# Quadrant II – Transcript and Related Materials

**Programme: Bachelor of Science (First Year)**

**Subject: Botany**

**Course Code: BOC-102**

**Course Title: Biodiversity-II (Pteridophytes, Gymnosperms, Angiosperms)**

**Unit: 1**

**Module Name: Sexual Reproduction of *Selaginella***

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**Notes**

**Spores: Two types of spores are there. They are :-**
**Microspores:-**

- The **microspores** are **small in size, 0.015 to 0.06 millimeters in diameter, spherical** or **round** in **shape** and **double layered structures.**
- The **outer wall** is **thick** and **known** as **exospore (exine).**
- While **inner wall** is **thin** and is called **endospore (intine).**
- **The haploid microspores on germination give rise to male prothalli or male gametophyte or microgametophyte.**

**Megaspores:-**

- **The megaspores are much larger than microspores, 1.5 to 5 millimeter in diameter, tetrahedral in shape and show triradiate ridge.**
- **The megaspore has three wall layers namely exospore, mesospore and endospore.**
- **On germination, the haploid megaspore develops into the female prothalli or Female gametophyte or megagametophyte.**

**Gametophytic Generation:**

- The **development** of **male** and **female gametophytes** (**prothalli**) takes place from the **haploid microspores** and **megaspores** respectively i.e., **microspores** and **megaspores** are the **unit of male** and **female gemetophytes**, respectively.

- The **development** of **microspores** and **megaspores** generally **starts inside** their respective **sporangia**. Therefore, the **spores** are shed at **multicellular stage**.
- **Gametophytes** produce **gametes** (**eggs** and **sperm**) that **fuse**, **giving rise** to the **sporophyte generation**.
- In *Selaginella*, **male** and **female prothalli** are formed and confined within the **spore walls**.
- The **spores** are formed in **sporangia** which are **1-celled, sub-globose,** and **solitary**.
- **Male gametophyte** develops within the **microspore** wall.
- **Male gametophyte develops antheridia** which **produces antherozoids**.
- The **antherozoids** are **free swimming type**, **spirally coiled** and **biflagellate**.
- **Megaspores** are large in size, 1-4 numbers, **germinates** into **female gemetophyte**.
- **Female gametophyte** produces **archegonia** which **produces eggs**.
- These **reproductive structures** after **fertilization** produces **zygote** (2x) which **again on germination** gives rise to a **sporophytic plant (2x).**
- The **young sporophyte** remains **attached** to the **megaspore** for some time later **falls** to the **ground** and form **roots** and become **independent.**
- In this way the **sporophytic** and **gametophytic generations alternate with each other** although the **sporophytic phase** is **dominant** over **gametophytic phase.**

**Structure of Mature Archegonium:**

- The **archegonium** is a **short flask shaped structure embedded** in **female gametophytic tissue** (Fig. 16 H).
- Only the **upper tier** of **neck cells projects out**.
- **Each archegonium consists** of a **short neck** of **2 tiers of 4 cells each** and **a broad venter**.
- The **four cells** of the **upper tier of neck function** as **cover cells.**
- The **neck** encloses a **single neck canal cell** and the **venter** consists of a **ventral canal cell** and an **egg** (Fig. 16 G).
- There is **no definite wall** of **venter**.
- At **maturity** the **neck canal cell** and **the ventral canal cell disorganize** and **absorb water** which creates a **pressure** to **separate apart the cover cells** through which the **antherozoids enter** the **archegonium** and reach the **egg**.

**Fertilization:**

- The **mature archegonia** are **embedded** in the **gametophytic tissue**.
- The **ventral canal cell** and the **neck canal cell degenerate** leaving only the **egg**.
- **Fertilization** may take place when the **mega-gametophytes** are on the **soil** or when they are still **within** the **mega-sporangia**.
- **Water** is necessary to carry out the **process** of **fertilization.**
- **The swimming antherozoids reach the egg through the neck of archegonium and the nucleus of antherozoid fuses with the egg nucleus thus forming a zygotic nucleus.**
- **The fertilized egg secretes a wall around it forming a diploid structure known as zygote or oospore (2x).**
- **Thus the gametophytic generation ends and the initial stage of new sporophytic generation is formed.**
- **In some species e.g. *S. intermedia* the egg develops into embryo without fertilization.**

  **This phenomenon is known as parthenogenesis.**