

**Topic: Heterospory and Evolution of Seed Habit**

**B.Sc. Botany (Hons.) I**

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### **Heterospory and Evolution of Seed Habit**

Heterospory is a very prominent feature found in *Selaginella*. It is a condition in which two types of spore produced. The spores different in size, shape and in developmental processes. The smaller spore is microspore and the larger spore is megaspore. The occurrence of two different types of spores is also seen in *Isoetes*, *Marselia*, *Azolla*, *Salvinia* and some other pteridophytes.

The differentiation of spores in size is certainly related to the distinction of sex of gametophyte. On germination the microspore gives raise male (micro) gametophyte while the megaspore produces female (mega) gametophyte. The male gametophyte is antheridium which produces antherozoids whereas the female gametophyte is archegonium which produces the egg.

#### **Origin of Heterospory**

On the basis of palaeobotanical evidence and experimental results it has been suggested that heterospory arose as a result of the disintegration of certain number of spores and consequent better nutrition of surviving ones. On the basis of fossil records of *Equisetales* Scott (1925) the process of heterospory giving more rapidly in some sporangia and may ultimately have rendered possible the exercise development of those spores that survived and that resulted in the development of megaspore.

The experimental observations have found that nutritional factor is mainly responsible for heterospory. Gowel has found that if the photosynthetic activity in *Selaginella* is retarded by growing it under feeble light condition the strobilus will produce only microspores.

### **Importance of Heterospory**

It has a great biological importance on account of the facts that-

- The megaspore containing mega gametophyte takes its nutrition from sporophyte showing it's independently.
- The megaspore begins its germination inside the megasporangium into the female gametophyte.
- The microspore germinates into male gametophyte while it is enclosed within the macrosporangium.
- The adaptation of heterospory of the differentiation of megaspore and its germination into female gametophyte led to the phenomenon of seed habit in gymnosperms and angiosperms.

### **Evolution of seed habit**

*Selaginella* resembles with higher plants in the evolution of habit. The heterosporous condition bearing microspores and megaspores is a prominent feature of *Selaginella* which shows remarkable approach to the seed habit.

- Production of two types of spores.
- The germination of megaspore within the megasporangium shows a close resemblance to the corresponding stage in certain *Coniferales*.
- The arrangement of sporophyte in strobilus and the position of sporangia are directly comparable to the strobilus of *Coniferales*.
- The gametophytic generation is very much reduced and the male gametophyte is reduced to single cell, which resembles to *Pinus*.
- The gametophyte is dependent on sporophyte for nutrition.
- The gametophytes are dioecious and produce only one kind of gamete as in *Coniferales*.

- The new sporophyte develops from one to two cells resulting from the first division of oospore which resembles higher plants.
- The formation of suspensor from epibasal cell of oospore is a character which shows resemblance to the higher plants.
- The homologies between the female gametophyte of *Selaginella* and spermatophyta (Gymnosperms) are as follows-

**Selaginella**

**Gymnosperm**

Megasporangium

Nucellus of ovule

Megaspore

Megaspore

Mega gametophyte

Endosperm

Egg

Egg

- The plant is differentiated into root, stem and leaf and containing vascular tissue in the centre are also the characters of higher plants.

Thus find that *Selaginella* shows remarkable approach to the seed habit and resembles the higher plants.

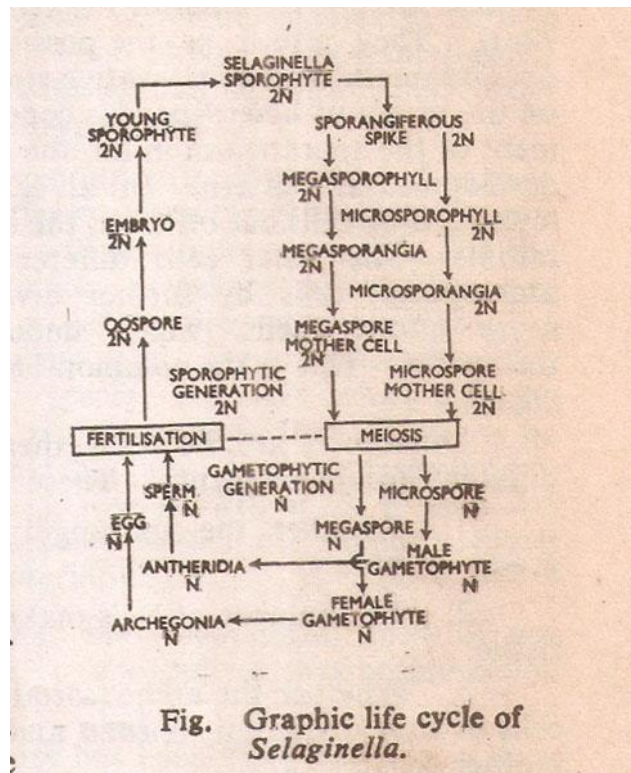


Fig. Graphic life cycle of *Selaginella*.