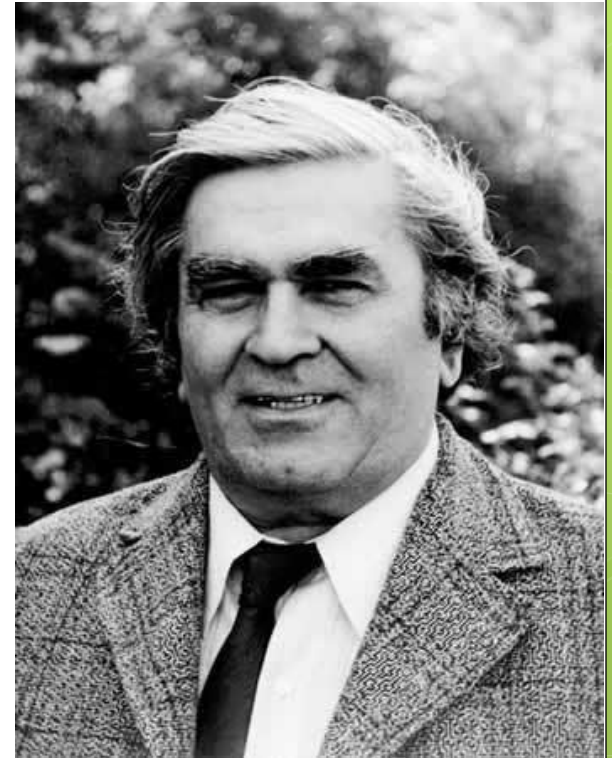# Takhtajan System of Classification

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Introduction

➢ Armen Takhtajan was born in 1910 and died in 2009

➢ Armen takhtajan who is the head of the department of higher plants at the komarov botanical institute in Leningrad, Russia, presented a system of classification, which was first published in a very preliminary form in 1942

➢ Takhtajan was inspired by hailier's attempt to create a synthetic evolutionary classification of flowering plants based on darwinian philosophy and his approach is very much similar to that of Cronquist

➢ Takhtajan's system of classification is basically of Bessey-Hallier tradition which considerd all evidences from different fields including morphological, anatomical, embryological, cytol ogical, palynological, paleobotanical, chemical and ultrastructural evidences while classifying angiosperms

Armen Takhtajan

Classification

➤ Takhtajan divided Magnoliophyta (= Angiospermae) into two classes— Magnoliopsida (Dicots) and Liliopsida (Monocots).

➤ He further divided Magnoliopsida into 7 subclasses, 20 superorders and 71 orders, and Liliopsida into 3 subclasses, 8 superorders, and 21 orders.

➤ Takhtajan (1980) recognizes a total of 92 orders and 410 families among angiosperms. An outline of his classification up to the level of orders is undermentioned

DIVISION: MAGNOLIOPHYTA (ANGIOSPERMAE)

Class: *Magnoliopsida*
(Dicotyledones)
Subclass 1. Magnoliidae
Subclass 2. Ranunculidae
Subclass 3. Hamamelididae
Subclass 4. Caryophylladae
Subclass 5. Dilleniidae
Subclass 6. Rosidae
Subclass 7. Asteridae

Class: *Liliopsida*
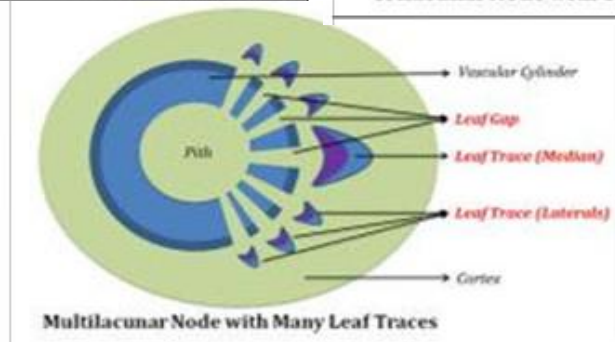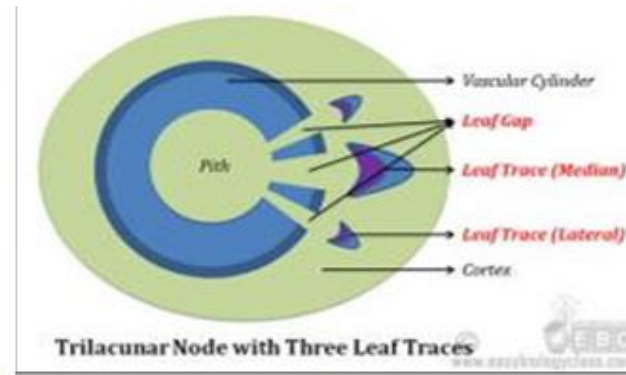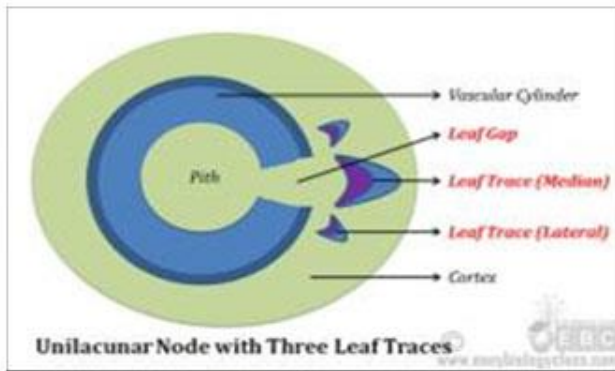(*Monocotyledones*)
Subclass 1. Alismalidae
Subclass 2. Liliidae
Subclass 3. Arecidae

Criteria

(i) Woody plants are primitive compared to herbaceous plants;

(ii) Deciduous woody plants are evolved from evergreen plants;

(iii) Parallel venation is most advanced;

(iv) Most primitive leaf arrangement is alternate;

(v) Stomata with subsidiary cells are primitive while those lacking subsidiary cells are advanced;

(vi) Unilacunar nodes are derived from trilacunar or pentalacunar nodes;

Alternate

Unilacunar Node with Three Leaf Traces

- Vascular Cylinder
- Leaf Gap
- Pith
- Leaf Trace (Median)
- Leaf Trace (Lateral)
- Cortex

Trilacunar Node with Three Leaf Traces

- Vascular Cylinder
- Leaf Gap
- Pith
- Leaf Trace (Median)
- Leaf Trace (Lateral)
- Cortex

Multilacunar Node with Many Leaf Traces

- Vascular Cylinder
- Leaf Gap
- Pith
- Leaf Trace (Median)
- Leaf Trace (Laterals)
- Cortex

(vii) Xylem fibres evolved from tracheids to libriform fibres, through fibre tracheids;

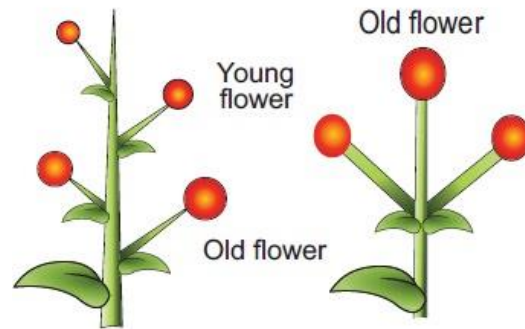(viii) Cymose inflorescence is primitive while racemose is derived;

Figure 4.2: (a)
Racemose

Figure 4.2: (b)
Cymose inflorescence

(ix) Flowers with an indefinite or a variable number of their floral parts are primitive;

(x) Pollen grains with their exine lacking any external sculpturing are primitive while those having various types of sculptures are advanced;

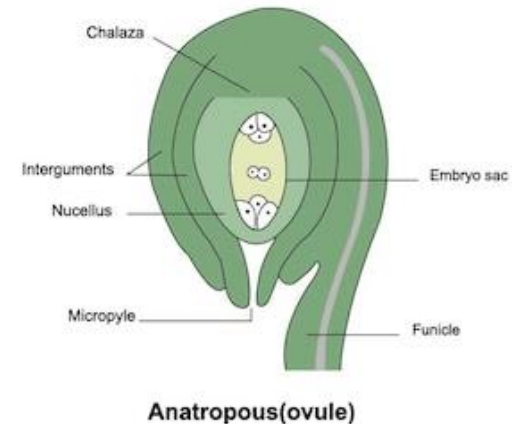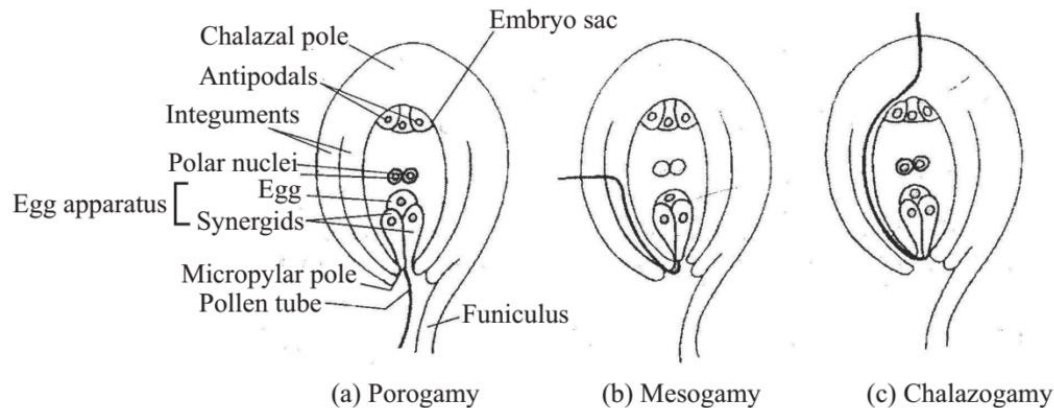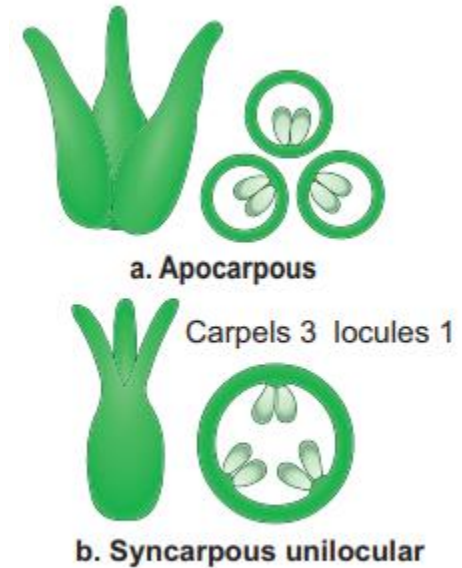(xi) Apocarpous gynoecium is the characteristic of primitive taxa;

(xii) Unitegmic ovules developed from bitegmic ovules;

(xiii) Basic type of ovule is anatropous type; all others are derived ones;

(xiv) Basic and most primitive type of female gametophyte is 8-nucleate *Polygonum*-type;

(xv) Primitive condition is porogamy, and the derived conditions are mesogamy and chalazogamy;

(xvi) Most primitive and basic type of fruit is a many-seeded follicle which develops from a multicarpellary apocarpous gynoecium.

a. Apocarpous

Carpels 3 locules 1

b. Syncarpous unilocular

Chalazal pole
Embryo sac
Antipodals
Integuments
Polar nuclei
Egg apparatus
Egg
Synergids
Micropylar pole
Pollen tube
Funiculus

(a) Porogamy (b) Mesogamy (c) Chalazogamy

Chalaza
Interguments
Nucellus
Micropyle
Embryo sac
Funicle

Anatropous(ovule)

Merits of the System of Takhtajan
1. Dicots (Magnoliopsida) are discussed prior to monocots (Liliopsida).
2. Dicots begin with the Magnoliales which are universally considered to be the most primitive living angiosperms.
3. In this system the families are small homogeneous units made up of closely related genera.
4. Division of Dicots into two traditional groups of Engler and Prantl, i.e. Archichlamydae and Metachlamydae, has been abolished in this system.
5. Alismatales, which are considered to be the most primitive living monocots these days, are the starting point of monocots in this system.

Demerit of the System of Takhtajan
One strong demerit is the extremely narrowly defined taxa in this system that has resulted in the unwarranted splitting of the related groups.