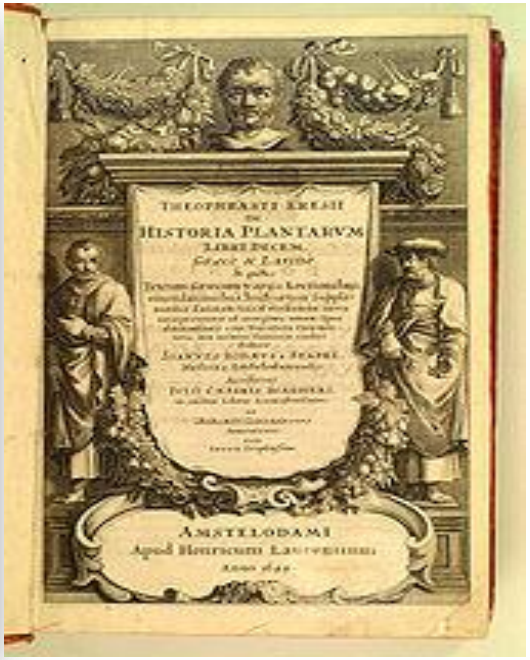
CLASSIFICATION OF GYMNOSPERMS

- Classification are merely the opinion of different authors gave time from time to time. Classification of gymnosperm is in topsy turvey state (disorder, confused or disorganised state). A number of classification has been prepared but there is unanimity in them, i e., they all agree about something or all vote for the same thing.

THEOPHARASTUS (370-285 B.C)

- The term "***GYMNOSPERM***" was first used by Theophrastus. He wrote a books "***HISTORIA PLANTARUM***" and "***ENQUIRY INTO PLANTS***". In these books he mentioned "***GYMNOSPERM***" and "***ANGIOSPERM***".

THEOPHARASTUS



ROBERT BROWN(1827)

Further analysis was made by Robert Brown in 1827. He for the first time recognized gymnosperms as a group distinct from Angiosperms due to presence of naked ovules.

ROBERT BROWN

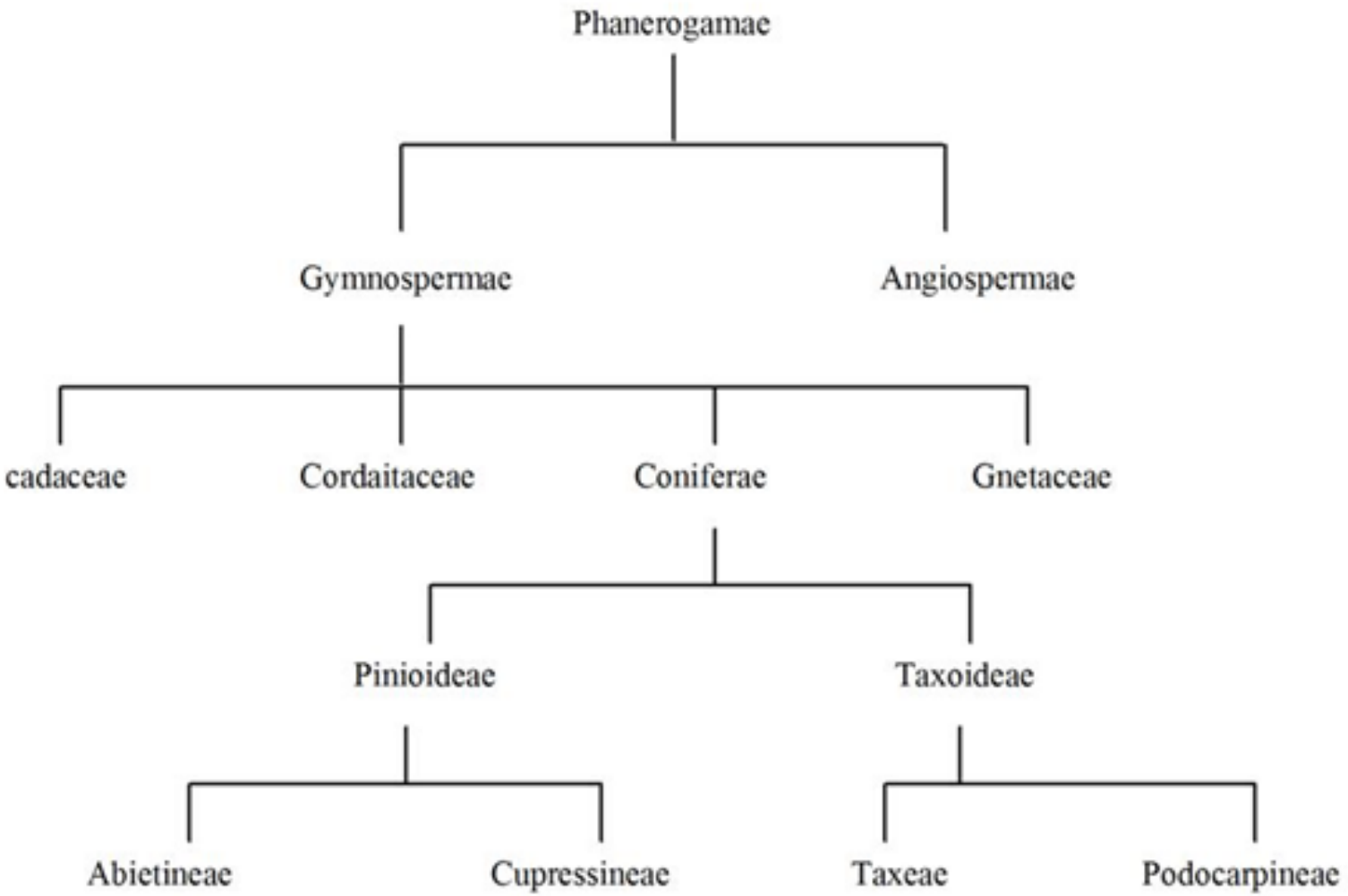
BENTHAM AND HOOKER (1862-83)

- Bentham and Hooker considered Gymnosperms equivalent to dicotyledons and monocotyledons . They divided them into three groups as -
- ***CYCADACEAE***
- ***GNETACEAE***
- ***CONIFERAE***
- They placed them in between dicots and monocots.

J. D. HOOKER

G. BENTHAM

Eichler (1883), considered gymnosperms as one of the two divisions under. Phanerogamae. The second division being Angiospermae. Eichler (1889) classified the seed plants as:



ADOLF ENGLER (1889)

- Adolf Engler, after the discovery of motile sperms in this genus (Hirase 1896), Engler created a new class Ginkgoales for the genus Ginkgo & its fossil representatives.

ADOLF ENGLER

VAN TIEGHAM (1898)

On the basis of Hofmeister work (1851), on the deveiopment & embryology of diverse plants, Van Tieghem remove gymnosperm from this intermediate position & place them as one of two primary division of spermophyta :

1.Gymnosperm (Astigmatic)

2. Angiosperm (Stigmatic).

Van Tiegham treated Gymnosperms as one of the sub-division of Spermatophyta.

To accommodate the fossil members subsequently three more classes were created-

Pteridospermae

Cordaitales

Bennettitales

VAN TIEGHAM

COULTER & CHAMBERLAIN (1910) ENGLER & PRANTL (1926) RENDLE (1926)

COULTER & CHAMBERLAIN(1910) ENGLER & PRANTL(1926) RENDLE(1926)

- They all considered gymnosperms as a division of Spermatophyta, Phanerogamia or Embryophyta and they further divided them into **seven orders** as-
- ***CYCADOFILICALES***
- ***CYCADALES***
- ***BENNETTITALES***
- ***GINKGOALES***
- ***CONIFERALES***
- ***CORDAITALES***
- ***GNETALES***

A.C. SEWARD(1919)

A. C. SEWARD had divided gymnosperms into **two classes-**

Class I- Manoxylic (wood is not compact due to the presence of well-developed pith and cortex and broad medullary rays.)

Orders-

(i) **Cycadales**

(ii) **Cycadeoidales**

(iii) **Cycadofilicales**

Class II- Pycnoxylic *(*wood is compact as pith and cortex are reduced and medullary rays are narrow.)

Orders-

(i) **Cordaitales**

(ii) **Ginkgoales**

(iii) **Coniferales**

(iv) **Gnetales**

A.C. SEWARD

BIRBAL SAHNI (1920)

- Prof. Birbal Sahni, an eminent **Indian botanist**, gave for the first time a **phytogenetic** system for the classification of gymnosperms. On the basis of the morphological nature of the ovule bearing organs, he had given the following classification of gymnosperms:-

BIRBAL SAHNI

GYMNOSPERMS

PHYLLOSPERMAE

(seeds borne on leaves)

Orders-

- **Cycadofilicales**
- **Cycadales**
- **Bennettitales**

STACHYOSPERMAE

(seeds borne on stems)

Orders-

Cordaitales

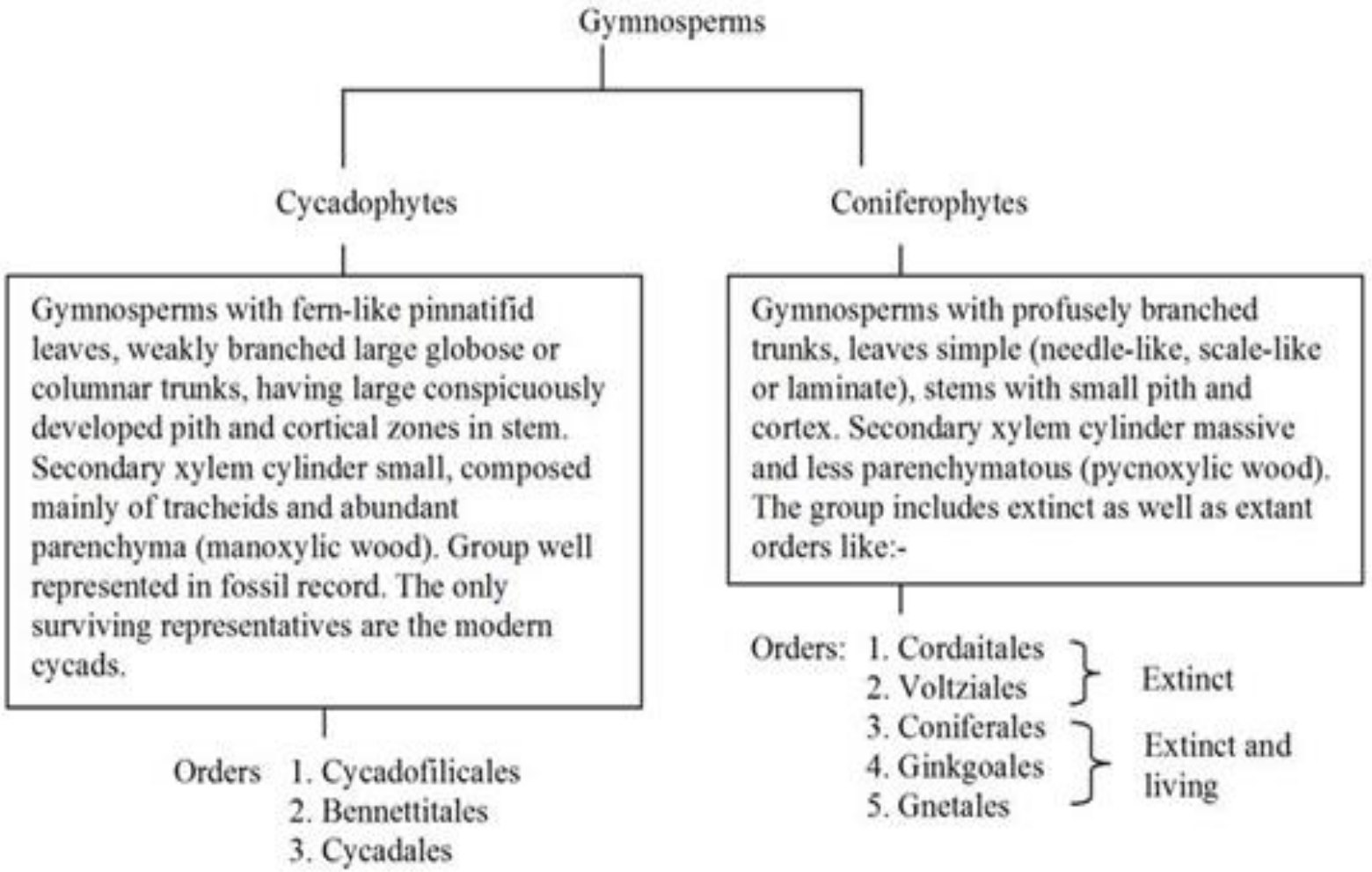
Coniferales

Ginkgoales

Taxales

Sahani did not place Gnetales at any where in his classification. Omission of Gnetales was greatest draw back of this classification.

Chamberlain (1935) classified gymnosperms into:



Gymnospermae

Cycadophyta

Orders-

(i) Cycadofilicales

(ii) Cycadales

(iii) Bennettitales

Coniferophyta

Orders-

(i) Ginkgoales

(ii) Cordaitales

(iii) Coniferales

(iv) Gnetales

Arnold (1948) recognized three classes under gymnosperms.

Gymnosperms

Classes	Cycadophyta	Coniferophyta	Chlamydospermophyta
Orders	1. Pteridospermales	1. Cordaitales	1. Ephedrales
	2. Cycadeoidales	2. Ginkgoales	2. Gnetales
	3. Cycadales	3. Taxales	
		4. Coniferales	

PROF. DIVYA DARSHAN PANT (1919-2001)-

- Prof. D.D. Pant was an excellent teacher as well as a distinguished visionary. He was the founder of a strong school of research in palaeobotany and morphology in the Department Of Botany, Allahabad University. He was fully devoted and dedicated to the cause of botany, even during his retired life. This can be well known by an incident – "He sent an advance letter to the Vice Chancellor of Allahabad University, he expressed his wish for not holding any condolence meeting at his death, so that work is not hampered".

D.D. PANT'S CLASSIFICATION OF GYMNOSPERM

Gymnosperms

Division: Cycadophyta

Plants with relatively small, usually unbranched or poorly branched aerial or subterranean trunks; leaves usually large and pinnate; stems have large pith, a thick cortex, scanty wood usually with wide medullary rays (manoxylic)

Class 1 Pteridospermopsida
Orders 1. Lyginopteridales
2. Medullosales
3. Glossopteridales
4. Peltaspermales
5. Corystospermales
6. Caytoniales

Class 2 Cycadopsida
Order 1. Cycadales

Class 3 Pentoxylopsida
Order 1. Pentoxylales

Class 4 Bennettitopsida (Cycadeoideopsida)
Order 1. Bennettitales (Cycadeoideales)

Chlamydospermophyta

Peculiar angiosperm-like forms

Class 1 Gnetopsida
Orders 1. Gnetales
2. Welwitschiales

Coniferophyta (Pinophyta)

Usually large sized trees, with profusely branched stems and simple leaves. Stems have small pith, narrow cortex, abundant compact wood usually with narrow medullary rays

Class 1 Coniferopsida (Pinopsida)
Orders 1. Cordaitales
2. Coniferales (Pinales)
3. Ginkgoales

Class 2 Epedropsida
Order 1. Ephedrales

Class 3 Czekanowskiopsida
Order 1. Czekanowskiales

Class 4 Taxopsida
Order 1. Taxales

Later publication suggested that separation of Taxopsida-Taxales was not valid in view of the work of Harris (1976) and others and accordingly merged this class and order with his order Coniferales (Pinales) and placed plants of this group under family Taxaceae under order Coniferales.

9. Classification Proposed by Sporne (1974)

Sporne (1974) adopted classification of Pilger and Melchior (1954) and recognized following three classes and nine order:

1. *Cycadopsida*	:	Pteridospermales, Bennettitales, Pentoxylales and Cycadales
2. *Coniferopsida*	:	Cordaitales, Coniferales, Taxales and Ginkgoales
3. *Gnetopsida*	:	Gnetales

CLASSIFICATION BY GIFFORD AND FOSTER

GIFFORD

Gymnosperms

Division

Div. 1 Progymnospermophyta

Orders — Aneurophytales; Archaeopteridales

Div. 2 Pteridospermophyta

Orders — Glossopteridales; Caytoniales

Div. 3 Cycadophyta
Order Cycadales

Div. 4 Cycadeoidophyta
Order Cycadeoidales

Div. 5 Ginkgophyta
Order Ginkgoales

Div. 6 Coniferophyta

Orders — Cordaitales; Voltziales; Coniferales

Div. 7 Gnetophyta

Orders — Ephedrales; Gnetales; Welwitschiales

S.V. MEYEN (1986)

Division- Pinophyta
Class- Ginkgopsida
Orders-
Calamopityales
Callistopityales
Peltaspermales
Ginkgoales
Leptostrobales
Caytoniales
Arberiales
Pentoxylales
Ephedrales
Class- Cycadopsida
Orders-
Lajenostomales
Trigonocarpales
Cycadales
Bennettitales
Gnetales
Welwitschiales
Class- Pinopsida
Orders-
Cordaianthales
Pinales

Kramer & Green (see Kubitzki, 1990) have classified the Division Gymnosperms into two Subdivision as follows:-