Patterns of Life Cycle in Algae

The following points highlight the four main patterns of life cycle in algae. The patterns are:

1. Haplontic Life Cycle
2. Diplontic Life Cycle
3. Diplohaplontic Life Cycle
4. Triphasic Life Cycle.

1. Haplontic Life Cycle:

The plant body is gametophyte (haploid) and sporophyte (diploid) stage is represented only by zygote. The gametophytic plant develops haploid gametes in the gametangium. The fusion between gametes results the formation of zygote, the only diploid stage i.e., sporophytic phase of the life cycle.

The zygote undergoes meiotic division and forms four meiospores. These meiospores develop into haploid plants. The alternation of generations can be interpreted by chromosome number (Fig. 3.19).

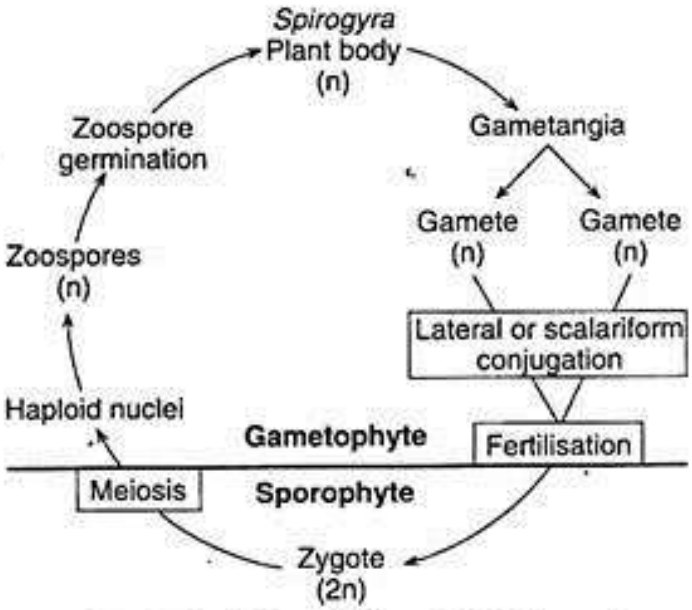

Fig. 3.19 : Haplontic life cycle (*Spirogyra*)

This life cycle is also known as monogenic life cycle. This type of life cycle is found in majority of Chlorophyceae like Chlamydomonas, Ulothrix, Oedogonium, Spirogyra, Chara etc. and all members of Xanthophyceae.

2. Diplontic Life Cycle:

The plant body is sporophyte and develops sex organs. Sex organs produce gametes by meiosis. The gamete only represents the gametophytic stage. The gametes undergo fertilization immediately and form zygote. The zygote does not undergo meiosis and give rise to new sporophytic plant body (Fig. 3.20).

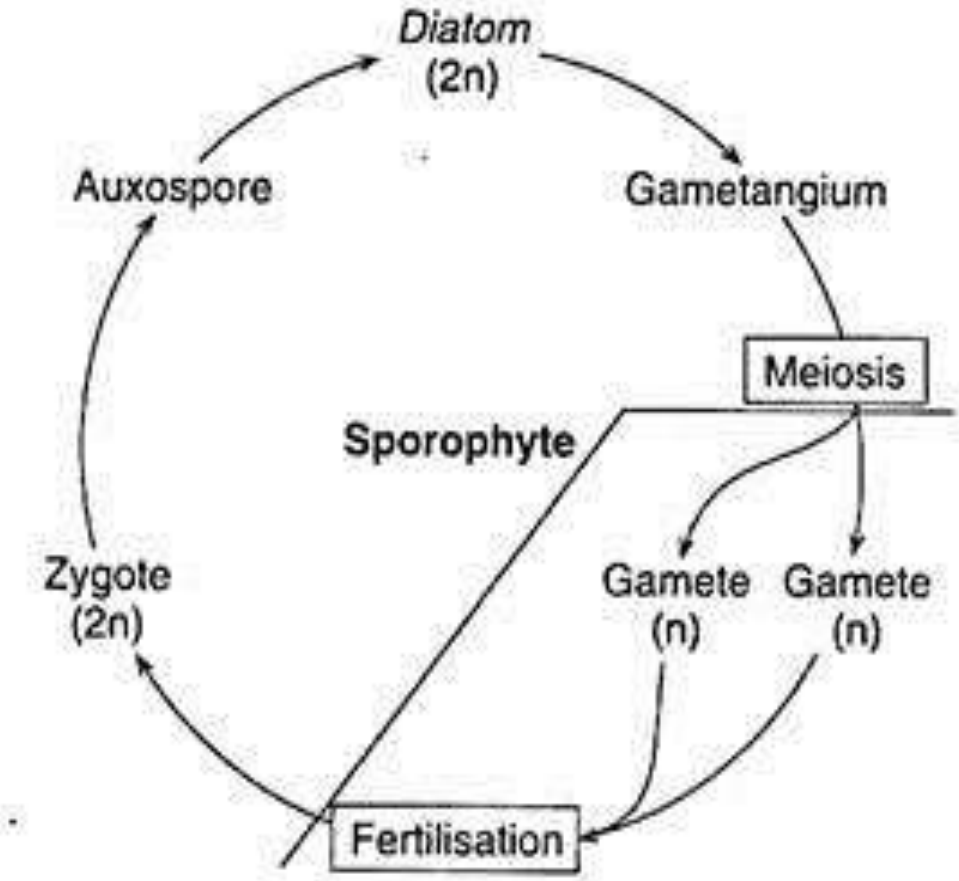

Fig. 3.20 : Diplontic life cycle (Diatom)

This type of life cycle is found in majority of the members of Bacillariophyceae, some members of Chlorophyceae like Cladophora glomerata. Fucus and Sargassum of Phaeophyceae also show this type of life cycle.

3. Diplohaplontic Life Cycle:

In this type the haploid and diploid phases are equally prominent and are represented by two distinct vegetative individuals. They differ only in chromosome number and function. The haploid gametophytic plant reproduces by sexual method, while diploid sporophytic plant by asexual process. In this life cycle alternation of two vegetative individuals occurs by sporogenic meiosis and fusion of gametes.

It is of two types:

i. Isomorphic or Homologous Diplohaplontic Type:

In this type both sporophytic and gametophytic plants are morphologically similar and free living. The gametophytic plant (haploid) produces gametes, undergo sexual reproduction and form zygote. The zygote germinates directly into a sporophytic (diploid) plant. The sporophytic plant forms haploid zoospores by meiosis. These zoospores can develop new gametophytic plant.

This type of life cycle is found in Clapdohora, Ulva, Draparnaldiopsis of Chlorophyceae and Ectocarpus of Phaeophyceae.

ii. Heteromorphic or Heterologous Diplohaplontic Type.

In this type both sporophytic (diploid) and gametophytic (haploid) plants are morphologically dissimilar.

Generally the sporophyte is complicated and much elaborate, but the gametophyte is simple and small as found in Laminaria of Phaeophyceae. In some cases like Cutlaria etc. gametophyte is dominant over sporophyte.

In Laminaria the gametophytic plant body is made up of minute filaments which produce gametes. The gametes undergo fusion and form zygote, which germinates directly into a sporophytic plant. The sporophytic plant body is macroscopic and several meters in length.

The sporophytic plant bears zoosporangia and produce zoospores after meiotic division. The haploid zoospores on germination produce haploid gametophytic plant.

4. Triphasic Life Cycle:

In this type, there is succession of three distinct generations.

It is of two types:

i. Haplobiontic Type:

In this cycle the gametophytic (haploid) phase is elaborate, dominant and persists for long time than sporophytic (diploid) phase which is represented only by zygote i.e.,

haplobiontic type and two successive haploid generations are interrupted only by diploid zygote stage indicate its triphasic nature.

This type of life cycle is found in the primitive members of Rhodophyceae like Batrachospermum and Nemalion (Fig. 3.22A).

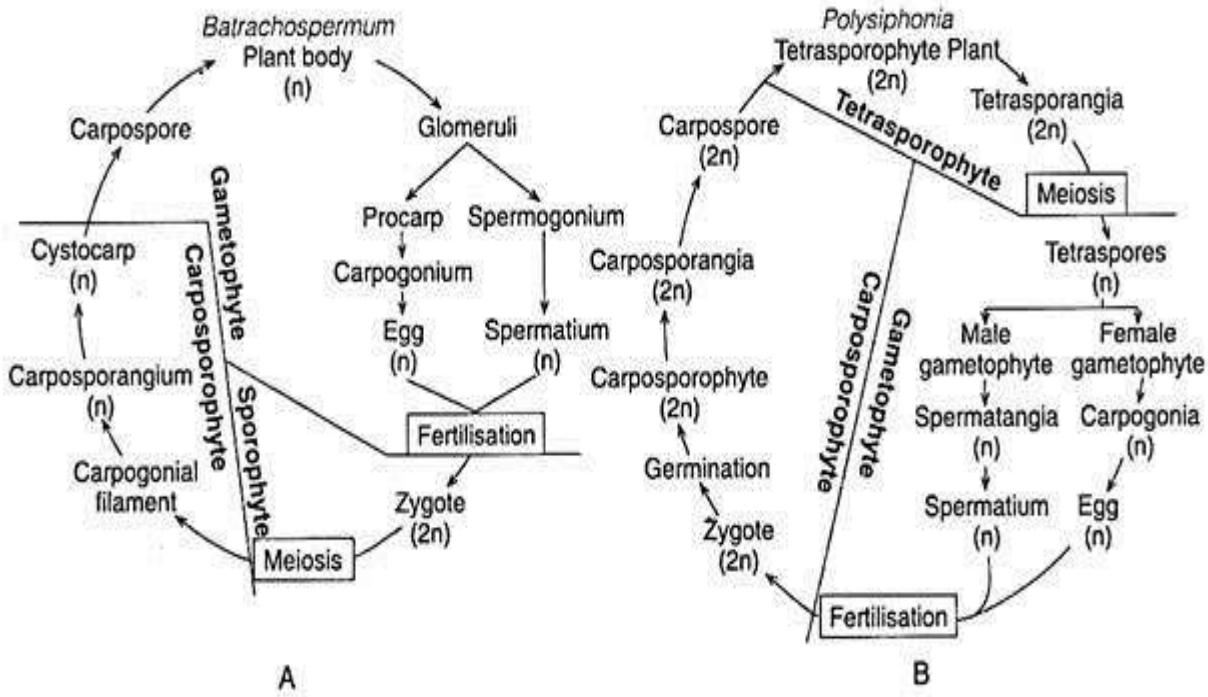

Fig. 3.22 : Triphasic life cycle : A. Haplobiontic type (*Batrachospermum*), B. Diplobiontic type (*Polysiphonia*)

In Batrachospermum the gametophytic plant body develops sex organs and produces male (spermatium) and female (egg) gametes. The gametes by fusion form zygote.

The zygote immediately undergoes meiosis and produces another haploid gametophytic plant, the carposporophyte. The carposporophyte develops carposporangium which produces haploid carpospores. The carpospores germinate and develop new free-living gametophytic plant.

So in this cycle, three phases are:

i. Haploid carposporophyte,

ii. Haploid gametophyte, and

iii. Diploid zygote.

ii. Diplobiontic Type:

In this type there is one gametophytic phase and two sporophytic phases indicate its triphasic nature and the sporophytic phase is more elaborate and persists for long duration than the gametophyte i.e., diplobiontic type (Fig. 3.22B).

This type of life cycle is found in Polysiphonia, a member of Rhodophyceae.

In Polysiphonia, the gametophytic phase is represented by two types of gametophytic plant i.e., male and female plant, those bear spermatangium and carpogonium respectively. Later, the spermatangium and carpogonium develop sperms and egg respectively.

The male and female gamete i.e., sperm and egg undergo fusion and form zygote. The zygote (2n) develops into a diploid carpospophytic phase. The diploid carpospores are formed in the carposporophyte.

The carpospores on germination develop the diploid tetrasporophytic plants. The tetrasporo- phytic plant develops diploid tetrasporangia each of which produce four tetraspores (n) by meiotic division. They are liberated by splitting of sporangial wall. Out of four tetraspores two produce male gametophyte and the other two into female gametophyte.

So in this cycle, three phases are:

i. Haploid gametophyte,

ii. Diploid carposporophyte, and

iii. Diploid tetrasporophyte