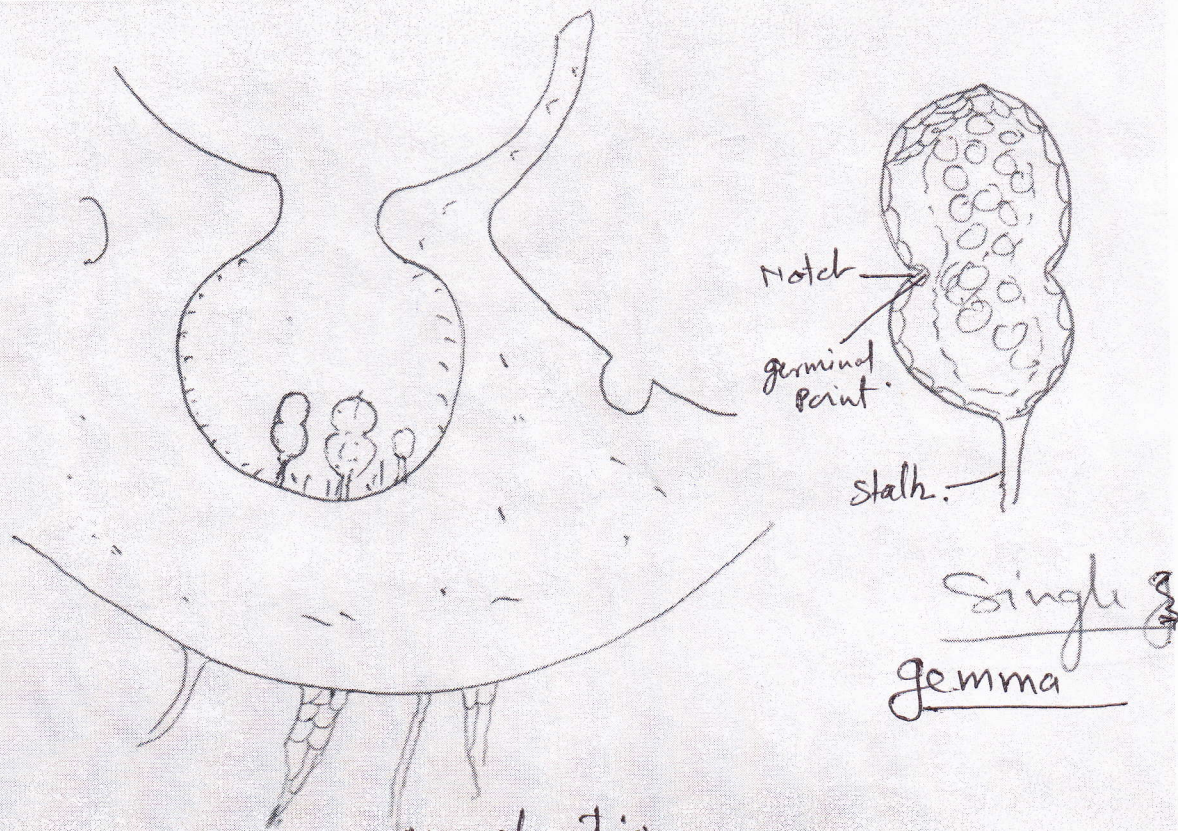
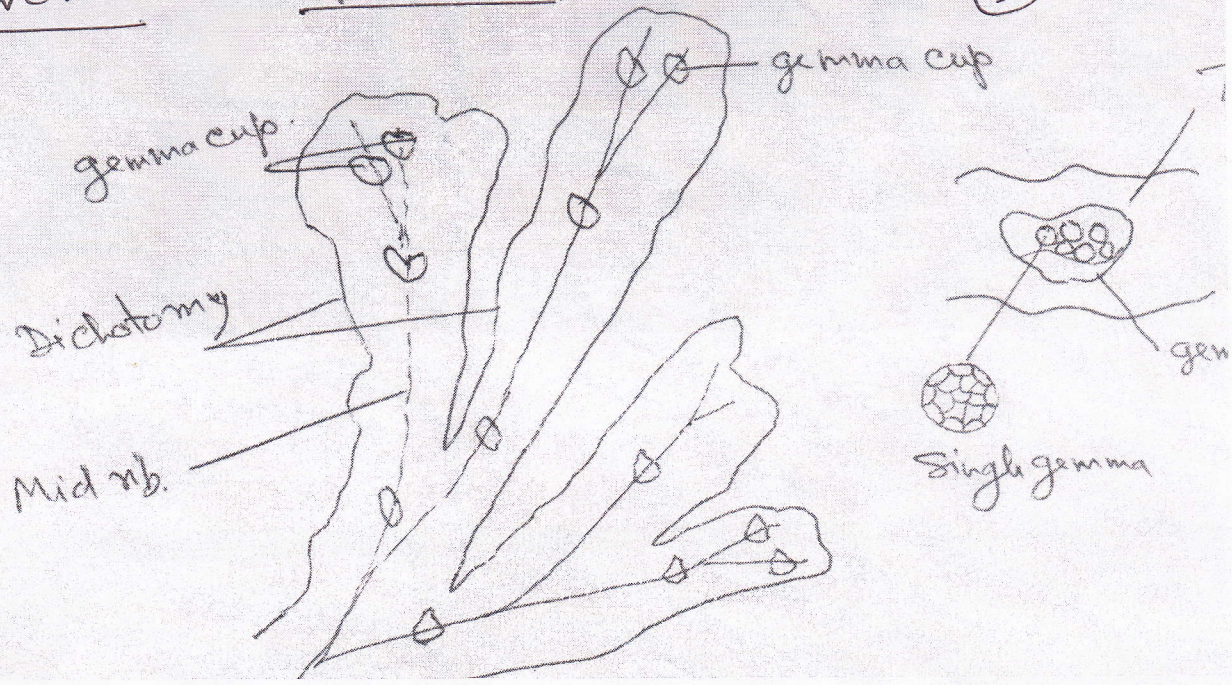


Q. 2 - Answer -

Section - B.

(2)



V.T.S Thallus of Marchantia
Showing gemma cup.

Asexual reproduction - "A sexual or 1
reproduction takes place through the
propagules called 'gemmae' or 'gemmae'.

(ii) These gemmae occur in a cup (gemma cup)

(iii) At the base of gemma cup numerous mucilaginous papillae are present and in between these papillae ~~is~~ biconvex discoid gemmae are attached through a small stalk which is called.

Gemmae - (i) Each gemma has two or three lateral notches. These notches denote the growing points

(ii) They ^(Gemmae) are multicellular in the centre and thin out towards the margin.

(iii) They possess chlorophyll and hence perform photosynthesis.

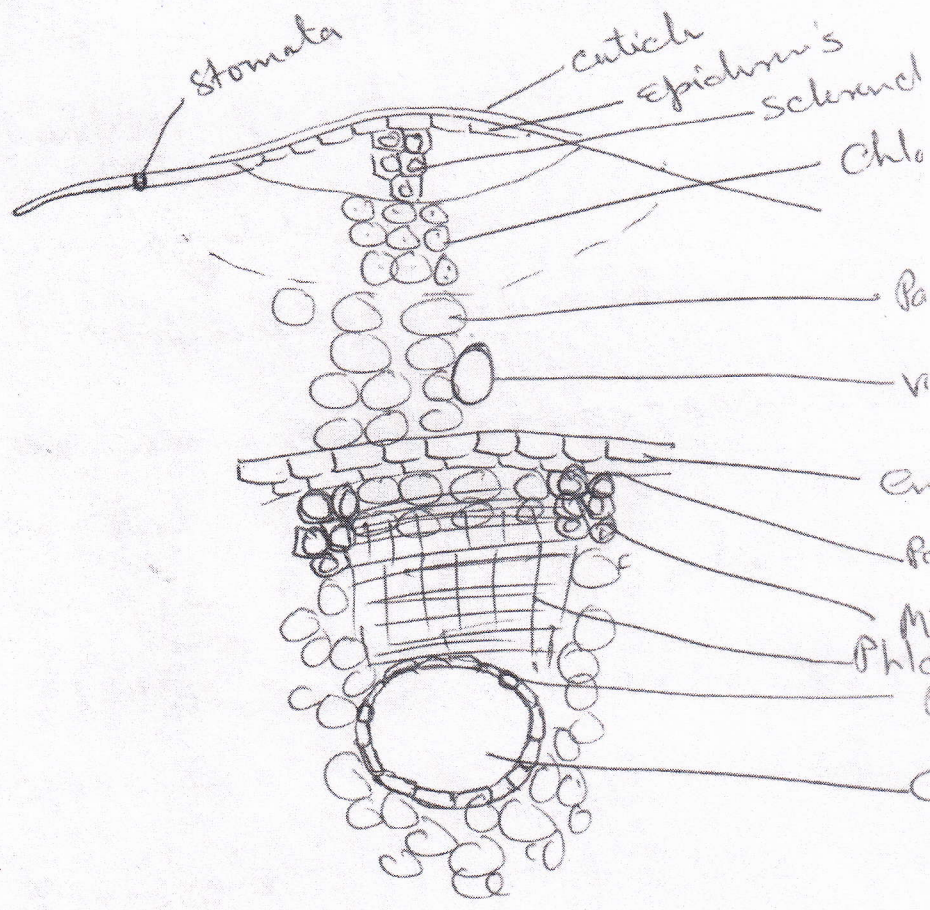
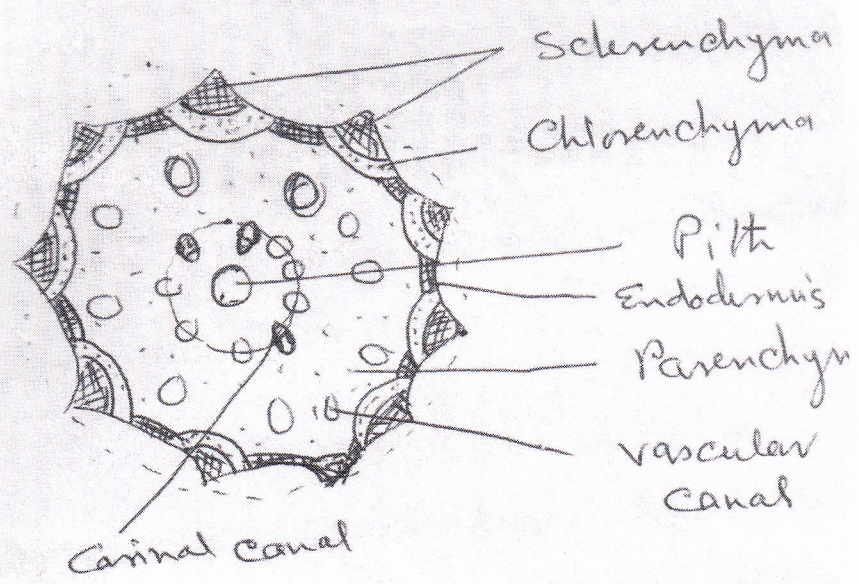
(iv) A few colourless cells are also present in the gemma which give rise to rhizoids.

(v) Due to expansion of mucilage the gemmae are detached from the parent and dispersed through the rain droplets.

(vi) After getting suitable substrate the growing points give rise to new gemmae which are separated due to d

Q. 3. Answer

Internal Structure



Equisetum
arvense

T.S. stem (cellular)

Q. - Ans - 4.

Apogamy

According to Winkler (1908) the apogamy may be defined as the formation of a sporophyte directly from the vegetative cells of the gametophyte without the act of syngamy or gametic union."

Thus, the apogamy is the development of an embryo from a cell of the gametophyte other than an egg-cell. The embryos formed from the gametophyte tissues developed into a sporophyte.

Apogamy is very common phenomenon in a number of ~~terrestrial~~ pteridophytes.

e.g. Selaginella, Marsilea

De Bary in 1878 proposed the term 'Apogamy'.

Farlow (1874) discovered that the cells of prothallus under artificial culture developed sporophyte without ~~sexual~~ fusion of male and female gametes.

The apogamy in artificial culture can be induced by reducing the water supply for fertilization in Lycopodium.

Other plants where apogamy induced in culture are

(a) Pteridium (b) Cytosium (c) Cheilanthes

Apogamy is a constant phenomenon in a number of ferns. It can be induced in cultural conditions, such as strong light, modified nutrient medium and insufficient water supply for fertilization.

Apospory

(6)

(2)

The phenomenon was first discovered by Druery (1884) as a natural phenomenon in Athyrium filix-femina var. clarissima

"Apospory is the production of a gametophyte directly from the vegetative cells of sporophyte without reduction division and spore formation".

Bower (1888) described both soral and apical apospory in two species of genus Trichomanes.

Farlow (1889) found apospory in Pteris aquilina.

Goebel (1905) reported it in Asplenium dimorphum.

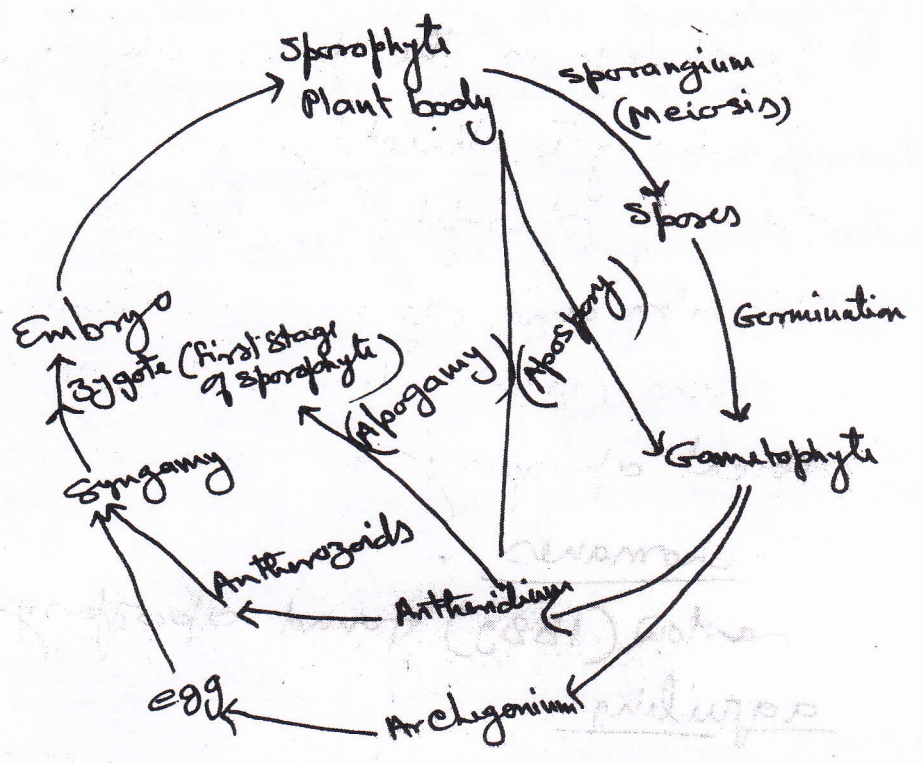
In apospory, a filamentous, or heart shaped gametophyte may be formed from one or more cells of any vegetative portion of a young or a mature sporophyte.

The structures taking part in apospory may be single cell of gametophytic nature, an antherogoid, an antheridium, a rhizoid or a gametophyte bearing reproductive organs.

In some forms prothallus develops on the under surface of leaf in place of spores.

A prothallus so formed bears antheridia and archegonia.

... it is not of constant nature in forms.



Q.S. Answer -

8

Economic Importance of Gymnosperms

Gymnosperms are an economically important group of plants spread all over the globe, primarily in the temperate regions and at higher elevations in the tropics.

The trees are used for landscaping, timber, building construction, resin and for the manufacture of paper and board.

They are also used in medicines, perfumes, varnishes and essential oils.

Wood - Abies alba general carpentry, sound boxes, paper pulp, boxes etc.

Other ^{major} trees are Agathis, Araucaria,

Cedrus, Cryptomeria, Cupressus, Juniperus

Pinus, Taxodium.

Resin - Rosin, Copal, Sandarac, Canadabalsam
Pinus and (Pinus sp.) (Agathis) (Callitris sp.) (Abies balsamea)
Amber are the products of Gymnosperms -

Essential oils - ~~the~~ Oil of Hemlock spruce obtained from
Tsuga canadensis

Fatty oils - Seeds of Torreya nucifera yield fatty oil which is edible

(9)

Paper - Picea, Larix, Abies, Pinus provide excellent quality of pulp.

The wood of Cryptomeria japonica yields Kraft paper.

Food - (1) Cycads are used as source of starch, either from seed kernels or from stem pith.
(2) Stem starch is known as 'sago' and is mainly obtained from Cycas circinalis.

Drugs - (1) The Alkaloid Ephedrine is extracted from the green branches of Ephedra sinica.
(2) The powdered stem of Cycas pectinata is used as a hair wash in Assam.
(3) The extract of leaves of Ginkgo biloba is useful in the treatment of cerebral insufficiency and vertigo.
(4) 'Taxol' is extracted from Taxus brevifolia and Taxus baccata.

Gymnospermous cones and leaves are used for decoration.
The famous Christmas tree is also belongs to Gymnosperm (Araucaria, Abies alba) etc.

Q. 6 (a) Answer —

Compressions : fossilized as Casts.

Coalified compression fossils are those in which bulk of plant material gets compressed in sediments. As additional sediments are added from above, water is squeezed out of the plant parts, they become more compact and

thus, a thin carbonaceous film corresponding to the original outline of the plant remains but an impression in which little or no cell

remains, we find in compression fossils cuticularized epidermal cells of various organs, spores, epidermal hairs and other cellular details. Thus, Compressions

in low heat and pressure, intercellular details such as microfibrillar organization of cell wall, Chloroplasts with grana, nuclei with chromatin and plasmodesmata have been observed with TEM. (Hiblas ^{et al} 1978).

Walton (1936) made the artificial compressions of plant parts. He compressed plants under hydraulic press after embedding them in mud and sand. He observed that ~~the~~ ^{while} vertical dimension of the organ got reduced, the horizontal dimension unaffected. He also observed that the upper face of the fossil was distorted, while the lower face remained unaffected.

Compressions are mainly formed in deltaic systems. Or they may also be formed in lagoons, swamps, ponds or other such situations.

The most well preserved plants are found in clay or shale. Sometimes compressions are also found in consolidated volcanic ashes.

Q. G. (b) Answer -

Petrifaction -

This is the first and the most informative mode of preservation.

Petrifactions are formed when plant parts are completely submerged in water bodies containing dissolved minerals.

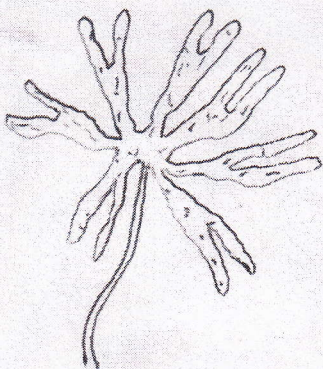
During their course of formation, various soluble minerals (silicates, carbonates and compounds) infiltrate the cells and intercellular spaces replacing the organic molecules and water. The precipitation of these minerals surrounding the cellular remains forms rock matrix. This precipitation of these salts takes place due to gradual evaporation of moisture from the swamps leading to supersaturation. Precipitation occurs when saturation point is reached.

Thus, A petrified plant fossil is a mass of plant tissues infiltrated with hard mineral substances so that most of the structure is preserved.

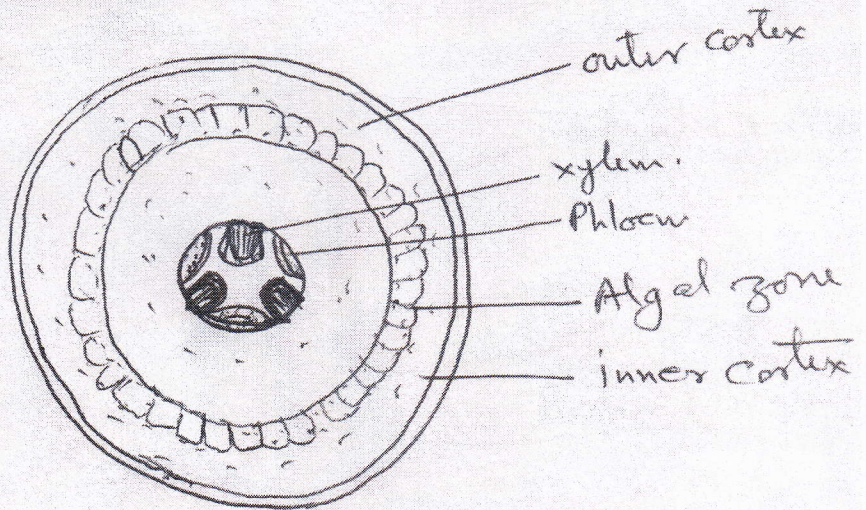
Petrifaction is readily produced

Q. Ans-7. Answer -

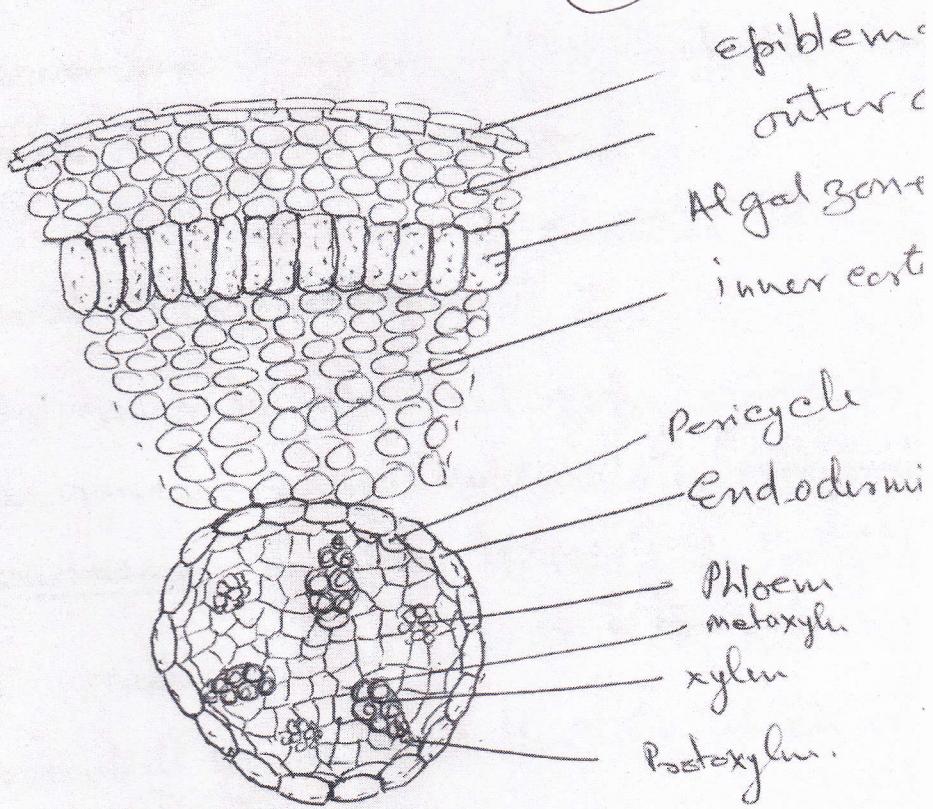
(b) Coralloid roots



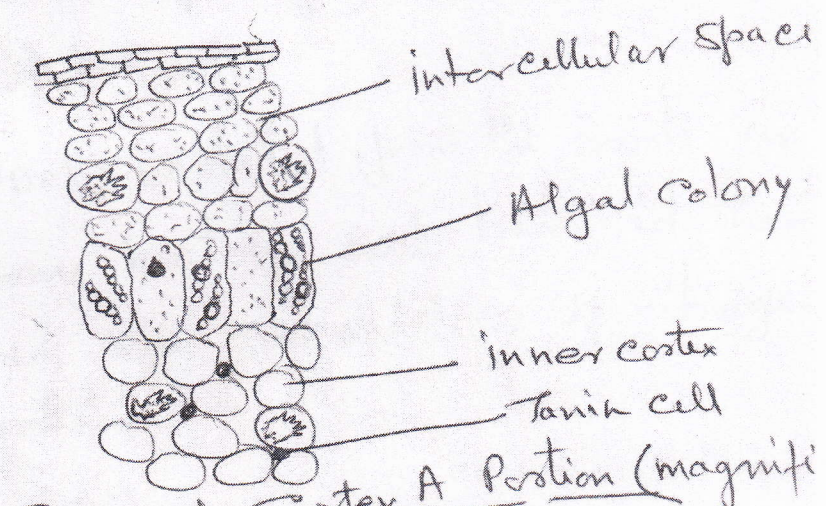
Coralloid roots



14



T.S. Coralloid root Cycas



Cycas root - Cortex A Portion (magnifi

Anatomy.

1. The anatomy of the coralloid root is to that of normal root.
2. In coralloid root the cortex is divi

- (3) → the outer most region of the root the c developed by cork cambium.
- (4) → the outer and inner cortical region comprised of parenchyma.
- (5) → the middle cortical zone consists blue green algal colonies of Anabaena cylindrica and is termed as algal
- (6) → the stele is diarch or tetrarch a surrounded by an endodermis which is by pericycle.
- (7) Schneider (1894) suggested a symbi association of alga and bacteria in coralloid root.
- (8) Life (1901) isolated from the roots an and some bacteria and believed them concerned with assimilation of nitrogen as aeration.

Economic Importance of Pteridophytes

- (1) Most of the Pteridophytes are used as ornamental plants in gardens and Hotels as indoor plants.
- (2) Various species of Lycopodium are used as hanging plants in gardens e.g. Lycopodium phlegmaria, L. squarrosum, L. juniforme, L. linifolium.
- (3) Genus Selaginella exhibits various shades and some of them e.g. S. willdenovii and shows bronze and blue colours of their leaves.
- (4) Selaginella serpens is well known for periodic changes in the colour of its leaves. On ^{the} leaves are bright green, during day they are pale and during night they again become green.
- (5) A few species of Selaginella, viz., S. selaginella and S. pilifera are sold as 'surnut' (~~is a plant~~) in the local market.
- (6) The plants of Equisetum, due to the presence of silica are rough in texture and are used for cleaning of dishes and Polishing.

(8) Some species of Equisetum are ind of mineral deposits in the soil.

(9) In Homeopathic system of medicine medicine named Lycopodium is also prep from the spores of Lycopodium sp. e.g. Dr spores of certain fern species / or to remove the worms from the intest

(10) → the stem of tree fern Cyathea (which are rare plants) are used as flower pots but now a days it is banned.

(11) Tubers of ~~Hepha~~ Hephaeopsis (A fern ^{urina} taken raw in the morning to remove ^{bl} stone.

(12) Young leaves of Pteris sp. ~~Waxia~~ are eaten vegetable in North-East India e.g Nagaland, Manipur, Meghalaya and Pradesh.

(13) Salvinia the water fern is ^{a weed and} grows in po causing lots of problem and known as obnox

14. Azolla, also known as water fern and rfc