Hello students I'm Dr. Maria Cineola Fernandes, Assistant Professor in Botany, St. Joseph Vaz College Cortalim, Goa. Welcome to the program Bachelor of Science, subject botany semester one, Course title BOC-101, Course code- BOC-101, Course title- Biodiversity I which includes microbes, algae, fungi, and bryophytes.

Title of the unit is Bryophyta, Module name, Reproduction in *Funaria* – sexual method. In this module we will study the sexual reproduction in *Funaria*. By the end of this module, you will be able to describe the structure of antheridium, structure of archegonium, explain the fertilization, development of sporophyte and explain the dehiscence of capsule and dispersal of spores. You will be able to explain the germination of spores and development of primary protonema.

Students now we will study the Sexual reproduction in *Funaria*.

Funaria is autoicously monoecious.
What do you mean by autoicously monoecious?
In this, the male reproductive structure that is known as the antheridium and female reproductive structure, which is known as the archegonium. They are present on the separate shoots of the same plant. OK, so this is known as autoicously monoecious.

Now antheridia are borne on main shoot of their plant, the female branch develops as a side shoot and it grows robustly and becomes longer than the male branch.

Now we will see what is in antheridium.
I told you antheridium is the male reproductive structure.

So, antheridia, they are born in clusters at the apex of the main axis they are associated with numerous green style long hair like multi cellular filaments with large capitate heads. They are known as the paraphyses. So, the leaves surrounding the antheridial cluster is known as Perigonial leaves.

Perigonial leaves spread out in the form of rosette. It gives as appearance of rosette which gives protection to the developing antheridia and this surrounding the perigonial leaves is known as the Perigonium.

This diagram shows the male shoot with the antheridia. The pair of paraphysis and the surrounding Perigonial leaves and you see that there is a tip of male gametophyte.

Then you see the development of the young antheridia. This is the young antheridia and the antheridia in the cross section. OK, then this is the antheridia in the side view you see the multi-cellular filaments here and with a capitated head which is known as the pair of paraphysis and antheridia are protected by this Perigonial leaves in section. These are the perigonial leaves which protects the developing antheridia.

Now the structure of mature antheridium. The picture shows the neat labeled diagram of mature antheridium which is differentiated into a short, multi-cellular stalk and an elongated club shaped body. The body has a sterile jacket layer of polyhedral mass of androcytes. Now there is an operculum or lid at the apex here.

The mature antheridia dehisce only in the presence of water. Liberated sperm is elongated, it is spirally coiled. And it is bi-flagellate structure you can see here. These are the developing sperm which is elongated and it is spirally coiled and bi-flagellate.

Next is the Archegonium. Archegonium is a female reproductive structure, so here you can see in the picture how the female branch showing the archegonia which is surrounded by the Perigonial leaves.

The archegonial branch springs from the base of the male, shoot. The archegonia are aggregated into terminal cluster. They stand erect at the apex of the female receptacle, intermingled with the paraphyses. It is surrounded by the perichaetial leaves, which constitutes the perichaetium and it protects the developing Archegonium.

Now, the structure of mature Archegonium. In this structure diagram you can see the mature Archegonium consists of a stalk. It has a basal, swollen venter and then elongated neck region. So, this neck is slightly long. It is tubular and it looks like a twisted neck.

It consists of six rows of neck cells which encloses axial row of 10 or more intensely protoplasmic neck canal cells. The archegonia jacket is single layered thick in neck region and it is double layered in the region of venter it contains the ventral canal cell and it contains an egg.

Next part is the fertilization.
At maturity both the neck canal cell in the ventral canal cell, will degenerate and becomes mucilaginous.
So, this mucilage fills the neck canal absorbs water and it swell. This will result in the separation of the terminal cell, will provide the way to the egg cell. Now many sperms will enter through this way to reach the egg cell but only one sperm will fuse with the egg and it will give rise to zygote. Now zygote will divide in the archegonia venter and it will form the multicellular embryo which develops into the sporophyte. Now the sporophyte which is formed is the diploid stage in the life cycle of *Funaria*.

Now the development of the sporophyte, the mature sporophyte is differentiated into foot, a long seta and capsule at the tip.

At maturity, the operculum begins to dry, which leads to the dehiscence of the capsule and finally, there is a dispersal of spores. Now under favourable conditions these spores they will germinate. During germination the exine ruptures and the intine protrudes out as a germ tube it elongates and then it septates and it produces filamentous primary protonema. So, this is the haploid stage in the lifecycle of *Funaria*.

These are the references.

Thank you.