

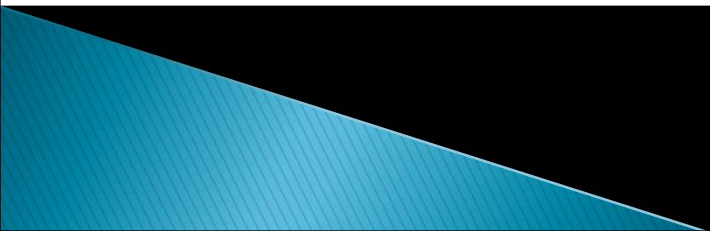
PHYLOGENY OF RANALES

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INTRODUCTION

- ▶ Bentham and Hooker included 8 families under order Ranales
 1. Magnoliaceae
 2. Annonaceae
 3. Dilleniaceae
 4. Calycanthaceae
 5. Menispermaceae
 6. Nymphaeaceae
 7. Ranunculaceae
 8. Berberidaceae
- ❖ Bessey, Hutchinson, Takhtajan, Cronquist considered Ranales (Magnoliales) as the primitive most order
- ❖ Engler considered Ranales advanced and kept them in the middle of the Dicotyledons
- ❖ Hutchinson kept the woody members in Lignosae and herbaceous members in Herbaceae in 7 orders

CHARACTERISTICS OF THE ORDER

- ▶ Numerous Floral parts especially stamens and carpels
 - ▶ Flral parts arranged in spiral,cyclic or hemicyclic manner
 - ▶ Flowers hypogynous
 - ▶ Several members pollinated by beetles(Cantherophilous)
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WINTERACEAE

- ▶ Trees or shrubs with alternate simple, entire, gland dotted, exstipulate leaves
- ▶ Flowers actinomorphic, bisexual, rarely polygamous, cymose or fascicled
- ▶ Sepals 2-6, free, valvate
- ▶ Petals 4-numerous, 1-3 seriate, imbricate
- ▶ Stamens 15-numerous, 2-5 seriate
- ▶ Gynoecium of 1-several carpels, free or partly or wholly connate
- ▶ 1-many ovules per locule on ventral or axile placentation
- ▶ Fruit of dehiscent follicles
- ▶ Seeds with copious endosperm
- ▶ Vessel less
- ▶ The family comprises 7 genera and 120 species
- ▶ Distributed in Pacific, East Australian, New Zealand, Central and South America
- ▶ Example: *Drimys*, *Pseudowintera*, *Bubbia*, *Belliolum*, *Exospermum*, *Zygogynum* and *Tetrathalamus*

MAGNOLIACEAE

- ▶ Deciduous or evergreen, trees or shrubs
- ▶ Leaves alternate, simple, stipulate, gland dotted, stipules large, enclosing the young bud, early deciduous and leaving a circular scar
- ▶ Flowers terminal or axillary, usually solitary, bisexual, actinomorphic with deciduous spathaceous bract
- ▶ Perianth numerous, usually not differentiated, cyclic (trimerous) or spirally arranged
- ▶ Stamens numerous, spirally arranged
- ▶ Gynoecium of numerous carpels arranged spirally on an elongated torus
- ▶ Ovules 1-several on parietal placentation
- ▶ Fruit an etario of follicle, berries or samara
- ▶ Seeds with minute embryo and copious endosperm
- ▶ Beetle pollination (Cantharophilous)
- ▶ Family consist of 12 genera and 230 species
- ▶ Distributed in temperate and tropical East Asia and America
- ▶ Example: *Magnolia*, *Michelia*, *Liriodendron*, *Kmeria*
- ▶ Majority are ornamental (*Magnolia*, *Michelia*) and few timber yielding (*Michelia*, *Liriodendron*)

AUSTROBAILEYACEAE

- ▶ Climbing shrubs
- ▶ Leaves opposite,entire,stipules small
- ▶ Flowers solitary,axillary,hypogynous,unpleasently scented
- ▶ Perianth of numerous segments,free,imbricate
- ▶ Stamens 12-25,petaloid
- ▶ Gynoecium of 8 carpels,ovules 8-14 per carpel
- ▶ Consist of only one genus *Austrobaileya* and 2 species occurring in Queensland

ILLICICEAE

- ▶ Shrubs or small trees
- ▶ Leaves simple, alternate, entire, exstipulate
- ▶ Flowers bisexual, actinomorphic, hypogynous, solitary, axillary
- ▶ Perianth 7-numerous, multiseriate, imbricate
- ▶ Stamens 4-numerous, 1-many seriate
- ▶ Gynoecium of 5-20 carpels, 1-seriate, with one ventral sub-basal ovule in each carpel
- ▶ Fruit a ring of spreading follicles
- ▶ Seeds with minute embryo and copious endosperm
- ▶ Consist of only 1 genus *Illicium* and 42 species
- ▶ Distributed in South East Asia, North America and West Indies

SCHISANDRACEAE

- ▶ Climbing shrubs
- ▶ Leaves simple, alternate, exstipulate, sometimes gland-dotted
- ▶ Flowers actinomorphic, hypogynous, unisexual, monoecious or dioecious, solitary, axillary
- ▶ Perianth 9-15, spiral, imbricate
- ▶ Stamens 4-numerous, filaments partially connate or wholly united into a fleshy globose mass
- ▶ Gynoecium of 12-numerous carpels on an elongated torus, with 2-5 ovules per locule
- ▶ Fruit an aggregate of drupe-like carpels
- ▶ Seeds with copious endosperm
- ▶ Two genera *Schisandra* and *Kadsura* and 47 species
- ▶ Distributed in East Asia, Western Malaysia and South Eastern United States

ANNONACEAE

- ▶ Trees or shrubs
- ▶ Leaves simple, alternate, exstipulate, entire
- ▶ Flowers solitary, actinomorphic, bisexual, hypogynous
- ▶ Perianth in three whorls of 3 each, outer whorl sepaloid, valvate
- ▶ Petals fleshy
- ▶ Stamens numerous, spirally arranged, with enlarged connective
- ▶ Gynoecium of numerous carpels, apocarpous or syncarpous
- ▶ Fruit an etario of berries or aggregate fruit
- ▶ Seeds large, endospermic
- ▶ Endosperm ruminant
- ▶ Family consist of 120 genera and 2100 species
- ▶ Distributed chiefly in old world tropics
- ▶ Example: *Annona*, *Artobotrys*, *Polyalthia*, *Miliusa*
- ▶ *Annona*, *Artobotrys* are important edible fruits

RANUNCULACEAE

- ▶ Perennial rhizomatous herbs
- ▶ Leaves exstipulate, simple or compound
- ▶ Flowers bisexual, actinomorphic or zygomorphic, solitary or in cymose inflorescence, hypogynous
- ▶ Floral parts on a well developed convex thalamus
- ▶ Perianth usually petaloid, rarely differentiated into sepals and petals, nectariferous glands usually present
- ▶ Stamens usually many, spirally arranged
- ▶ Gynoecium of numerous carpels, usually free
- ▶ Ovary superior, ovules 1-many on parietal placentation
- ▶ Fruit a group of follicles, achenes or berries
- ▶ Seeds with small embryo and copious endosperm
- ▶ Family consist of 50 genera and 1900 species
- ▶ Distributed in North Temperate zone
- ▶ Example: *Ranunculus*, *Delphinium*, *Anemone*, *Clematis*, *Naravelia* and *Aquilegia*
- ▶ *Aconitum* yield alkaloid Aconitin, *Anemone* yields the medicine Pulsatilla of Homeopathy *Ranunculus*, *Delphinium*, *Anemone* and *Aquilegia* grown as ornamentals

MENISPERMACEAE

- ▶ Mostly twining shrubs, herbs or trees
- ▶ Leaves simple, exstipulate, entire or occasionally palmately lobed, palmately veined
- ▶ Flowers unisexual, dioecious, actinomorphic
- ▶ Sepals mostly 6, bimerous
- ▶ Petals 6, bimerous, free
- ▶ Stamens usually 6, or numerous
- ▶ Gynoecium of 3-6 carpels, ovary superior, placentation parietal
- ▶ Fruit drupe or achene
- ▶ Seeds with or without fleshy endosperm
- ▶ Family consist of 65 genera and 350 species
- ▶ Distributed throughout the paleotropic regions
- ▶ Example: *Menispermum*, *Cocculus*, *Tinospora*, *Cissampelos*

BERBERIDACEAE

- ▶ Perennial herbs or shrubs
- ▶ Leaves alternate, usually spiny, simple or pinnately compound, exstipulate
- ▶ Flowers bisexual, actinomorphic, hypogynous
- ▶ Perianth in four whorls of 3 each, outer two whorls of sepals and inner two whorls of petals
- ▶ Stamens 4-18, distinct, generally in 2 whorls, those of the outer whorl opposite the petals
- ▶ Ovary superior, 1-carpelled with 1 or several basal ovules
- ▶ Fruit usually a berry
- ▶ Seed with a small embryo and copious endosperm
- ▶ Family consist of 4 genera ,575 species
- ▶ Distributed in North temperate regions and tropical mountains of South America
- ▶ Example: *Berberis*, *Mahonia*, *Epimedium* and *Vancouveria*

NYMPHAEACEAE

- ▶ Perennial or annual aquatic herbs
- ▶ Stem rhizomatous, short, stout and erect or creeping
- ▶ Leaves simple, usually large and peltate, long petioled, floating or emergent, sometimes dimorphic
- ▶ Flowers large, solitary, long peduncled, bisexual, actinomorphic, hypogynous or perianth or epigynous
- ▶ Perianth segments many, free, spirally arranged, gradually passing from sepals to petals and from petals to stamens
- ▶ Stamens numerous
- ▶ Ovary of many carpels, apocarpous or syncarpous
- ▶ Fruit follicle or an aggregate of indehiscent nutlets or a berry
- ▶ Bentham and Hooker divided Nymphaeaceae into 3 subfamilies: Cabomboideae, Nelumboideae and Nymphoideae
- ▶ Bessey treated each as a distinct family and placed Cabomboideae and Nelumboideae in the Ranales and removed the Nymphaeaceae to the Rhodales
- ▶ Takhtajan and Cronquist recognised them as three independent families
- ▶ Economically the family is important as ornamentals

CALYCANTHACEAE

- ▶ Aromatic shrubs
- ▶ Leaves opposite, simple, exstipulate, entire
- ▶ Flowers solitary, bisexual actinomorphic, perigynous
- ▶ Perianth lobes numerous, spirally arranged, with a gradual transition from sepals to petals
- ▶ Stamens 5-30, the inner ones sterile
- ▶ Ovary of 20 carpels, borne on inside of the receptacle with 1-2 ovules in each locule
- ▶ Fruit an achene
- ▶ Seeds with large embryo and no endosperm
- ▶ Family consist of 2 genera and 6 species
- ▶ Distributed in East Asia and North America
- ▶ Example: *Calycanthus*, *Chimonanthus*