



# **CLASSIFICATION OF GYMNOSPERMS**

*Chamberlain System of Classification*

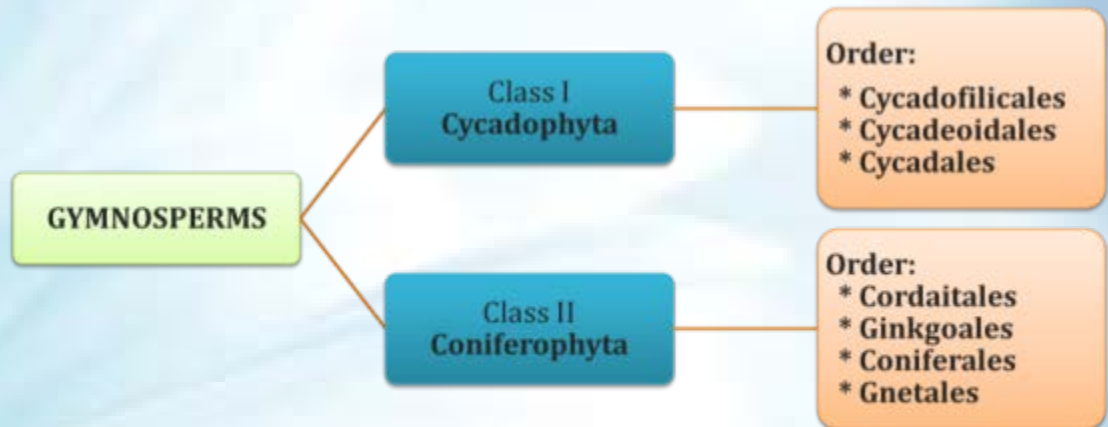


*“Develop a passion for learning. If you do, you will  
never cease to grow...”*

*Anthony J. D'Angelo*

## *Learning objectives:*

- Classification of Gymnosperms
- Chamberlain System of Classification



**Classification of Gymnosperms**  
Chamberlain System (1934)

**ATTENTION.**

**DON'T KILL YOUR TIME FOR COPYING THE SLIDES**

Listen the Class Carefully and Grab the Concept in Your Brain

*What you have in your **brain** is more important than  
what you have in your notebook !*

# GYMNOSPERMS - CLASSIFICATION

## *Brief history...*

- Many systems for the classification for Gymnosperms.
- **Robert Brown** (1827) for the first time recognized Gymnosperms as a separate group of plants.
- **Bentham and Hooker** (1883) placed Gymnosperms between Dicots and Monocots in their classification (*Genera Plantarum*).
- **Van Tieghman** (1898) gave the status of **Major Division** to Gymnosperms
- Tieghman divided the whole **Spermatophyta** into **two** divisions:
  1. **Gymnosperms** (*Astigmatae*)
  2. **Angiosperms** (*Stigmatae*)

# GYMNOSPERMS - CLASSIFICATION

## *Brief history*

- **Coulter and Chamberlain (1912)** divided Gymnosperms directly into **SEVEN** orders :
  1. *Cycadofilicales*
  2. *Bennettitales*
  3. *Cycadales*
  4. *Cordaitales*
  5. *Ginkgoales*
  6. *Coniferales*
  7. *Gnetales*
  
- **Chamberlain (1934)** divided the Gymnosperms into **TWO** classes and each class into orders.

# GYMNOSPERMS - CLASSIFICATION

## *Chamberlain System of Classification of Gymnosperms (1934)*

- ❖ Published by Chamberlain in 1934
- ❖ Gymnosperms were divided into **TWO** classes:

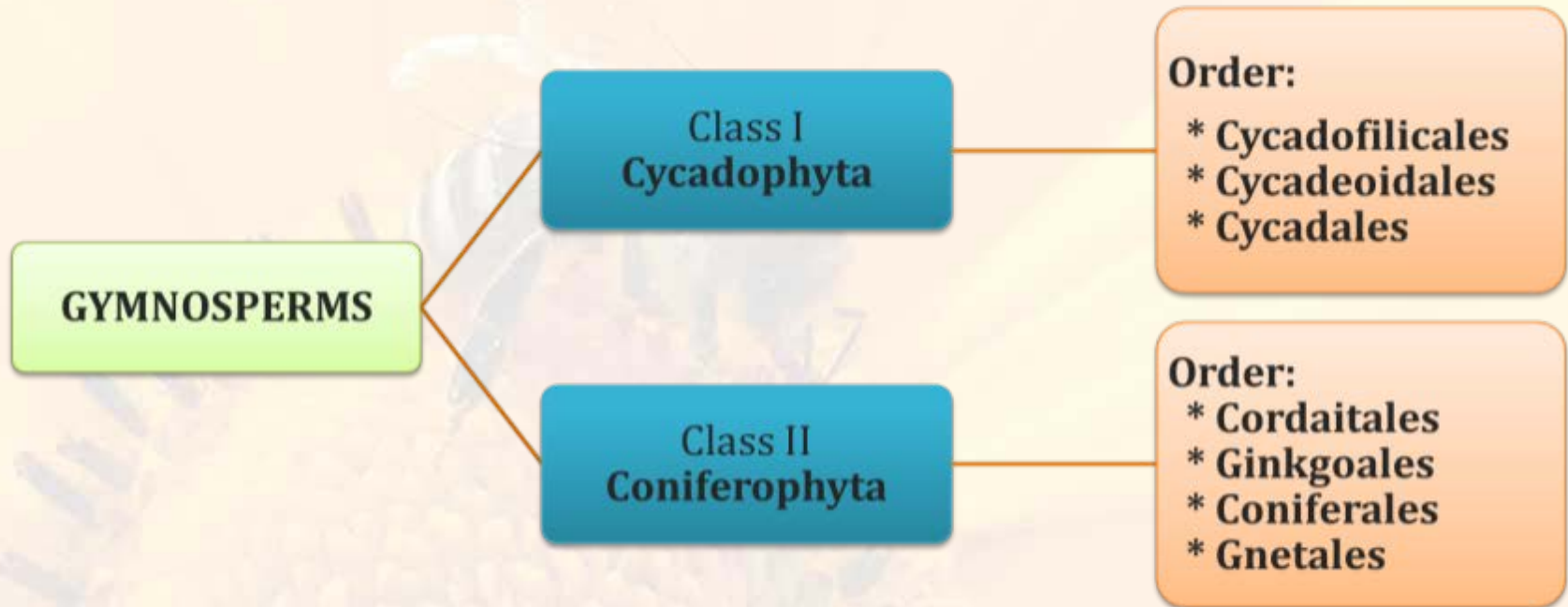
1. **Cycadophyta**
2. **Coniferophyta**



Charles Joseph Chamberlain

# GYMNOSPERMS - CLASSIFICATION

## *Classification - outline*



## **Classification of Gymnosperms** Chamberlain System (1934)



# GYMNOSPERMS - CLASSIFICATION

## *Class I : Cycadophyta*

- ❑ Includes **fossil** and **living** forms
- ❑ Stem is **unbranched** and stumpy
- ❑ Large **pinnately compound leaves**
- ❑ Male cones large and compact with **simple microsporophylls**
- ❑ Female cones **loose or pinnate**
- ❑ Megasporophyll simple, ovules large
- ❑ **Anatomically stem with wide cortex**
- ❑ **Wood manoxylic**



*Cycas*  
*Megasporophyll*



*Pinnately Compound Leaf*



*Male cone*



*Manoxylic Wood*

# GYMNOSPERMS - CLASSIFICATION

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## *Class I : Cycadophyta*

■ Class Cycadophyta consists of **THREE orders**

a) **Cycadofilicales**

b) **Cycadeoidales**

c) **Cycadales**

# GYMNOSPERMS - CLASSIFICATION

## (I. a). Cycadofilicales

- They are **cycad-ferns**
- Also called as **Pteridospermales** or **seed-ferns**.
- All are **extinct** forms
- Appeared in **Devonian** period, abundant in **Carboniferous** period
- Morphology and anatomy **similar** to that of Ferns and Gymnosperms
- **Cones are NOT produced**
- Example: *Lyginopteris*



*Lyginopteris*



*Lyginopteris*

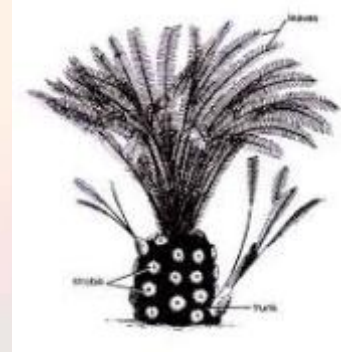


*Lyginopteris*

# GYMNOSPERMS - CLASSIFICATION

## (I. b). Cycadeoidales

- Also called as *Bennettitales*
- An **extinct** group
- Appeared in **Triassic** period, Common Gymnosperm of the **Mesozoic** era
- Extinct by Cretaceous period
- Plant body **resembles to that of living cycads.**
- Have stout or slender stem
- Reproductive parts are **flower-like**
- Cones **bisporangiate** or monosporangiate
- Example: *Cycadeoidea*, *Williamsonia*



*Williamsonia*

# GYMNOSPERMS - CLASSIFICATION

## *(I. c). Cycadales*

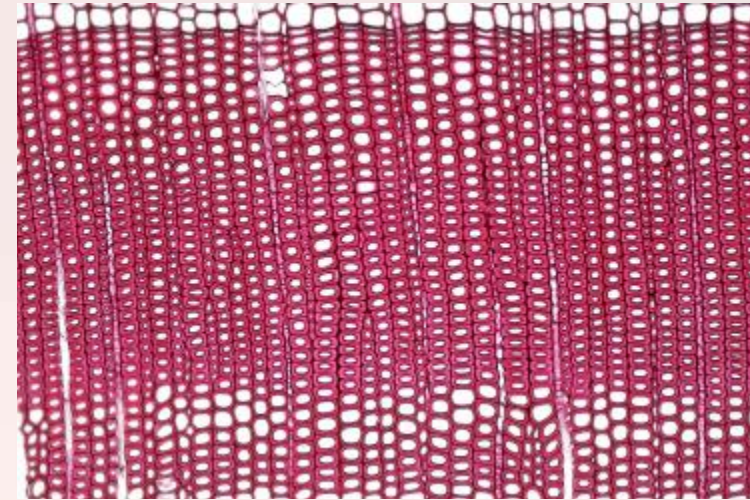
- All are **living** (present day Cycadophyta)
- Most of them are **xerophytic**
- Plant body **palm-like**, very slow growing
- Stem short, un-branched (usually) covered with **persistent leaf scars**
- Leaves **pinnately compound**, arranged as a terminal crown
- All cycads are **dioecious**
- Ovules **straight** (anatropous)
- Example: *Cycas*, *Zamia*, *Dioon*



# GYMNOSPERMS - CLASSIFICATION



Cone forest



*Pycnoxylic wood of Gymnosperms*

## *Class II: Coniferophyta*

- ❖ Large, profusely branched tree forms
- ❖ Plants with **cone-like** appearance
- ❖ Leaves simple
- ❖ Anatomy: **Pith small**
- ❖ Xylem dense and massive
- ❖ **Wood pycnoxylic**
- ❖ Male and female strobili compact and contain complex sporophylls.



*Female and Male Cones of Coniferophyta*

# GYMNOSPERMS - CLASSIFICATION

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## *Class II: Coniferophyta*

❖ Coniferophyta consist of FOUR orders.

a) **Cordaitales**

b) **Ginkgoales**

c) **Coniferales**

d) **Gnetales**

# GYMNOSPERMS - CLASSIFICATION

## (II. a). *Cordaitales*

- ❖ They are the **early conifers**
- ❖ Appeared during the Devonian period
- ❖ All are **extinct**
- ❖ Tall trees
- ❖ Reproductive structures are **catkin** like clusters
- ❖ Example: *Cordaites*, *Mesoxylon*





# GYMNOSPERMS - CLASSIFICATION

## (II. b). *Ginkgoales*

- Consists of only one **extant** genus with one species & many fossils species.
- Extant sps; *Ginkgo biloba* (Monotypic)
- *Ginkgo biloba* – maiden hair tree
- A **living fossil**
- Native to China (Endemic to China)
- Leaves broad, bi-lobed with dichotomous veining



# GYMNOSPERMS - CLASSIFICATION

## (II. c). Coniferales

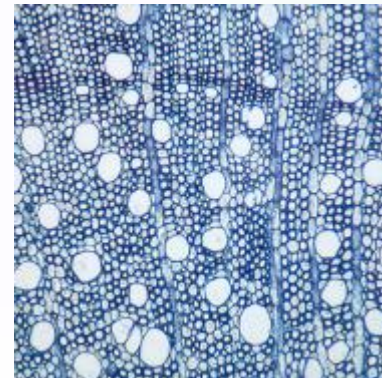
- Mostly evergreen trees
- Largest Gymnosperm order** (living forms)
- Plants possess xerophyte adaptations
- Leaves usually needle like and spirally arranged
- Wood with large number of resin canals
- Plants monoecious or dioecious
- Pollination by wind
- Example: *Pinus*, *Taxus*



# GYMNOSPERMS - CLASSIFICATION

## (II. d). Gnetales

- Highly advanced group
- Shrubs or woody climbers
- Morphologically similar to Angiosperms
- Leaves opposite
- The only Gymnosperm taxa having wood with **VESSELS**
- **Embryo dicotyledonous**
- Resin canals are absent
- A connecting link between Gymnosperms and Angiosperms
- Example: *Gnetum*



*Thank You...*

