M.Sc. First Year
SEMESTER - I
Theory Paper - III
Taxonomy of Angiosperms and Gymnosperms.

## UNIT - I :⇒ Gymnosperms & Palaeobotany

### General characters of Gymnosperms :⇒

1) Gymnosperms are the naked seed plants. (Gymnos - naked ; sperma - seed)
2) In gymnosperms ovules are not enclosed within the ovary.
3) ovules of gymnosperms are freely exposed before and after fertilization.
4) Gymnosperms grows in the temprate, tropical as well as in cold region.
5) Most of the gymnosperms are xerophytic.
6) some groups has both living and extinct species.
7) Generally plants are woody, perennial and slow growing plants.
8) These are evergreen plants which are represented by trees, shrubs, with moderate size.
9) Stem is aerial and woody, it may be branched or unbranched.
10) Plant body is differentiated into root, stem & leaves.
11) Root is tap-root and shows symbiotic association with cyanobacteria and fungi.

12) Wood is either monoxylic or pycnoxylic.
Monoxylic wood ⇒ soft & loose
e.g. cycas
Pycnoxylic wood ⇒ compact & hard
e.g. Pinus

13) Leaves are dimorphic in nature i.e. gymnosperms have two types of leaves viz. foliage leaves and scale leaves.
e.g. Pinus, cycas etc.

14) Foliage leaves are large, green and pinnately compound, which functions as photosynthesis.

15) Scale leaves are brown coloured and they protect the young foliage leaves.

16) sometimes leaves may be simple & small.

17) vascular system is present i.e. xylem and phloem is present.

18) xylem is present with tracheids and phloem with companian cells.

19) vessals are absent except order gnetales.

20) secondary growth takesplace due to formation of cambium (fascicular).

21) Male and female plants are seperate.

22) Male plants are represented by micro-sporophylls while female plants are represented by megasporophylls.

23) Gymnosperms are called as "coniferous plants" because reproductive organs are present in the form of cones / strobili

24) Pollination takesplace through wind.

25) Fertilization occurs through pollentube i.e. siphanogamy.

26) Generally ovule is orthotropous and unitegmic.

→ Some of the gymnosperms are the world's tallest and long-lived plants, e.g. Sequoia gigantea lives for 4,000 years and grows very tall.

→ leaves of gymnosperms possess resin passages. e.g. Pinus cedrus etc.

→ The number of resin canals varies in various species.

→ In all the species of Juniperus there is a single resin canal on the abaxial side between the epidermis and vascular bundle.

→ The leaves of conifers and cycads possess a transfusion tissue.
e.g. cycas pinna (leaflet)

→ Gymnosperms are heterosporous in nature, because two types of spores are produced by them which are different i.e. microspores and megaspores.

→ ovule of gymnosperms is consists of three layer i.e. outer, middle and inner layer. outer layer is fleshy which also called as sarcotesta. middle layer is stony, also called as sclerotesta and inner layer is again fleshy which is known as sarcotesta.

# Classification of Gymnosperms



→ According to Professor Birbal Sahni (1920) classification of Gymnosperms is as follows :-

→ on the basis of axial or foliar origin of ovules Birbal Sahni classified the gymnosperms into two major groups, viz. ① Stachyspermae & ② Phyllospermae.

① **Stachyspermae** :⇒

In this group of gymnosperms ovules arises/developed on the axial organs.

e.g. Cordaitales
Ginkgoales
Coniferales
Taxales.

② **Phyllospermae** :⇒

ovules are borne on leaves, in phyllospermae group of gymnosperms.

e.g. Pteridosperms
Cycadales.

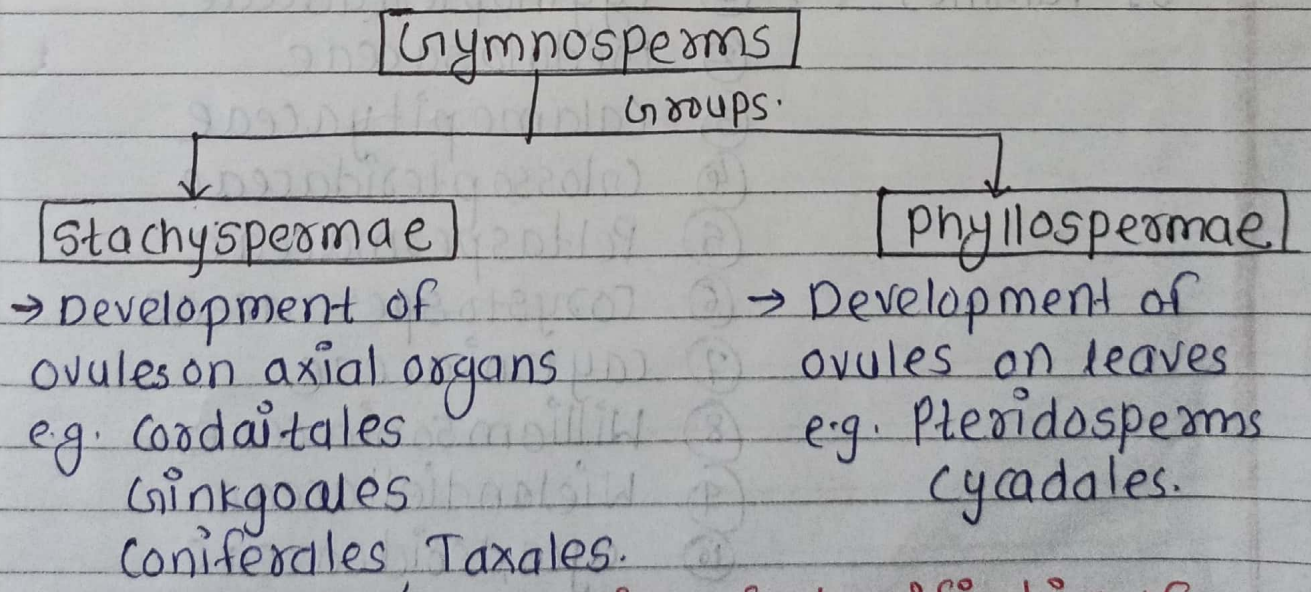



Fig. Schematic representation of classification of Gymnosperms according to Birbal Sahni.

## * Classification of Gymnosperms according to Sporne (1965) *

According to Sporne Gymnosperms are classified into three classes, Nine orders and Thirty one familes.
(03 classes, 09 orders & 31 families)

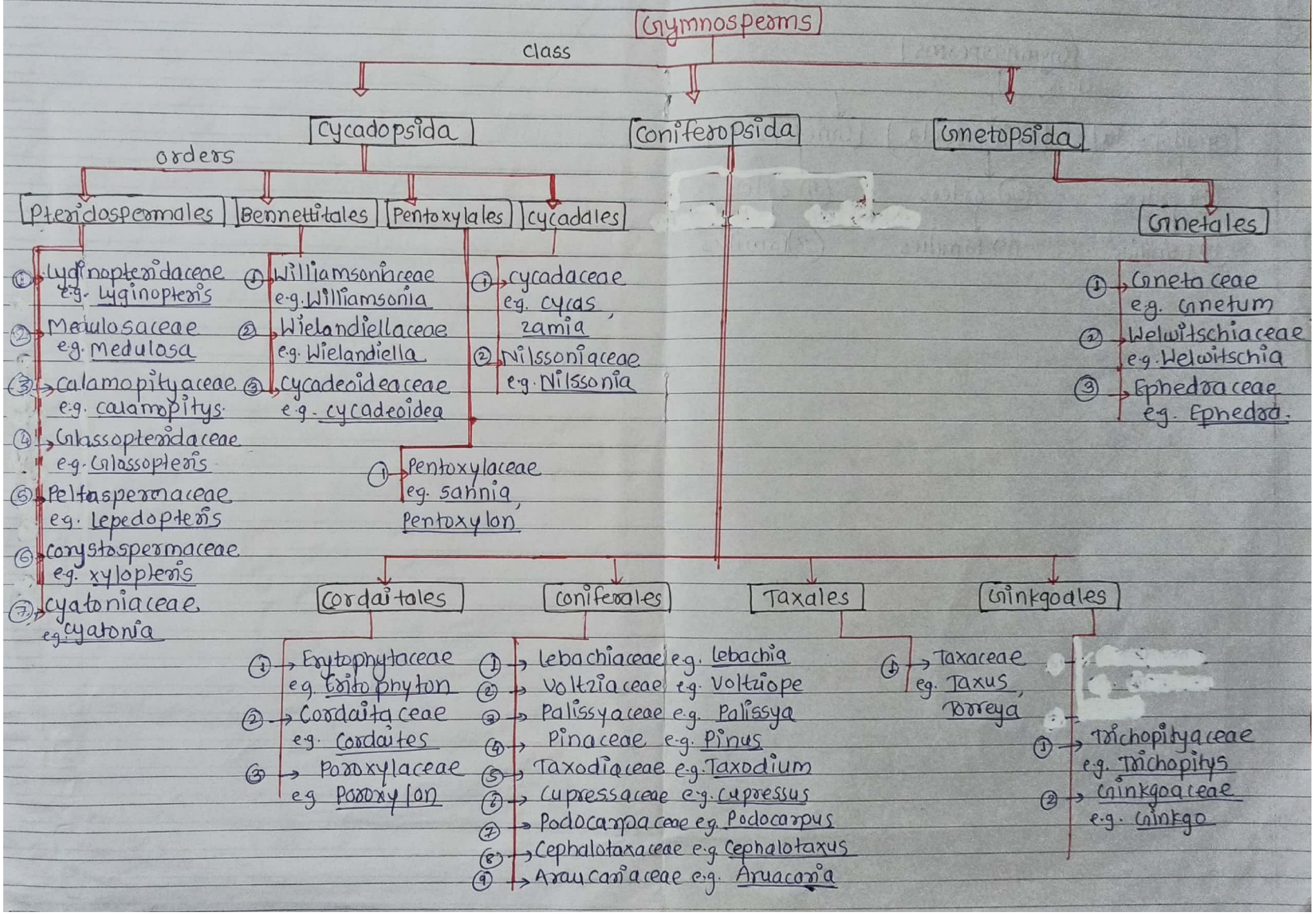
Three classes :⇒
1. Cycadopsida
2. Coniferopsida
3. Gnetopsida

Nine orders :⇒
1. Pteridospermales
2. Bennettitales
3. Pentoxylales
4. Cycadales
5. Cordaitales
6. Coniferales
7. Taxales
8. Ginkgoales
9. Gnetales.

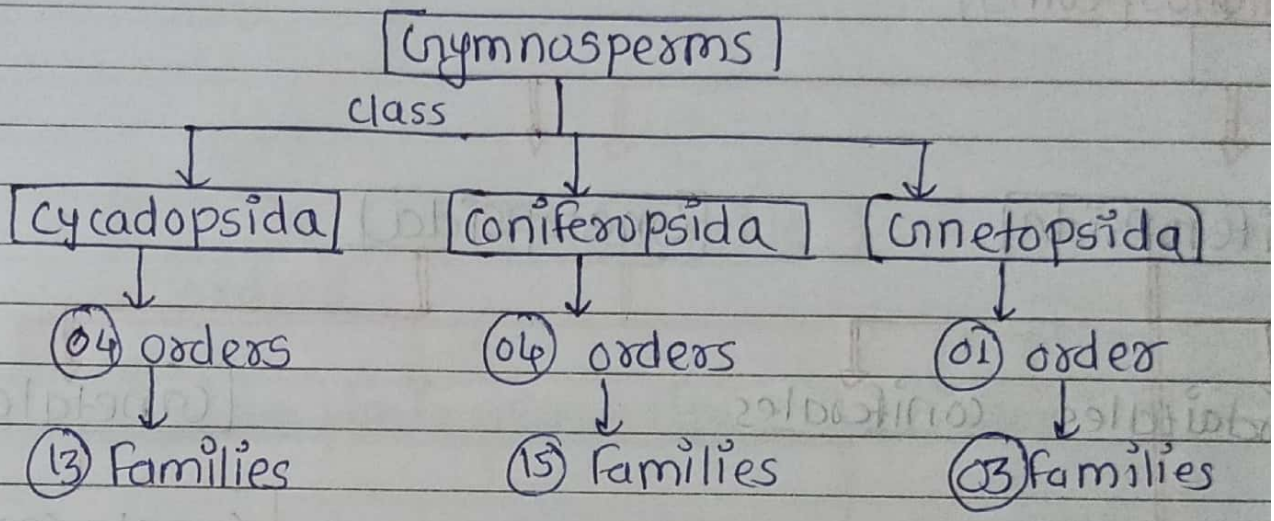
31 families :⇒
1. Lyginopteridaceae
2. Medulosaceae
3. Calamopityaceae
4. Glossopteridaceae
5. Peltaspermaceae
6. Corystospermaceae
7. Caytoniaceae
8. Williamsoniaceae
9. Wielandiellaceae
10. Cycadeoideaceae

11. Pentoxylaceae
12. cycadaceae
13. Nilssoniaceae
14. Erytophytaceae
15. cordaitaceae
16. Poroxylaceae
17. Lebachiaceae
18. voltziaceae
19. Palissyaceae
20. Pinaceae
21. Taxodiaceae
22. cupressaceae
23. Podocarpaceae
24. cephalotaxaceae
25. Araucariaceae
26. Taxaceae
27. Trichopityaceae
28. Ginkgoaceae
29. Gnetaceae
30. Welwitschiaceae
31. Ephedraceae.

# Classification of Gymnosperms according to Sporne. (1965)

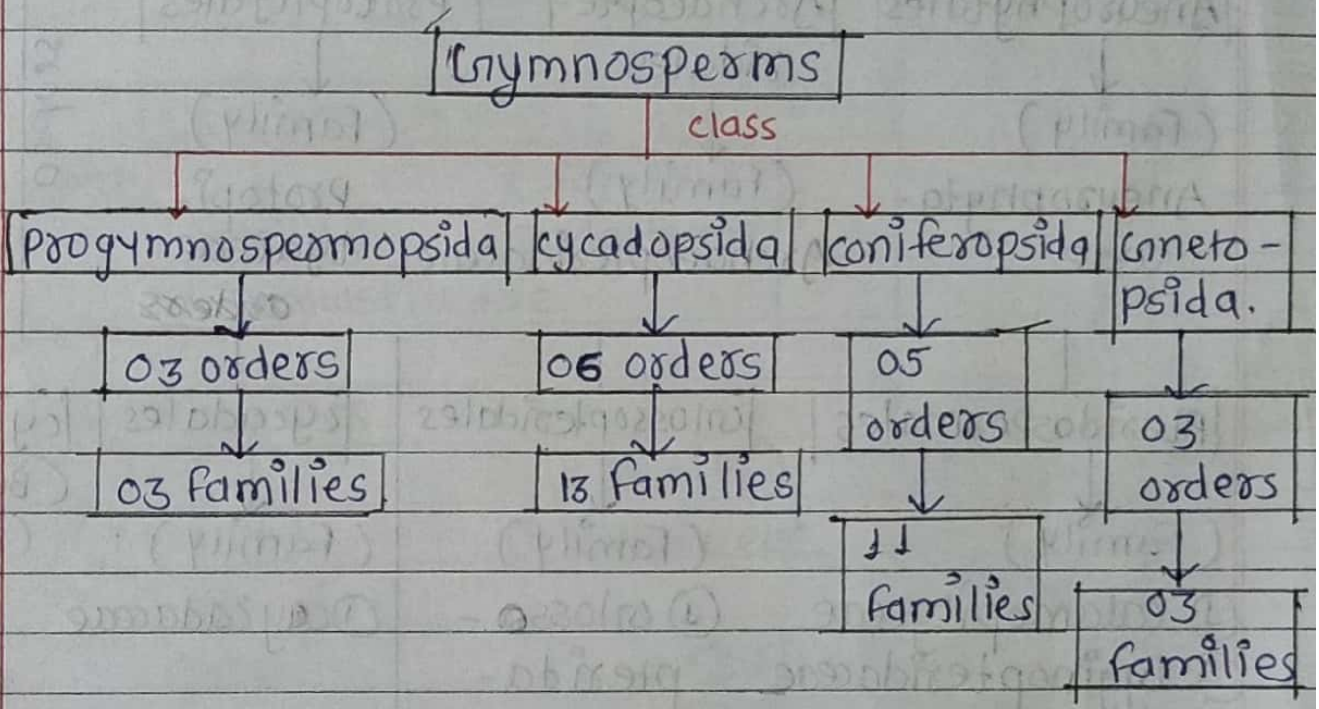


## Schematic representation of classification of Gymnosperms according to Sporne (1965)



## Classification of Gymnosperms according to S.P. Bhatnagar and Alok Moitra (1996)

→ S.P. Bhatnagar and Alok Moitra classify the gymnosperms into 04 classes, 17 orders and 30 families.



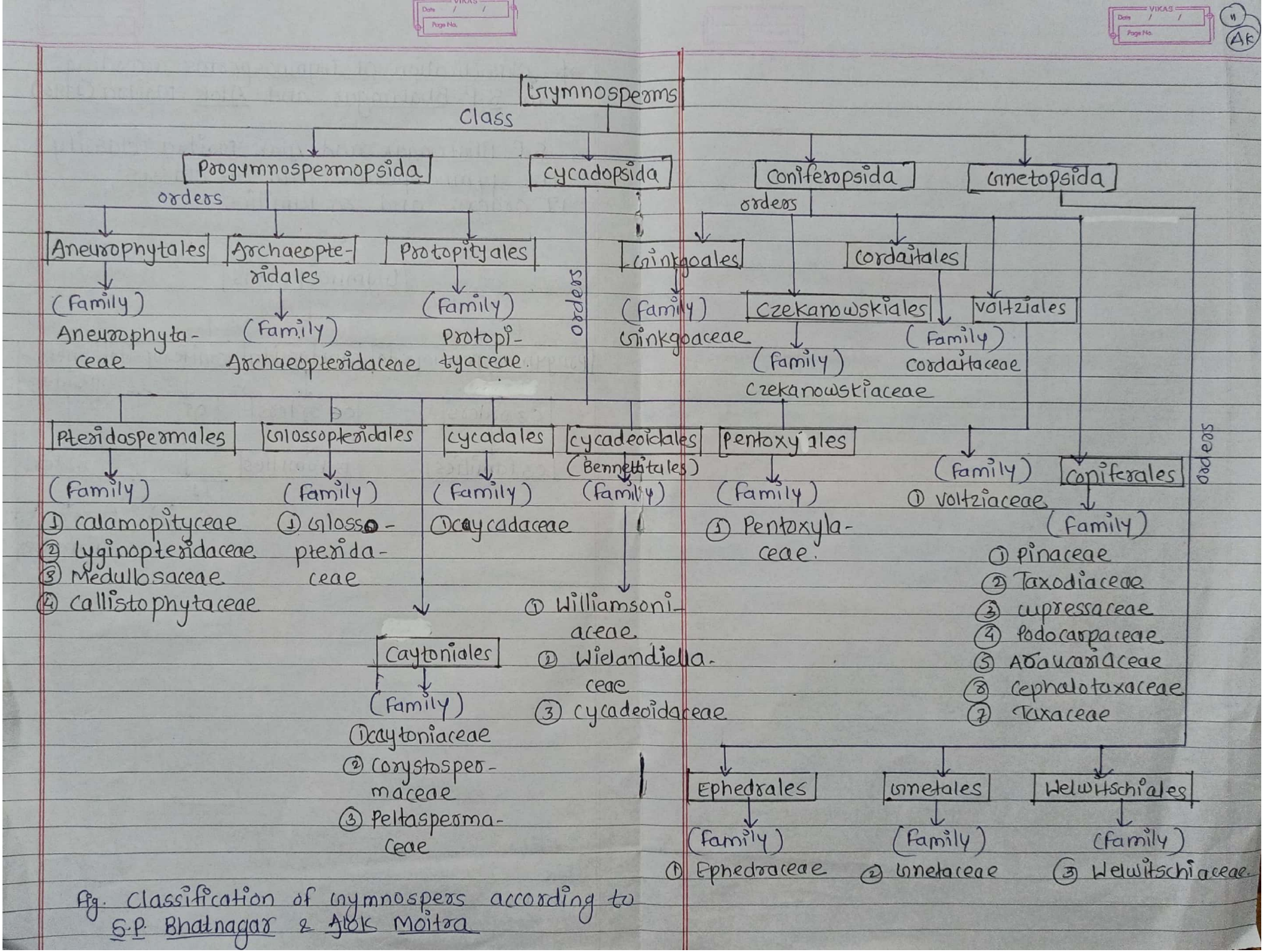



Fig. Classification of Gymnosperms according to S.P. Bhatnagar & Alok Moitra