

Ques - Describe the structure and sexual reproduction (gametophytic stage) of Polysiphonia.

Ans. According to Fritsch (1945)

Class - Rhodophyceae

Order - Ceramiales

Family - Rhodomelaceae

Genus - Polysiphonia

Bold and Wynne (1978) reported more than 150 species of which some species are found in India, plant is common marine red alga found in littoral and sublittoral zone in tidal marshes.

P. fastigiata is semiparasitic where P. urceolata is epiphytes.

STRUCTURE

→ Polysiphonia has a filamentous thallus delicate feathery and will branched. Siphon like cells in large number are arranged in definite tiers hence plant is called polysiphonia. The thallus is reddish or, dark brown or, bluish red colour.

The thallus show hetero-
tricho as para ^{prostrate} or,
attachment filament
and erect or vertical fi-
laments. The plants remain
attached to the substrate
by means of several thick
walled rhizoid bearing lobed
haptera. In few species (P.
violace) prostrate system
are absent.

From the prostrate
filament many erect fila-
ments are arises. These
filaments consists of main
axis and branches of
limited and unlimited
growth. The ~~large~~ long
or unlimited branches
are ^{appear} as ^{as} ^{leathery} ^{structure}
polysiphonous. The short or limited
branches are ^{un-}
siphonous are known as
trichoblast.

Main axis and all
the long branches are
made up of a central
siphon consisting of many
elongated cells arranged
one upon the other.
The central

Siphon are surrounded by many pericentral siphon which number is vary. In few species the cells of pericentral siphon divide by periclinal and anticlinal division into many cortical cells. All the cells are interconnected with pit connected. The trichoblasts are coloured and dichotomously branched and bear sex organ. The cells are thick walled monokaryotic with discoid chromatophore and floriden starch ^{as reserve} ~~cell~~ ^{each} has large central vacuole without pyrenoids. The pigment contain chl. a and β caroten with few xanthophyll and biliprotene.



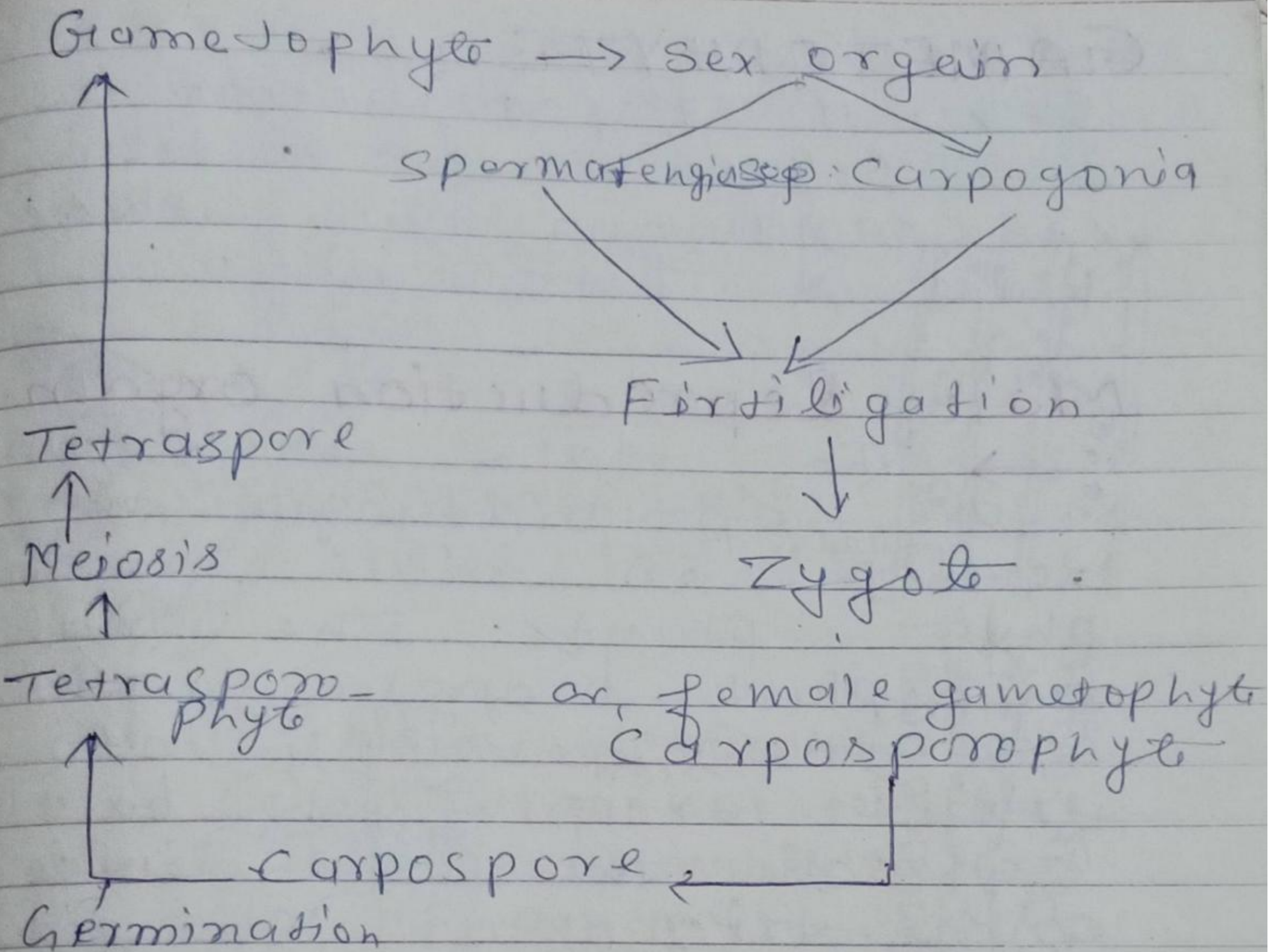
REPRODUCTION :->

In the life cycle three different type of plant structure are found as gametophyte (haploid), Carposporophyte (diploid) and Tetrasporophyte (haploid).

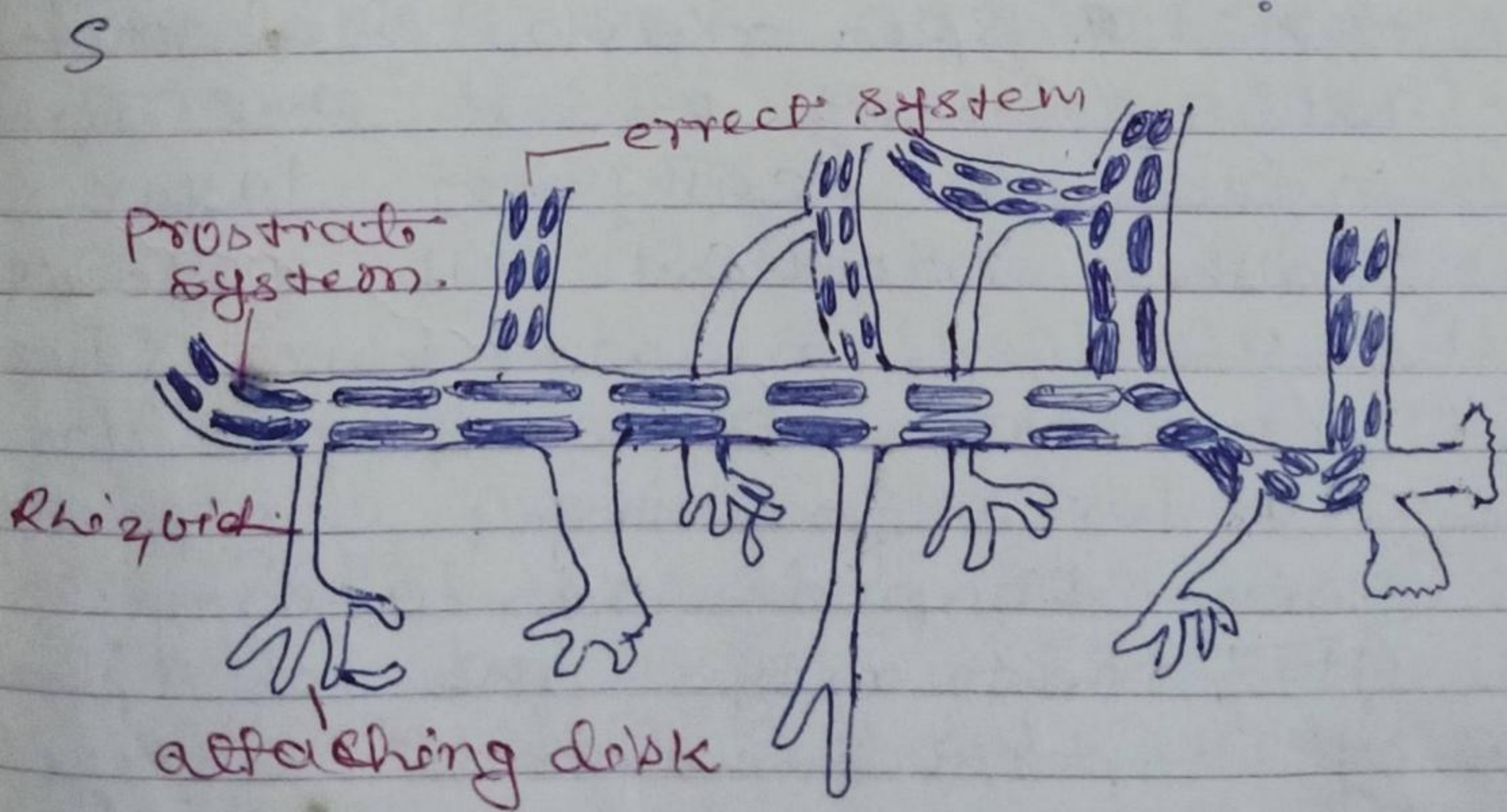
Gametophyte :-> In this stage sex organs as spermatangia and carpogonia are developed and reproduce by sexual reproduction.

Carposporophyte :-> It is developed from zygote on female gametophyte and produce diploid carpospore.

TETRASPOROPHYTE :-> It is free living stage develop from diploid carpospore and produce haploid tetraspore with as sex organ. (~~is~~ Asexual stage)



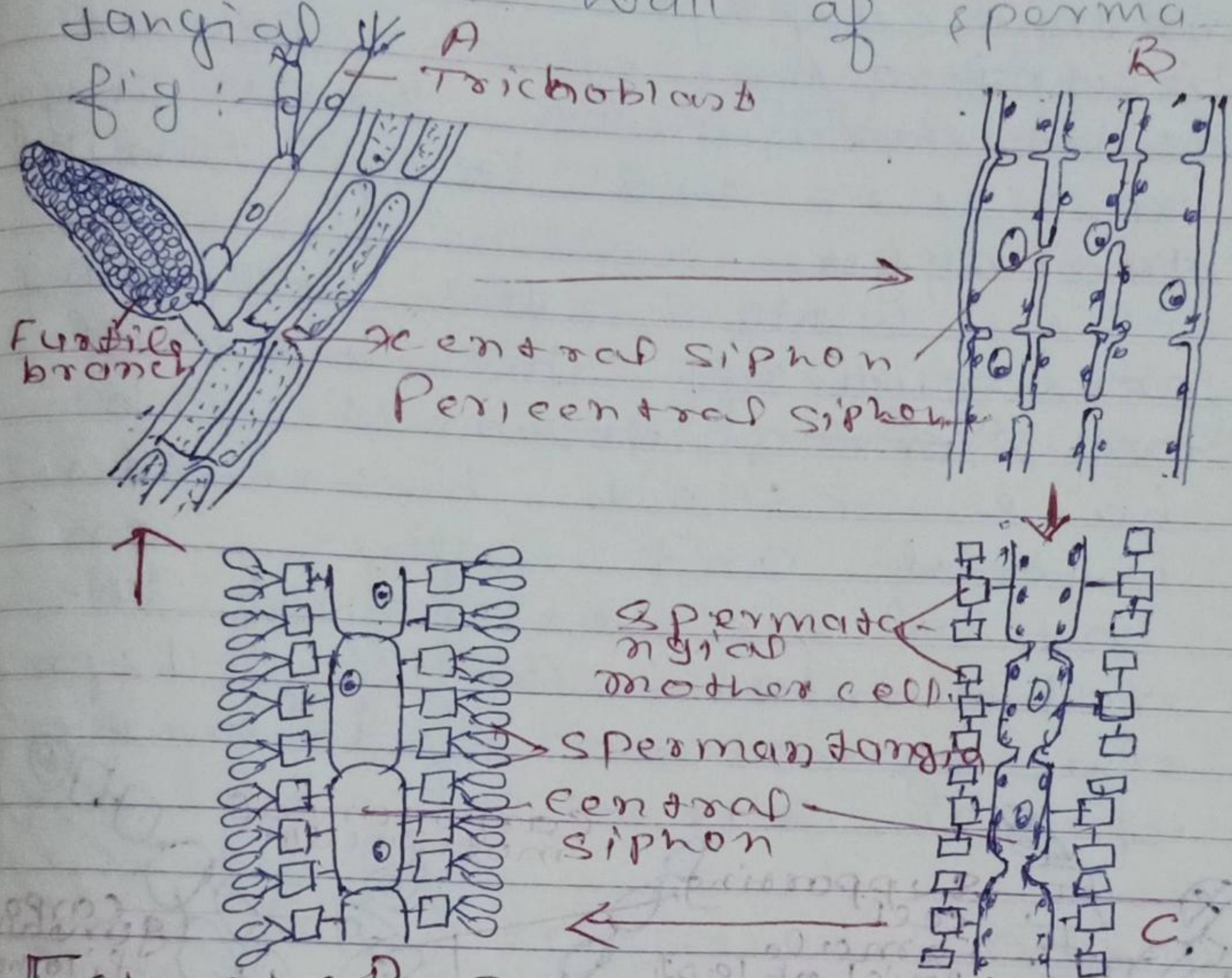
GAMETOPHYTE :



GAMETOPHYTE →
Sexual reproduction.
Sexual reproduction
is oogamous type where
plant is heterothallic.

Male Reproduction Organ
→ The male sex organ
are spermatangia and
develop on male gameto-
phyte plants. The male
trichoplast branches (both
are one) develop into
fertile except few basal
cell all the cells divide
and trichoblast changed
into polysiphonous. The
Pericentral cells function
as spermatangial mo-
ther cells which are ar-
ranged in compact layer
each mother cell produce
2-4 spermatangium. These
structure are borne in
cluster forming compact
cone shaped structure.
At maturity the cytoplasm
of spermatangium change
into unicellular, uninucleate
spherical non-motile color-
less structure called

Spermata. It is liberated through a narrow slit in thick wall of spermatangial

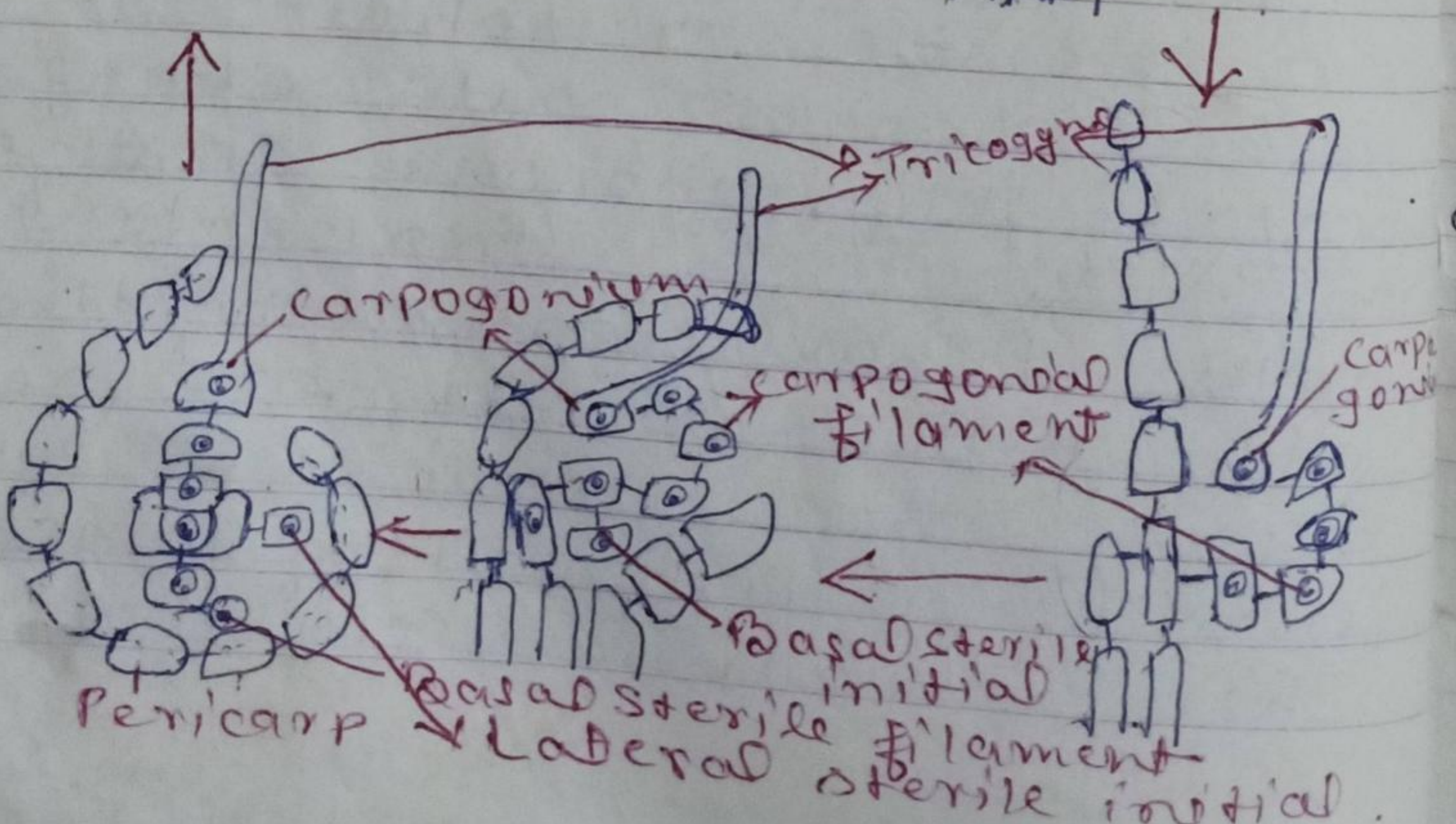
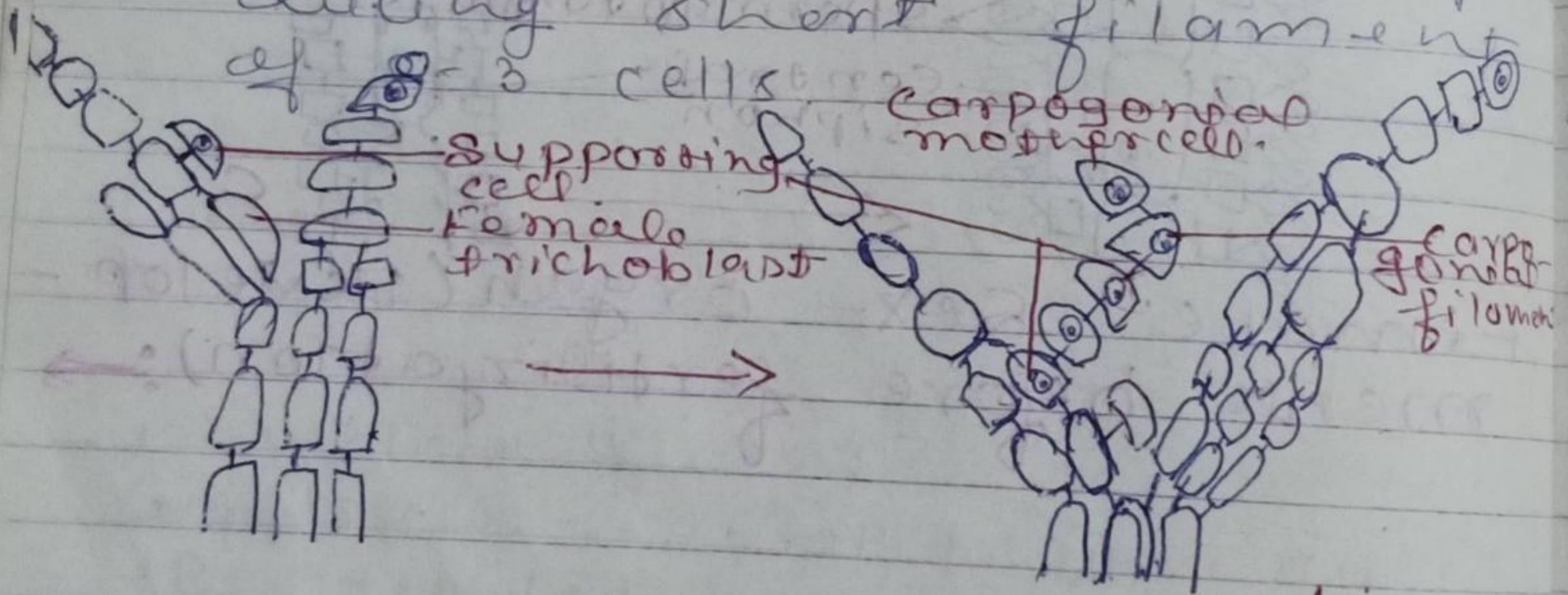


Female sex-organ (Development before fertilization): → The female sex-

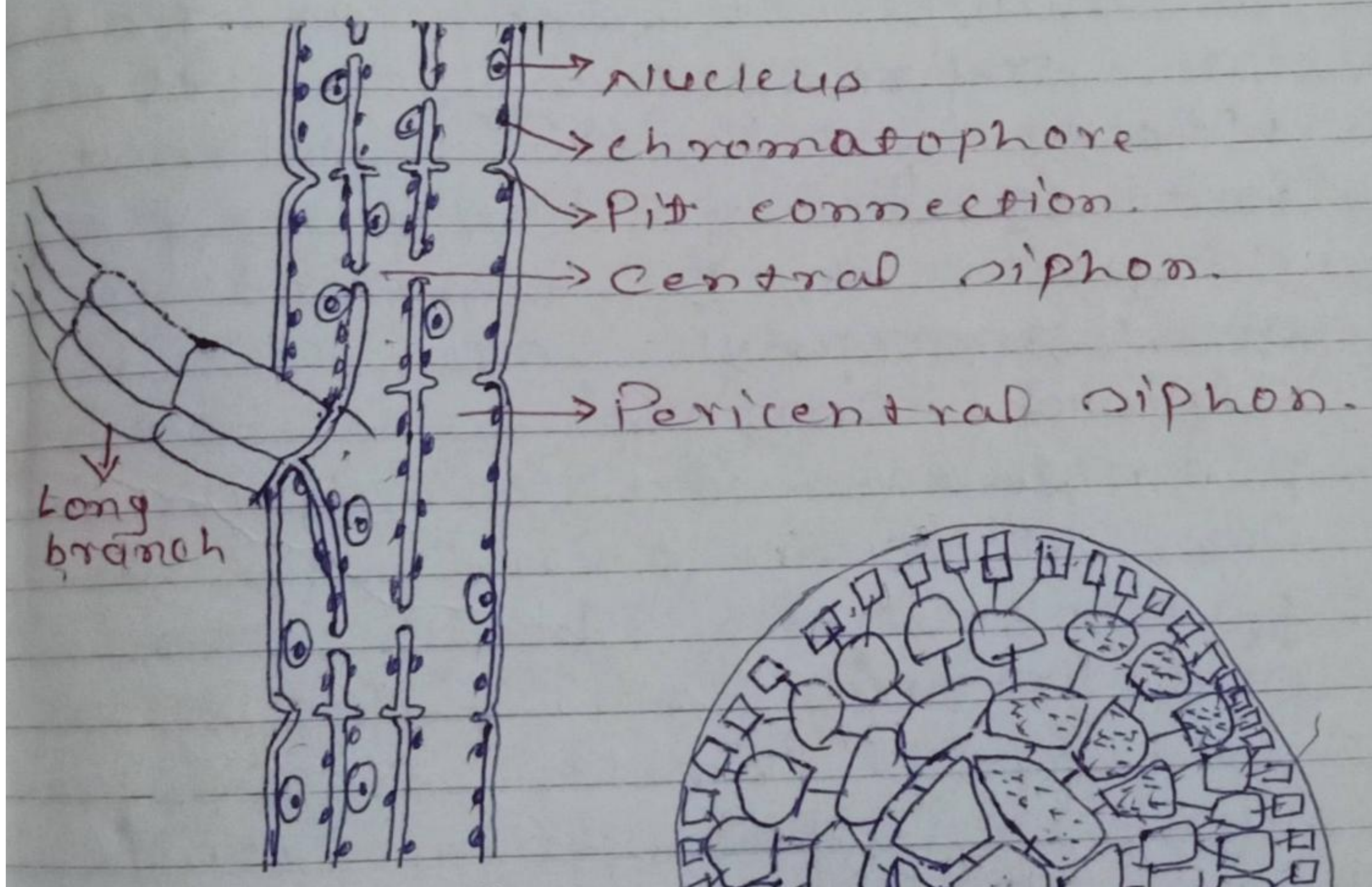
organ carpogonia develops on female trichoblast. It is unisiphonous but changes into polysiphonous on the ^{adaxial} ~~axial~~ side. Pericentral cells behave as supporting cells which divide and re-divide to form 4-8 called curved carpogonial filament. The terminal cell function

as Carporgonial filament mother cell, which modified into Carporgonium each Carporgonium have lower swollen ^(that part) part having egg nucleus and long tubular trichogyne.

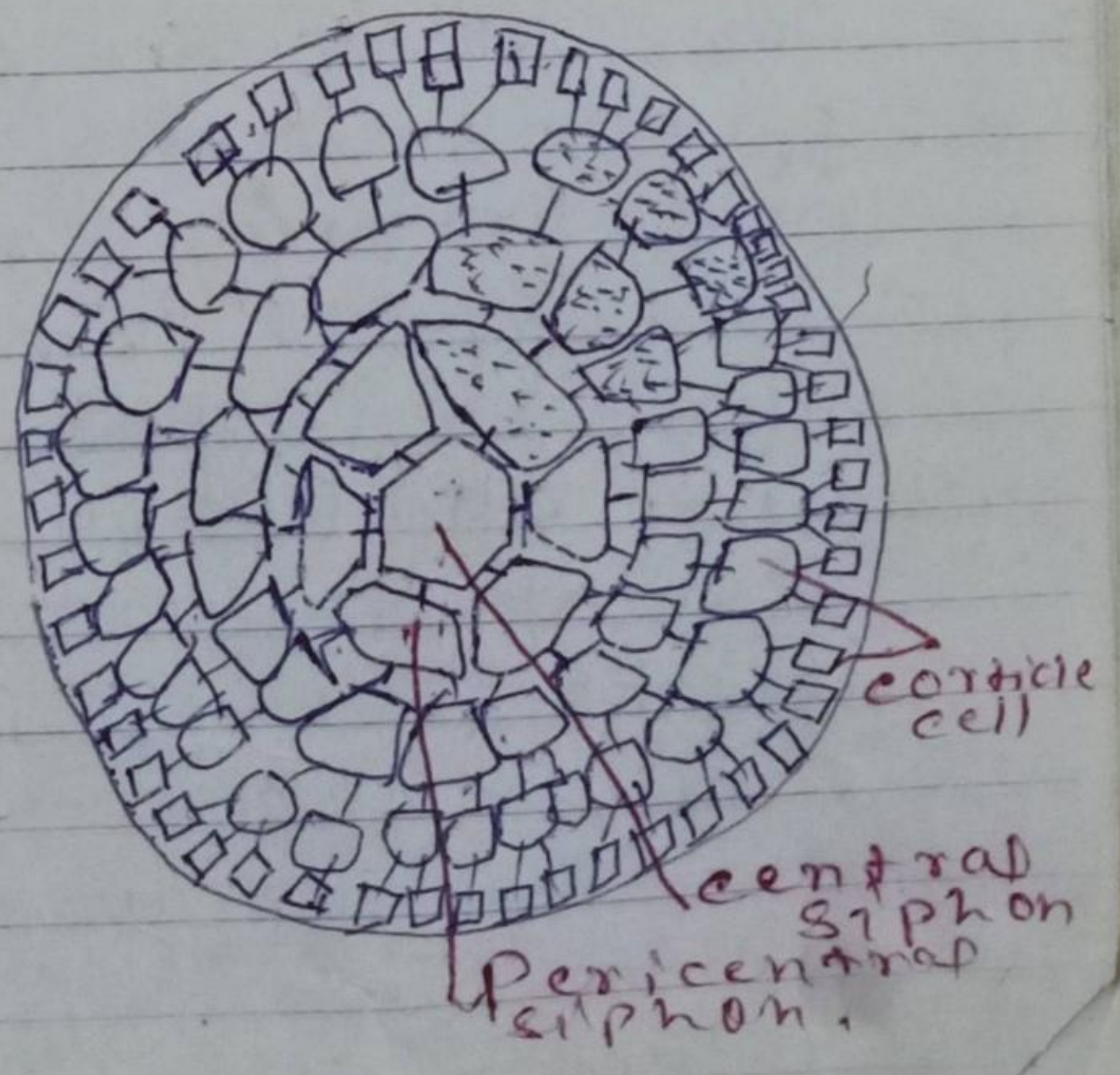
Now the supporting cells cut off two sterile cell ~~one~~ towards its base called basal sterile initial and other on lateral side called lateral initial. Both cell producing short filament of 3 cells.



FERTILIZATION: → The liberated spermatia are covered by coater to the trichogyne and the point of attachment dissolve. The male nucleus enter into trichogyne and move down. and finally fuse with whole nucleus to produce diploid zygote



CENTRAL OR PERICENTRAL SIPHON



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POST FERTILIZATION

CHANGE \rightarrow The polysiphonous life cycle have three different type of structure in which the main plant is gametophyte. After fertilization the zygote developed into a sporophyte which is parasite on female gametophyte.

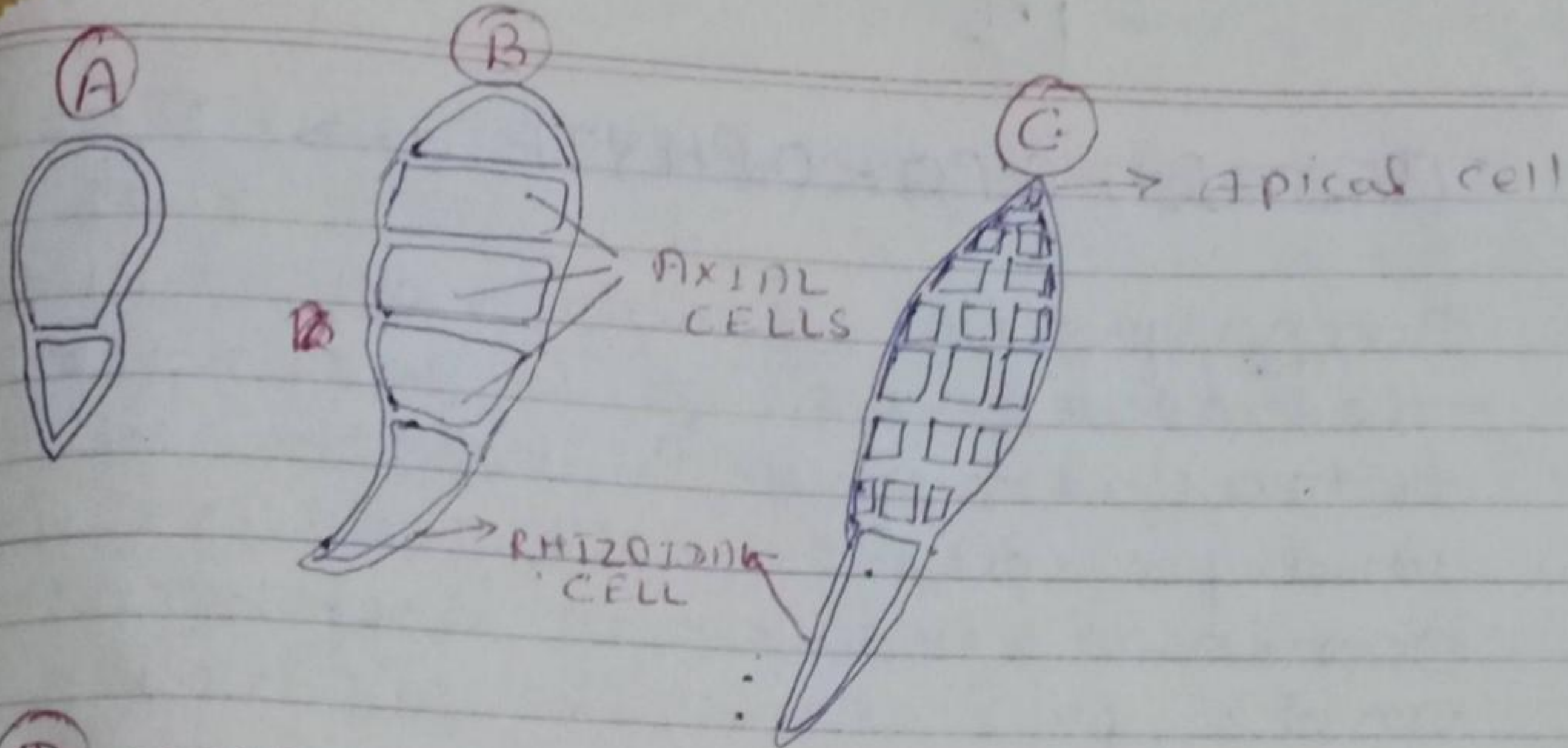
After fertilization so many change are found in reproductive structures which further developed into fruiting body's cystocarpus. It is the first stage of sporophyte on which diploid carpospere is developed. Thus it is called carposporophyte. From the supporting cells basal sterile and lateral sterile cells are developed which are nutritive in function. But an auxiliary cells is developed at upper side in between carposporium and supporting cell. From this carposporium a tubular connection is developed which connect to aux

auxiliary cells. The zygotic nucleus of carpogonium divide by mitosis, and one nucleus ~~migrates~~ ^{migrates} to auxiliary cell through tubular connection. Thus auxiliary cells have diploid and haploid nucleus. Now carpogonial filament and haploid nucleus of auxiliary cells become ~~de~~ degenerate. From the auxiliary cells small, lateral outgrowth is developed which is called gonimoblast initial (youth) from this initial cells few celled filament is developed of which upper cell changed into carposporangium. The content of carposporangium developed into single diploid carpospores. Further the sterile cells & supporting cell fused together to form placenta. From the gametophytic tissue, in-velope is developed, which cover placental cell, gonimoblast filament, carpospo

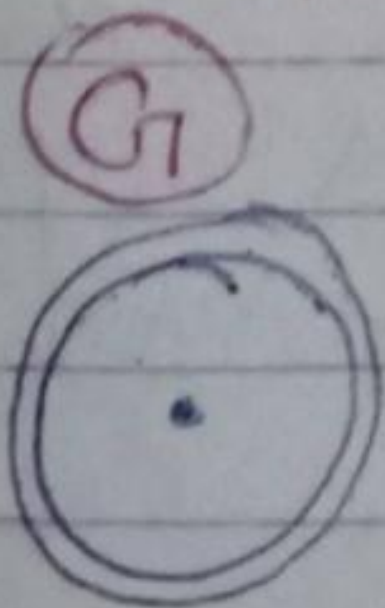
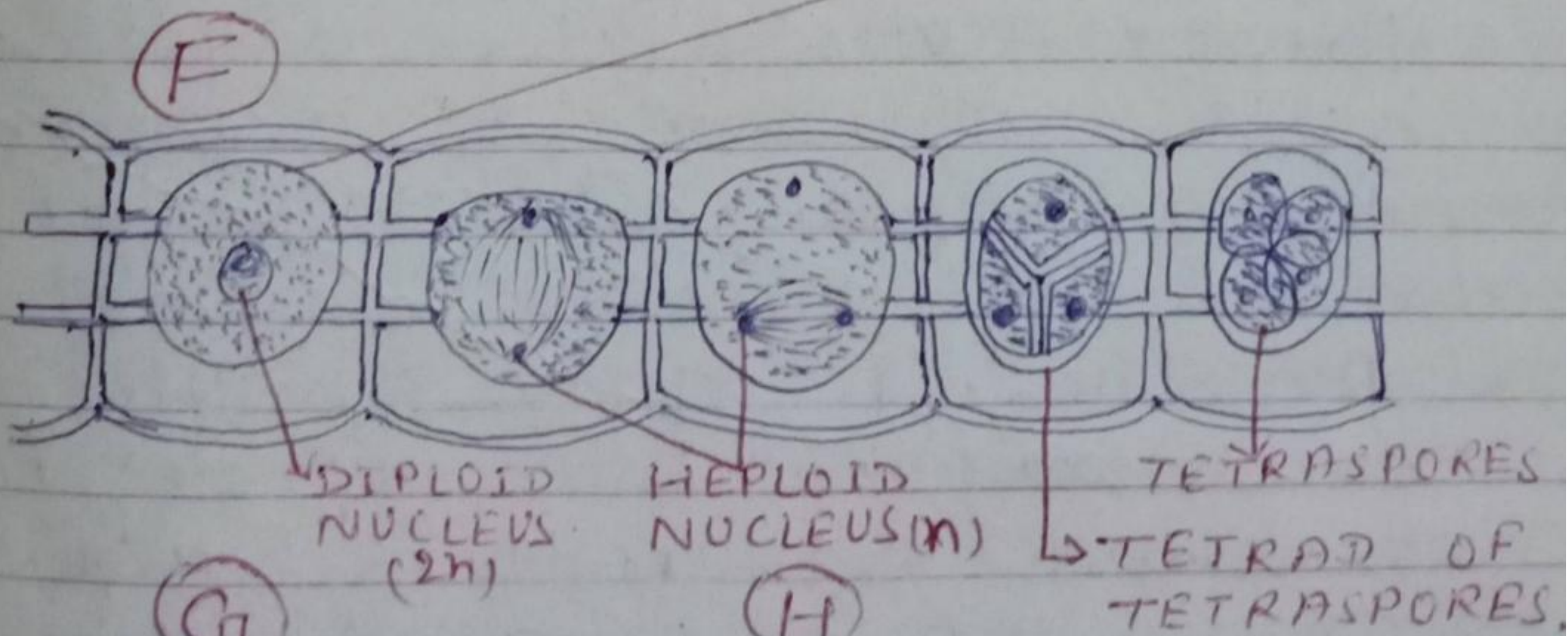
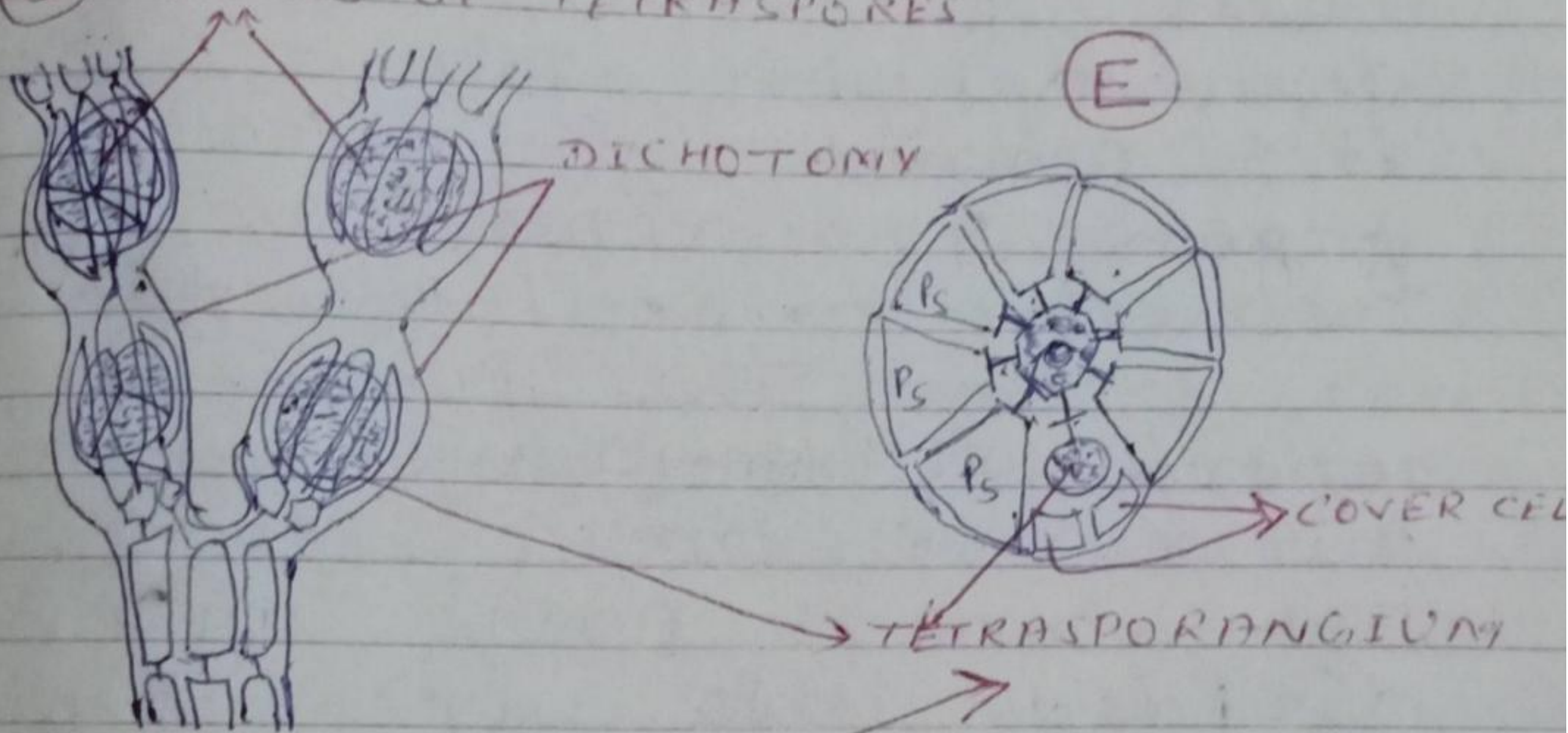
angium auxillary cells the entire structure is called cystocarp. Thus cystocarp is partially (31/12/23) haploid and partially diploid.

cystocarp = haploid + diploid
(Pericarp) (G.I) filament
corposper
angium
carposp

In this stage asexually ^{developed} diploid carpospores is released through ostiole and then germinate. After germinations and development the second diploid (sporophyte stage) are developed, which is called ~~carposporophyte~~ Tetrasporophyte.



(D) TETRADS OF TETRASPORES



TETRASPOROPHYTE \rightarrow The
 diploid
 carpospores germinate into
 heterotricous filament of
 tetrasporophyte which is an
 independent structure. It
 consists of central siphons
 and pericentral siphons
 thus it is similar to
 gametophytic plant but
 it cannot produce sex
 organ. It reproduces by
 asexual microtetraspore.

The fertile peri-
 central cells (siphons) divide into
 outer and inner part.
 The inner parts again
 divide into upper and
 lower cells. The upper
 cells produce tetrasporangia.
 Its diploid nucleus divides
 by meiosis and
 producing non-motile tetra-
 spores. The spore is
 necked structure which
 comes out and germin-
 ate into gametophytic
 plant.