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Methodology of Teaching the Division of Gymnospheres Or Pinophyta In Practical Training

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Abstract: This article explains the methods used in the practical training of the division on gymnosperms in botany and provides information about some of the methods used within the subject.

Keywords: Method, pine, herbarium, dome, micropreparations, microsporophyll, microsporangia, exine, intine megasporangium, endosperm, nutcellus, micropyle, archegonium, antheridial, viability.

Introduction: It is also relevant to conduct practical classes in botany lessons using new innovative technologies, as well as to prepare graduates who will independently, critically, socially, economically and ecologically examine topics during the lessons. Because a student who has acquired such characteristics as education and upbringing based on the development of sustainable education, self-development and self-expression, independent and critical thinking will not encounter difficulties in the process of teaching in secondary schools in the future. For this reason, we tried to develop assignments using the textbooks of U.Khijanazarov, R.Ishmuhammedov, J.Tolipova [1, 2, 3, 4].

Required materials: Microscope, magnifying glass, slide, cover glass, tweezers, sharp-edged scalpel or razor, live branches of juniper, cypress and common pine, herbariums. Alcohol-fixed samples of young pollen and seed cones of the species. Various permanent micropreparations.

Aim of the work: To study the systematics of the

subfamily Pinus, the general structure, living conditions and the structure of male and female cones in their specific development (*Pinus sylvestris*) based on natural, herbarium and plant samples.

General concept

Seed plants are sharply distinguished from other higher spore-bearing plants (mosses, lichens, centipedes, and centipedes) by the presence of seeds. These plants reproduce by seeds, and their shoots remain viable for a long time even in unfavorable environments. Gymnosperms appeared on Earth about 350 million years ago. The department is a division of higher spore-bearing plants, which includes more than 1000 modern species. Among modern gymnosperms, trees and shrubs predominate in terms of life forms. The leaves of most representatives have a needle-like or lanceolate appearance. Open-seeded plants have seeds and ovules, which are located openly on the macrosporophyll or carpel, therefore these plants are called open-seeded plants. Representatives of the department are also considered archegonial plants, but their distinctive feature is the presence of seeds. So these plants appeared before seeds, flowers and fruits in the evolutionary process. The fact that gymnosperms have a seed bud and seeds due to fertilization sharply differs from other higher spore plants, including mosses, lichens, and ferns. Gymnosperms reproduce by seeds. Their seeds are in an open state in the fruit leaf. Their buds remain intact for a long time even in unfavorable environments. Gymnosperms do not produce fruits, but in some species, like flowering plants, they form fleshy berries as a result of the growth of their stamens (juniper, yew). The seed gametophyte consists of an endosperm and 2 archegonia. The department is mainly divided into six classes:

1. Pteridosperms (Pteridospermsida)
2. Cycads (Cycadopsida)
3. Bennettites (Bennetitopsida)
4. Ginkgos (Ginkgopsida)
5. Pines (Pinopsida)
6. Gnetums (Gnetopsida)

Representatives of the class Pteridospermopsida appeared on Earth in the Devonian period and flourished during the Carboniferous period. Some representatives grew until the end of the Permian period. These plants are fossil plants that resemble modern-day tree-like centipedes. An example is *Lyginopteris oldhamia*. *Lyginopteris oldhamia* is a dioecious plant that reproduces by seed.

Representatives of the class Cycads (Cycadopsida) are found in tropical and subtropical regions, although

they are rare. They are mainly widespread in Central America and Southeast Asia. This class has about 100 species and has one family Cycads. They are tree-like plants, 15-20 meters high, with a trunk about 2 meters long, covered with feathery leaves. An example of this class is the cycad (*Cycas*).

The class Bennettites (Bennetitopsida) is similar in appearance to representatives of the Cycads. Representatives of the class Bennettites lived in the Mesozoic era and are among the plants that later became extinct. Their disappearance coincides with the time of the appearance of flowering plants. Therefore, most botanists attribute the origin of flowering plants to the Bennettites. Representatives of this class were also various spore plants. We can take the giant *Williamsonia* (*Williamsoniella*) as an example.

The class Ginkgo (Ginkgopsida) has only one family and one species (*Ginkgo biloba*). *Ginkgo biloba* is a large deciduous tree, reaching a height of 30-40 meters. The leaves are fan-shaped, with a pointed tip and fall off in winter. It is grown in gardens as an ornamental and medicinal plant.

The class Pinopsida is the largest class in the gymnosperms, with about 50 genera and about 550 species. The common pine (*Pinus sylvestris*), a member of the Pinaceae family, and the juniper (*Juniperus*), a member of the cypress family, form dense forests. These plants are valuable for paper production, various building materials, and valuable raw materials.

The branching type is monopodial, the leaves are needle-like, and therefore evergreen, located on a short stem

Let's consider the development of the common pine (*Pinus sylvestris*) of the pine family (Pinaceae) of the pine order (Pinales) of the pine class (Pinopsida). This plant has a monopodial branching type, and is 40 meters high with a taproot. It is an evergreen with needle-like leaves, the tips of which are sharp, hard, in bundles of two or three, and are located on a shortened branch. The common pine is a monoecious, single-sex plant. In spring, the flowers are formed in clusters at the ends of the branches, and a spike-like male inflorescence, a "ball of flowers", is formed.

After producing microspores in the male peduncle (dome), the "ball of flowers" quickly dries up and the terminal branches fall off. A shaft passes through the middle of the male peduncle, and the microsporophylls are attached to this shaft. The membranous tip of the microsporophylls is turned upwards and looks like a body. At the bottom of the peduncles are two anthers, that is, microsporangia. A large number of microspores (pollen) ripen inside the microsporangia. Microspores have a unique appearance. They are round in shape and

are surrounded by a double shell, an outer thick endosperm and an inner thin endosperm. The endosperm shell forms two air-filled sacs on both sides of the microspore. As a result, it allows the microspores to be dispersed by the wind. Two

vegetative and generative cells are formed inside the microspore. Pollination processes occur in the first month of summer.



Pinus silvestris, male cones

The female cone is much larger than the male cone, and is located singly or in pairs on the lower branches, and matures in two years. Initially, the green fruits are densely covered with scales, but the following year the fruits open and turn brown. The male cone has a shoot that passes through the middle of the female cone, and the fruits are attached to this shoot. Two types of bodies are distinguished in the male cone. These are the covering and seed bodies. The covering body is a small body that is attached to the shoot, and in its axil is a somewhat large fruit body with a thick edge. Near the base of these bodies, two ovule micropyles are located facing downwards.

The ovule is an oval macrosporangium with an endosperm and gametophyte in its center. In its upper part there are archegonia with large nuclear egg cells. The archegonia are surrounded by the endosperm and nutcellus from the outside. There is a cover over the nutcellus, which is surrounded by the lower side of the ovule. The ends of the cover do not touch each other, forming a micropyle. The resulting spore falls from this micropyle into the nutcellus and grows. Its cells divide, forming a pollen tube. It passes through the nutcellus and goes to the archegonia through the endosperm, and two antheridial cells fertilize the egg cell.



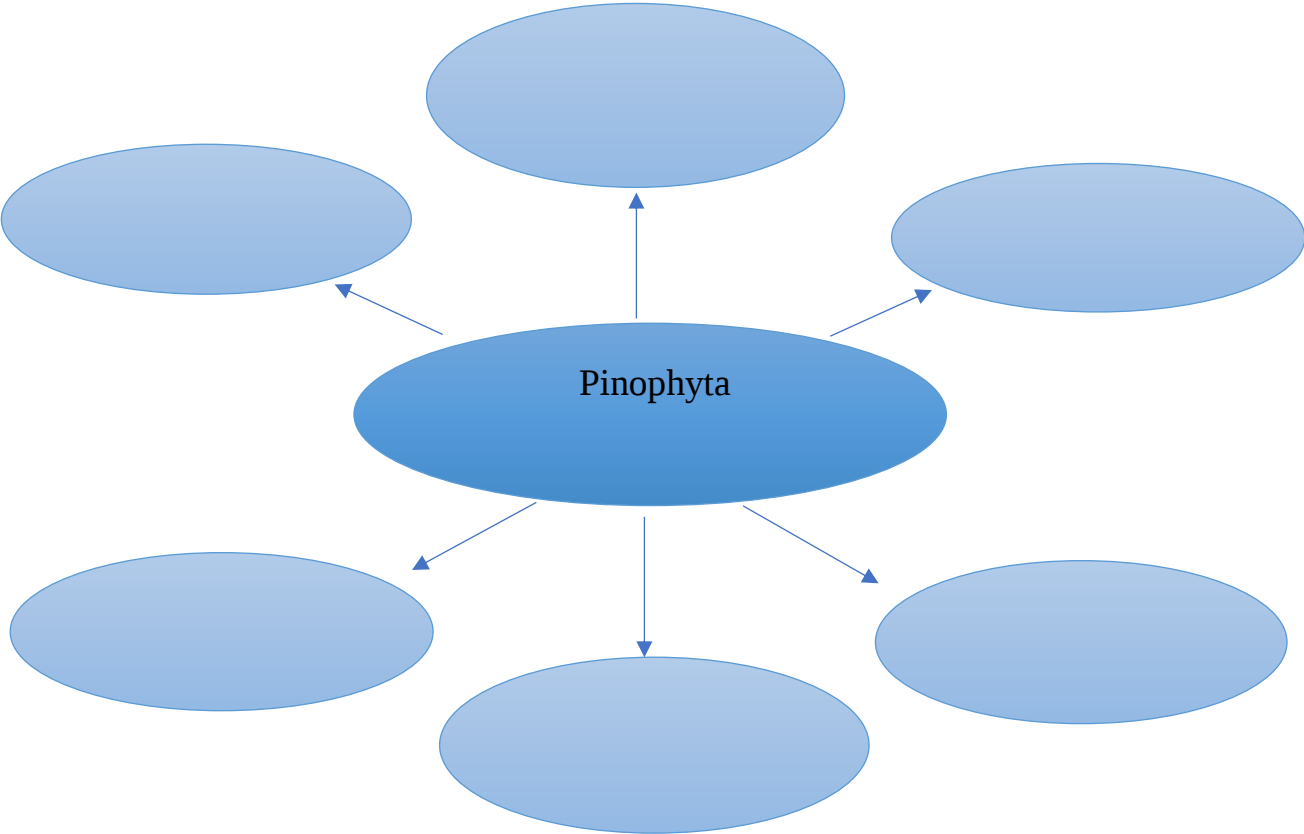
Female cone of Pinus silvestris

The leaves of the representatives of the cypress family are opposite or whorled trees and shrubs. The leaves are often lanceolate, sometimes needle-like, monoecious or dioecious plants. The seed cone of the seed-bearing cypresses fuses with the covering cypress to form a dome-shaped shell, inside which there are 1-3 ovules. The microsporophylls consist of a short thread and an expanded part with 3-6 microsporangia.

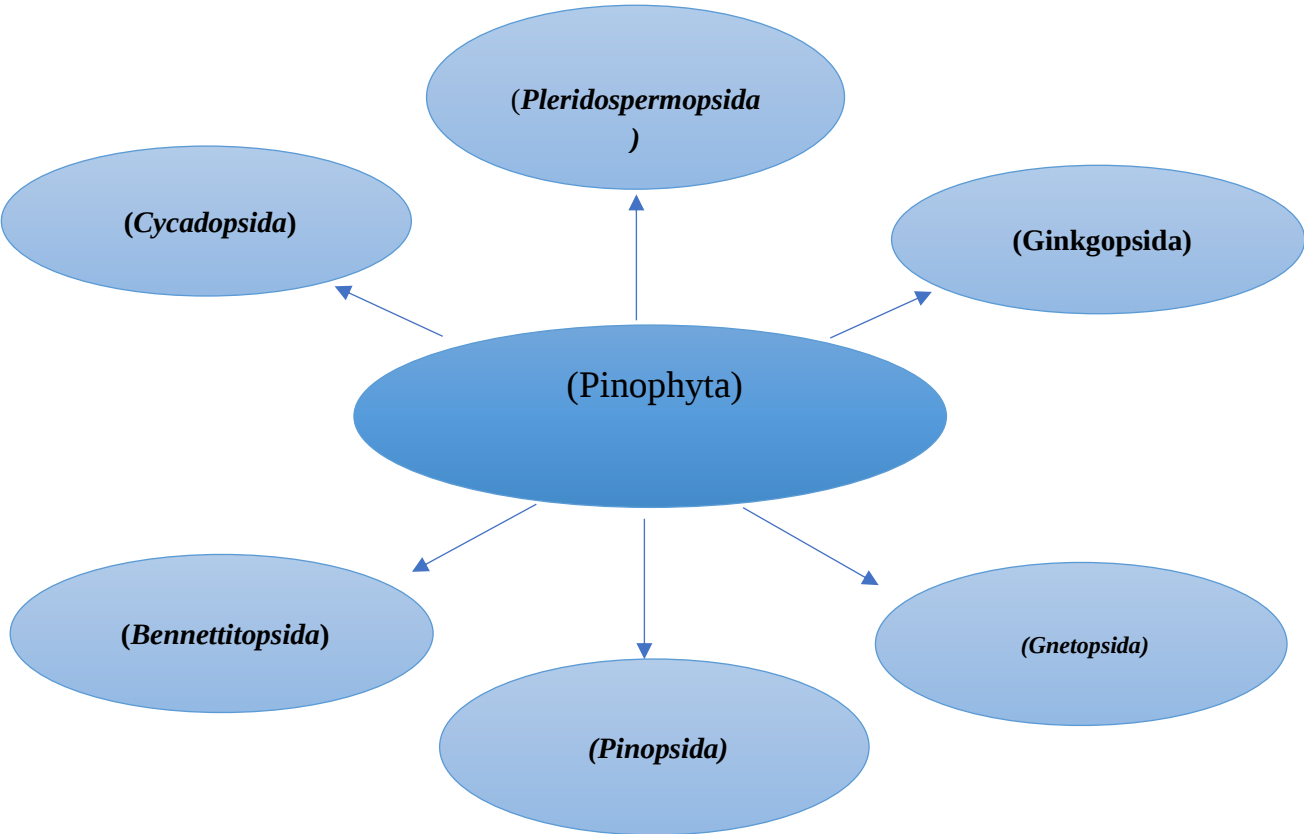
The cypresses of junipers are berry-like, spherical, contain from 1 to 10 seeds, and ripen in the second or third year. Three genera are widespread on Earth:

1. Juniperis
2. Cupressus
3. Thuja

Task 1: Write down the classes belonging to the pine family in Table 1.



Task 1: Answer the classes belonging to the pine family in Table 1.



Task 2: In the table provided, write the correct answers to the representatives of the classes belonging to the pine family.

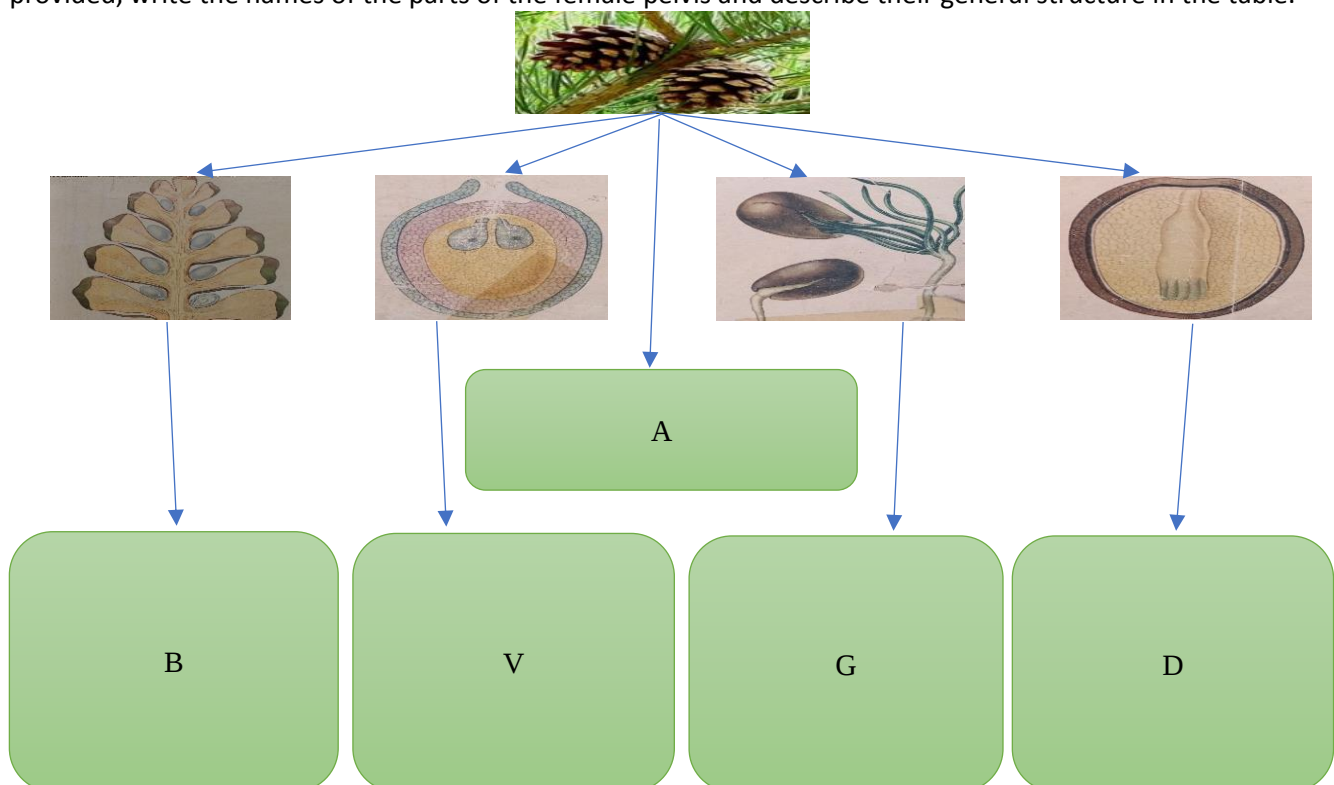
No.	Classes belonging to the pine family			Class representatives		
1.	Pteridospermopsida			A	Ephedra	
2.	Cycadopsida			B	Pinus silvestris	
3.	Bennetitopsida			V	Ginkogo biloba	
4.	Ginkgopsida			G	Williamsoniella	
5.	Pinopsida			D	Cycas	
6.	Gnetopsida			E	Lyginopteris oldhamia	
Answers		1 -	2 -	3 -	4 -	5 - 6 -

Task 2: Answer the representatives of the classes belonging to the pine family in the given table.

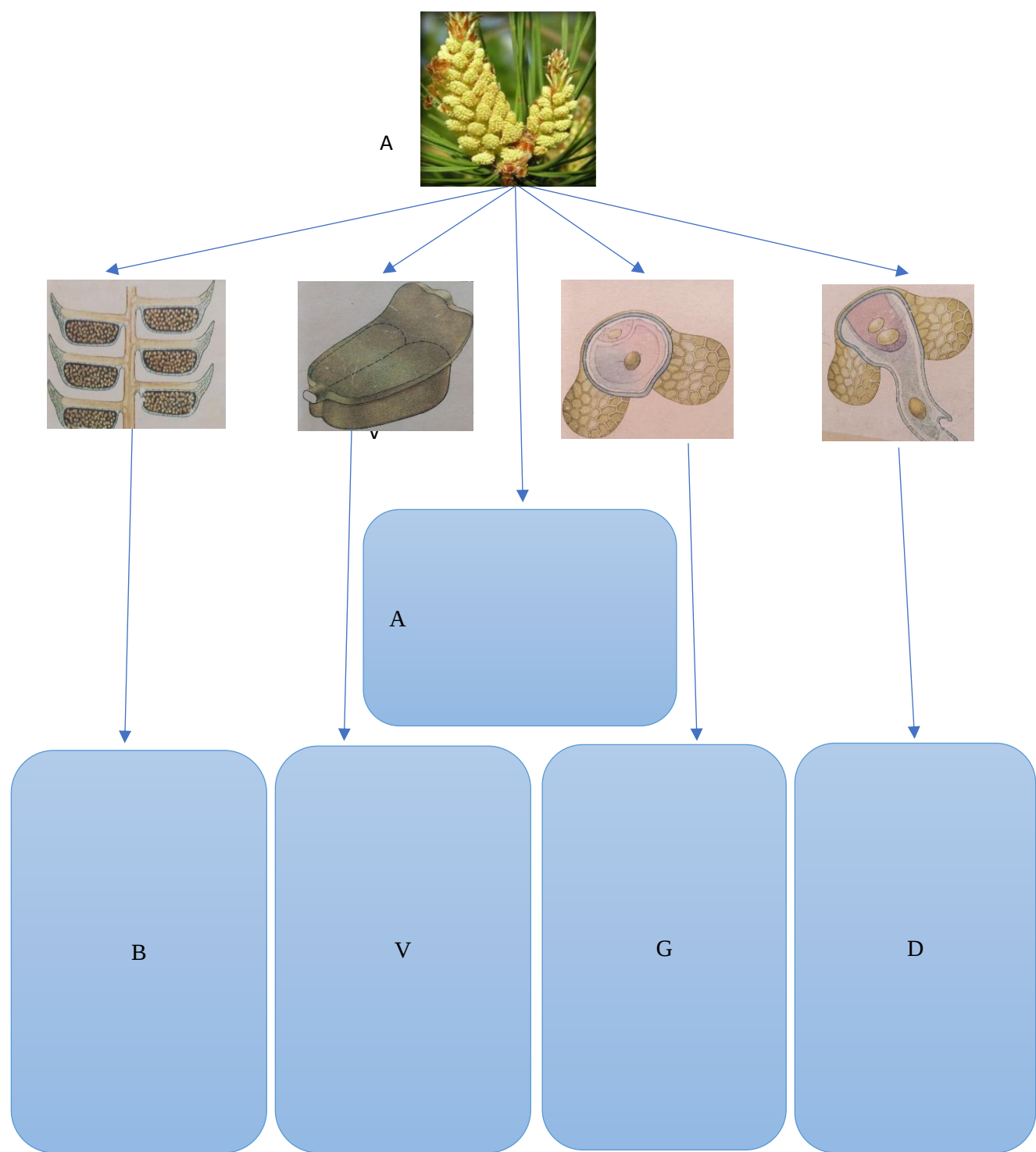
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4.	Ginkgopsida			G	Williamsoniella	
5.	Pinopsida			D	Cycas	
6.	Gnetopsida			E	Lyginopteris oldhamia	
Answers		1 - E	2 -D	3 -G	4 -V	5 -B 6 - A

Task 3: Based on the pictures

provided, write the names of the parts of the female pelvis and describe their general structure in the table.



Task 4: Based on the pictures provided, write the names of the parts of the male genitalia and descriptions of their general structure in the table.



Task 5: Based on the given picture, write down the developmental process of Scots pine (*Pinus silvestris*) in Table 1 in sequence.

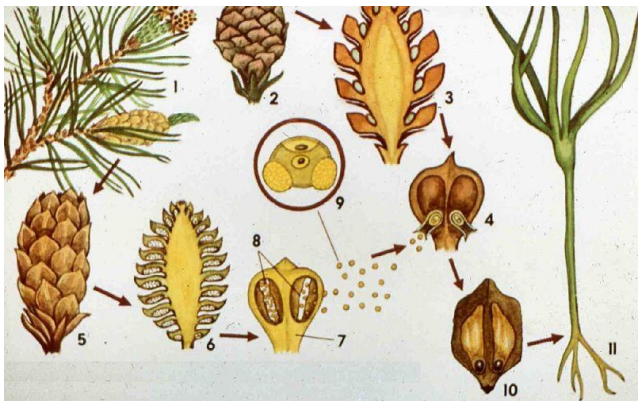


Table 1.

№	Female cone	№	Male cone
1.		1.	
2.		2.	
3.		3.	
4.		4.	
5.		5.	
6.		6.	

CONCLUSION

By teaching this practical exercise, students will be able to understand the specific features and teaching methods of teaching botany, types of assessment and control of knowledge, skills and qualifications related to gymnosperms, modern requirements for developing lesson plans. Moreover, students will be able to apply modern methods of teaching botany, and ensure the coherence and consistency of the content, tools, methods and forms of botany.

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