in a typical dicot root (a-e).

1. Vascular cambium
2. Cork cambium

1. **Secondary growth in dicot roots** is essential to **provide strength** to the growing aerial parts of the plants.

2. It is **similar** to that of the **secondary growth** in dicot stem.

3. However, there is **marked difference** in the manner of the formation of **vascular cambium**.

4. The vascular cambium is **completely secondary in origin**.

5. It **originates** from a **combination** of two tissues namely:

1. *Conjunctive tissue*
2. *Pericycle tissue*

6. **Conjunctive tissue** is located just **below** the **phloem bundles**.

7. **Pericycle tissue** is present above the **protoxylem**.

8. They form a complete and *continuous wavy ring*.
9. This *wavy ring* later *becomes circular* and *produces secondary xylem* and *secondary phloem* similar to the secondary growth in stems.

