

Ministry education and Science of Republic of Kazakhstan
Karaganda State University named after academician Ye.A.
Buketov

Biological and geographical faculty

Botany Department

Course – Botany

Specialty - 5B011300 – «Biology»

Lecture № 6

Structure of flower. Morphology of flower. Double fertilization

(1 hour)

Lecturer: candidate of biological science, associated
professor

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167. *Орша cepaa—Alnus incana (L.) Moench.*

Plan of lecture:

- 1 Flower, structure, basic parts of flower.
- 2 Morphology of flower.
- 3 Process of pollination.
- 4 Double fertilization.

Main literatures:

- 1 Бавтуто Г.А. Практикум по анатомии и морфологии растений. – Минск: Новое знание, 2002. – 185 с.
- 2 Родман А.С. Ботаника. – М.: Колос, 2001. - 328 с.

Additional literatures:

- 1 Ишмуратова М.Ю. Ботаника. Учебно-методическое пособие. - Караганда: РИО Болашак-Баспа, 2015. - 331 с.
- 2 Тусупбекова Г.Т. Основы естествознания. Ч. 1. Ботаника. – Астана: Фолиант, 2013. – 321 с.
- 3 Байтулин И.О. Основы ризологии. - Алматы: Гылым, 2001. – 210 с.

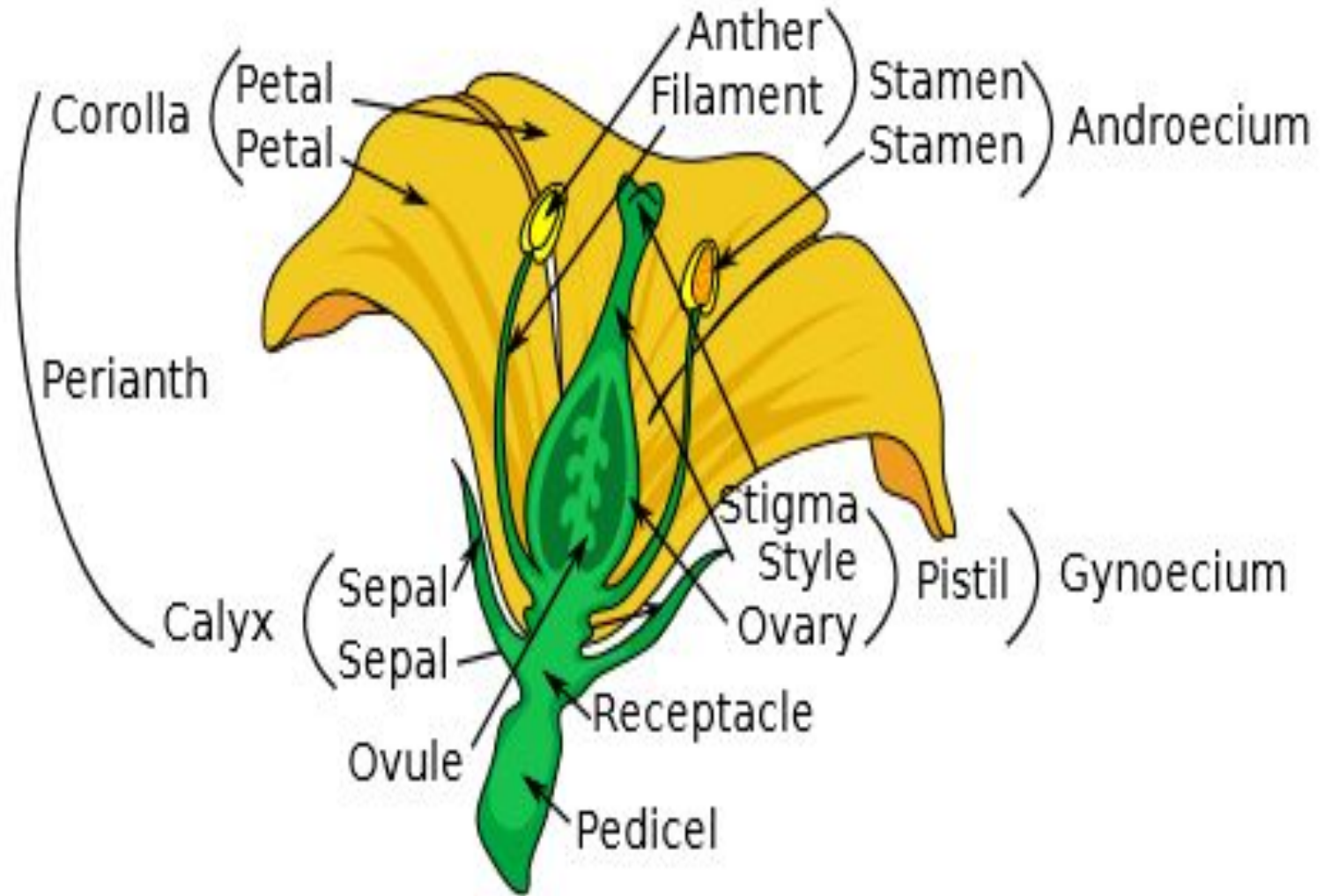
A **flower** is a compact generative shoot that is comprised of three zones: sterile (perianth), male (androecium), and female (gynoecium).

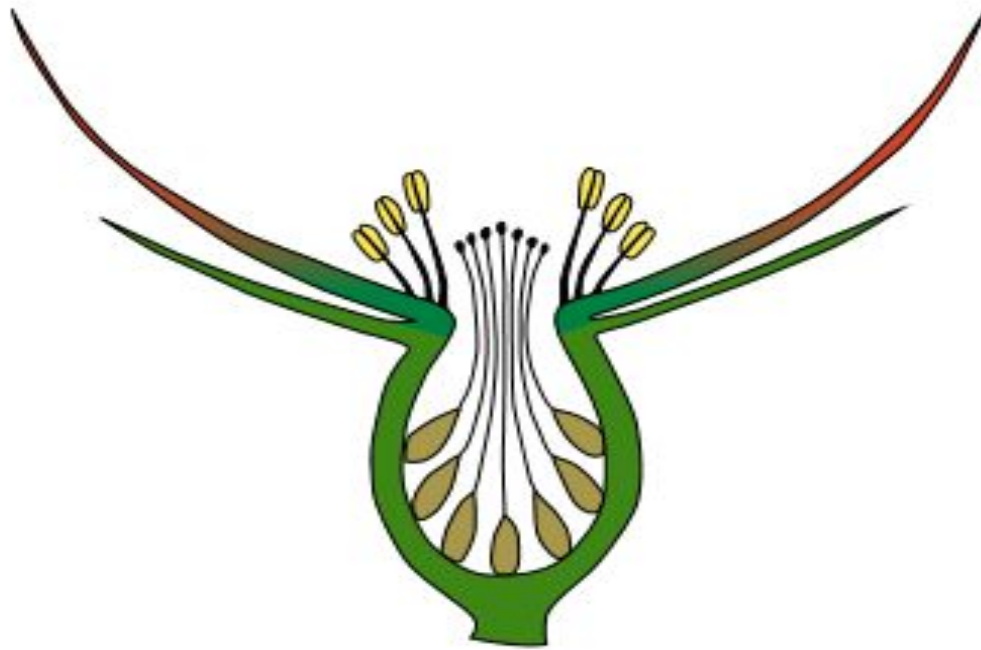
Perianth is typically split into green part (calyx, consists of sepals) and color part (corolla, consists of petals).

Sometimes perianth consists of similar parts which are neither sepals nor petals: tepals. This might be seen in the tulip (*Tulipa*) flower where tepals change their color from green (like in calyx) to red, white or yellow (like in corolla).

The general characters that a flower has are sex, merosity, symmetry, and the position of the gynoecium.

Structure of flower





Flower with hypanthium (cup-shaped receptacle).



Diagram of male (left) and diagram and scheme of female (central and right) flowers of sedges (*Carex*). Note the perigynium (external cover of pistil).

Main parts of flower

FLOWER PARTS occur in whorls in the following order—sepals, petals, stamens, pistils

PEDICEL flower stem

RECEPTACLE base of flower where other parts attach

HYPANTHIUM cup-shaped receptacle

PERIANTH = CALYX + COROLLA

SEPALS small and green, collectively called the CALYX, formula: K

PETALS often large and showy, collectively called the COROLLA, formula: C

TEPALS used when sepals and petals are not distinguishable, formula: P

ANDROECIUM collective term for stamens: formula: A

STAMEN = FILAMENT + ANTHER

ANTHER structure containing pollen grains

FILAMENT structure connecting anther to receptacle

GYNOECIUM collective term for pistils/carpels, formula: G. Gynoecium can be composed of:

1. A single CARPEL = simple PISTIL
2. Two or more fused CARPELS = compound PISTIL
3. Two or more unfused CARPELS = two or more simple PISTILS

To determine the number of CARPELS in a compound PISTIL, count LOCULES, points of placentation, number of STYLES, STIGMA and OVARY lobes.

PISTIL Collective term for carpel(s). The terms CARPEL and PISTIL are equivalent when there is no fusion, if fusion occurs then you have 2 or more CARPELS united into one PISTIL.

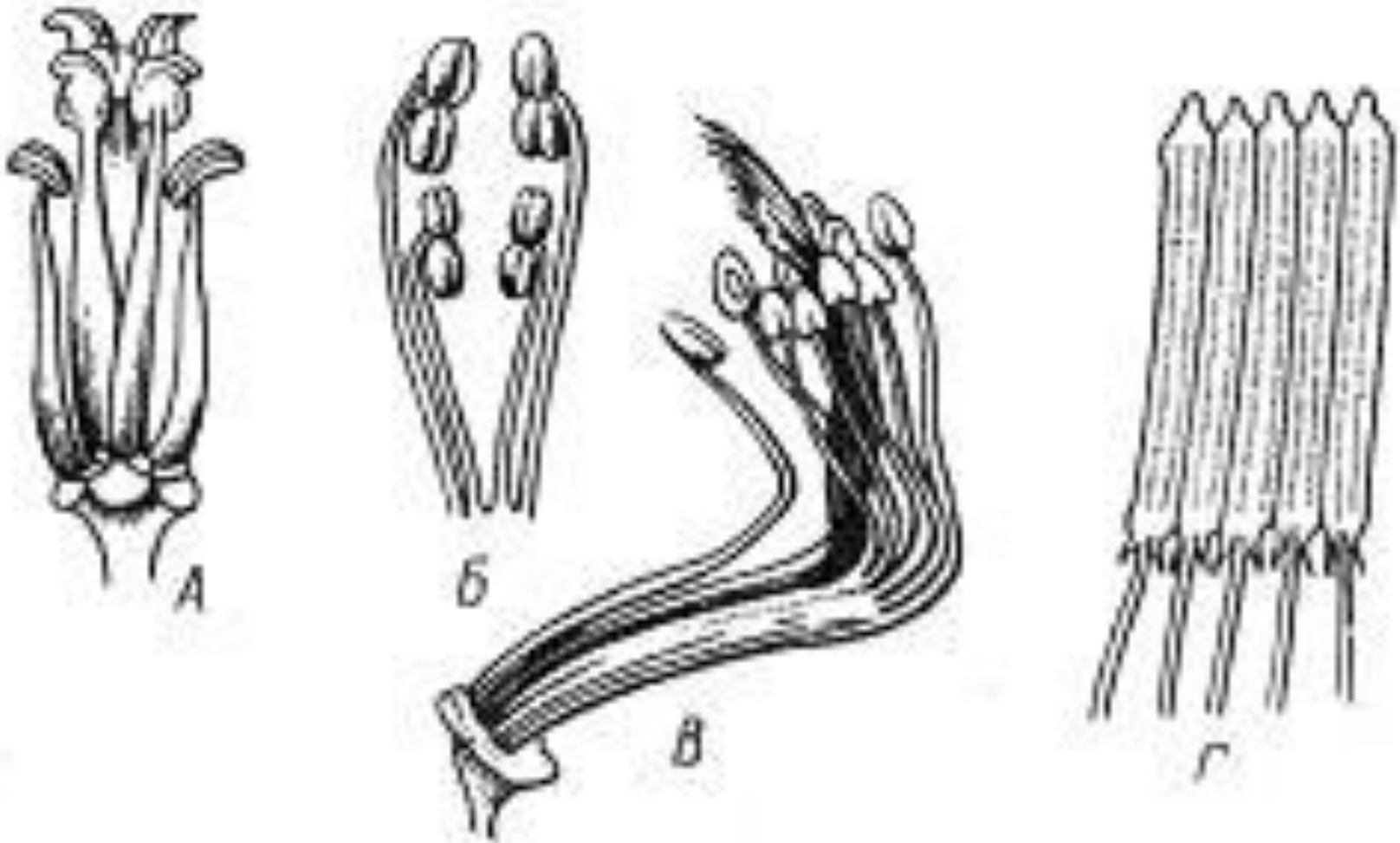
CARPEL structure enclosing ovules, may correspond with locules or placentas

OVARY basal position of pistil where OVULES are located. The ovary develops into the fruit; OVULES develop into seeds after fertilization.

LOCULE chamber containing OVULES

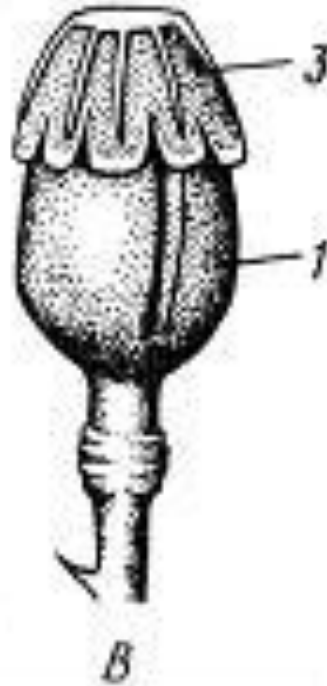
PLACENTA place of attachment of OVULE(S) within ovary

Types of anthers



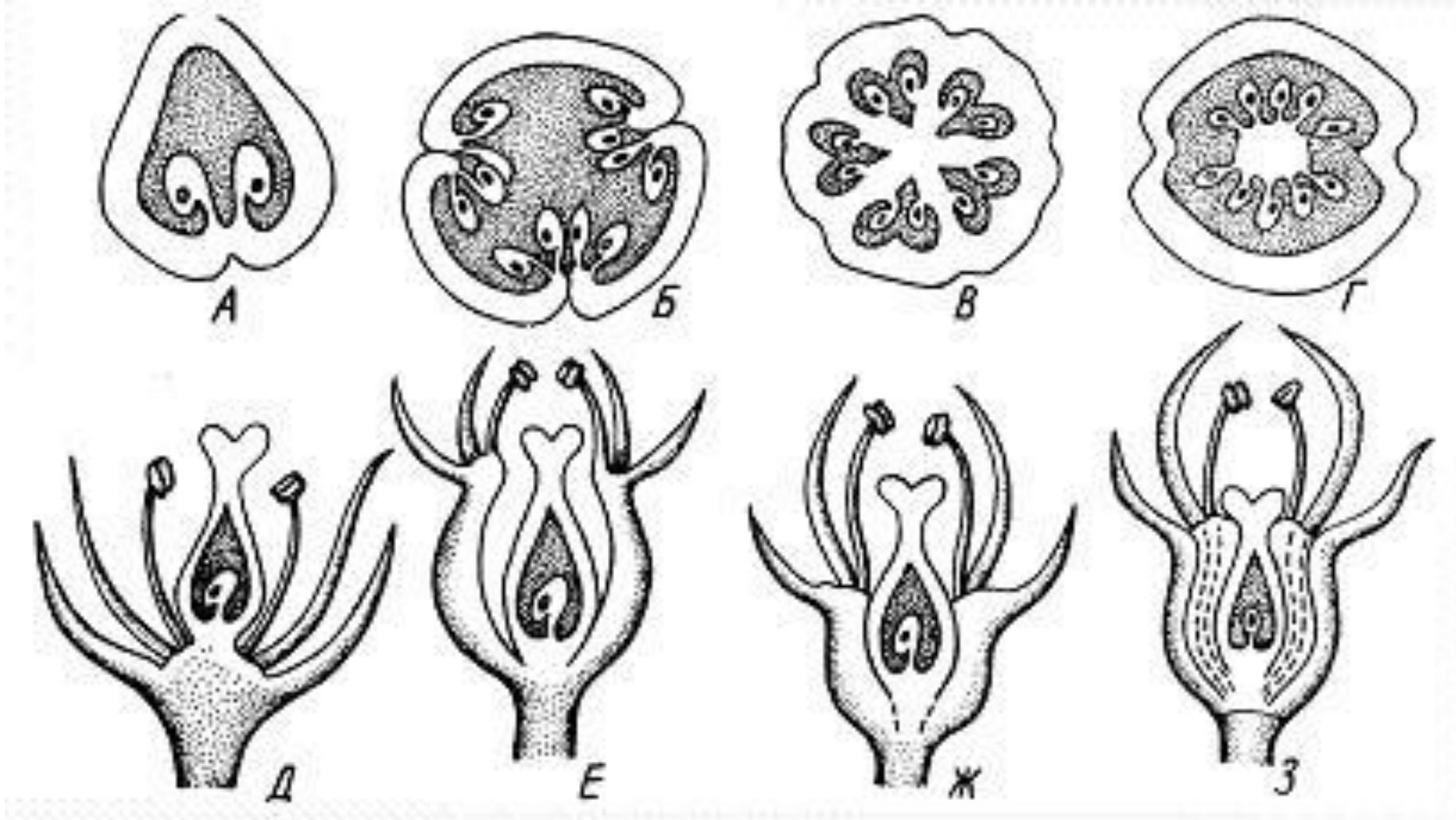
A – *Brassicaceae*); Б – *Lamiaceae*; B – *Fabaceae*; Г – *Asteraceae*

Types of gynoecia



A-B – cenocarpium; Г – apocarpium. A – *Nicotiana*; Б – *Salix*; B – *Papaver*; Г – *Butomus*: 1 – ovary, 2 – style, 3 – stigma

Types of ovary



Formula of flower

$\uparrow K_{(5)}[C_{(1,2,2)}A_{2,2}]G_{(2 \times 2)}$: flower zygomorphic, with five fused sepals, five unequal fused petals, two-paired stamens attached to petals, superior ovary with two subdivided carpels

$*K_{(5)}C_{(5)}[A_5G_{(3)}]$: actinomorphic flower with five fused sepals and five fused petals, five stamens attached to pistil, ovary inferior, with three fused carpels

The following signs are used to enrich formulas:

PLUS “+” is used to show different whorls; *minus* “-” shows variation; “v” = “or”

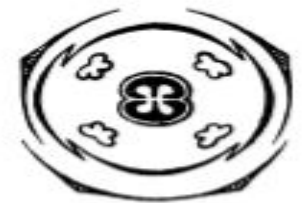
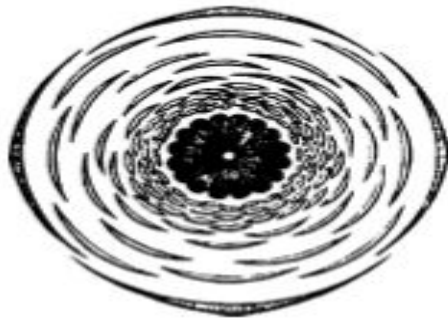
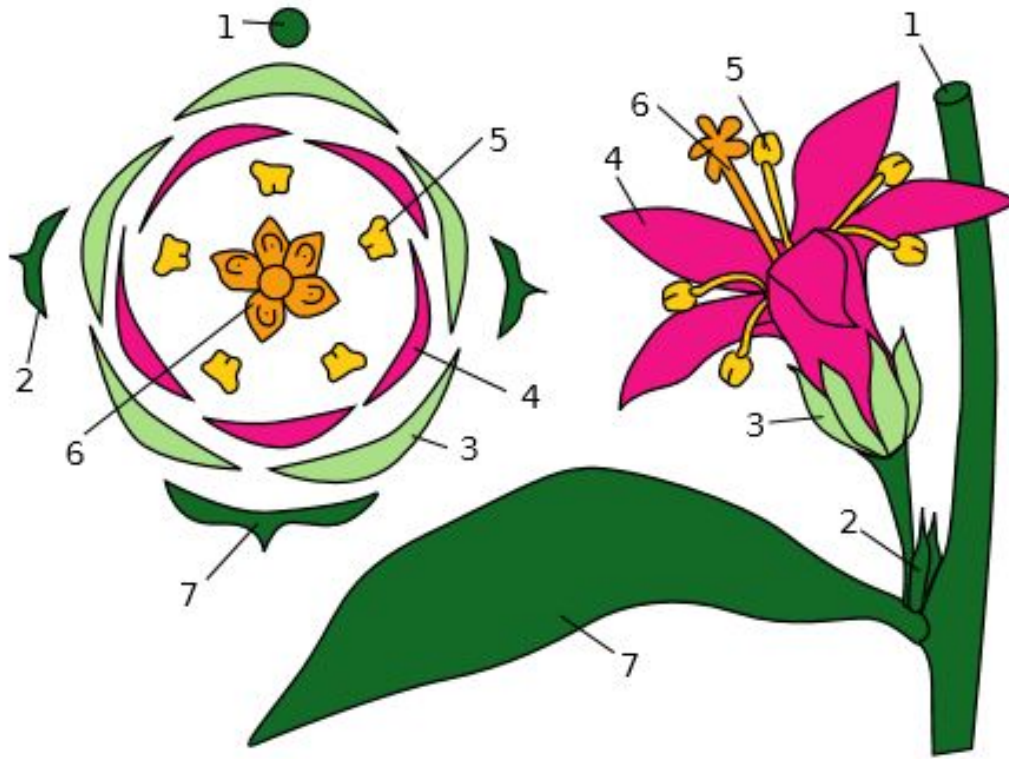
BRACKETS “[]” and “()” show fusion

COMMA “,” shows inequality of flower parts in one whorl

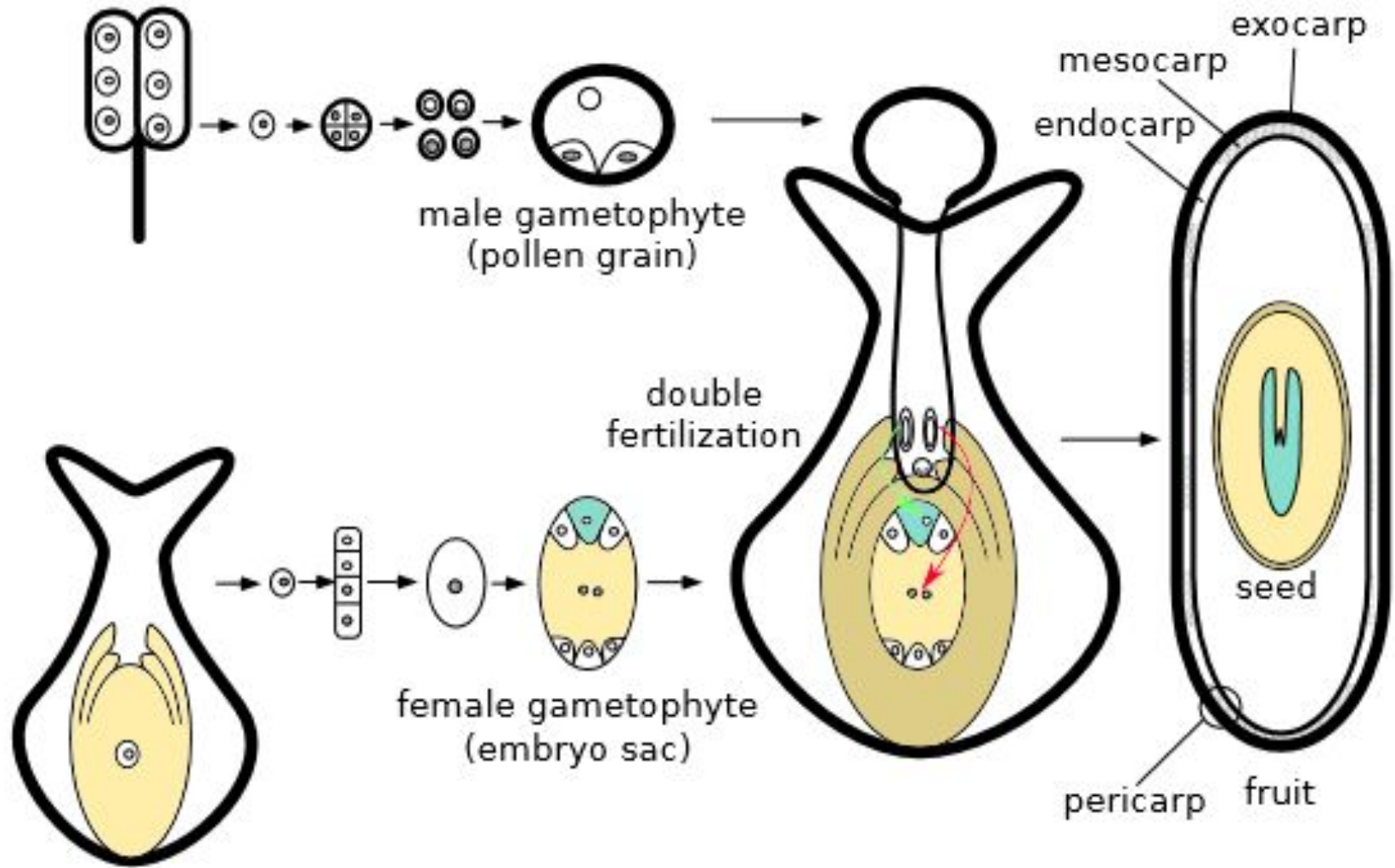
MULTIPLICATION “×” shows splitting

INFINITY “∞” shows indefinite number of more than 12 parts

Diagram of flower



Double fertilization and creation of fruits



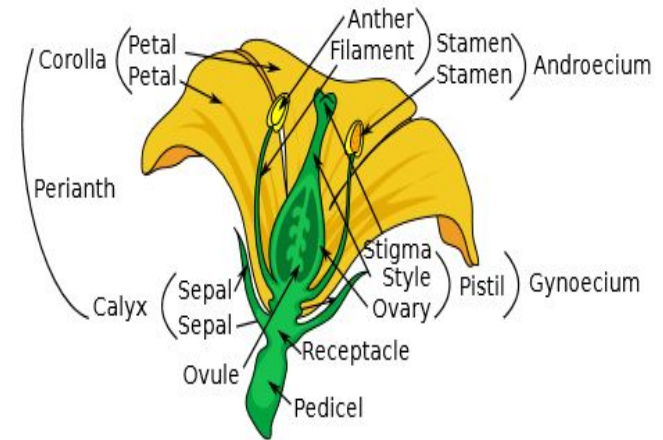
Control questions:

- 1 What are the main parts of flower?
- 2 Which are the functions of flowers?
- 3 Which are the functions of stamen?
- 4 Describe the structure of pollen grain.
- 5 How did open the processes of double fertilization?
- 6 Which cells are included in pollen grain?
- 7 Which type of pollination do you know?

Test questions:

Fertile organs of flowers:

- A) perianth
- B) calyx
- C) corolla
- Д) pedicel
- E) stamen
- F) Pistil



Who did describe the process of double fertilization:

- A) Navashin
- B) Miller
- C) Sechenov
- Д) Pavlov
- E) Baitulin