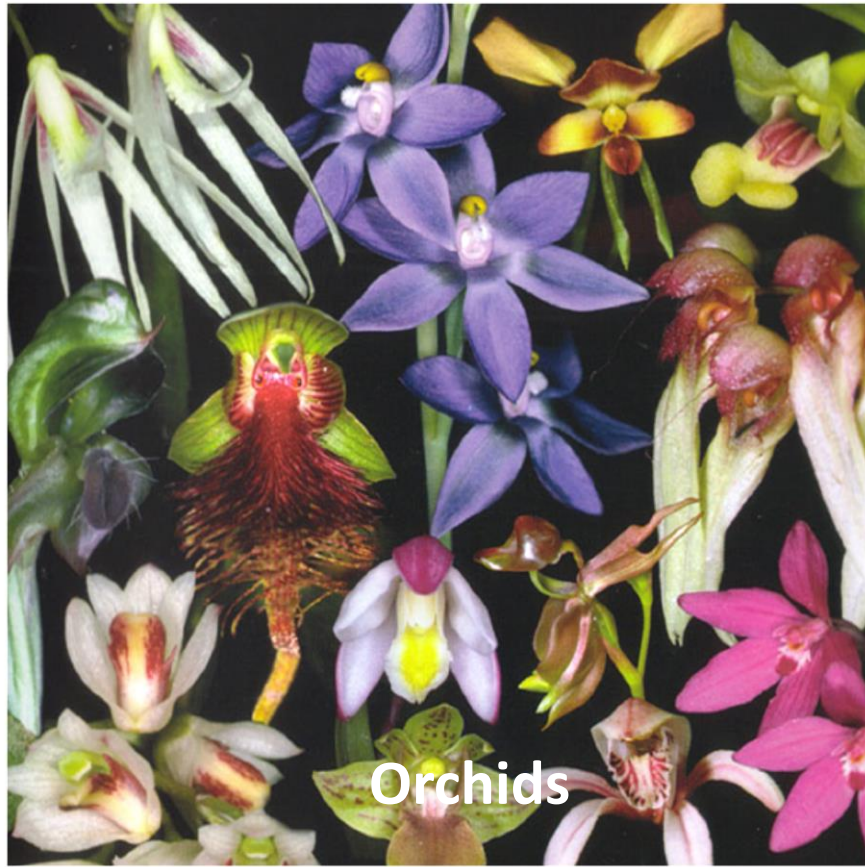


LIFE SCIENCES

GRADE 11 CAPS

STRUCTURED, CLEAR,
PRACTICAL - *HELPING*
TEACHERS UNLOCK THE POWER
OF NCS

KNOWLEDGE AREA: Diversity,
change and continuity
TOPIC 1: Biodiversity of Plants
and Reproduction



Orchids



Sangari SouthAfrica
THINK. DO. LEARN.



Biodiversity of Plants

SUMMARY OF PRESENTATION

Introduction to Plant Kingdom

The Bryophytes

The Pteridophytes

The Gymnosperms

The Angiosperms

The Progressive Development of Land
Plants

INTRODUCTION TO PLANT KINGDOM

- ⦿ All the plants in the **plant kingdom** maybe grouped into **vascular** and **non-vascular plants**.
- ⦿ **Vascular plants** are those with **conducting tissue**.
- ⦿ **Non-vascular plants** are those that **do not have conducting tissue**.
- ⦿ Do you remember that **conducting tissue** are **xylem and phloem**?
- ⦿ Some **examples** of **non-vascular plants** are **mosses, liverworts and hornworts**.

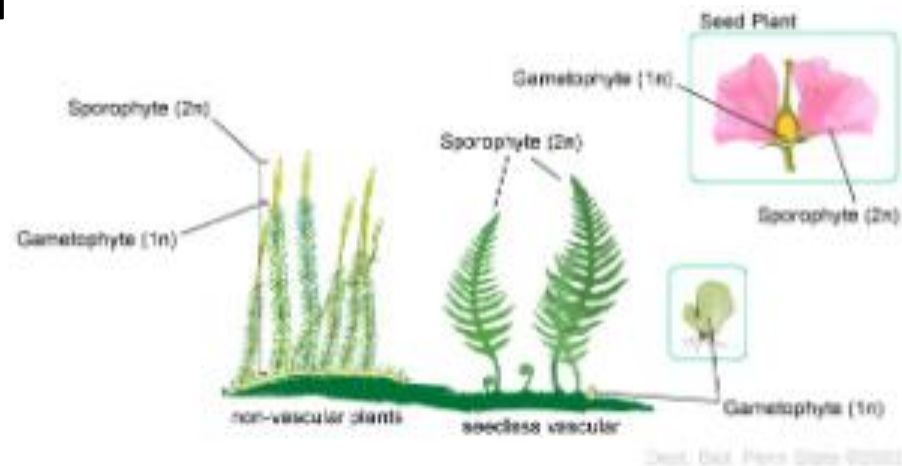
INTRODUCTION TO PLANT KINGDOM

- These plants belong to the **Phylum Bryophyta**.



INTRODUCTION TO PLANT KINGDOM

- The **vascular plants** may be further divided into those that **bear seeds and those that do not**.
- An example of **seedless plants** are the **ferns**.
- **Pine tree and flowering plants** are examples of **seed-bearing plants**.



INTRODUCTION TO PLANT KINGDOM

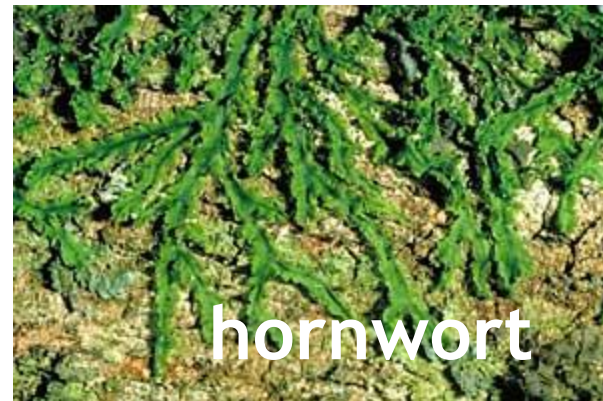
- The **ferns** belong to the **Phylum Pteridophyta**.
- While the **pine plant** belongs to the **Phylum Gymnosperm** and the **flowering plants** belong to the **Phylum Angiosperm**.
- **All plants** have a **lifecycle** that is made up of **2 generations**.
- These **2 generations** are the:
 1. Gametophyte
 2. Sporophyte
- These **generations alternate** with each other.

INTRODUCTION TO PLANT KINGDOM

- One generation gives rise to the other.
- You will learn more about this in grade 12.

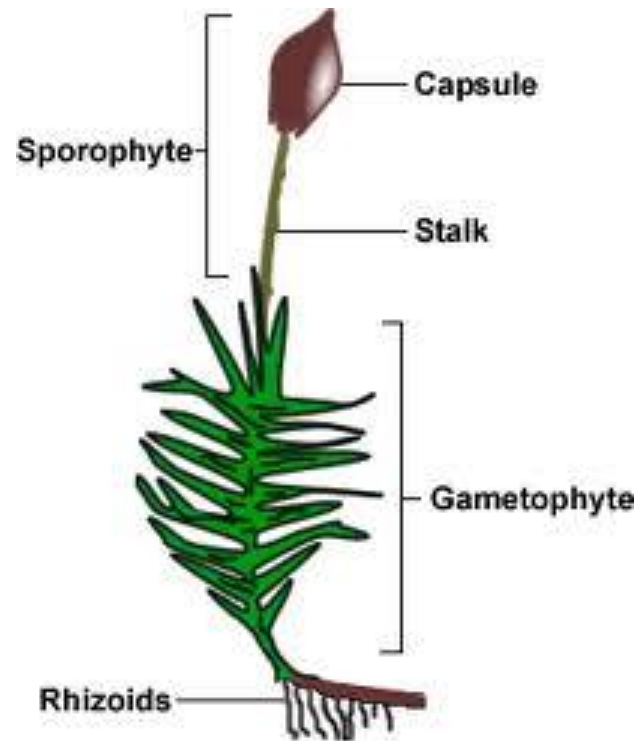
THE BRYOPHYTES

- ⦿ This group is made up of **3 large groups**.
- ⦿ They are the:
 - a. Mosses
 - b. Liverworts
 - c. Hornworts
- ⦿ All these are **terrestrial plants**.
- ⦿ They grow in **damp, shady ground**.



THE BRYOPHYTES

- The **most well known bryophyte** is the **moss**.
- In the **bryophytes** the **dominant generation** is the **gametophyte**.
- The **gametophyte** is **dominant** because it **lives longer** and is **larger than** the **sporophyte generation**.



The moss showing the 2 generations

THE BRYOPHYTES - CHARACTERISTICS

- The plant has **root-like** structures called **rhizoids**.
- The **rhizoids anchor the plant** to the **ground**.
- The moss also has **stem-like** and **leaf-like structures**.
- Since the moss has **no true roots, stems** and **leaves** it is called a **thallus**.



THE BRYOPHYTES - CHARACTERISTICS

- ⦿ The moss also **lacks xylem and phloem**.
- ⦿ Therefore we say it **lacks conducting tissue**.
- ⦿ They **reproduce using spores** and have **no seeds**.
- ⦿ These **spores** occur in **spore bearing capsules**, therefore the moss has **no fruits**.



THE BRYOPHYTES - CHARACTERISTICS

- ⦿ The **male and female reproductive organs** are found on **different branches of the same plant**.
- ⦿ The **sperms** have to **move** from the male reproductive organs to the **female reproductive organs**.
- ⦿ The **sperms swim to reach the egg** in the female reproductive organ.
- ⦿ The **sperms swim in a film of water** to reach the egg.
- ⦿ Therefore we say that the **moss is dependent on water** for reproduction.

THE BRYOPHYTES - CHARACTERISTICS

- ⦿ During **asexual reproduction spores are produced**.
- ⦿ These **spores** are **dispersed by wind**.
- ⦿ The **moss** is **dependent** on **dry weather** for the **release and dispersal of spores**.

THE PTERIDOPHYTES

- ◎ This phylum includes the **ferns, horsetails and whisk ferns.**



THE PTERIDOPHYTES - CHARACTERISTICS

- These plants have **vascular tissue**.
- They also have **supporting tissue**.
- They therefore have **true roots, stems and leaves**.
- The Pteridophytes are **not thallus plants**.
- They **reproduce using spores**, they **do not produce seeds**.
- **Spores** are **made and stored** in **spore bearing capsules**.
- They **do not** have fruits.

THE PTERIDOPHYTES - CHARACTERISTICS

- ⦿ They undergo both **sexual and asexual reproduction**.
- ⦿ The **sperms** need to **swim to reach the egg** in the **female reproductive organ**.
- ⦿ The sperm **swims in water**.
- ⦿ Therefore the **pteridophytes depend on water for sexual reproduction**.
- ⦿ During **asexual reproduction spores are produced**.
- ⦿ These **spores** depend on **dry weather** for their **release and dispersal**.

THE PTERIDOPHYTES - CHARACTERISTICS

- ⊙ The **dominant generation** is the **sporophyte generation**.
- ⊙ The **sporophyte generation** is **dominant** because it is **able to stay alive** and **produce spores** for **many cycles**.
- ⊙ The **gametophyte generation dies** after just **one cycle of gamete formation and fertilization**.

THE SPERMATOPHYTES

- All **plants** that **bear seeds** belong to the **phylum Spermatophyta**.
- These plants maybe separated into **2 groups**, those that **bear naked seeds** and those whose **seeds occur within fruit**.
- The **plants** that produce **naked seeds** belong to the **group Gymnosperms**.
- The **plants** that produce **seeds within fruits** belong to the group **Angiosperms**.

THE GYMNOSPERMS

- ⦿ There are **4 groups** of Gymnosperms.
- ⦿ These 4 groups are:-
 1. Conifers
 2. Cycads
 3. Gnetophytes
 4. Ginkgophytes

THE GYMNOSPERMS

1. **The Conifers:**
 - These are **cone bearing plants**.
 - They are made up of about **600 different species**.
 - This makes them the **biggest group of gymnosperms**.
 - Some examples are pine trees, yellow woods, red woods and firs.



A selection of Conifers

THE GYMNOSPERMS

2. **The Cycads:**
 - ⦿ They form the **second largest group** of **gymnosperms**.
 - ⦿ They are made up of **130 extant species**.
 - ⦿ **Extant** means that the **organism is not extinct**.
 - ⦿ There were a much larger population of cycads but many of them became extinct.



THE GYMNOSPERMS

3. The Gnetophytes:

- ⦿ This group is **very small**.
- ⦿ It is made up of only **3 genera**. (Genera is plural of genus)
- ⦿ One example is the ***Welwitschia mirabilis***, that is found in the Namib Desert.



THE GYMNOSPERMS

4. The Ginkgophytes:
 - ⦿ This group is made up of only **one species**.
 - ⦿ This species is called the ***Ginkgo biloba***.
 - ⦿ The ***Ginkgo biloba*** is commonly known as the **maidenhair tree**.



THE GYMNOSPERMS - CHARACTERISTICS

- ⊙ These plants have **conducting tissue**, therefore **water and manufactured food** can be **transported to all parts of the plant**.
- ⊙ They also have **supporting tissue**, they have **enough strength and support** to allow them to **grow to great lengths**.
- ⊙ They have **true roots, stems and leaves**.
- ⊙ Therefore they are **not thallus plants**.
- ⊙ They undergo **both sexual and asexual reproduction**.
- ⊙ During **sexual reproduction seeds are produced**.

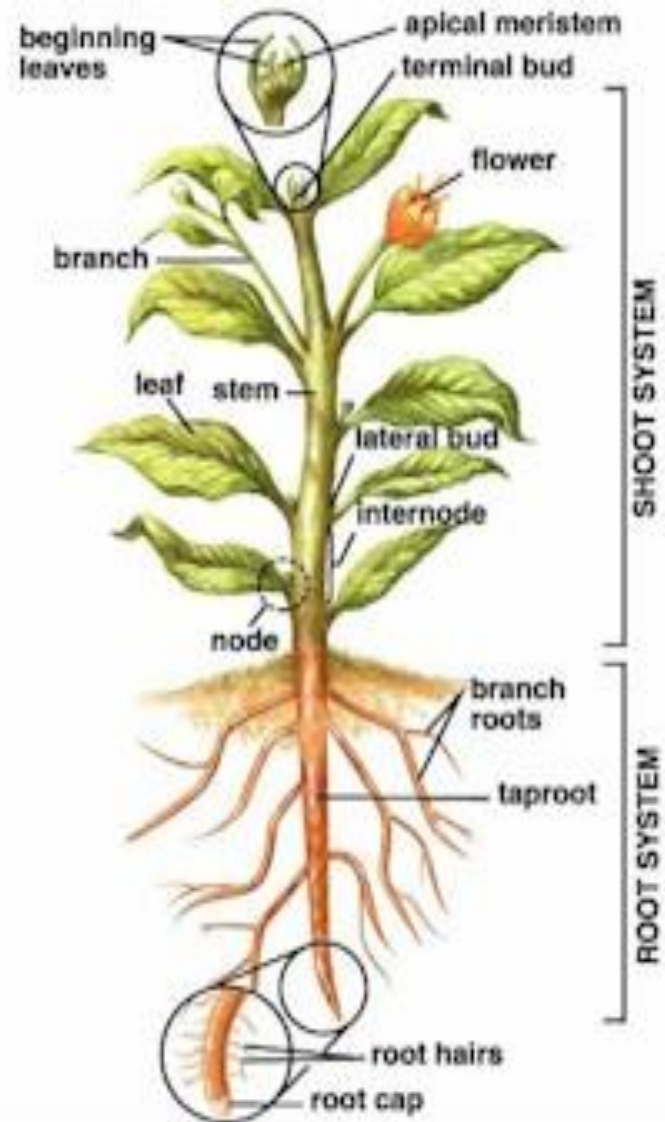
THE GYMNOSPERMS - CHARACTERISTICS

- ⊙ These **seeds are found on the cones.**
- ⊙ They **do not bear fruit.**
- ⊙ They have **spores**, but they have **both male and female spores.**
- ⊙ These **spores** are inside the **pollen grain and ovary.**
- ⊙ They are **not dependent on water for reproduction.**
- ⊙ The **male spores** are carried to the **female cone** by the **wind.**
- ⊙ The **pollen tube** then **carries the spores** to the **ovary.**

THE GYMNOSPERMS - CHARACTERISTICS

- ⦿ Two generations also occur in these plants.
- ⦿ The **sporophyte generation** is **dominant**.
- ⦿ The **gametophyte generation** is **separated** into a **male gametophyte** and a **female gametophyte**.
- ⦿ Both the **male and female gametophyte generation** occur **within the sporophyte**.

ANGIOSPERMS



ANGIOSPERMS

- ⦿ These are **terrestrial plants**, that occur over a widespread area.
- ⦿ They are a very successful group of plants.
- ⦿ Some of them occur in **very dry areas**, these are called **xerophytes**.
- ⦿ Other angiosperms are found in areas that have **an abundant water supply**, these plants are called **hydrophytes**.
- ⦿ Then finally some of them live in areas of **moderate water supply**, such plants are called **mesophytes**.

ANGIOSPERMS

- ⊙ These plants also have **both the sporophyte and gametophyte generations**.
- ⊙ The **sporophyte** is the **dominant generation**.
- ⊙ **Two separate gametophyte generations** occur.
- ⊙ They are the **male gametophyte and the female gametophyte**.
- ⊙ Both these **gametophyte generations** occur in the **sporophyte generation**.

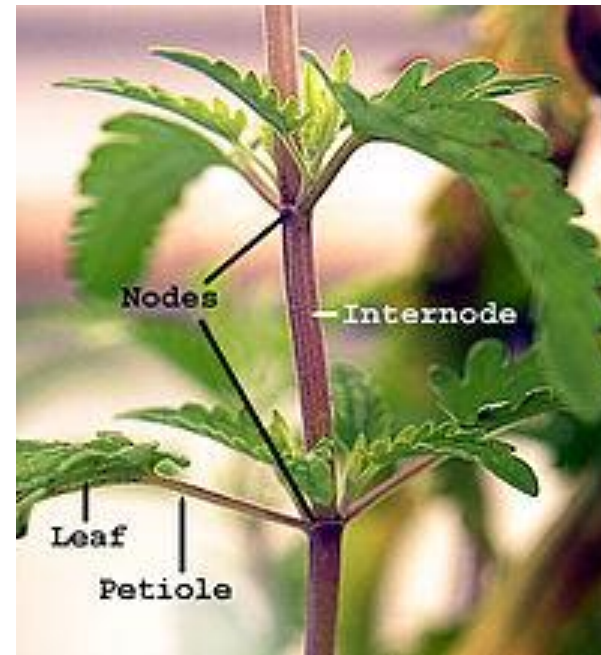
ANGIOSPERMS - ROOTS

STRUCTURE:

- ⊙ The **sporophyte generation is the flowering plant.**
- ⊙ It is made up of **roots, stems leaves and flowers.**
- ⊙ **Two types of roots systems** may occur.
- ⊙ These are the **tap root system** or the **adventitious root system.**

ANGIOSPERM - STEMS

- ⦿ These **stems** are **upright structures**.
- ⦿ They are found **above the ground**.
- ⦿ They **bear leaves and flowers**.
- ⦿ The portion of the stem from which the **leaf** and sometimes **flowers** arises is called the **node**.
- ⦿ The **part between two nodes** is called the **internodes**.



ANGIOSPERM - STEMS

- ⦿ These stems have **conducting tissue**.
- ⦿ They can also be quite tall and therefore they have **well developed supporting and strengthening tissue**.
- ⦿ The **strengthening tissue** maybe **collenchyma** or **sclerenchyma**.

FUNCTION

- ⦿ The stem holds the **flower** in a **perfect position** for **pollination**.
- ⦿ The stem holds the **leaves** in a perfect **position** to **receive sunlight**.

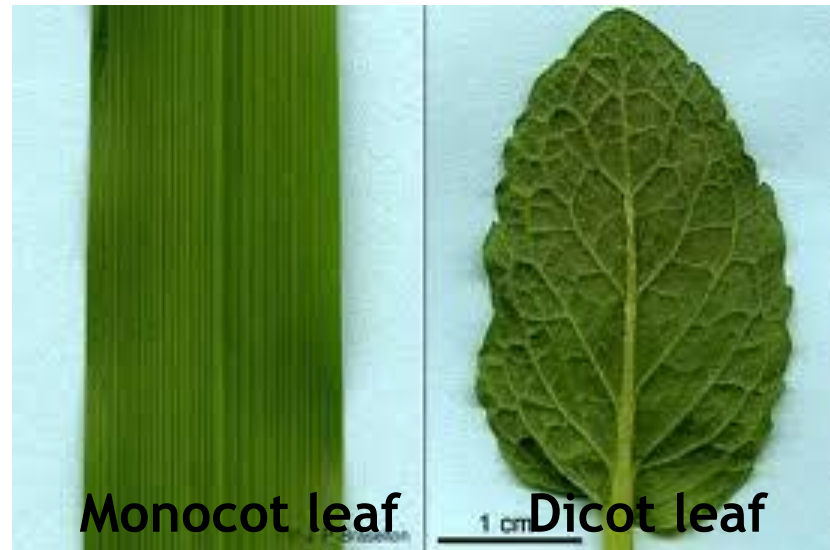
ANGIOSPERM - STEMS

- ⦿ The stem also **transports water and mineral salts** from the **roots to the leaves**.
- ⦿ They also **transport manufactured food** from the **leaves to all parts of the plant**.
- ⦿ Therefore it has **well developed xylem and phloem**.

ANGIOSPERM - LEAVES

STRUCTURE:

- The leaves are **green** in colour.
- They can be **broad and flat** as in the **dicot leaf** or **long and narrow** in the monocot leaf.
- **Dicot leaves** have **net venation** while **monocot leaves** have **parallel venation**.

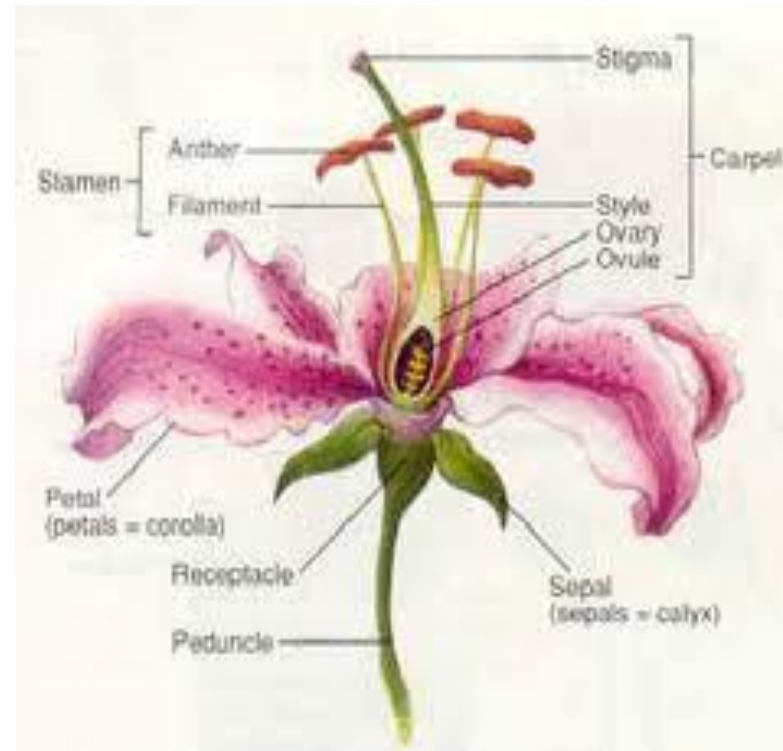


ANGIOSPERM - FLOWER

- ⦿ The **flower** is the **reproductive organ** of the **plant**.
- ⦿ The **male and female gametophyte** are found in the **flower**.
- ⦿ The **male and female gametes** are found within the **male and female gametophyte**.

ANGIOSPERM - FLOWER

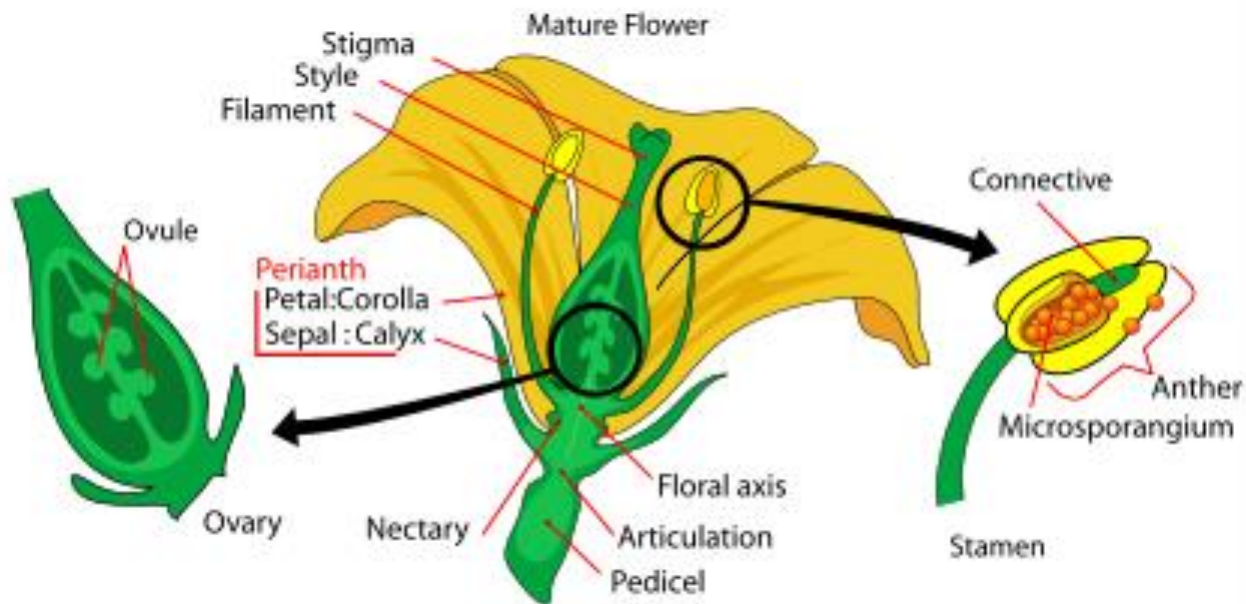
- ⦿ In the **dicot flower** the perianth is differentiated into **2 whorls**.
- ⦿ These are the **corolla (petals)** and the **calyx (sepals)**



Dicot Flower

ANGIOSPERM - FLOWER

- ⊙ In the **monocot flower** the **calyx and corolla** is **fused** to form the **perigone**.



Monocot Flower

ANGIOSPERM - REPRODUCTION

- Stamen - male spores - produced in pollen sacs
- Pistil - style and ovary - is female sex organ
- Ovule - located inside the ovary
- Pollination
 - A ripe pollen grain lands on a receptive stigma.
 - Grain germinates and develops a pollen tube with 2 male gametes (male gametophyte)
 - One female spore (in the ovule) forms the embryo sac(female gametophyte)

ANGIOSPERM - REPRODUCTION

○ Pollination continue

- the embryo sac contains an ovum and 2 polar nuclei
- Pollen tube grows down the style, into the ovary and penetrates the ovule - releases male gametes
- One gamete fuses with ovum - forms a zygote
- Zygote becomes embryo
- Fertilised ovule develops into seed that contains embryo endosperm and testa
- Seed germinates - testa ruptures