PRAMUKH SWAMI SCIENCE & H.D.PATEL ARTS COLLEGE ,KADI

B.Sc. I- Life Cycle of Oedogonium

Dr. Kalpesh J.Bhatt
Head,Department of Botany
Pramukh Swami Science & H.D.Patel Arts College ,Kadi

SCIENTIFIC CLASSICIFICATION OF OEDOGONIUM

KINGDOM	PROTISTA
DIVISION	CHLOROPHYTA
CLASS	CHLOROPHYCEAE
ORDER	OEDOGONIALES
GENUS	OEDOGONIUM

OEDOGONIUM

- The filament is attached with the help of colourless disc like hold fast to the substratum.
- Plant body is of filamentous, unbranched.
- It is aquatic found in permanent, semipermanent fresh water of pools, tanks ditches etc.
- Presence of large single nucleus and a reteculate chloroplast with numerous pirenoids.
- Presence of caps in the dividing cells.
- The cell wall with outer chitin, middle pectin and inner cellulose.

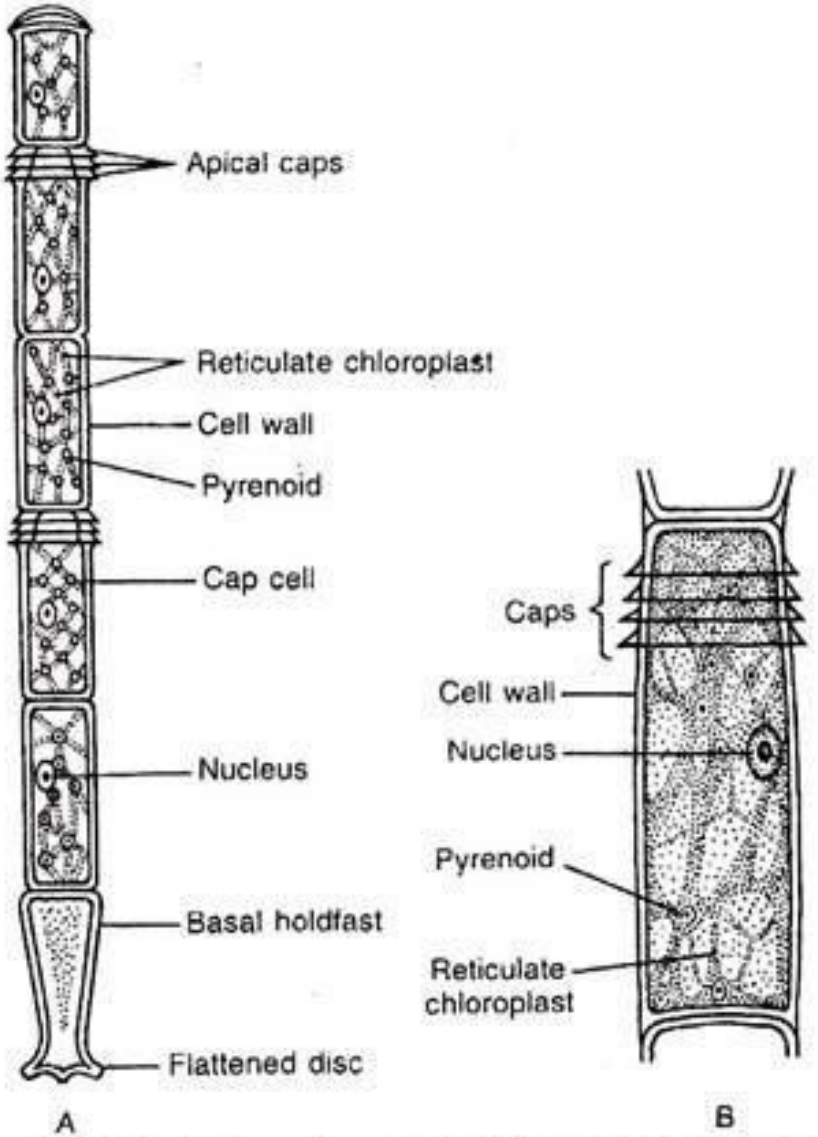


Fig. 3.72 : *Oedogonium* sp. : A. Single vegetative filament with holdfast and apical cell, B. Single vegetative cell

Genus- *Oedogonium*

Vegetative Cell Division -

As the cell enters the division phase, the nucleus moves to the centre.

Soon a transverse ring of wall material appears on the inner face of the lateral wall just below the apical end of the cell.

Nucleus divides and an unattached floating septum is formed between the two daughter nucIei.

The middle and outer wall layers external to the groove then rupture, permitting further elongation of the ring which forms a new piece of cell wall.

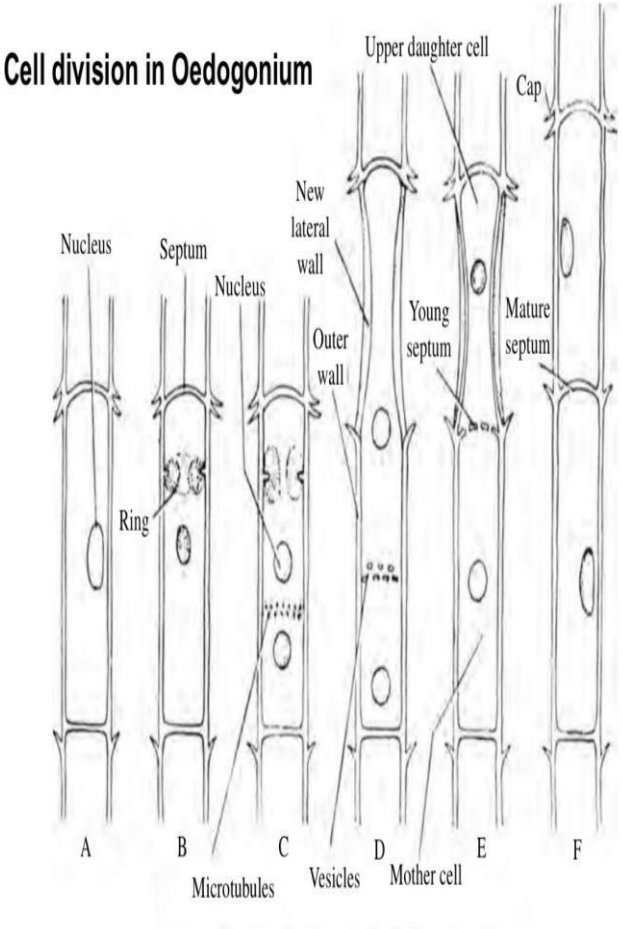
Ultimately, the floating septum moves upward and becomes fixed near the terminus of the old cell wall.

Genus- *Oedogonium*

The new cell has the wall formed from the thickened ring and the newly synthesized piece.

The membranous striation of the ruptured parental wall at the anterior region of the upper daughter cell is the cap and the cell bearing it is known as a cap cell.

The number of caps on a cell indicates the number of cell divisions that have taken place .



Vegetative Reproduction

1. Fragmentation:

It takes place by accidental breakage of the filament, dying off of inter•calary cells or by the formation of intercalary sporangia. The fragments are capable of developing into new filaments.

2. Akinete:

During unfavourable condition the entire protoplast of a cell becomes a thick-walled, reddish-brown, round or oval structure, the akinete. The akinete germinates during favourable condition and develops a new filament. They generally form in chain.

ASEXUAL REPRODUCTION;

- Oedogonium is aform of filamentous green algae.
- It is capable of reproducing sexually,which means that each oedogonium has both male and female reproductive organs.
- In asexual reproduction,the oedogonium fragments produses zoospore.
- Zoospore are able to move spontaneously through the water. Once the zoospore is produced,it is released and is free to find a suitable substrate. Once found ,the zoospore's cells are able to divide and form a new filament of oedogonium.

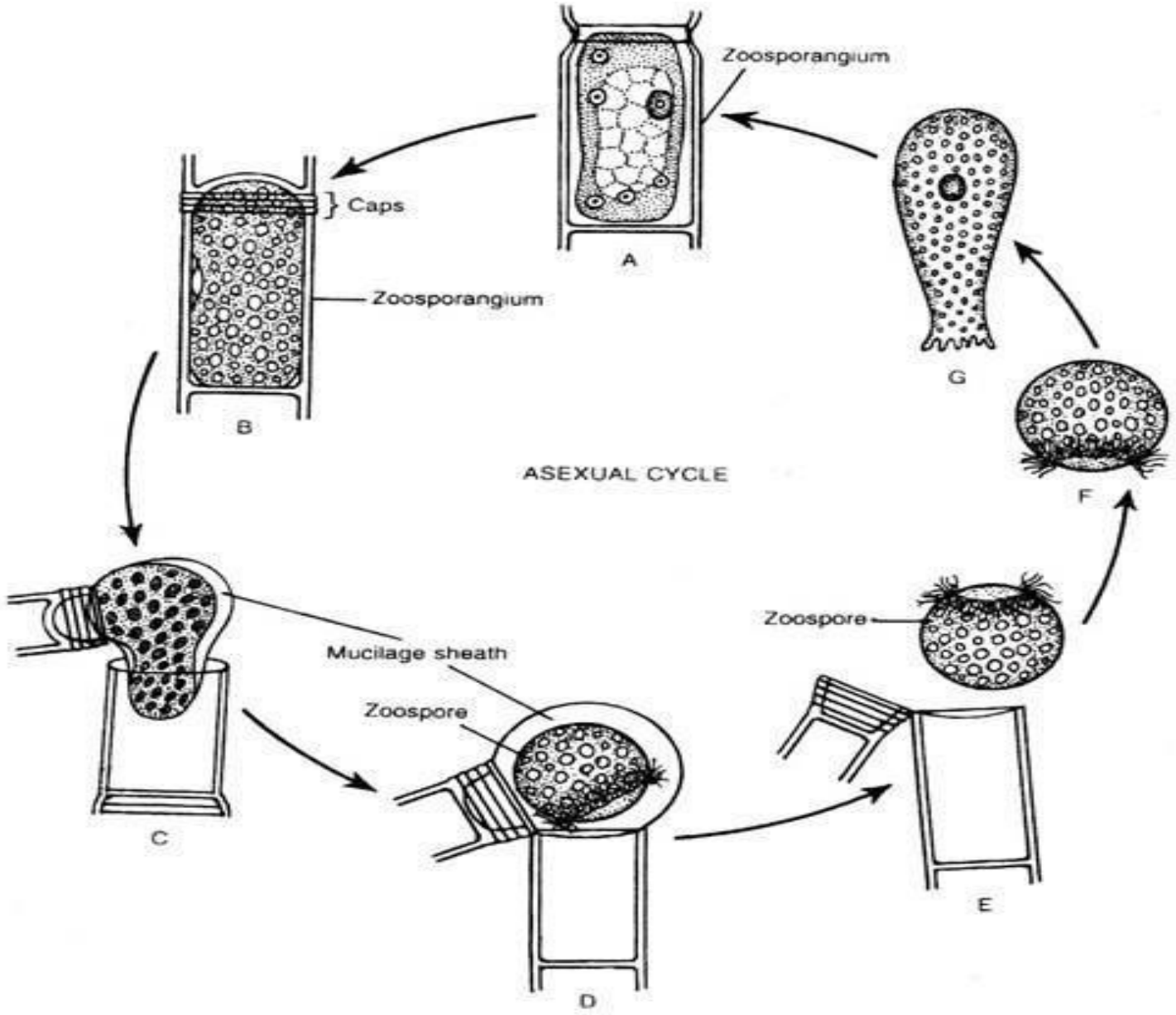


Fig. 3.74 : *Oedogonium* sp. Asexual reproduction : A-E. Successive stages of zoospore formation, F. Single zoospore, and G. Germination of Zoospore

Sexual Reproduction:

- Advanced **Oogamous type.**

- The male gametes or antherozoides are produced in antheridium and the female gamete or egg is produced in oogonium .

- Male and female gametes differ both morphologically and physiologically.

- Only one egg is produced in each oogonium and two antherozoides in each antheridium.

- Another motile structure, the androspore, is produced singly in each androsporangium.

- Deficiency of nitrogen and alkaline pH are the important fac•tors for promoting sexual reproduction.

Development of antherozoid

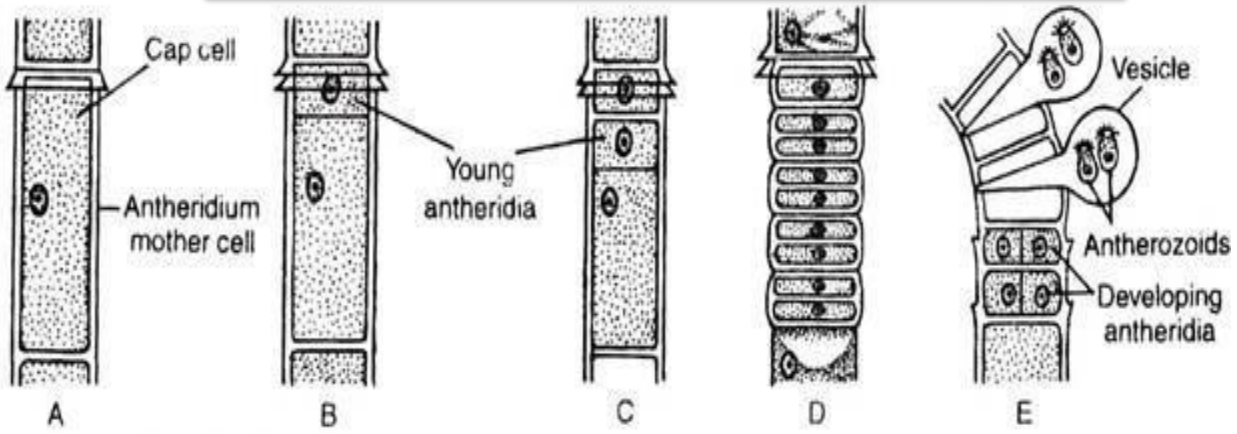


Fig. 3.75 : *Oedogonium* sp. : A-E. Successive stages of development of antherozoids

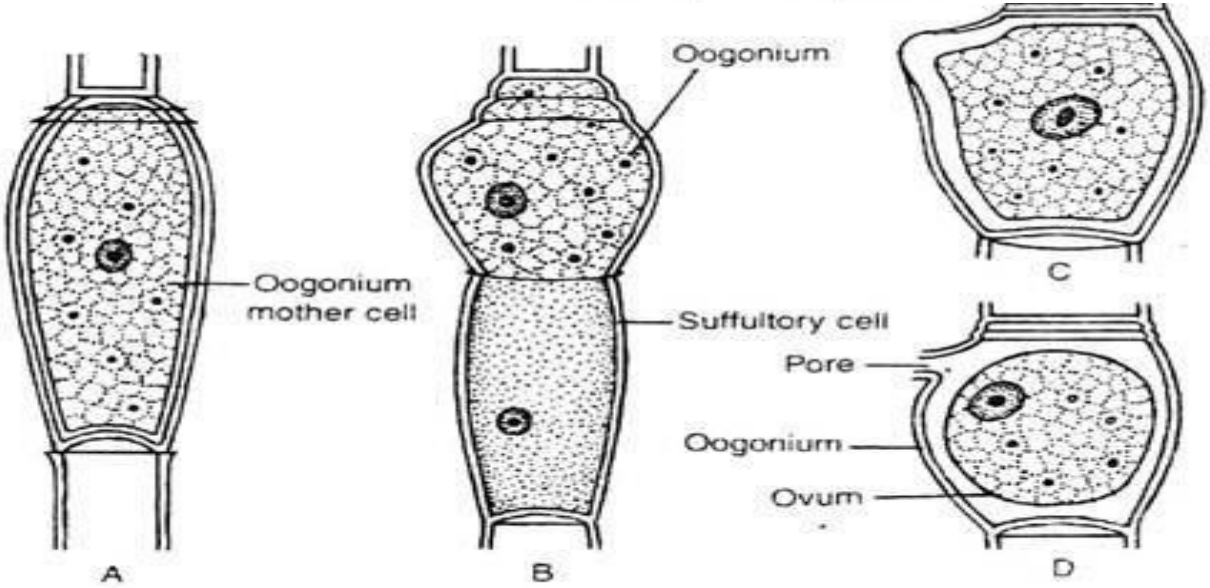


Fig. 3.76 : *Oedogonium* sp. : A-D. Successive stages of development of ovum

Development of ovum

Distribution of Sex Organ in Oedogonium

▪**Based on the size of the male (antheridial) filament the species of Oedogonium are divided into two groups macrandrous and nannandrous type**

▪**1. Macrandrous Type-** In macrandrous type the antheridium develops in the filament of nor•mal size.

a) Monoecious- In this type (e.g., O. fragile, O. nodulosum and O. hirnii) antheridia and oogonia are borne on the same filament.

b) **Dioecious type-** (heterothallic or unisexu•al). In this type (e.g., O. gracilius, O. cardiacum and O. aquaticum) the antheridia and oogonia are borne on the different filaments .

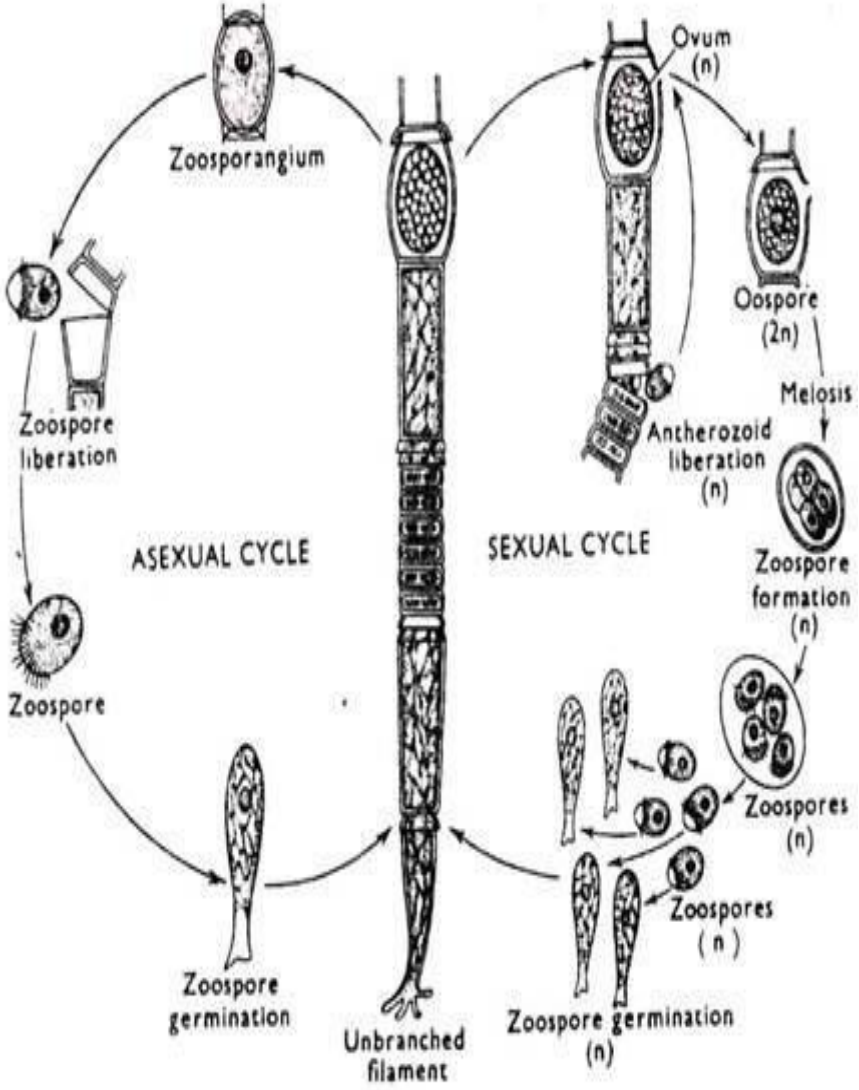


Fig. 3.79 : Life cycle of macrandrous monoecious species of *Oedogonium*

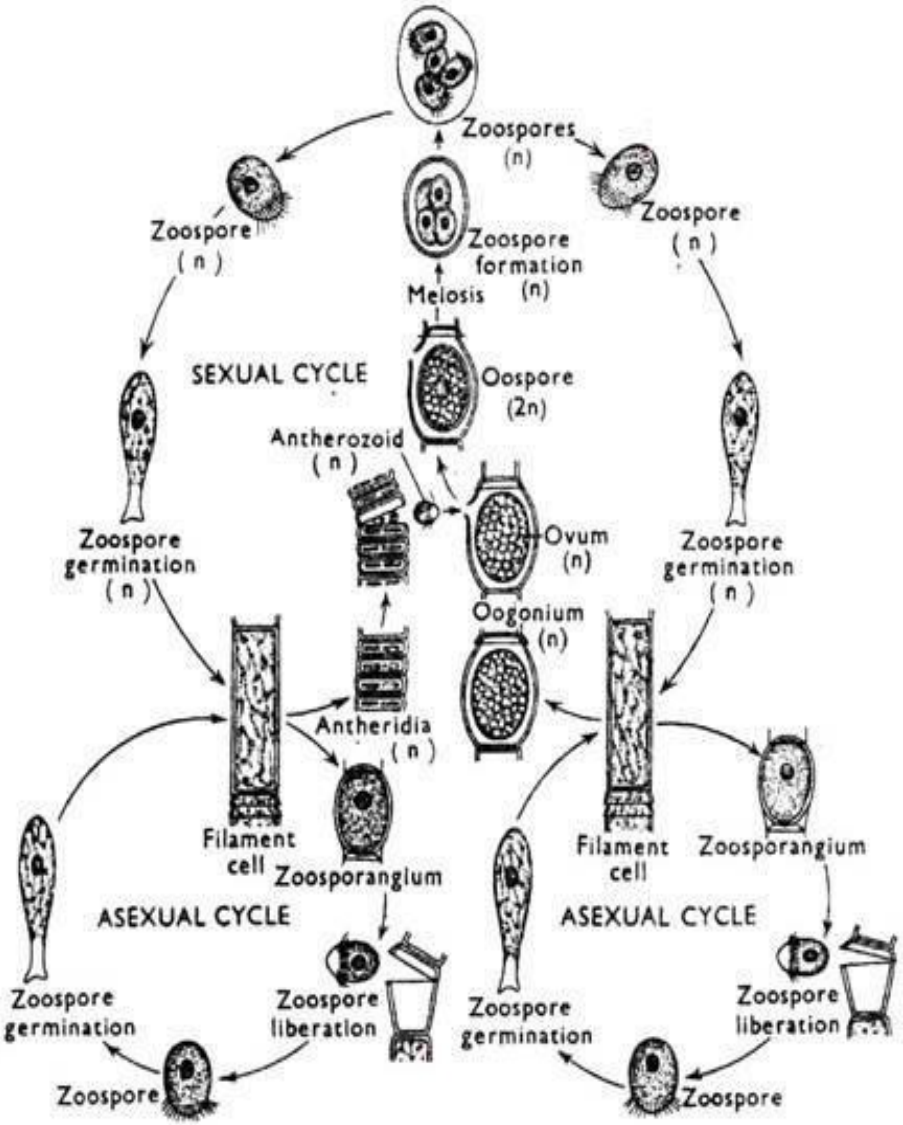


Fig. 3.80 : Life cycle of macrandrous dioecious species of *Oedogonium*

2. Nannandrous Type

•The nannandrous species are always dioecious (heterothallic) i.e., antheridia and oogonia are borne on different filaments.

• The antheridia develop on a very small filament termed as dwarf male or nannandrium.

•Initially androsporangia are developed in series on normal sized filament. The andro•spore form singly within androsporangium.

• Each antheridium produces two antherozoides.

•The androspores are smaller than zoospores (produced asexually) but larger than antherozoides.

Nannandrous Type

- Gynandrosporous Type- androsporangia and oogonia born on same filament
- Idiosporous Type- androsporangia and oogonia born on different filament

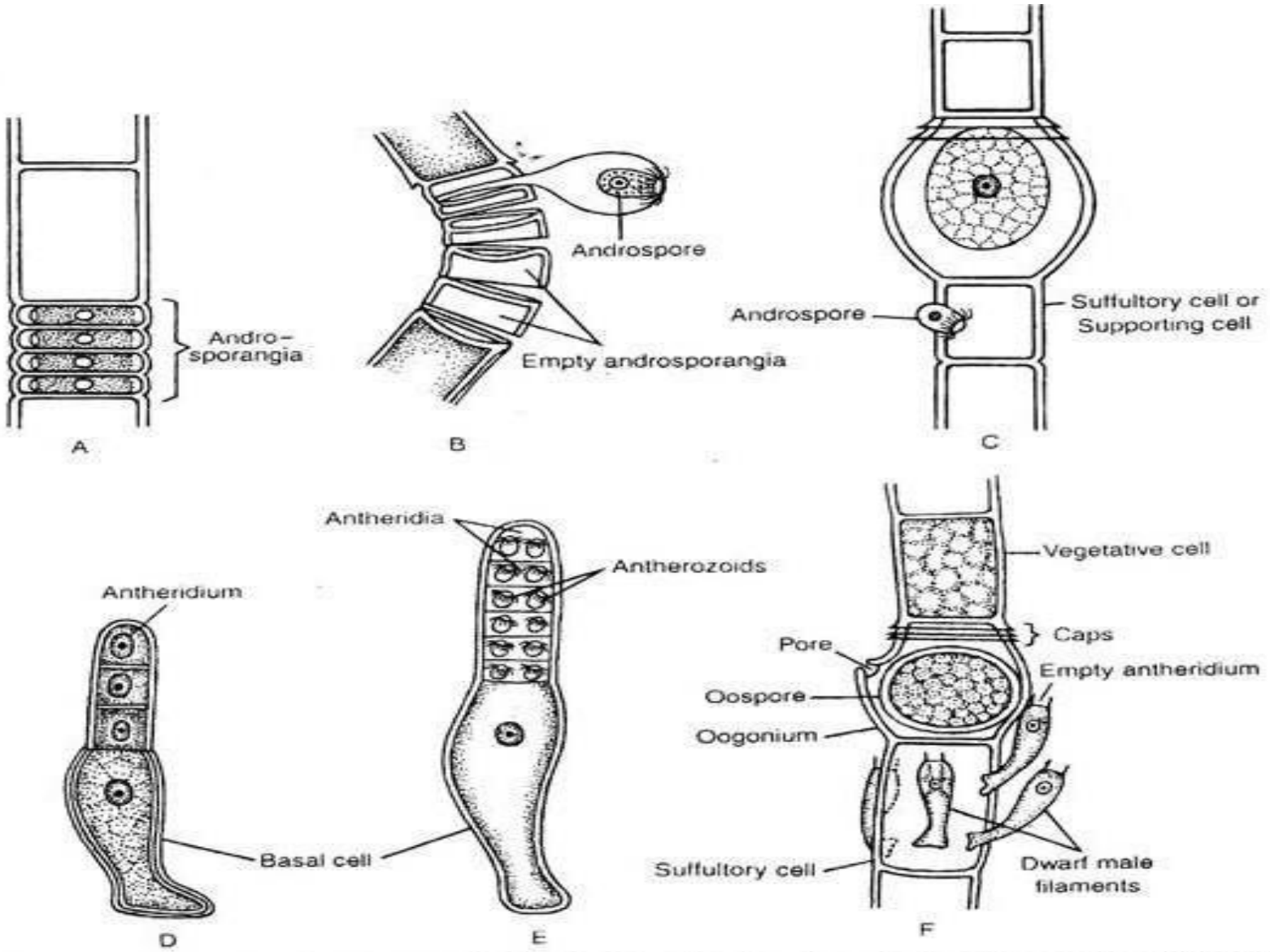


Fig. 3.77 : *Oedogonium* sp. Development of dwarf male : A-B. Development of androspore, C. Attachment of androspore on suffultory cell, D-E. Development of dwarf male and formation of antherozoid, and F. Formation of oospore after fertilisation

Fertilization

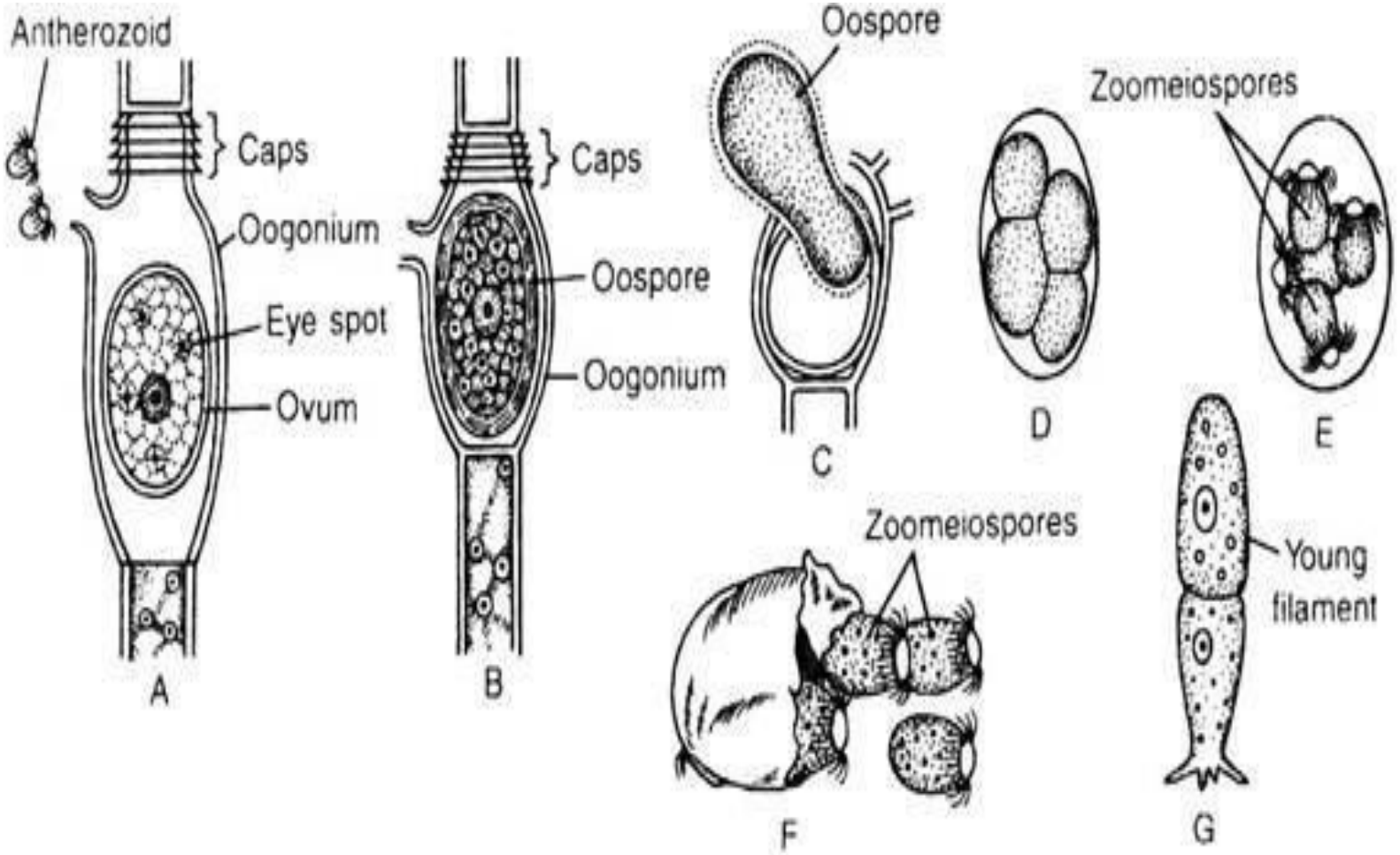


Fig. 3.78 : *Oedogonium* sp. : A. A stage before fertilization, B. Oospore in oogonium, C. Liberation of oospore from oogonium, D-E. Stages of zoospore formation, F. Liberation of zoospore, and G. Young filament develops after germination of zoomeiospore.

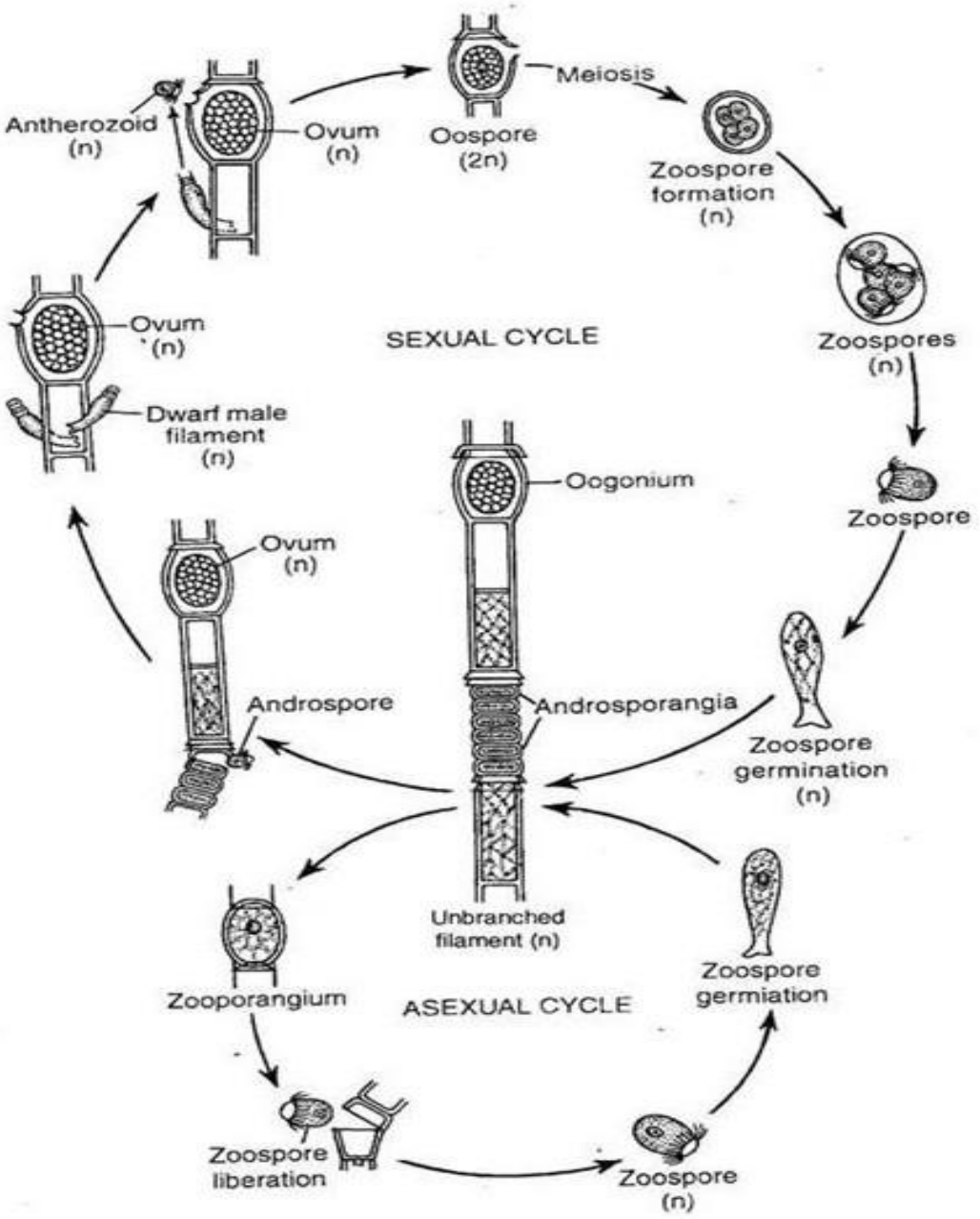


Fig. 3.81 : Life cycle of nannandrous (all are dioecious) – gynandrasporus species of *Oedogonium*

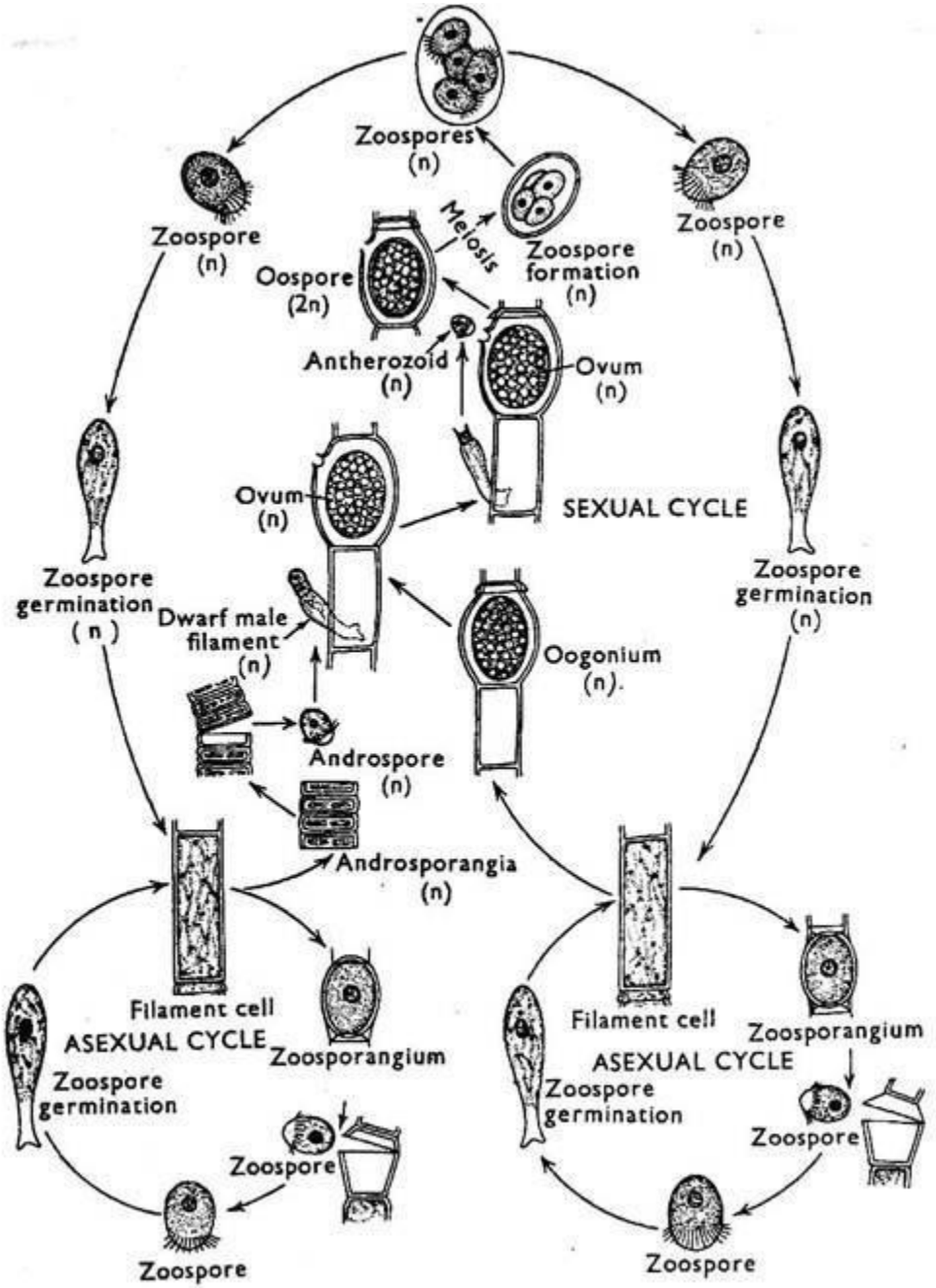


Fig. 3.82 : Life cycle of nannandrous (all are dioecious) – idioandrosporus species of *Oedogonium*

THANX