

CLASSIFICATION OF GYMNASPERMS BY SPORNE (1965)

(The Sporne's System of classification of Gymnosperms)

There are many systems of classifications for Gymnosperms in the literature. In the previous post, we discussed the Chamberlain's System of Classification of Gymnosperms. In this post, we discuss the Sporne's System of Classification of Gymnosperms (1965). We will also discuss the characteristics of different Classes and Orders in the classification very briefly.

Sporne's System of Classification of Gymnosperms (1965)

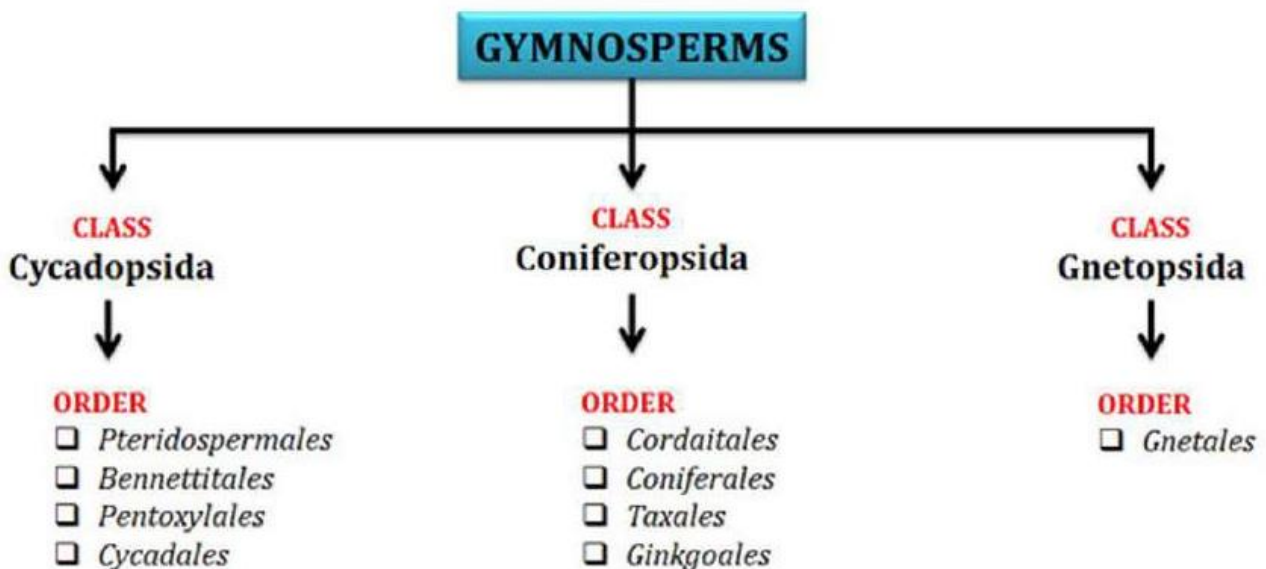
- ❖ Published by K.R. Sporne in 1965
- ❖ The entire gymnosperms were divided into **Three** classes

1. **Cycadopsida**
2. **Coniferopsida**
3. **Gnetopsida**

Class I: Cycadopsida

- Class Cycadopsida includes fossil and living forms.
- The stem is unbranched and stumpy.
- Large and pinnately compound leaves.
- The male cones are large and compact with simple microsporophylls.

Classification of Gymnosperms by K.R. Sporne (1965)



- Female cones are loose or pinnate (leaf-like).
- Megasporophyll is simple and the ovules are large.
- Anatomically the stem is with wide cortex.
- **The wood manoxylic type (with a large amount of parenchyma)**
- Class Cycadopsida consists of **THREE orders**
 - a) **Pteridospermales**
 - b) **Bennettitales**
 - c) **Pentoxylales**
 - d) **Cycadales**

(1a). Pteridospermales

- Pteridospermales are also called as cycadofilicales.
 - They are **cycad-ferns**.
 - All are extinct forms (no living representative)
 - They appeared in the **Devonian** period and abundant in the **Carboniferous** period.
- The morphology and anatomy of Pteridospermales were **similar** to that of Ferns and Gymnosperms.

PTERIDOSPERMALES



Neuropteris



Alethopteris

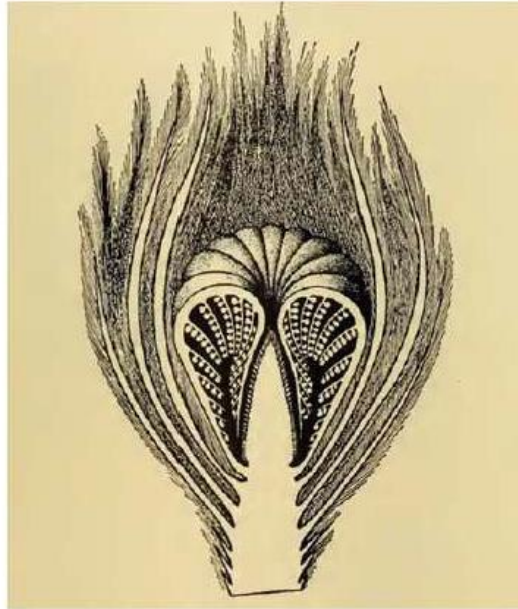


Lyginopteris

- **Cones are NOT produced by this group.**
- **Ovules are directly borne on the leaf margin.**
- Example: *Lyginopteris*

(1. b). Bennettitales

- Bennettitales are also called as *Cycadeoidales*.
- They are also an extinct group.



Cycadeoidea - Strobilus

- Appeared in the **Triassic** period, Common gymnosperm of the **Mesozoic** era.
- Completely extinct in the Cretaceous period.
- Plant body **resembles that of living cycads.**
- Have stout or slender stem.
- Reproductive parts were **flower-like.**
- Cones bisporangiate or monosporangiate
- Example: *Cycadeoidea*, *Williamsonia*

(I. c). *Pentoxylales*

- A completely **extinct** group.
- Plants were shrubby.
- Stem with **five** vascular strands.
- Each vascular strand with own **cambial ring and undergo secondary thickening**.
- This group was originally described by **Prof. Birbal Sahni** (Father of Indian Paleobotany)
- Female 'inflorescence' with **many cones**.
- Male structures are developed directly on dwarf shoots
- Example: Pentoxylon, Sahnia

(I. d). *Cycadales*

- They are the **living** (present-day) Cycadophyta.
- Most of them are xerophytic in nature.
- The plant body is **palm-like** and very slow-growing.
- Stem short, un-branched (usually) covered with **persistent leaf scars**.
- Leaves **pinnately compound**, arranged as a terminal crown.
- Leaves show circinate vernation.
- All cycads are **dioecious (male and female plants are separate)**

Cycas



Habit - Leaves



Male Cone



Microsporophylls

- Ovules are **straight** (anatropous).
- Example: *Cycas*, *Zamia*, *Dioon*

Class II: Coniferopsida

- Members of Coniferopsida are large, profusely branched tree forms.
- Plants with **cone-like** appearance.
- Leaves are simple
- Anatomically the **pith is small**.
- Xylem dense and massive.
- **The wood is pycnoxylic type.**
- Male and female strobili compact and contain complex sporophylls.
 - Class Coniferopsida consist of FOUR orders.
 - a) **Cordaitales**
 - b) **Coniferales**
 - c) **Taxales**
 - d) **Ginkgoales**

(II. a). Cordaitales

- They are the **early conifers**.
- Appeared during the Carboniferous period.
- All are **extinct, no living representatives**.
- The plants were tall trees with **star-shaped leaves**.
- The reproductive structures were **catkin**-like clusters.
- Example: *Cordaites*, *Mesoxylon*

Cordaite



Fossil



Reconstruct

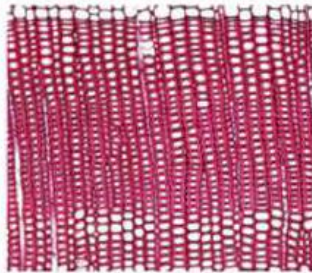
(II. b). *Coniferales*

- Mostly evergreen trees.
- Coniferales represent the largest Gymnosperm order (living forms).
- Plants possess xerophyte adaptations.

Pinus



Leaves



Pycnoxylic Wood



Male Cone



Female Cone

- Leaves usually needle-like and spirally arranged.
- Wood with a large number of resin canals.
- Plants monoecious or dioecious.
- Pollination by wind.
- Example: *Pinus*

(II. b). *Ginkgoales*

- Consists of only **one extant** genus with one species: ***Ginkgo biloba***
- *Ginkgo biloba* – maidenhair tree.
- ***Ginkgo biloba* is a living fossil.**
- The plant is native to China (Endemic to China).
- Leaves are broad, bi-lobed with dichotomous veining.

Ginkgo biloba



Plant with Seeds



Leaf



Seed

(II. c). Taxales

- Members of Taxales are evergreen small trees or shrubs.
- An extensively branched plant.
- Leaves simple, solitary, flat and distichous.
- Leaf arrangement is spiral.
- Secondary wood is pinoxylic.
- Ovules are surrounded by arils
- Example: *Taxus*

Class III: Gnetopsida

- Shrubs or woody climbers.
- Morphologically similar to Angiosperms.
- Leaves are opposite.
- Gnetales are the only gymnosperm having wood with VESSELS.
- Embryo dicotyledonous.
- Resin canals are absent.

Gnetum



Leaves and Seeds



Male cone



Female cone

- A connecting link between Gymnosperms and Angiosperms.
- Contain only one order: Gnetales
- Example: *Gnetum*, *Ephedra*, *Welwitschia*