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 № 7

Types of inflorescences. Role of inflorescences in plants' life

(1 hour)

Lecturer: candidate of biological science, associated professor
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Plan of lecture:

1 Definition and biological role of inflorescences.
2 Simple inflorescences.
3 Compound inflorescences.
4 Pollination.

Basic 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:

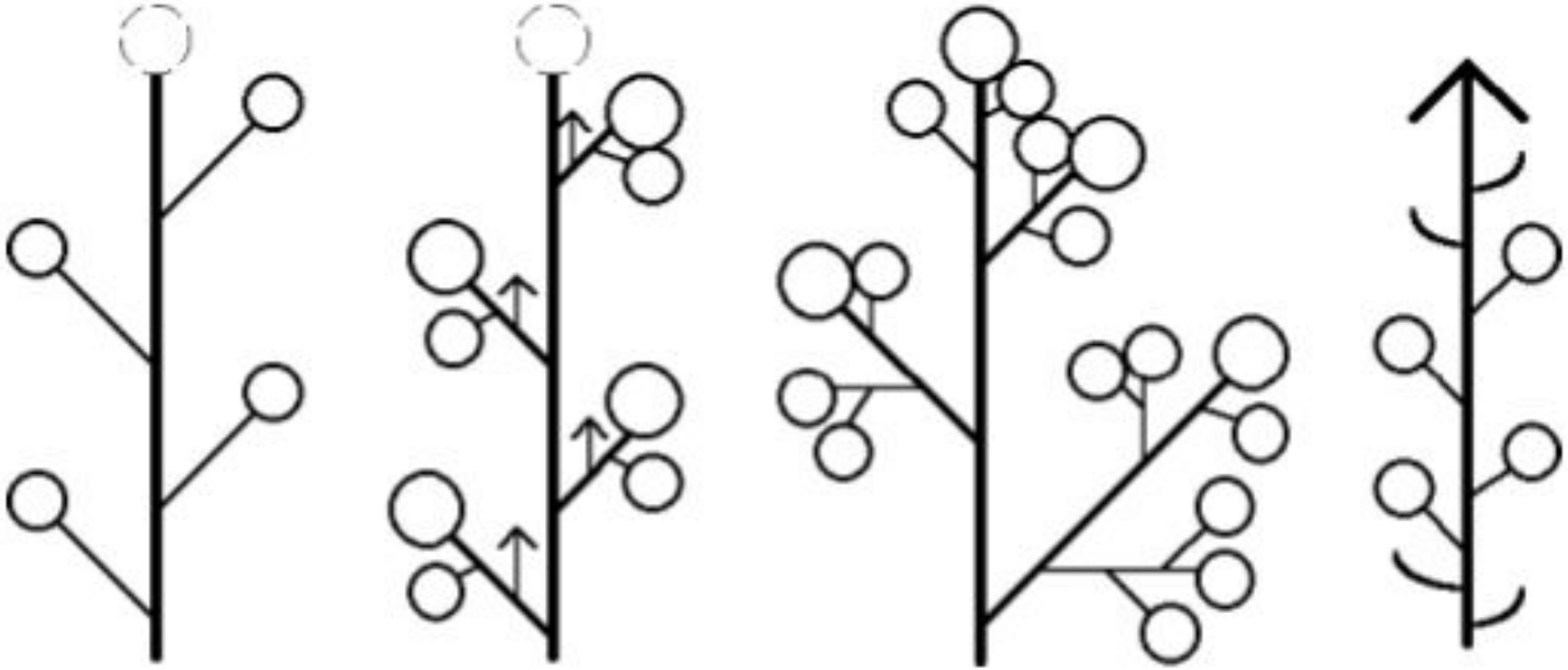
1 Ишмуратова М.Ю. Ботаника. Учебно-методическое пособие. - Караганда: РИО Болашак-Баспа, 2015. - 331 с.

2 Тусупбекова Г.Т. Основы естествознания. Ч. 1. Ботаника. – Астана: Фолиант, 2013. – 321 с.

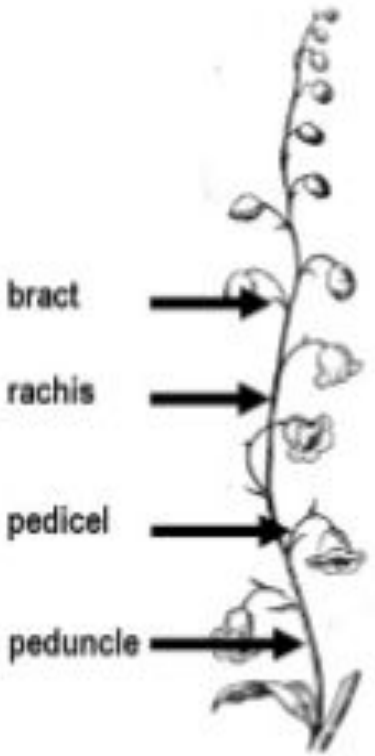
3 Байтулин И.О. Основы ризологии. - Алматы: Гылым, 2001. – 210 с.

Inflorescence is an isolated generative shoot (shoot bearing FU).Together, inflorescences make generative shoot system. Its diverse structure is of not lesser importance than the structure of vegetative shoot system.
Biological role of inflorescences – to attract insects – pollinators.

The vast diversity of inflorescences can be split into four groups, or “models”



Four kinds of inflorescences (left to right): Model I (raceme-based), Model II (thyrsoid) , Model III (panicle) and Model IV (intercalate).



Flower Parties

A flower inflorescence is simply the arrangement of flowers on a floral axis; basically a cluster of flowers. A variety of inflorescences are illustrated in Figure 17. You may be familiar with additional inflorescences that are not pictured, such as the spathe and spadix of Jack-in-the- pulpit and catkins of birch trees.

Parts of an Inflorescence

Peduncle—the stalk of an inflorescence or a solitary flower.
Pedicel—the stalk of one flower in an inflorescence.
Rachis—the primary axis of an elongated inflorescence.
Bracts—a modified or much-reduced leaf associated with an inflorescence or flower. These may differ substantially from foliage leaves.
Involucre—a series of bracts immediately subtending a flower or inflorescence.

Positions of Inflorescence

Where the cluster of flowers is held on the plant varies among plants and type of inflorescence.
Axillary—in the axil of a leaf or bract.
Whorled—occurring in whorls at a single node.

Terminal—occurring at the tip.
Intercalary—the inflorescence is disrupted by vegetative growth.
Basal—arises at base of plant on a leafless peduncle (scape).
Cauliflory—flowers that appear to grow directly upon woody branches or trunks. Example: redbud tree.

Sequence of Flowering and Types of Inflorescences In some inflorescence the terminal or central flower opens first

The primary axis then stops elongating. These are known as determinate inflorescence:

A. Simple (or basic) cyme - a three-flowered cluster composed of a peduncle bearing a terminal flower and below it two bracts with each bract subtending a lateral flower.

B. Compound cyme - a branching cyme.

In some plants the inflorescence primary axis continues to grow as the flowers develop. These are called indeterminate inflorescence. The lowermost or outermost flowers open first; usually no terminal flower is produced.

C. Panicle - similar to a raceme but greatly branched.

D. Raceme - stalked flowers arranged along an elongate central axis.

E. Spike - sessile flowers arranged along an elongate central axis.

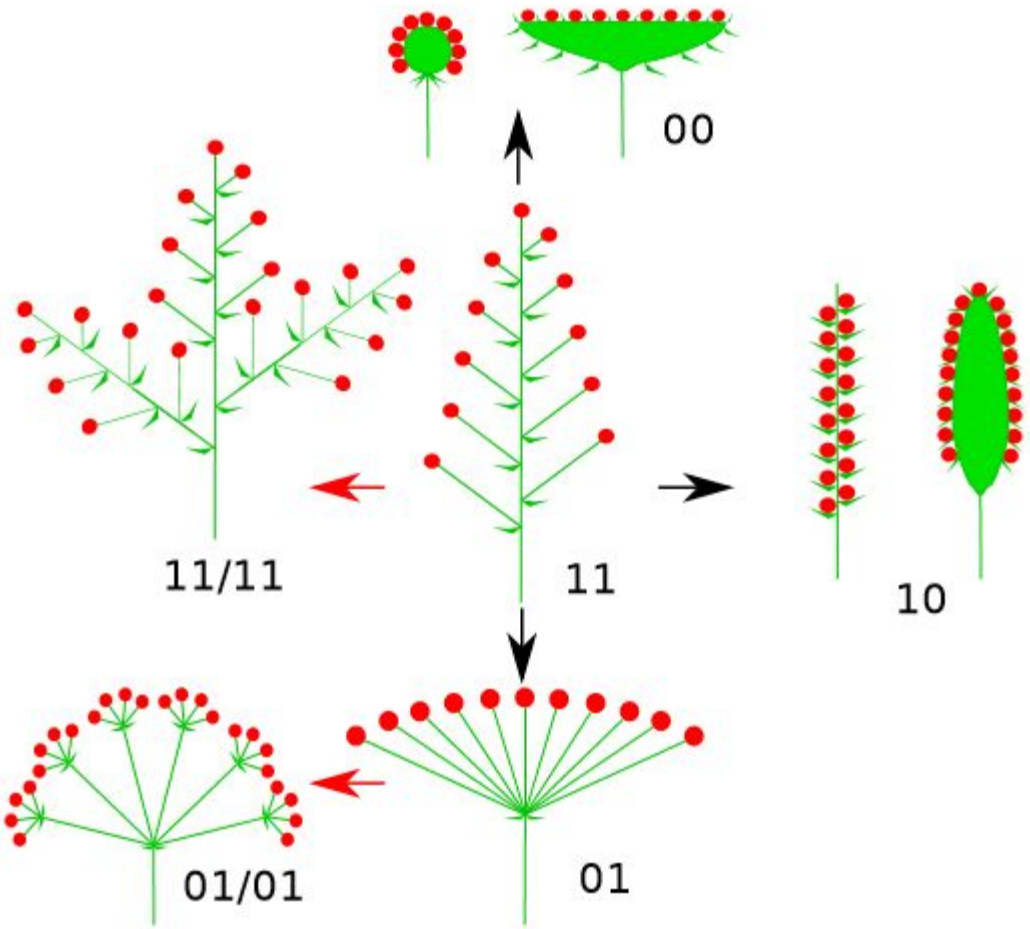
F. Corymb - short, broad, and flattopped.

G. Simple umbel - several branches radiating from the same point and terminated by single flowers.

H. Compound umbel - same as above with additional secondary umbels.

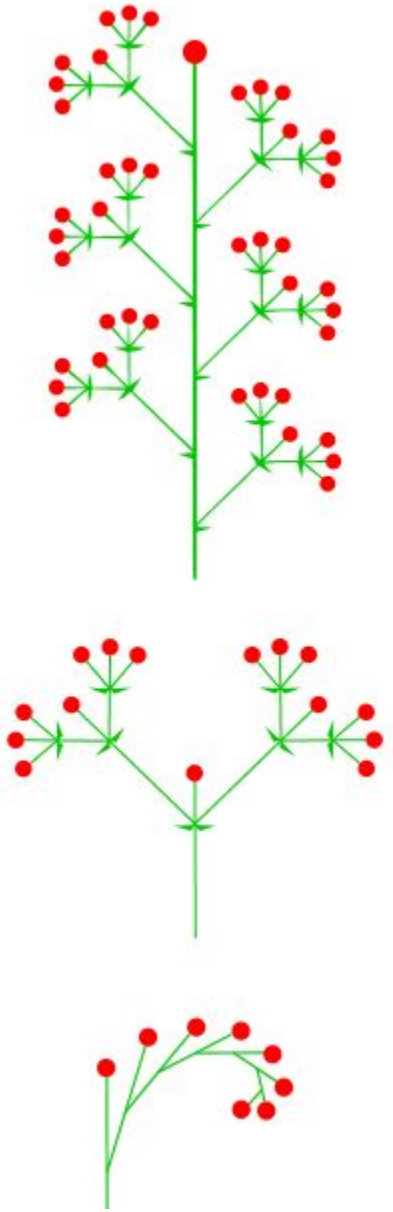
I. Head (capitulum) - a compact inflorescence composed of a very short axis and usually sessile flowers; characteristic of sunflower family.

Types of inflorescences



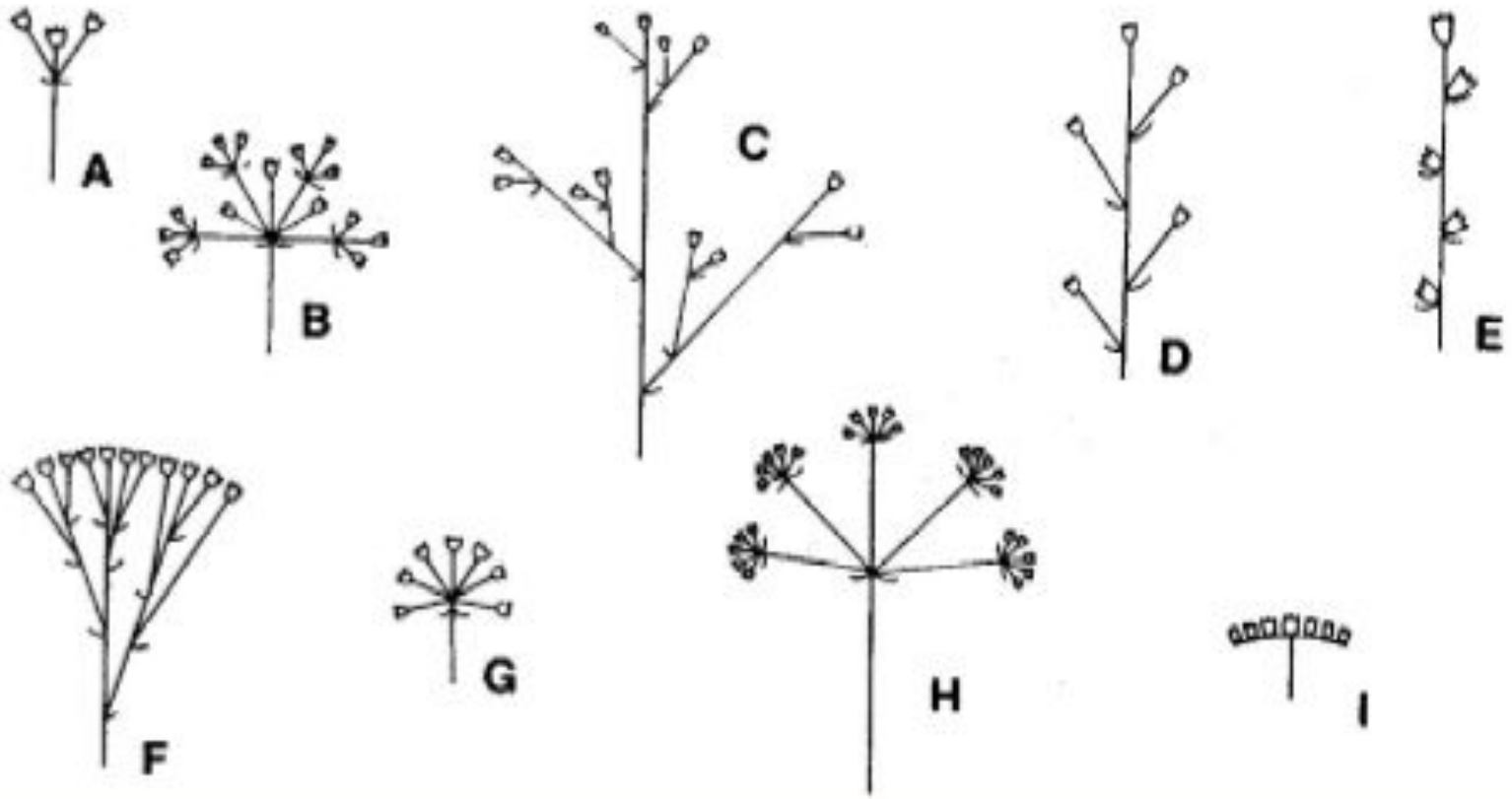
Different Model I inflorescences and their evolutionary connections. Digits represent the simple encoding system: first position is main axis, second position are secondary axes (flower pedicels), 1 means developed, 0 reduced. Double inflorescences have four digit positions, for the first and second orders of branching. Some names: 11 raceme, 11/11 double raceme, 10 spike and spadix, 01 umbel, 01/01 compound umbel, 00 head.

Types of inflorescences



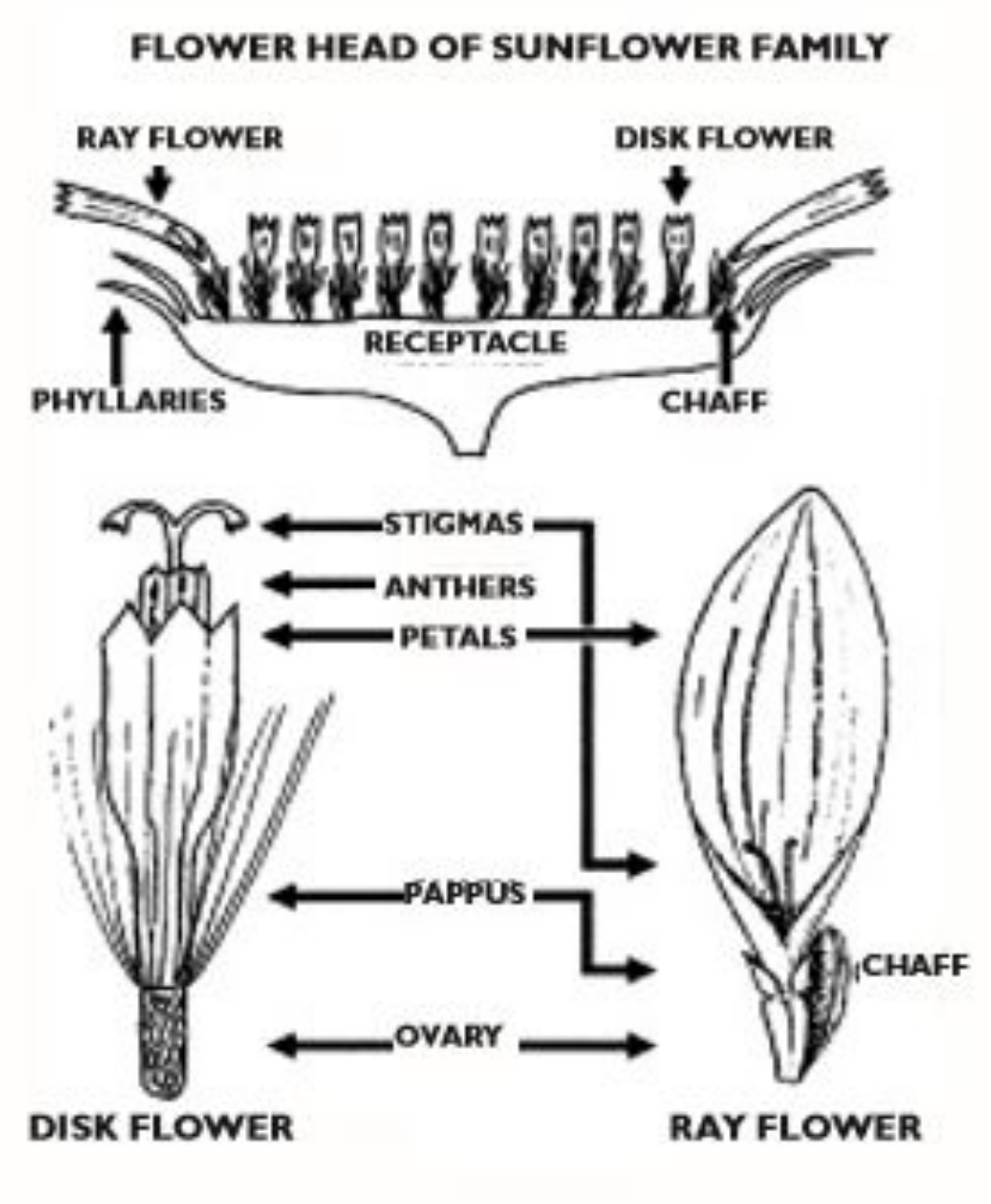
Model II inflorescences (from top to bottom): thyrsus, dichasium and monochasium (cincinnus)

Types of Inflorescence



Inflorescences: A, simple cyme; B, compound cyme; C, panicle; D, raceme; E, spike; F, corymb; G, simple umbel; H, compound umbel; and I, head.

Types of Inflorescence of Asteraceae family



Pollination could be of two types: self- and cross-pollination. Cross-pollination can happen in both abiotic and biotic ways. Abiotic would be represented by gravity, wind, or water; biotic would be performed by agents like insects, birds, bats, or in some cases tree mammals like possums. Wind-pollination is seen as being wasteful and unintelligent due to the fact that the plant needs to produce so much more pollen without any precise targeting.

Adaptation to the particular pollination agent results in different pollination syndromes. For example, cup-shaped flowers are usually pollinated with massive animals like beetles and even bats. Funnel-shaped flowers as well as labiate flowers (with lips), are adapted to flies and bees. Flowers with long spurs attract butterflies and birds (like hummingbirds or sugarbirds).

Self-pollination of ten exists like a “plan B”, in case cross-pollination is, for some reason, impossible. Sometimes, self-pollinated flowers even do not open; these flowers are called cleistogamous.

If pollination needs to be avoided, apomixis will prevent it. Apomixis requires reproductive organs, but there is no fertilization. One type of apomixis is apospory when an embryo develops from the maternal diploid tissue, but does not go through the meiosis stage. In this process, asexual reproduction will have become vegetative. Another type of apomixis would be apogamy (parthenogenesis) when embryo develops from an unfertilized gamete after diploidization has occurred. Here, vegetative reproduction evolved from sexual reproduction.

Control questions:

1 What is biological role of inflorescences?
2 Which principles did use for classification of inflorescences?
3 Describe general characteristics of simple and compound inflorescences.
4 Which inflorescences are characterized for Asteraceae family?
5 Which inflorescences are characterized for Apiaceae family?
6 Why inflorescences are important diagnostic signs for classification of plants?

Test questions:

Type of simple inflorescences:
A) simple spike
B) compound spike
C) head
Д) compound umbel
E) compound cyme
F) Panicle

Type of inflorescence for Asteraceae family:
A) simple spike
B) anthodium
C) head
Д) umbel
E) panicle