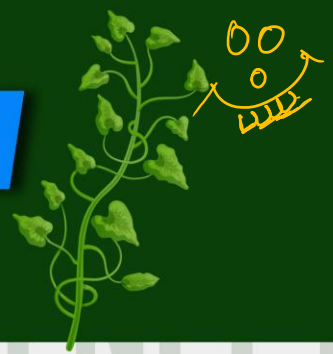
PLANT KINGDOM - L7



BOTANY

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Dr. Sachin Kapur

Biology Expert - NEET

12TH CLASS | TUESDAY, THURSDAY
11TH CLASS | MONDAY, WEDNESDAY, FRIDAY

3 PM | 4 PM | 5 PM | 6 PM

MISSION MBBS

VIKAS SIR

CHEMISTRY | 3:00 PM

ANUSHRI MA'AM

PHYSICS | 4:00 PM

SACHIN SIR

ZOOLOGY | 5:00 PM

PANKHURI MA'AM

BOTANY | 5:00, 6:00 PM

PUSHPENDU SIR

ZOOLOGY | 6:00 PM

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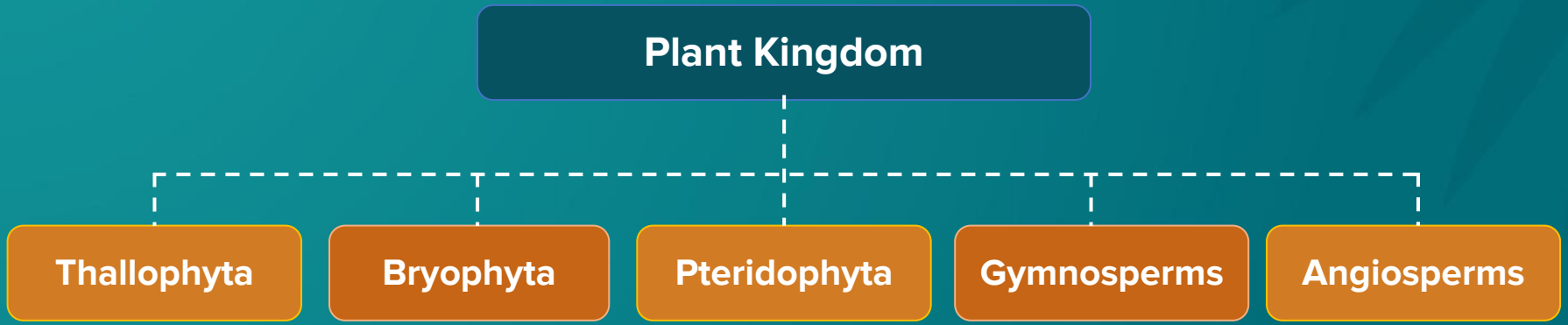
Recall! Plant Kingdom Classification



Recall - Comparison

Features	Algae	Bryophytes	Pteridophytes
Plant body	Undifferentiated	Undifferentiated	Differentiated
Habitat	Aquatic/ moist surfaces	Moist, Shaded	Terrestrial (Cool and damp)
Vascular structure	Absent	Absent	Present
Motile gametes	Yes	Yes	Yes

Thalloid

Thalloid.

Male

Biflagellated

1st

Multiflagellated spiral Sperms

Oosphere

Sporophyte

Zygote → Embryo → Sporophyte

2n

Dominant

Gametophyte

- More dominant
- Multicellular
- Free-living
- Diploid
- Two types based on types of spores

AIIMS — RAMENTA

Brown, hair like structures

(Ferns)

Pinnately Compound leaves

Neem

Complete zygote is involved

Ferns

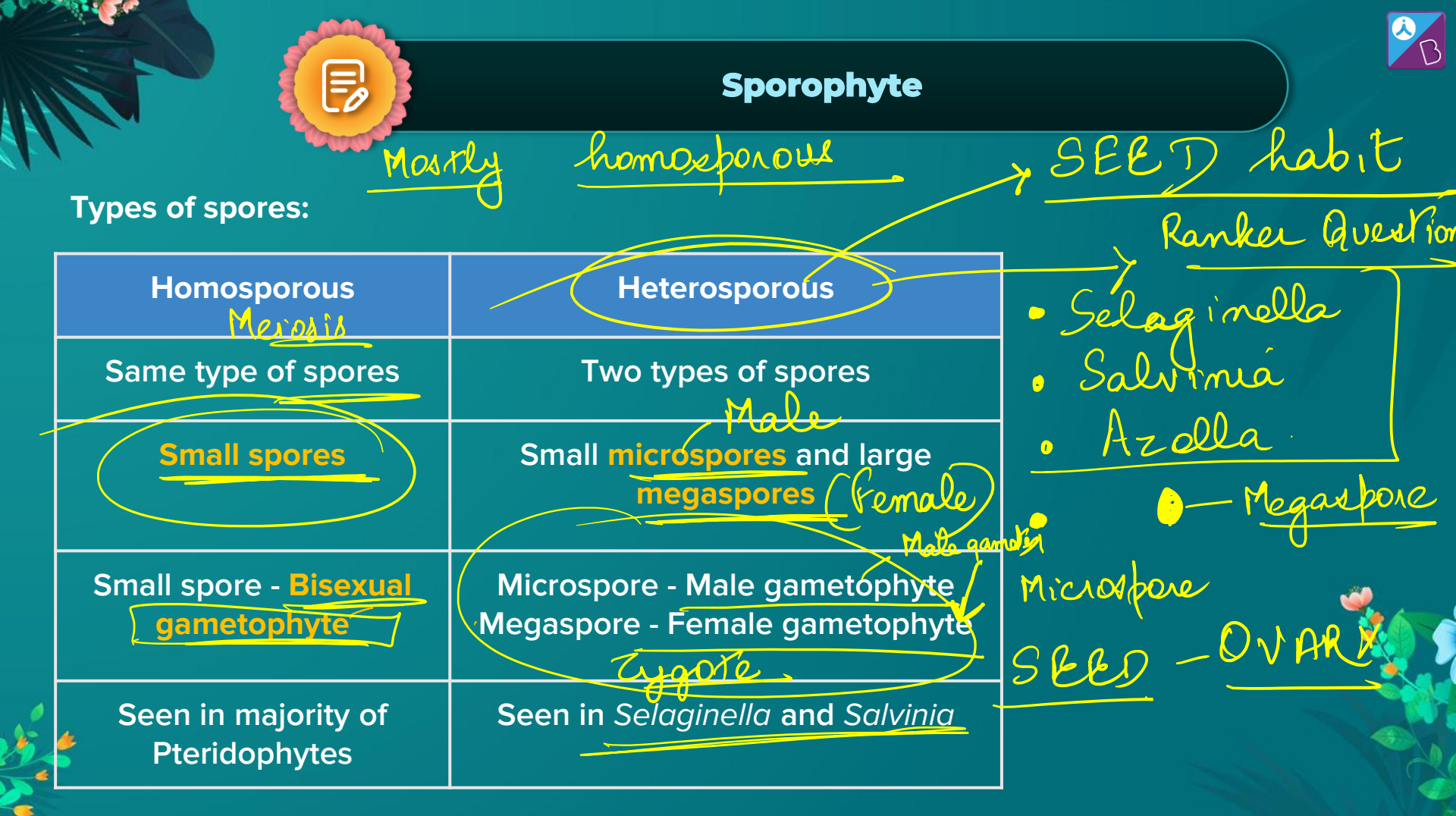
- Development of embryo is HOLOBLASTIC / MEROBLASTIC
- Part of zygote → Sperm fuses with oosphere to form OOSPORE
- Sperm (multiflagellate)

Sporophyte

Types of spores:

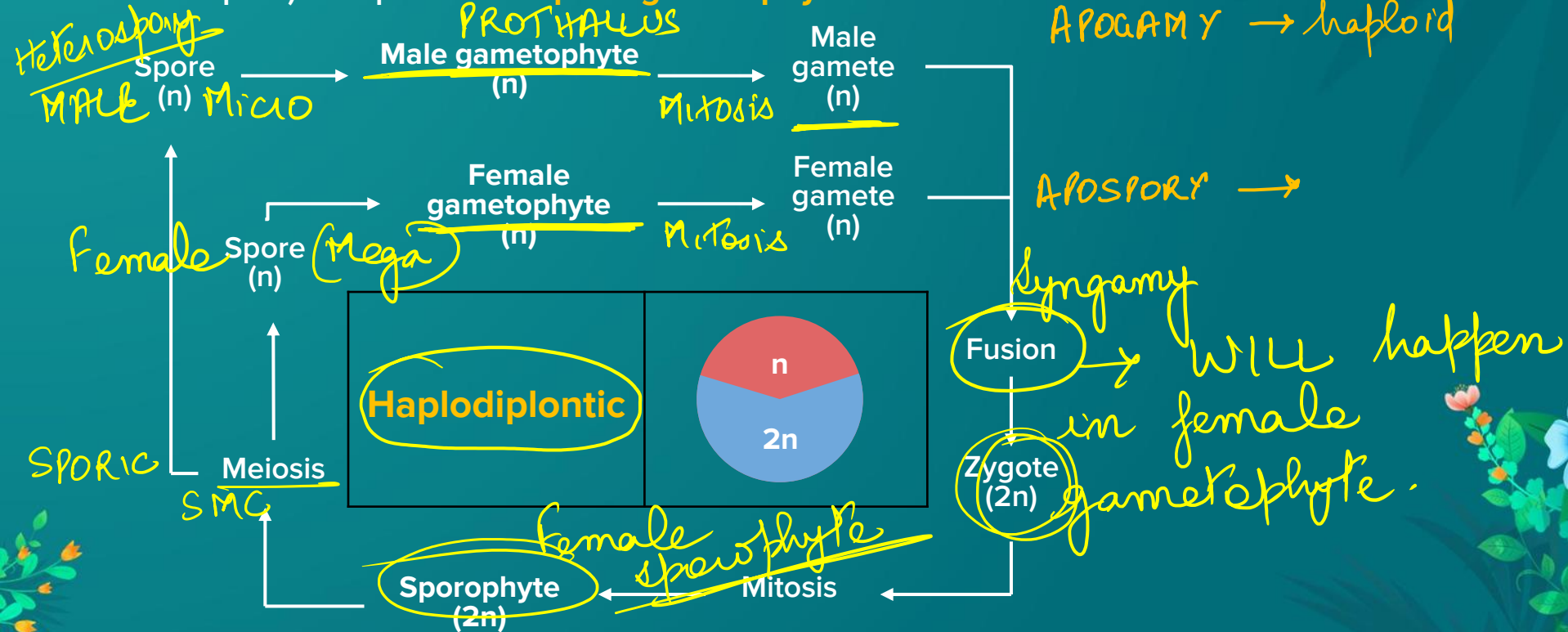
Homosporous	Heterosporous
Same type of spores	Two types of spores
Small spores	Small microspores and large megaspores
Small spore - Bisexual gametophyte	Microspore - Male gametophyte Megaspore - Female gametophyte
Seen in majority of Pteridophytes	Seen in *Selaginella* and *Salvinia*

- Selaginella
- Salvinia
- Azolla



Phases of Pteridophyte Life Cycle

A dominant, independent **diploid sporophyte** alternates with short-lived (saprophytic or autotrophic) independent **haploid gametophyte**



Did You Know?

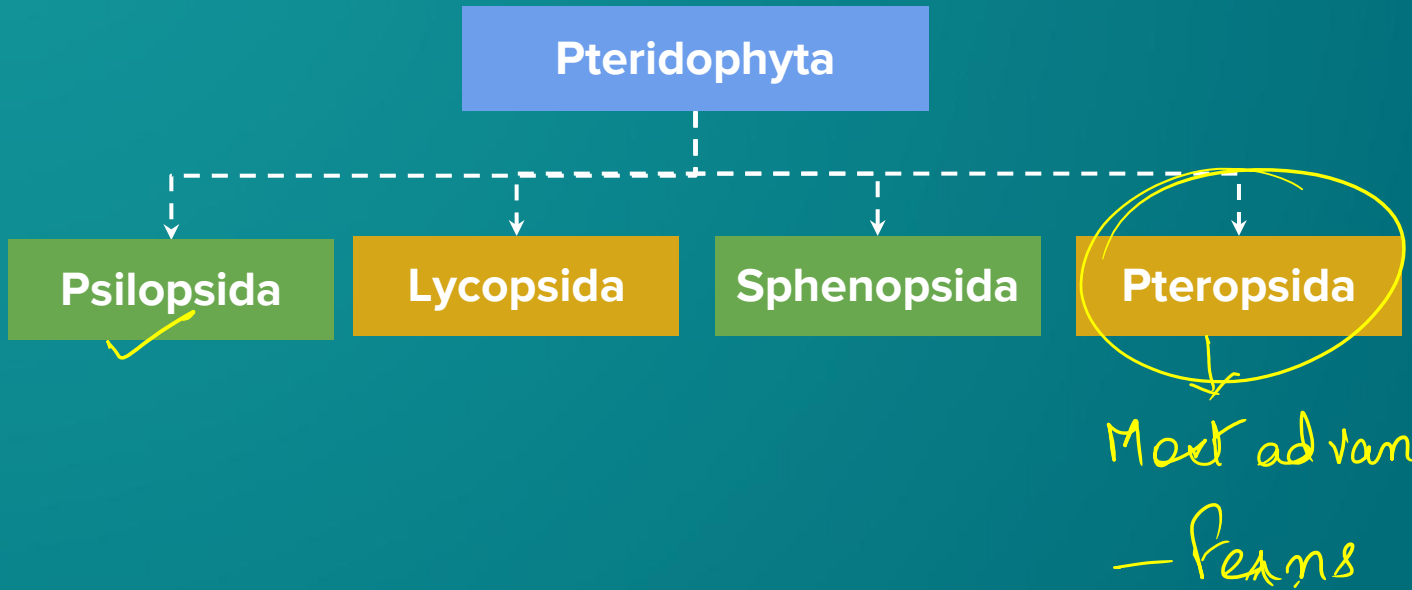
11,000 is the approximate number of species of Pteridophytes. This is the second diverse group of land plants after flowering plants

- Selaginella → Spike moss
- Lycopodium → Club moss
- Azolla pinnata → Smallest

Pteridophyte / aquatic fern

Classifications of Pteridophytes

Classifications of Pteridophytes



Classifications of Pteridophytes

- Pteridophyta
  - Psilopsida
  - Lycopsida
  - Sphenopsida
  - Pteropsida

Psilotum

Classifications of Pteridophytes

- Pteridophyta
  - Psilopsida
  - Lycopsida
  - Sphenopsida
  - Pteropsida

Selaginella

Lycopodium

Classifications of Pteridophytes

- Pteridophyta
  - Psilopsida
  - Lycopsida
  - Sphenopsida
  - Pteropsida

Equisetum (horsetails)

Strobili, Cones.

Classifications of Pteridophytes

Pteridophyta

- Psilopsida
- Lycopsida
- Sphenopsida
- Pteropsida

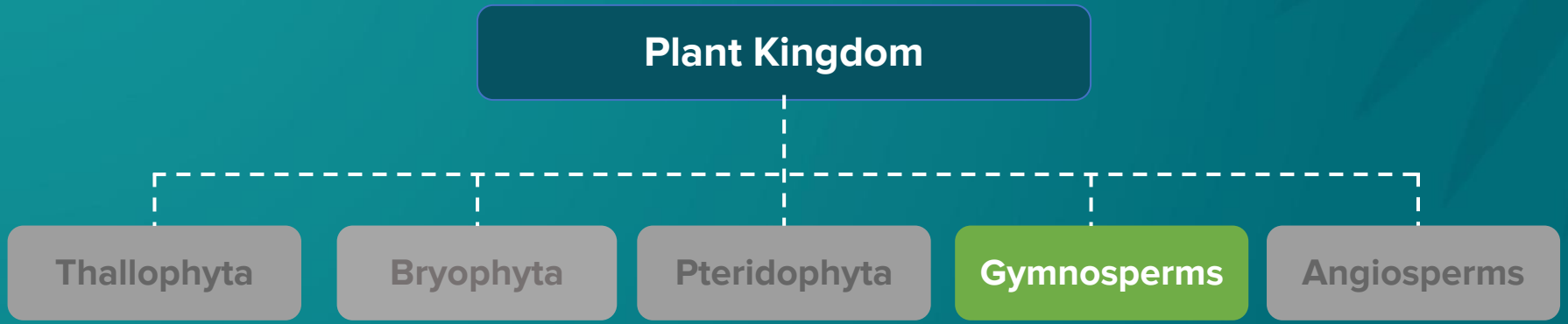
reproduces vegetatively by adventitious buds present on LEAF TIPS

Pteris

Adiantum
(walking fern)

Dryopteris

Recall! Plant Kingdom Classification



→ Naked Seeded Vascular Plants.

Spermatophytes

Gymnosperms

Phanerogams

Naked

Seed

Gymnosperms

- Plants **with 'naked' seeds**
- First seed plants
- Vascular plants: xylem (transports water), phloem (transports food)
- Differentiated plant body: well-defined roots, shoots and leaves
- **Habitat**: Dry, cold conditions

Did you know?

Smallest gymnosperm-
Zamia pygmaea

Dwarf

Largest gymnosperm-
Sequoiadendron giganteum

GIANT RED WOOD Tree

1000's of Trees.

Tallest Tree

Gymnosperms

NEN

Roots

- Generally taproot
- Symbiotic associations of roots
  - Fungi: Mycorrhiza → Pinus
  - Nitrogen fixing cyanobacteria: Coralloid roots

Q

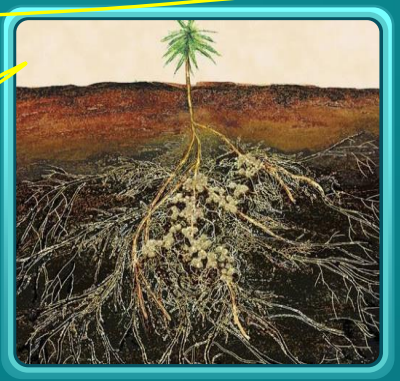
5 *

2 * organisms are mutually benefitted.

BGA

Heterocyst

Anabaena: cycadae



Pinus

Cycas

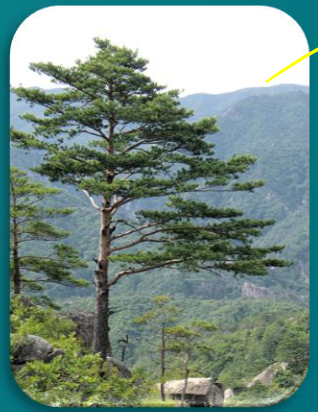
Gymnosperms

Erect stem

- Unbranched
- Branched

Cycas

Cedrus



Pinus

Cold, extreme

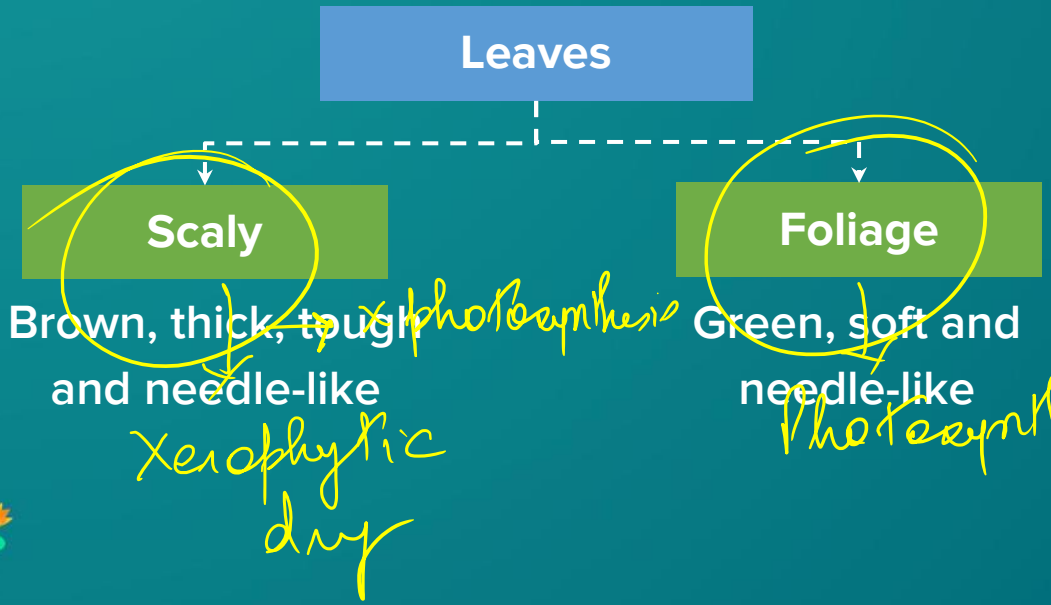
→ P. Y. Q

TIP

Gymnosperms

Leaves

- Two forms: Scaly and Foliage



Gymnosperms

Foliage

Simple

Compound

Eg - Pinus

Eg - Cycas

→ Temp, humidity and Wind

Snow

needle like leaves are characteristic

P.Y.Q

Gymnosperms

Cycas

No palmately compound leaves

Gymnosperms

- Adaptations: Extreme conditions of temperature, humidity and wind

Adaptations of leaves

Needle-like leaves

- Snow cannot sit on leaves
- Reduced area = less water loss

↓ Transpiration

Thick cuticle

WAX

- Waxy coating on leaves
- Prevents water loss

Sunken stomata

Reduces water loss

• Deeper layers

Evergreen

Gymnosperms

Sporophylls

All are heterosporous.

- Modified leaves containing sporangia (produces spores)
- Also called strobili or cones — Male, Female cone
- Bear 2 types of spores (heterosporous) - a) Microsporangia (in male strobili)
- b) Megasporangia (in female strobili)

Male cone

Female cone

Strobilus

Microsporophyll

Microsporangia → Microspore → Pollen Grains

Male gametophyte

Phases of Gymnosperm Life Cycle

Gametophytic
- Gamete bearing
- Always haploid

Sporophytic
- Spore bearing
- Always diploid
- Dominant stage

Gymnosperms

Male strobili

Microsporangiate or male strobili:

- Strobili bearing **microsporophylls and microsporangia**
- Microspores develop into a male gametophytic generation (highly reduced and confined only to a limited number of cells)

Gymnosperms

Male strobili

Microsporangiate or male strobili:

- Reduced gametophyte: **Pollen grain**
- The development of pollen grains take place within the microsporangia.

Gymnosperms

Female strobili

Macrosporangiate or female strobili:

- Cones bearing megasporophylls with ovules or megasporangia (Integumented) – Unitegmic
- Megaspore mother cell is differentiated from one of the cells of the nucellus
- Composite structure: **Ovule**

Gymnosperms

Female strobili

Macrosporangiate or female strobili:

- Ovules are borne on megasporophylls
- Megaspore mother cell divides **meiotically** to form **four megaspores**

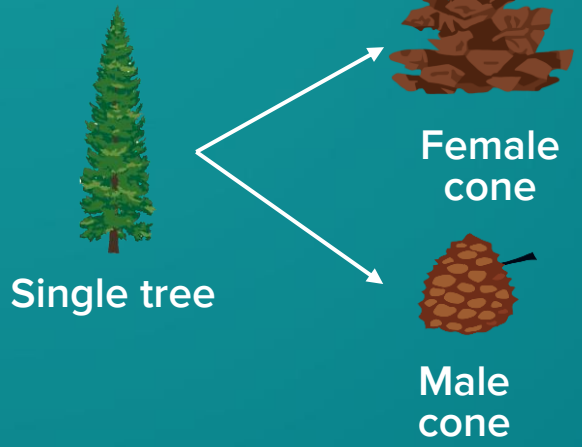
Gymnosperms

Female strobili

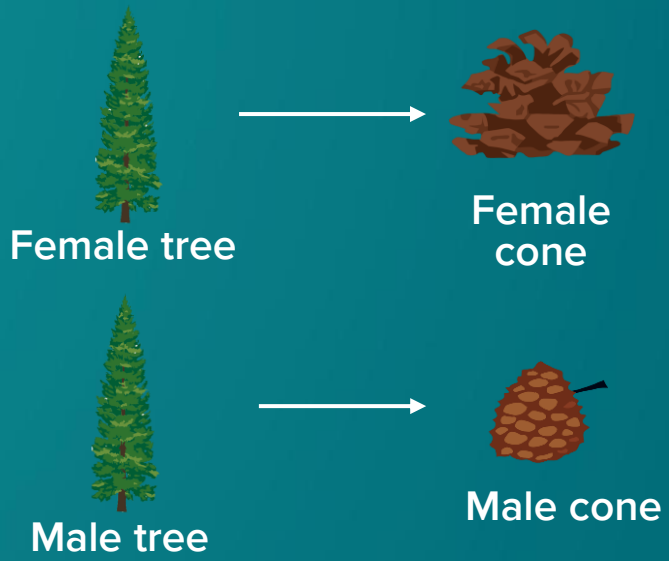
Macrosporangiate or female strobili:

- One of the megaspores develops into a multicellular female gametophyte that **bears two or more archegonia or female sex organs.**
- Anemophily
- One male gamete is functional, 2 are produced.

Gymnosperms

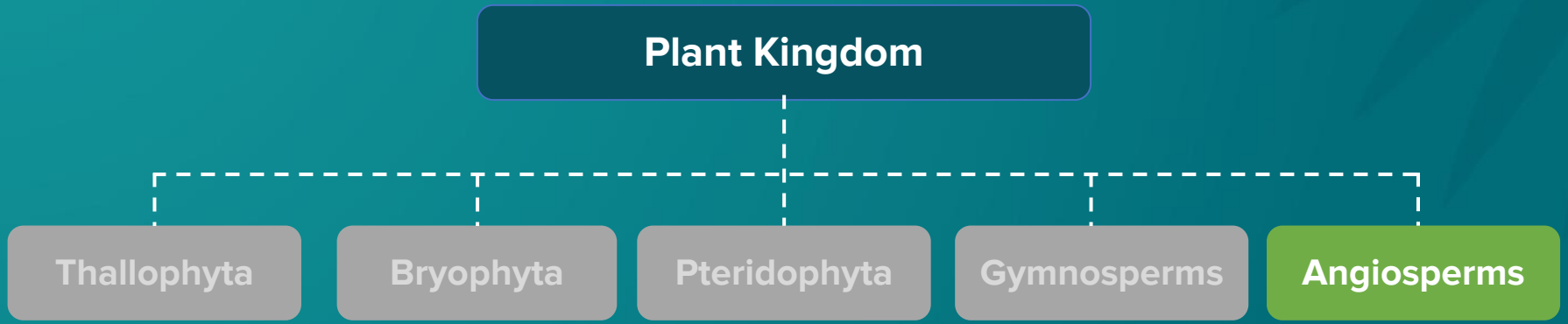


Monoecious - eg- *Pinus*



Dioecious - eg- *Cycas*

Recall! Plant Kingdom Classification

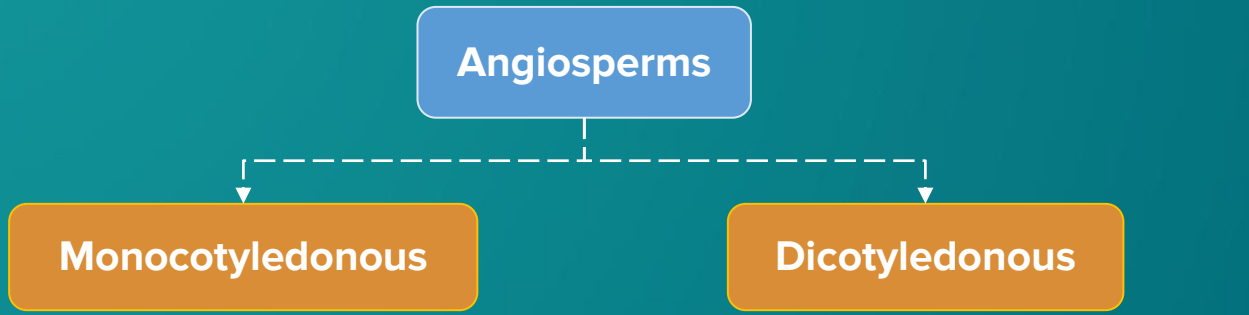


Angiosperms

Angiosperms

- Vascular (like Pteridophytes)
- Seed bearing (like Gymnosperms)
- Flower bearing
- Seeds enclosed in fruits

Angiosperms



- Contain **single cotyledonous** seed
- **Parallel** venation
- **Trimerous** flowers

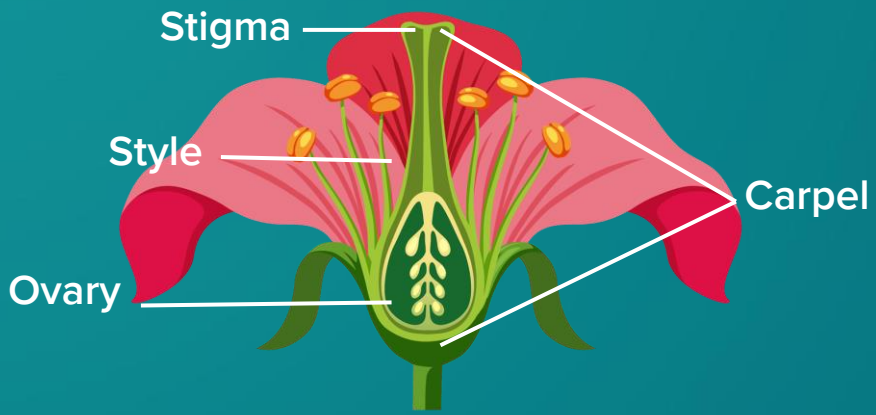
- The seeds have **two cotyledons**
- **Reticulate** venation
- **Tetramerous or pentamerous** flowers

Angiosperms

Male sex organs:

Produces male gametes

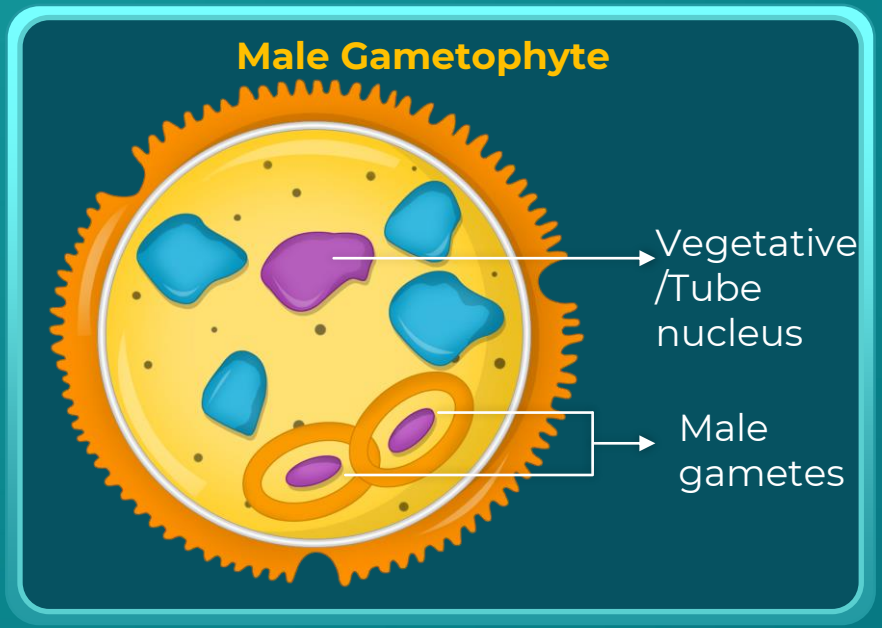
Angiosperms



Female sex organs:

Produces female gametes

Gametophytes of Angiosperms



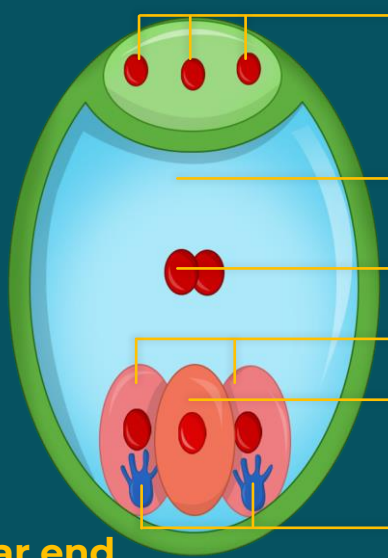
The male gametophyte, microspores, or the pollen grains develops from the sporogenous tissues of the stamens

Gametophytes of Angiosperms

Carpel

The **female gametophyte** or the embryo sac develops from the cells of the **nucellus** that are found in the ovules or the megasporangium present within the pistil

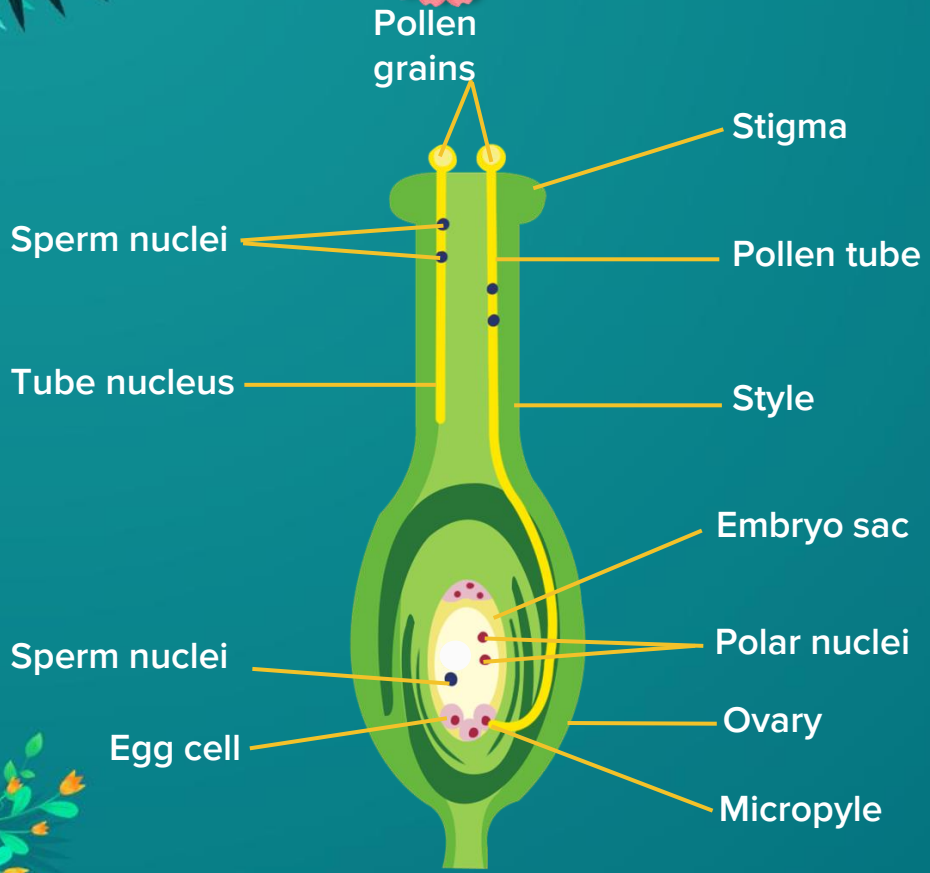
Gametophytes of Angiosperms



Female Gametophyte

Double Fertilization

Double Fertilization

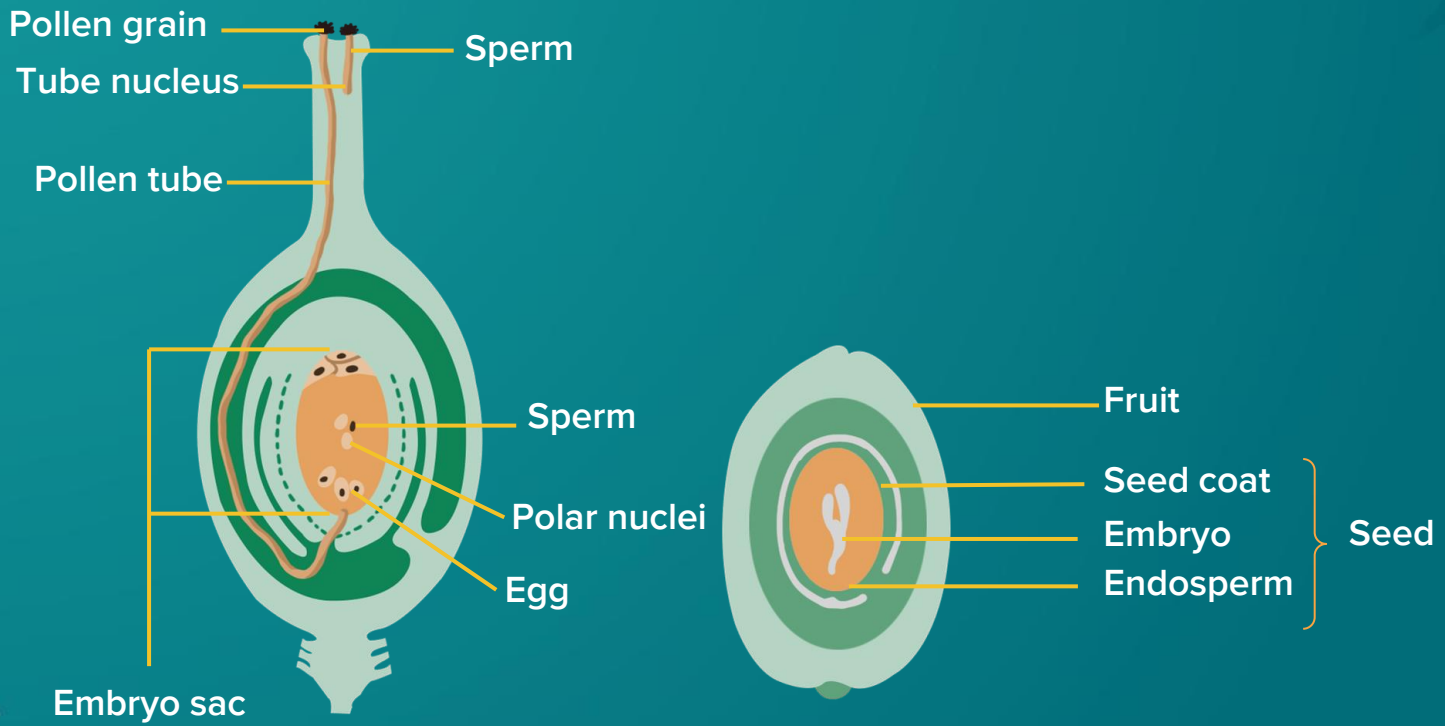


- The pollen grains germinate on the stigma and the resulting **pollen tubes** grow through the tissues of stigma and style and **reach the ovule.**

Double Fertilization

- The pollen tubes enters the embryo-sac where **two male gametes** are discharged.
    1. One fuses with the egg cell (syngamy) to form a **zygote.**
    2. Other fuses with the diploid secondary nucleus to produce the **triploid primary endosperm nucleus** (PEN).
- Since two fusions occur in this process, i.e., syngamy and triple fusion, this event is termed as **double fertilisation.**

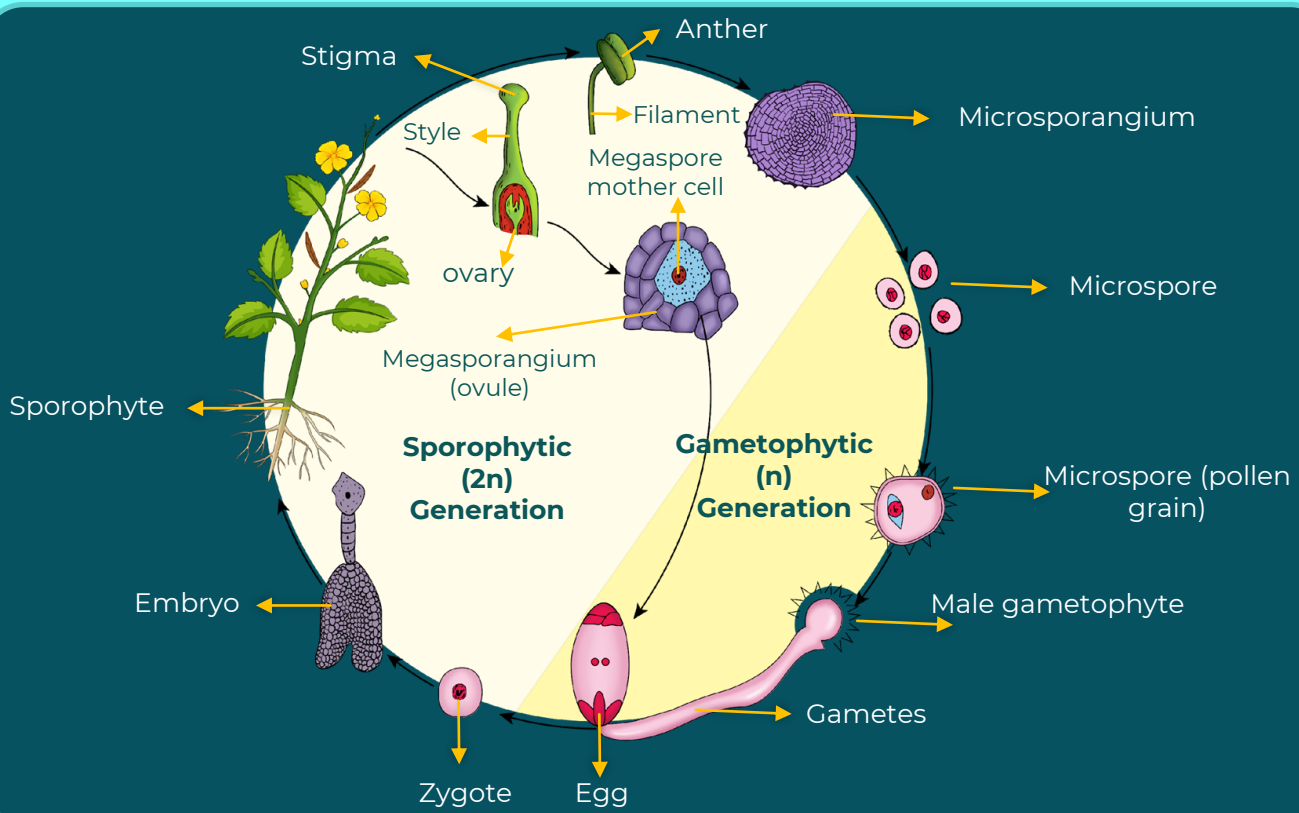
Double Fertilization



Double Fertilization

- After double fertilisation, the zygote develops into an **embryo** and the triploid primary endosperm nucleus (PEN) **develops into endosperm.**
- The ovary develops into a fruit and the ovule becomes the seed.

Life Cycle of Angiosperms



Some Amazing Angiosperms

Smallest Flower

Wolffia

Largest Flower

Rafflesia arnoldii

Animal-like Orchids

Monkey-face orchid

Bat plant flower

Fly orchid


Keep
Learning!