SYNCHYTRIUM

General Characters

1. Mastigomycotina includes those fungi which produce motile zoospores.
2. The zoospores may be uniflagellate or biflagellate.
3. The flagellum of zoospores may be whiplash or tinsel type.
4. The position of the flagella (anterior or posterior) may be known by their orientation during locomotion.
5. In case of biflagellate zoospores, the flagella remain always oppositely directed during locomotion.

The sub-division Mastigomycotina has been divided into four classes - Chytridiomycetes, Hyphochytridiomycetes, Plasmodiophoromycetes and oomycetes, on the basis of number (one or two), Position (anterior, posterior or lateral) and type (whiplash or tinsel) of the flagella attached on zoospores.

1. Chytridiomycetes or Chytridiomycotina - Zoospores uniflagellate, flagellum posteriorly attached and whiplash type.

2. Hyphochytridiomycetes - Zoospores uniflagellate but flagellum anteriorly attached and

tinsel type.

3. Plasmodiophoromycetes :- Zoospores biflagellate, flagella unequal, both are of whiplash type, thallus plasmodial.

4. Oomycetes. — Zoospores laterally biflagellate reniform but flagella mostly unequal, rarely equal, posterior flagellum whiplash and anterior ~~tin~~ tinsel type, cell wall is made up of cellulose, thick walled oospore is formed as a result of sexual reproduction.

SYNCHYTRIUM

Systematic Position.

Division	Eumycotina.
Sub-Division	Mastigomycotina.
Class	Chytridiomycetes
Order	Chytridiales.
Family	Synchytriaceae.
Genus	Synchytrium

Habitat → The fungus grows as obligate parasite in the epidermal cells of algae, mosses and various angiosperms. It causes disease which results into hypertrophy and hyperplasia of affected regions. It commonly occurs on potato and number of cucurbits.

Some of the species and hosts are as follows:

(i) S. endobioticum infects Solanum tuberosum (potato).

(ii) S. trichosanthoides infects cucurbits.

(iii) S. sesame infects Sesamum indicum til - Pedaliaceae.

The diseased material can be collected in early spring season from the potato growing fields.

Disease, Host and Symptoms

1. Synchytrium causes black wart disease of potatoes
2. It infects various hosts
3. The disease appears as greenish yellow wart like swellings on potato tubers which later on darkens in colour causing potato decay.
4. The wart like swellings or tumours are formed due to hypertrophy in the host tissue. The enlargement and swelling of host cells is called hypertrophy.
5. The infection of tubers is brought about by uniflagellate zoospores released from the diseased plants.

Vegetative Structure or Thallus Structure

The thallus is non-filamentous, unicellular, microscopic, uninucleate and globose mass of protoplasm surrounded by thin wall. It is endobiotic i.e lives entirely within the cell of the host. The thallus is holocarpic (whole vegetative plant body is converted into reproductive body) and polycentric (more than one reproductive structures but scattered). Vegetative thallus is called summer spore, which lies singly within the enlarged host cell. The summer spore is almost spherical, large, uninucleate and surrounded by double layered wall. The outer wall of spore is thick and golden brown in colour while inner wall is thin and transparent. The summer spores are formed from unicellular, uninucleate and uniflagellate zoospores when they infect the epidermal cells of the host tissue.

Prosorous and its development

Prosorous develops from summer spore. Summer spore lies at the bottom of any epidermal cell of the host. The outer wall of summer spore ruptures and the inner wall alongwith protoplasm comes out in the form of a sac

The nucleus in the sac divides mitotically several times to form about 32 free nuclei. This multinucleate stage is called prosorus. The neighbouring cells divide repeatedly (hyperplasia) followed by swelling (hypertrophy). It results into formation of the tumour. The surrounding epidermal cells also divide similarly forming rosette with the infected cell being placed in the middle.

Formation of Sorous and Zoospores

1. The protoplast of the prosorous is cleaved into 5-9 pieces.
2. The nuclei of each piece divide continuously till 200-300 nuclei are formed.
3. Each piece is called summer sporangium or zoosporangium and the complete structure with 5-9 pieces is called Sorous.
4. The protoplast in each piece is then cleaved to form a large number of uninucleate zoospores.

Reproduction

Asexual Reproduction → Asexual reproduction takes place by naked, uniflagellate

zoospores. The flagellum of zoospores is whiplash and is inserted on posterior side. A large number of zoospores are released in the soil from infected plant parts, during the spring season. The zoospores swim in the film of water and under suitable conditions come to rest on host cell wall withdrawing their flagella. The zoospores are also called swarmers.

Sexual Reproduction → The sexual reproduction is carried by isogamous planogametes produced in gametangia. This reproduction usually occurs in unfavourable conditions. The formation of gametes is influenced by the non-availability of water in soil. When sufficient moisture is available, the swarmers produced from zoosporangia function as zoospores but when water is lacking, the same swarmers function as gametes. The zoosporangia now is called gametangia. Morphologically, zoosporangia and gametangia are similar. Zoospores and gametes are also similar. Zoospores and gametes are also similar, however the gametes are smaller than zoospores. The gametes are liberated and fuse in pairs.

Zygote Formation and development of Sexual Zoospores.

Zygote is formed by the fusion of two planogametes. Zygote penetrates the host cell, becomes surrounded by thick-wall layers and is converted into resting sporangium. Resting sporangium is also called winter spore. The infected hypertrophying epidermal cell of the host becomes quite large. The zygote divides meiotically and then mitotically to form several alike haploid zoospores. The zoospores are uninucleate, posteriorly uniflagellate and naked, but somewhat larger than the asexual zoospores.

Questions

Q1. Describe the life cycle of Synchytrium.

Q2. Give the characters of chytridiomycotina.

Q3. Describe the thallus organisation of Synchytrium.

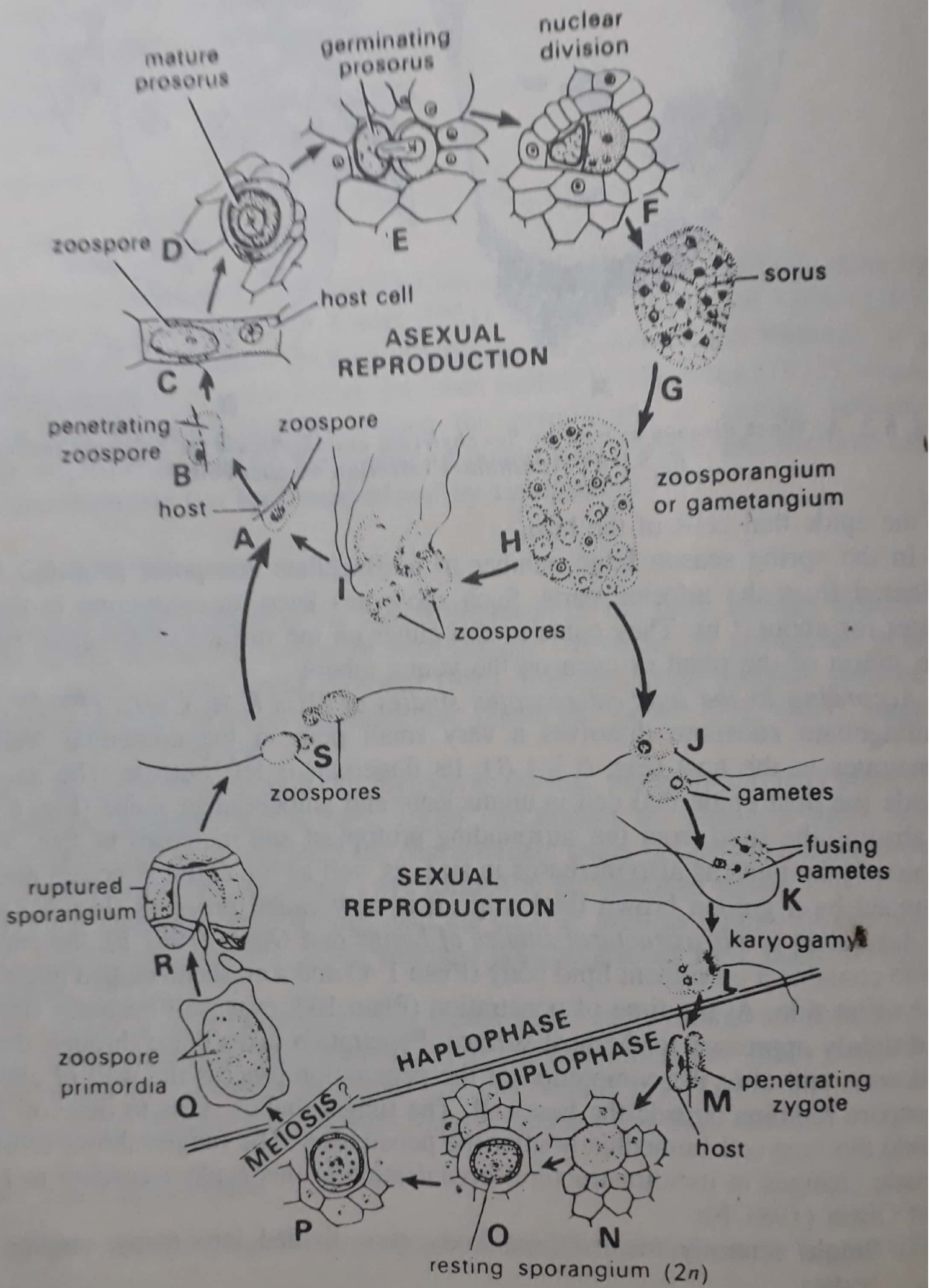

Fig. 6.3 A–S Life-cycle of *Synchytrium endobioticum* (based on Curtis, 1921)