



RICCIA

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SYSTEMATIC POSITION ::

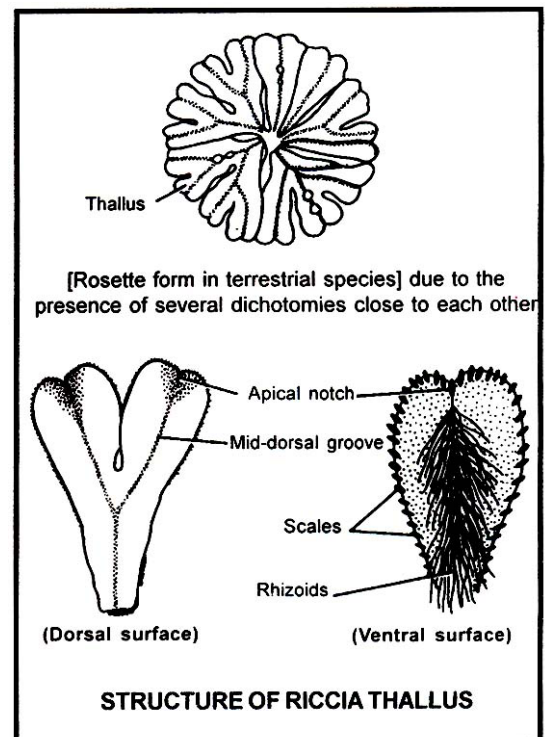
Kingdom	:	Plantae
Sub kingdom	:	Embryophyta
Division	:	Bryophyta
Class	:	Hepaticopsida
Order	:	Marchantiales
Family	:	Ricciaceae
Genus	:	Riccia

HABIT AND HABITAT ::

- **Riccia** was discovered by **F.F. Ricci**.
- Species of **R iccia** are generally found in moist land.
- The common Indian species are as follows :
 - i. **Riccia discolor/R.himalayensis**
 - ii. **R. glauca**
 - iii. **R. pathankotensis**
 - iv. **R. robusta**
 - v. **R. crystallina**
- **Riccia discolor** found in Rajasthan.
- Some species of **Riccia** are **aquatic**.
- Such as - **Riccia fluitans, R.abuensis, R.riella etc.**

STRUCTURE ::

- The main plant of **Riccia** is **gametophyte** in the form of thallus.
- It is green, flat, dorsiventral and **dichotomously** branched. It grows **prostrate** on the soil.
- At the growing point of thallus a notch is present, at the apical end. It is known as **Apical notch**.
- At the base of apical notch a apical cell is present. It is **pyramidal** shape. The thallus grows by the activity of this apical cell.



- Each lobe of the thallus is thick in the middle and thin at their margins.
- On the **upper (dorsal) surface** of each lobe vein is present in the middle which extends from anterior to posterior. It is known as **longitudinal median vein**.
- A long groove is present in the region of median vein, is called **Median groove**.
- In this groove, sex organs are developed in **acropetal order** (New at apical notch old away from it) on the dorsal surface of thallus.

Note : The dorsal surface of the **Marchantia** thallus (Liver shaped) bears **gemma cups** along the mid rib.

(a) Rhizoid :

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- Rhizoids are found in the mid rib region on the **ventral/Adaxial** surface of the *Riccia* thallus. (In scattered form)
- Rhizoids are **unicellular, unbranched, colourless and tubular**.

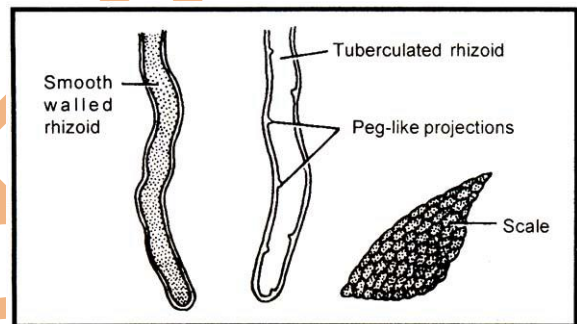
Two type of rhizoids are found in *Riccia*

1. Smooth walled :

- Outer and inner walls of rhizoids are **smooth & straight**.

2. Tuberculated :

- Peg like ingrowths are present on the surface of inner wall.



- **Note :** Smooth walled & tuberculated rhizoids are also found in **Marchantia & Plagiochasma**.
- **Rhizoids are absent** in the aquatic species of *Riccia*. Such as **R.fluitans**.

Function : The main function of the rhizoids are is **to fix the plant** with the substratum and it **absorbs** some amount of water and minerals.

- The whole ventral surface also absorbs water and minerals.

(b) Scales :

- Triangular, **multicellular** and **violet colour scales** are present on the margin of **ventral surface** of thallus.
- **Violet (Purple)** colour of the scales is due to presence of **anthocyanin** pigment in their **cell sap**.
- They are **ligulate**. The scales are single celled thick. **Maximum scales are found in apical notch**.
- Scales are absent or less developed in aquatic species of **Riccia**.
- Plant growing moist terrestrial habitats usually have small and ephemeral scales, whereas those of **dry habitats** have **large and persistent Scales**.

Note : In **Marchantia** scales are **appendiculate & ligulate**.

- In Riccia the half scales are found at margin of the thallus. **Complete scales are found in the apical notch.**

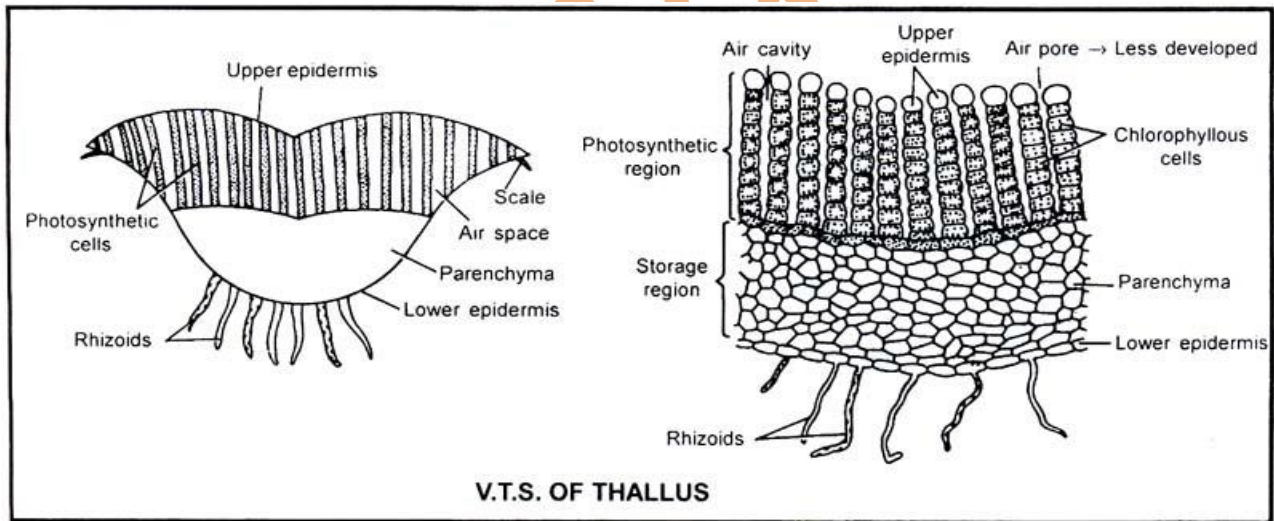
Function :

- (1) The main function of the scales is the **protection of growing points.**
 - (2) Some amount of water also absorbed through the scales.
- Scales are formed by the activity of the apical cell and arranged in a single row, but as the thallus grows and widens, each scale splits into two halves along the median line, so that **two rows of scales** are seen, one row near each margin of the thallus.

INTERNAL STRUCTURE ::

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- Internally, the thallus is divided into **two** distinct zones or regions.
 - (i) Upper or dorsal : **Photosynthetic or assimilatory region.**
 - (ii) Lower or Ventral : - **Storage region.**
- (i) **Assimilatory Region or Photosynthetic region : -**
 - The cells of this region are **loosely arranged and parenchymatous.**
 - Chloroplasts (**Discoid type**) are found in the cells of this region. So this region is able to carry the process of photosynthesis. Therefore it is known as **photosynthetic region.**



- The chlorophyllous cells are arranged in **vertical rows.**
- A narrow, deep space is found in between the vertical rows, called **air space** or **air canal.**
- Upper cell of each vertical row is **colourless**, larger in size & differentiated to form upper epidermis.
- Air canal opens at upper epidermis through the **pore** called **air pore.**
- Air canals are **schizogenous** in origin. It means it is formed by the **separation of cells.**
- The presence of air canal or air chamber is the ancestral feature. They shows **aquatic ancestral** Character.

- Food material synthesise in this region through the photosynthesis.

(ii) Storage Region :-

- The cells of this region are **colourless, compact, parenchymatous** and without intercellular spaces.
- The **starch** is stored by the cells of this region as food.
- The lower most layer of cells are arranged systematically to form a **lower epidermis**.

REPRODUCTION ::

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- It reproduces by two different ways.
 - (i) Vegetative Reproduction
 - (ii) Sexual Reproduction

VEGETATIVE REPRODUCTION ::

- It is responsible for the **gregarious** (Growing close together but not matted) habit of the plant. It takes place by following methods:

(a) By progressive death and decay of older parts of thallus.

- It is normal method of vegetative reproduction. It takes place in **favourable** growth season (period).
- The older part of the plant body gradually becomes aged, die and ultimately decay.
- When this process of decay reaches up to **dichotomous point**, two branches get separated and each branch form a new thallus through the apical growth.

(b) By Rhizoidal tips.

(c) By Adventitious branches.

(d) By tuber formation.

- In many species like ***R.discolor*, *R.perennis*** growing in dry habitat.
- When the **dry season starts**, the apical cell divide to form a **multicellular mass** of cells on the apex of each branch. This mass of cells of the lobes becomes thick due to **storage of food** material and develop a thick protective layer around it after degeneration of marginal cells. This thick structure is known as **tuber**.
- The **tubers** remains **dormant** in **dry season**. On the returns of favourable condition or moist season, each tuber resumes growth and give rise to new thallus. Tubers shows "**perennation**".

(e) By persistent apices/ By death of thallus in drought condition except growing region.

- This method found in region having prolonged dry season as in **Punjab** and **Rajasthan**. eg., ***R.discolor***.
- In the beginning of dry season entire body of the thallus becomes dry **except the apices**.

- The apices very often grow down into the soil and becomes thick due to the **storage of food** material.
- On the advent of favourable condition. (ie., rainy season) all the apices grow and form a new plant.

SEXUAL REPRODUCTION ::

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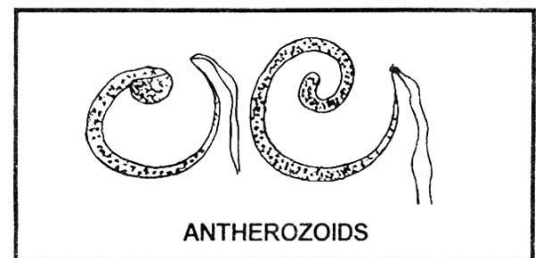
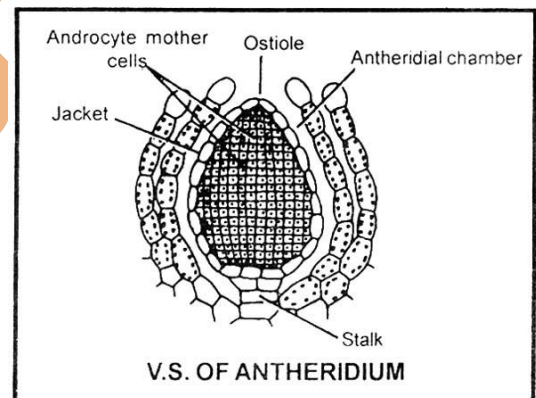
- The main plant of **Riccia** is gametophyte. It reproduces by **gamete formation**.
- It is oogamous type.
- Male sex organ called as **antheridium** and female sex organ called as **archegonium**.
- The sex organs of Riccia are borne on **dorsal surface** of the thallus in the median groove.
- The sex organs are develop singly, usually deeply in the tissues in **acropetal order**. (Youngest sex organ near the apex and oldest sex organ away from the apical notch.)
- The species of Riccia are **Monoecious** and **dioecious**. But most of the species of Riccia are **monoecious**.

(a) **Monoecious species** : Male and female sex organs lies on the same thallus. Such as : ***R.robusta***, ***R.glauca***, ***R.pathankotensis***, ***R.gangetica*** etc.

(b) **Dioecious species** : Male and femal sex organs are present on separate thallus such as : ***R.discolor*** / ***R.himalayensis***.

[i] Antheridium :

- Each mature antheridium is some what elongated oval or **pear shaped** and **stalked** structure.
- Each antheridium enclosed in a cavity or chamber, known as **antheridial-Chamber**.
- Each antheridium has a short, **few celled stalk** by which it is attached with the base of antheridial chamber.
- The **jacket of the antheridium** is made up of **sterile cells**.
- Jacket is **single celled thick** and **multicellular**.
- Antheridium has large number of small cells, called **Androgonial cells**.
- An **oblique** or diagonal cell division takes place in each androgonial cell. Resulting, two **androcytes** or **antherozoid mother cells** (Sperm mother cells) are formed.
- Each **androcytes** converts into a **male gamete** (elongated nucleus present) or **antherozoids** by metamorphosis.
- These antherozoids are **motile** male gametes.
- The are **comma** like or **curve** shaped and **biflagellate**. (In **Marchantia** rod like and biflagellate.)



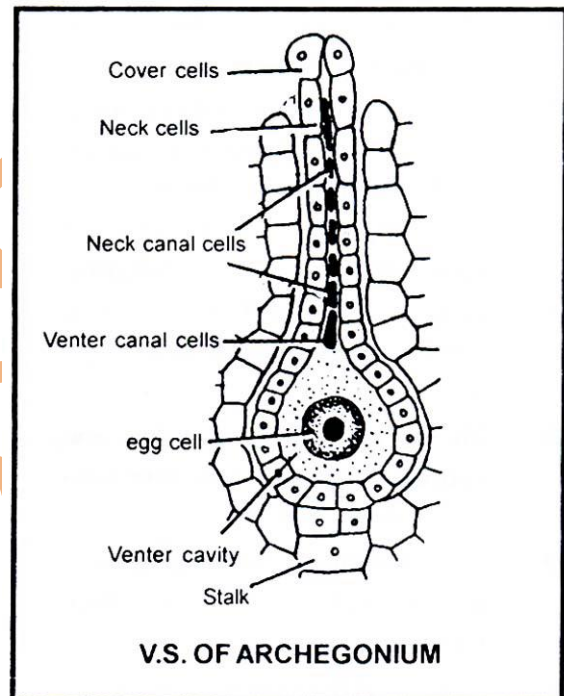
Note : Most of the species of **Marchantia** are **dioecious** or **heterothallic**.

- At the maturation of antheridium **cell wall of the androcytes** dissolves during metamorphosis and mucilage is formed.
- It is **hygroscopic** in nature.
- The apical cells of **Antheridial Jacket** absorbs water by imbibition from the antheridial chamber. Resulting, a pressure increase on the apical region of antheridium and the **Jacket bursts at the apex** then antherozoids come out with mucilage.
- On coming in contact with water, the **antherozoids swim freely** with the help of their flagella.

Dehiscence of antheridium takes place in the presence of high amount of water, is called **Hydrochasy**.

[ii] Archegonium :

- A mature archegonium is **flask shaped** structure and enclosed in **archegonial chamber**.
- It is attached with the base of archegonial chamber with the stalk.
- The basal swollen portion of archegonium is called **Venter**. The upper narrow tube like portion is termed **neck (sterile cell)**
- The archegonium has a **single layered jacket**.
- The jacket in the neck region is composed of **six vertical rows** of cells. In each vertical row 6 to 9 (**mainly 6**) **neck cells** are present.
- Venter region contains **two cells**. A large cell which is termed **egg** or **oosphere** and above the oosphere is a small **venter canal cell**.
- The neck region has **4(mainly) – 6 neck canal cells**. (In **Marchantia** 4-8 N.C.C.)
- The **four** terminal cells of jacket of the neck of archegonium function as **cover-cells**.



FERTILIZATION ::

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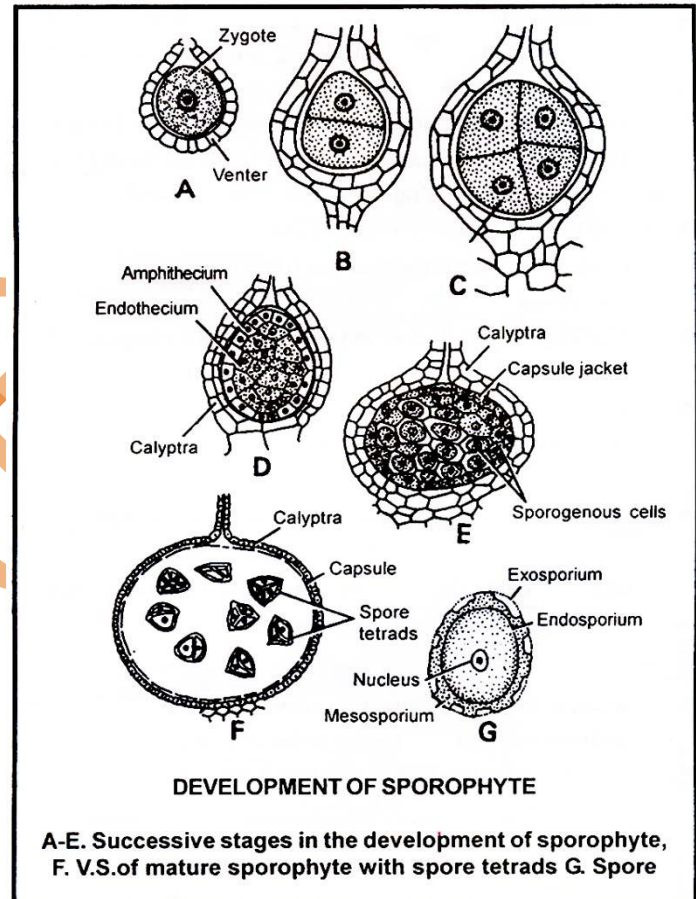
- When archegonium is fully mature, the **neck canal cells** and **venter canal cells** of archegonium **degenerate**.
- Only one cell remains which is called **egg cell**.
- Disintegration of the cells give rise to **mucilaginous substance**.
- Mucilage is **hygroscopic** in nature. It absorbs water, results increase a pressure in archegonium and consequently the **cover cells of archegonium separate from each other** and forming funnel shaped opening and the mucilage oozes out.

- **Inorganic potassium salts** and **soluble protein** are present in mucilage which attracts the **antherozoids**.
- Antherozoid shows **chemotactic** movement.
- Due to this chemotactic response many **antherozoids** enter into the neck of archegonium. But eventually only **one antherozoid** fuses with the **egg cell** and other perish.
- Now fertilized egg cell is called **Zygote** which is **diploid** structure.

DEVELOPMENT OF SPOROPHYTE ::

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- Development of zygote takes place **only inside archegonium**.
- Zygote is the **first cell of sporophytic generation**.
- The first division is **transverse** in zygote and second one is perpendicular to the first one while the third division is vertical which give rise to **8-celled-embryo [octant]**.
- Subsequent division occur in all **possible planes** until a mass of 20-40 cells is formed.
- The superficial cells of this mass now undergo **periclinal division**, resulting in an **outer amphithecium** layer and a **central mass of cells, the endothecium**.
- The cells **amphithecium** divides again and again **anticlinically** to form the **wall of sporogonium**. It is **single layered**.
- **Endothecium** acts as a **archesporium**.
- The cells of **endothecium** divides in all planes, resulting, a mass of cells (**sporogenous tissue**) is formed. It has two types of cells.
 - (i) **Sporocytes** or **spore mother** cells and
 - (ii) **Nutritive cells** or **Nurse cells. (Prestructure of elaters)**



Note : In **Marchantia** nurse cells are transform into **elaters (2N)**. Elaters are hygroscopic in nature and help in dispersal of spores.

- The nurse cells provide nutrition to the sporophytes. (In **Riccia**)

- ☛ One **periclinal division** takes place in the cells of **venter region** during the development.
- ☛ Due to this bilayered covering is formed around the **sporogonium**. It is termed **calyptra**.
- ☛ Calyptra is **haploid**. Because, it is formed by venter region of archegonium.
- ☛ **The cell wall of sporogonium and sporocytes or spore mother cells are diploid.**
- ☛ Now, **meiotic** cell division takes place in spore mother cells, results, **haploid spores** are formed.
- ☛ Now wall of sporogonium disintegrates, to provide nutrition to the spores.
- ☛ Later inner most layer (wall) of Calyptra also breaks down to provide additional nourishment.
- ☛ In mature sporophyte spore **tetrads** lie in a cavity enclosed by a **single layered calyptra**.
- ☛ All the structures in capsule are Diploid except spore.
- ☛ The sporophyte of Riccia is simplest in **Bryophyta**. It is made up of **only capsule**.
- ☛ The sporophyte is **devoid of foot and seta**.
- ☛ In **Marchantia** sporophyte is differentiated into Foot, Seta and Capsule.

DEHISCENCE OF CAPSULE / DEHISCENCE OF SPORE SAC ::

- ☛ There is no special means of dehiscence of capsule of **Riccia**.
- ☛ The liberation of the spores is brought about **by the death and decay of capsule and thallus**.

STRUCTURE OF SPORE ::

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- ☛ Spore is the **first cell** of the **gametophytic generation**.
- ☛ The spores are arranged in **tetrahedral tetrad**.
- ☛ The spores of Riccia are **uninucleate, pyramidal and rough**. Their diameter is 0.05 mm to 0.12 mm.
- ☛ The spore wall is tri-layered.
 - Outer layer or Exospore or Exosporium** : It is **thick and spiny**. It is made up of **callose and cutin**.
 - Middle layer or Mesospore or Mesosporium** : It is thick and solid. It is composed of **Cutin**.
 - Innermost layer of Endospore or Endosporium** : It is **thin and elastic**.
It is composed of **pecto-cellulose**. These layer are developed in centripetal order.
- The spores germinate when there is **enough water** in the soil and **new thallus** is formed.

LIFE CYCLE ::

- ☛ **Haplo-diplotic** type alternation of generation is found in **Riccia**.
- ☛ **Sporophyte of riccia** completely depend upon **gametophyte for nutrition and shelter**.

Note : [In **haplo-diplontic** alternation of generation a **dominant, independent, photosynthetic, thalloid** or erect phase is represented by a **haploid gametophyte** and it alternates with the **short, lived multicellular sporophyte** which is totally (eg., Riccia) or partially dependent (eg., Funaria) on the gametophyte for its **anchorage and nutrition.**]

- Haplo-diplontic type of alternation of generation is found Bryophytes.

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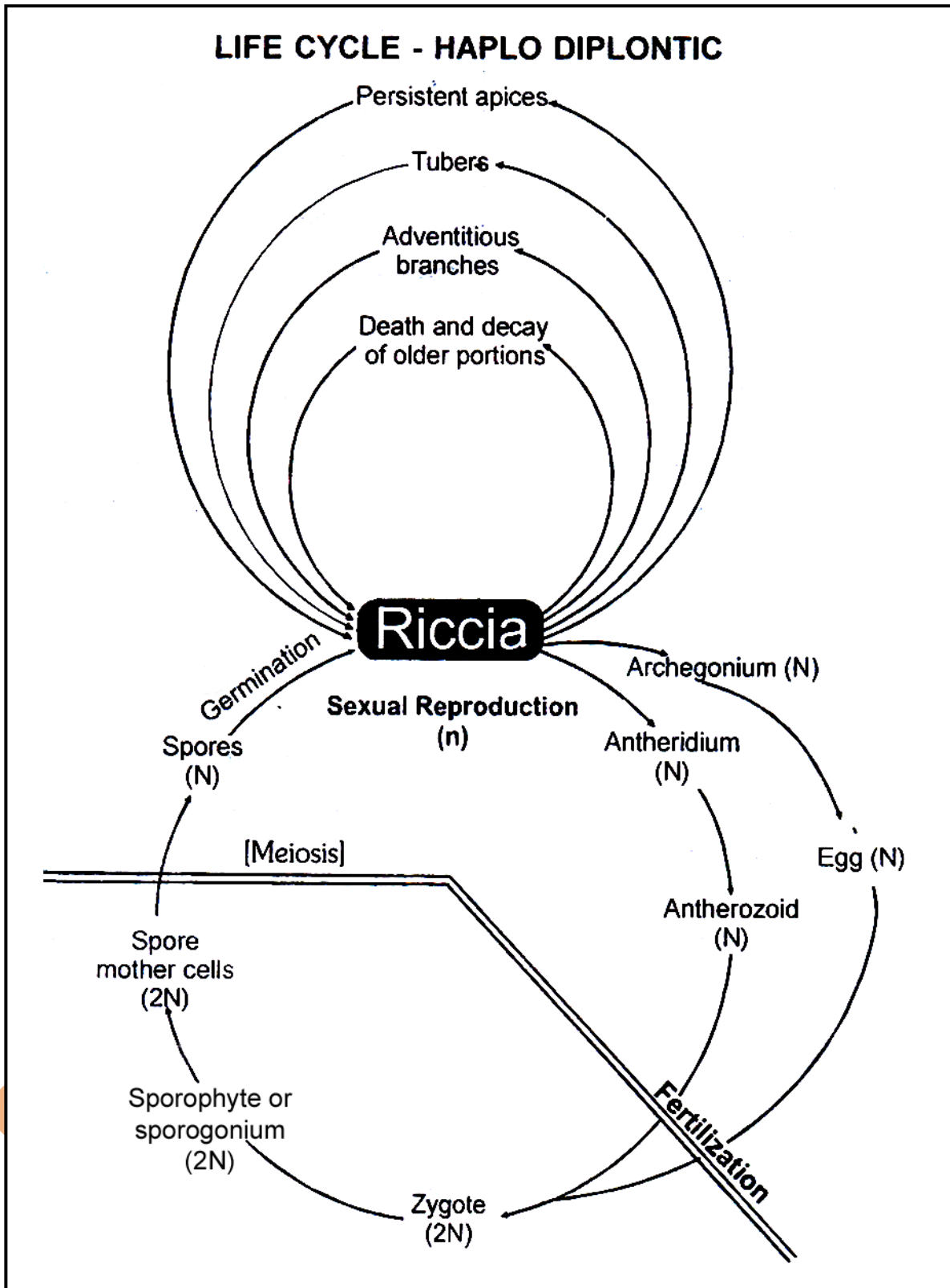
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LIFE CYCLE - HAPLO DIPLONTIC



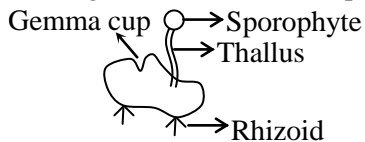
- Q.1** *Riccia* is a liverwort due to its-
- (1) Use in liver disease
 - (2) Liver like colour
 - (3) Shape
 - (4) Cause of liver disease
- Q.2** How does the dehiscence of sporogonium and dispersal of spores occur in *Riccia*.
- (1) By internal pressure of elaters
 - (2) By death and decay of thallus and sporogonium and external pressure on calyptra
 - (3) By peristome teeth and seta
 - (4) By shrinking of annulus and dehiscence of capsule
- Q.3** Scales on margins of *Riccia* are arranged in -
- (1) Basipetal order
 - (2) Acropetal order
 - (3) Scattered
 - (4) None of the above
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- Q.4** Which of the following type of scales are found in *Riccia*-
- (1) Multicelled and ligulate
 - (2) Multicelled and appendiculate
 - (3) Unicelled and appendiculate
 - (4) Unicelled and ligulate
- Q.5** In which of the following, sporogonium is having nurse cells-
- (1) *Porella*
 - (2) *Anthoceros*
 - (3) *Riccia*
 - (4) *Marchantia*
- Q.6** Rhizoids of *Riccia* are-
- (1) One type and scattered
 - (2) One type and arranged in rows
 - (3) Two types and scattered
 - (4) Two type and arranged in rows
- Q.7** Vegetative propagation is most common in -
- (1) Fern sporophyte
 - (2) Fern gametophyte
 - (3) *Riccia* gametophyte
 - (4) *Riccia* sporophyte
- Q.8** Where do air chambers occur in *Riccia*-
- (1) Storage region
 - (2) Assimilatory zone
 - (3) Both (1) and (2)
 - (4) Below the lower epidermis
- Q.9** Rosette habit of *Riccia* is due to-
- (1) Dichotomous branching
 - (2) Sympodial branching
 - (3) Monopodial branching
 - (4) Assymetrical branching
- Q.10** How many antherozoids are produced from an Androgonial cell in *Riccia*-
- (1) One
 - (2) Two
 - (3) Three
 - (4) Four
- Q.11** What type of sexual reproduction occurs in *Riccia*-
- (1) Isogamous
 - (2) Anisogamous
 - (3) Oogamous
 - (4) Conjugation
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- Q.12** The gametophytic phase of *Riccia* ends with-
- (1) Gamete
 - (2) Spore mother cells
 - (3) Spore
 - (4) Oospore
- Q.13** Aquatic *Riccia* are-
- (1) Free floating
 - (2) Submerged
 - (3) Amphibians
 - (4) Suspended
- Q.14** Spores release from sporogonium in *Riccia* take place in-
- (1) Dry-season
 - (2) Wet-season
 - (3) High temperature
 - (4) Low temperature
- Q.15** Cells of calyptra and wall of sporogonium in *Riccia* are respectively-
- (1) Diploid, Diploid
 - (2) Haploid, Haploid
 - (3) Triploid, Triploid
 - (4) Haploid, Diploid
- Q.16** Sex organ in *Riccia* develop on-
- (1) Dorsal surface in acropetal order
 - (2) Dorsal surface in basipetal order
 - (3) Ventral surface in acropetal order

- (4) Ventral surface in basipetal order
- Q.17** Which statement/s is/are true-
- (1) In *Riccia*, sporophyte is made up of only capsule
 - (2) In *Riccia* thallus rhizoids are present on ventral (adaxial) surface
 - (3) Six to eight cells are present in the axis of archegonium of *Riccia*
 - (4) All of these

- Q.18** In dry weather, *Riccia* survives in form of-
- (1) Tubers
 - (2) Persistent apices
 - (3) Spores
 - (4) All the above

- Q.19** At the time of fertilization, how many cell/cells is/are present in the axis of archegonium of *Riccia*-
- (1) One
 - (2) Two
 - (3) Three
 - (4) Four

- Q.20** Given diagram related to which plant group :



- (1) Thallophyta
- (2) Pteridophyta
- (3) Bryophyta
- (4) Gymnosperm

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- Q.21** During formation of calyptra jacketed cells divided by-
- (1) Periclinal division
 - (2) Anticlinal division
 - (3) Both (1) and (2)
 - (4) Diagonal division

- Q.22** In which of the following groups would you place a plant which produces spores and embryos but lacks seeds and vascular tissues-
- (1) Bryophytes
 - (2) Pteridophytes
 - (3) Gymnosperms
 - (4) Fungi

- Q.23** In aquatic *Riccia*-
- (1) Rhizoids absent
 - (2) Scales poorly developed or absent
 - (3) Air canals more developed
 - (4) All the above

- Q.24** Which characteristic assign *Riccia* to bryophyte-
- (1) Depended sporophyte
 - (2) Plant body thallus

- (3) Free gametophyte
- (4) Non vascular

- Q.25** In the life cycle of *Riccia* from 20 Androgonial cells, how many antherozoids will be formed-

- (1) 10
- (2) 20
- (3) 40
- (4) 80

- Q.26** Which structure protects apical meristem in *Riccia* -

- (1) Apical notch
- (2) Scales
- (3) Primordial leaves
- (4) Position of sex organ

- Q.27** Which species of *Riccia* reproduces by Persistent apices-

- (1) *R. glauca*
- (2) *R. curtisi*
- (3) *R. bischoffii*
- (4) *R. discolor*

- Q.28** The cell walls of mature spores in *Riccia* have

- (1) One layer
- (2) Two layer
- (3) Three layer
- (4) None of these

- Q.29** If '6' chromosomes are present in each cell of the spore tetrad of *Riccia*. How many chromosomes should be present in the cells of apical cell and calyptra? Respectively-

- (1) 6 & 12
- (2) 6 & 6
- (3) 12 & 6
- (4) 3 & 6

- Q.30** Bryophytes grow in moist and shady environments because-

- (1) They cannot grow on land
- (2) They requires water for fertilization
- (3) They lack vascular tissue
- (4) They lack roots and stomata

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- Q.31** What is the function of the Ventral scales of *Riccia*-

- (1) Fixation
- (2) Absorption and protection
- (3) Protection
- (4) Perennation and protection

- Q.32** In *Riccia*, stomata are found on-

- (1) Dorsal assimilatory region
- (2) Sporangium

- (3) Ventral scales
- (4) No where on *Riccia*

- Q.33** Violet colour of scales of *Riccia* is due to-
- (1) Presence of anthocyanin pigment in cytoplasm
 - (2) Presence of anthocyanin pigment in cell sap
 - (3) Presence of anthocyanin pigment in chloroplast
 - (4) None of the above

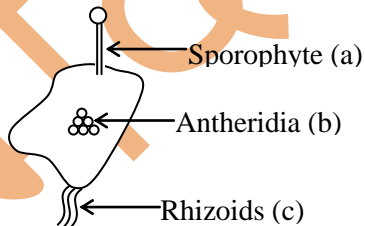
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- Q.34** In *Riccia*, what is the first and last stage of gametophytic generation-
- (1) Gamete and spore
 - (2) Spore and gamete
 - (3) Spore mother cell and zygote
 - (4) Sporocyte and gamete

- Q.35** The gametangia of *Riccia* are present in -
- (1) Dorsal side
 - (2) Ventral side
 - (3) Dorsal surface in medium groove
 - (4) Any where in the thallus

- Q.36** In the life cycle of *Riccia*, the stage in which meiosis occurs is-
- (1) Sporogonium
 - (2) Oospore
 - (3) Spore mother cell
 - (4) Gamete formation

- Q.37** Given a picture of Bryophyte. The correct ploidy levels of the indicated structure are-



- (1) (a) ; 2N (b) ; N (c) ; N
- (2) (a) ; N (b) ; N (c) ; N
- (3) (a) ; N (b) ; 2N (c) ; 2N
- (4) (a) ; 2N (b) ; N (c) ; 2N

- Q.38** Conducting tissue in *Riccia* is made up of-

- (1) Parenchyma
- (2) Collenchyma
- (3) Xylem and Phloem
- (4) Thick walled cells

- Q.39** The nature of movement of antherozoids in *Riccia* is-
- (1) Phototactic
 - (2) Chemotactic
 - (3) Chemotropic
 - (4) Chemonastic

- Q.40** The simplest sporophyte among bryophyte is of-
- (1) *Riccia*
 - (2) *Marchantia*
 - (3) *Anthoceros*
 - (4) Moss

- Q.41** In *Riccia*, the shape of antheridium is-
- (1) Pear-shaped
 - (2) Spherical
 - (3) Conical shaped
 - (4) Flask-shaped

- Q.42** *Riccia* and other bryophytes differ from algae in-
- (1) Discoidal chloroplast and absence of pyrenoids
 - (2) Jacketed gametangia and sporangia
 - (3) Mitotic development of Oospores into embryo
 - (4) All of these

- Q.43** In *Riccia*, what is first cell of a gametophytic and first cell of a sporophytic generation respectively-
- (1) Gamete and spore
 - (2) Spore and Oospore
 - (3) Oospore and Spore
 - (4) Spore and gamete

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- Q.44** In *Riccia*, reduction division take place in-
- (1) Archegonium
 - (2) Antheridium
 - (3) Capsule
 - (4) Rhizoids

- Q.45** *Riccia* is a bryophyte because-
- (1) It occurs mostly on land and have motile sperm
 - (2) It has heteromorphic alternation of generation
 - (3) It has multicelled sex organ with a jacket of sterile cells
 - (4) Sporophyte depends upon gametophyte

- Q.46** The positive evidence of aquatic ancestry of Bryophyte is-
- (1) Their green colour
 - (2) Thread like protonema
 - (3) Flagellated antherozoids
 - (4) Some bryophytes are still aquatic
- Q.47** What is the most common method of vegetative reproduction of *Riccia*-
- (1) Fragmentation
 - (2) Formation of adventitious buds
 - (3) Progressive death and decay of older parts of the cells
 - (4) Tuber formation
- Q.48** The assimilatory tissue of *Riccia* thallus is made up of-
- (1) Assimilatory filaments
 - (2) Spongy mesophyll
 - (3) Palisade tissue
 - (4) Both (2) and (3)
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- Q.49** Exchange of gases into assimilatory region occurs via-
- (1) Stomata
 - (2) Air pores
 - (3) Lenticels
 - (4) All of these
- Q.50** Which structures causes apical growth in *Riccia*?
- (1) Promeristem
 - (2) Procambium
 - (3) Transverse row of apical cell
 - (4) All of these
- Q.51** The neck canal of *Riccia* archegonium is filled up with-
- (1) 2-cells
 - (2) 4-6 cells
 - (3) 6-12 cells
 - (4) 24 cells
- Q.52** Sporophyte of *Riccia* possess-
- (1) Foot and Seta
 - (2) Foot and capsule
 - (3) Foot, Seta and Capsule
 - (4) Capsule only
- Q.53** The sporophyte is completely dependent on gametophyte in-
- (1) *Riccia*
 - (2) *Pteris*
 - (3) *Cycas*
 - (4) *Pinus*
- Q.54** Calyptra is a structure-
- (1) Formed of the venter of archegonium
 - (2) Formed at the base of antheridium
 - (3) Formed in the center of the capsule
 - (4) Formed at the base of leaves
- Q.55** The rhizoids of *Riccia* are-
- (1) Unicellular and coloured
 - (2) Unicellular and colourless
 - (3) Multicellular and Green
 - (4) Multicellular and Brown
- Q.56** The shape of apical cell in *Riccia* is-
- (1) Pyramidal
 - (2) Tetrahedral
 - (3) Sclerenchyma
 - (4) All of these
- Q.57** Storage region in *Riccia* is made up of-
- (1) Collenchyma
 - (2) Parenchyma
 - (3) Sclerenchyma
 - (4) All of these
- Q.58** The spores from *Riccia* capsule are released-
- (1) Through stomium and annulus
 - (2) Through transverse slit
 - (3) Through vertical slit
 - (4) On decay of thallus
- Q.59** The jacket of antheridium in *Riccia* is made up of -
- (1) One layer of three cells
 - (2) One layer of many cells
 - (3) Two layer of many cells
 - (4) Many layer of many cells
- Q.60** Shape of chloroplast in assimilatory zone of *Riccia* is-
- (1) Girdle shaped
 - (2) Spiral

(3) Discoidal (4) Cake like

(3) Rhizome (4) Persistent apices

Q.61 Photosynthetic filaments occur in-
[RPMT 2000]

- (1) *Nostoc* (2) *Chlamydomonas*
(3) *Phytophthora* (4) *Riccia*

Q.66 An order of development of structures successively towards the apex, the oldest at the base and youngest nearest the apex called as-

- (1) Acropetal (2) Basipetal
(3) Both (1) and (2) (4) None of these

Q.62 Which type of rhizoids are presents in *Riccia* [RPMT 2002]

- (1) Unicellular and smooth
(2) Multicellular and smooth
(3) Unicellular, smooth and tuberculated
(4) Multicellular smooth and tuberculated

Q.67 An order of development of organs in which the youngest structures are at the base and the oldest at the apex, called as-

- (1) Acropetal (2) Basipetal
(3) Both (1) and (2) (4) None of these

Q.63 *Antherozoids* of *Riccia* are - [RPMT 2003]

- (1) Long, curved and multiflagellate
(2) Small and non-filagellate
(3) Small, curved (comma shaped) and biflagellate
(4) Rod shaped and biflagellate

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Q.64 Sporophyte of *Riccia* is- [RPMT 2005]

- (1) Saprophyte (2) Partial parasite
(3) Complete parasite (4) None of these

Q.65 A student came from U.P. to Rajasthan to study on *Riccia discolor* a species of *Riccia* found in dry habitat. When dry season becomes start he observed, a mass of multicellular structure is formed, due to fast division of apical cell of the apex of every branch, in which food materials stored and develop a thick protective layer around it after degeneration of marginal cell. This perennating body called as-

- (1) Rhizoids (2) Tuber

Answer Key

RICCIA											EXERCISE				
Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	3	2	2	1	3	3	3	2	1	2	3	1	1	2	4
Ques.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	1	4	4	1	3	1	1	4	1	3	2	4	3	2	2
Ques.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	2	4	2	2	3	3	1	1	2	1	1	4	2	3	4
Ques.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	3	3	1	2	3	2	4	1	1	2	1	2	4	2	3
Ques.	61	62	63	64	65	66	67								
Ans.	4	3	3	3	2	1	2								

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