International Journal of Advanced Research in Biological Sciences
ISSN: 2348-8069
www.ijarbs.com
DOI: 10.22192/ijarbs Coden: IJARQG(USA) Volume 6, Issue 8 -2019

Research Article

DOI: http://dx.doi.org/10.22192/ijarbs.2019.06.08.003

The anatomical structure of the *Orchis purpurea* Huds

Heydarova Rena Tahir
[1 2]Institute of Botany of ANAS, Badamdar highway, 40, Baku AZ1004, Azerbaijan;
E-mail: *rana_haydarova@yahoo.com*

Abstract

The article gives anatomical characteristics of species of the genus Orchis L..The anatomical structure of the *O. purpurea* Huds. has beens tudied for the first time.

Keywords: *Orchis* L., genus, species.

Introduction

The family *Orchidaceae* Jussis considered to be a large widespread group of flowering plants. There are 48 species of this family in Azerbaijan flora. The book“Caucasian flora conspectus”, 2006 shows that 54 species of 21 genera have been spread throughout Azerbaijan in the Greater Caucasus, but the latest literatures and surveys show34 species and 3 subspecies of 17 genera. Among the species included in these genera, there are some controversial species, including the *Orchis purpurea* Huds. Our objective is to clarify what type the herbarium specimen we have collected belongs to and determine the status of that species. The species having various features was identified during the study of the collected specimens. Based on morphological studies, the anatomical studies of the stem, leaf and root of the *Orchis purpurea* Huds have been conducted and it has been determined that they belong to this genus.

Materials and Methods

The researches were carried out in the territory of Azerbaijan in the Greater Caucasus in 2013-2016. The object of the research was the *Orchis purpurea* Huds.

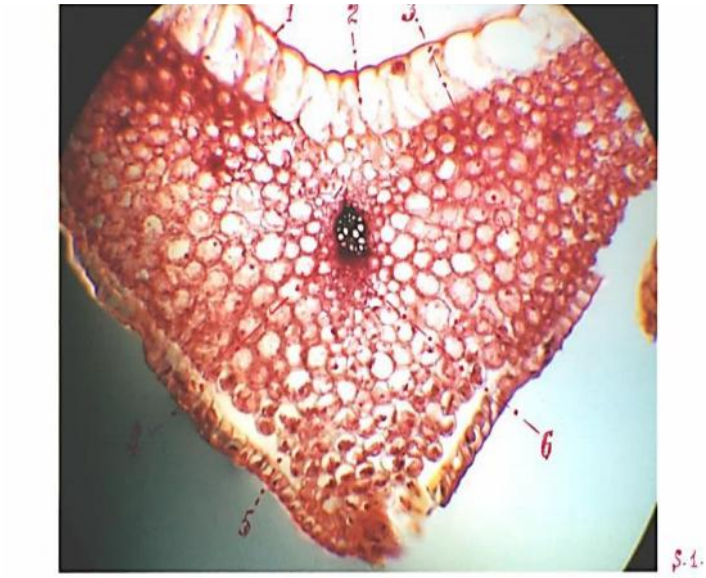
The anatomical structure of the plant was studied for the first time. Specimens for the study (leaf, petiole, stem and root) were mostly taken in the blooming phase, as well as before and after the blooming. The collected specimens were fixed using 70% alcohol. Temporary and permanent medicines were made of both fresh and alcohol-based specimens. These medicines were made on the basis of general anatomical methods (Prozina, 1960, Pausheva, 1974, Tutayug, 1976, Barikina, 2004, Humbatov, Aliyev, Aliyeva, 2015). The cuttings were painted with safranin and solution of fluoroglycinein alcohol. In the description of the epidermis of the leaf, terminology of N.A.Aneli (1975), V.K.Tutayug (1967, 1980), Humbatov (2000) and O.A. Korovkin (2008) has been used [1,4,5,6].

The morphological features of vegetative organisms (V.K.Tutayug, 1980) were investigated with the help of “MBS-2’ binocular microscope and the medicines were studied on “Biolom” and “MBI-3” microscopies. The thickness of the cuts, the size of the leaf, the petiole, some parts of the root and the cells were measured with an ocular micrometer.

Anatomical pictures have been taken with RA-2, MI-4100 D microscope and the Tucsen microscope camera.

Anatomical Researches

Leaf (folium) is the most important organ of the plant, carrying out three vital processes - photosynthesis, gas exchange and transpiration.



Picture 1 – *Orchis purpurea* Huds.
The Leaf Anatomy
1 – Cuticle, 2 - Upper epidermis, 3 - Mesophyll,
4 - Xylem, 5 – parenchyma (spongy tissue), 6 – Phloem

The leaf has an isolateral structure in the transverse section (Picture 1). So, the leaf mesophyll is formed of the same type of cells. This structure is caused by the same degree of illumination of the upper and lower sides of the leaf. As the leaves have a vertical position on the plant, the light also falls on the lower part of the leaves and eventually they gain an isolateral structure. The leaf is covered with the epidermis consisting of a single cellular layer on both the lower and upper surfaces, and the epidermis is covered with cuticle on the outside.

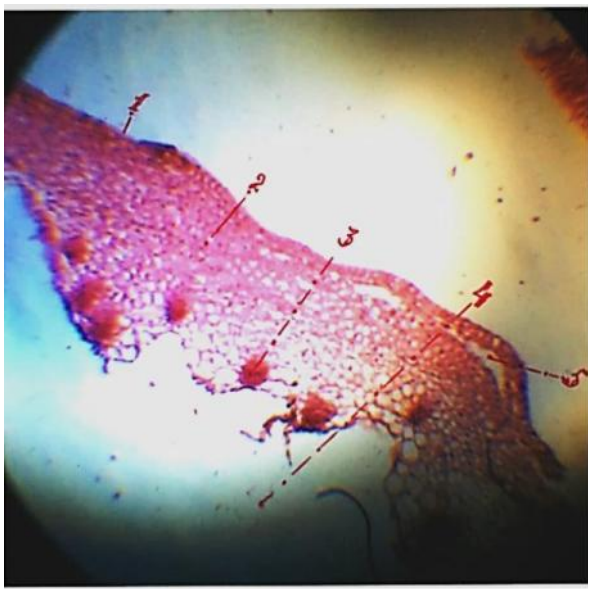
The leaf mesophyll is composed of similar parenchymal cells. It is difficult to distinguish the lower and upper parts of the leaf because of the shape, structure, and location of the cells [3]. In microscopic view, it is possible to determine the upper and lower sides of the leaf according only to the reason of the epidermal cells being large and small in size (the upper epidermal cells are large) and by the location of xylems and phloems of the vascular bundle. Thus, xylems are at the upper surface of the leaf, but phloems are directed toward the lower surface. Relatively large volumes of spongy tissue are observed to be oriented inward from the lower epidermis. It was formed in the first spring as an adaptation to the lack of air in the leaves of the plant, which generally grow in humid places. In the leaf mesophyll, collateral-type bundles are arranged on parallel lines. Xylems and water tubes (15-18 pieces) are small and dense. The stomata are in the lower epidermis. In some cases, they are also found in the upper epidermis of the leaf.

The anatomy of the leaf is characterized by large upper epidermal cells, isolateral mesophyll, location of the bundles on the parallel lines and placement of the stomata on the lower surface.

Stem (caulis) is one of the main organs of the plant, and it forms buds with the leaves. Stem ensures the transport of water and other substances between roots and leaves, enhances the absorption surface of the plant by branching, provides regular layering of leaves, flower and fruit, and takes part in the storage of water and other nutrients [6, 7].

The stem is circular in the transverse section (Picture 2). It is surrounded by a single layer of epidermis. Epidermal cells are intensively located and small. They are covered with cuticles.

Studies show that a hollow stem is formed as a result of the extension and growth of the cells in the central part. The bundles seem in order and collateral. There are relatively large spongy tissue trails in some parts of the epidermis. This can be regarded as a sign of adaptation to air deficiency.



Picture 2 – *Orchis purpurea* Huds.

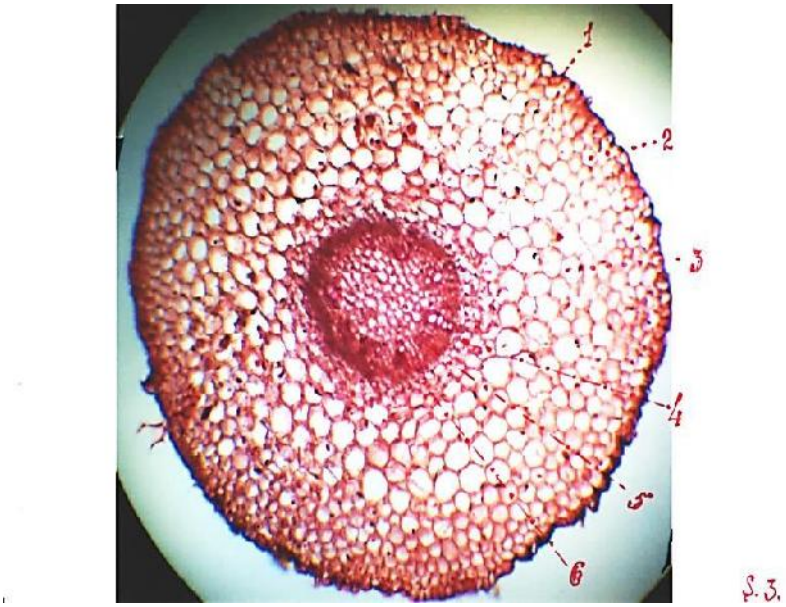
The Stem Anatomy

1 - Epidermis, 2 – Cortex, 3 –Vascular bundle, 4 –Vallecular canal, 5 –parenchyma (spongy tissue)

From the epidermis to the pithcavity, there is a cortex. Cortex is made up of small cells. Parenchymal cells are more primitive and simple in origin. These primitive and simple-structured cells possess highly sophisticated physiological ability. They play an active role in the functioning of live protoplasmic responses and are involved in the processes such as photosynthesis, decomposition reactions, storage of nutrients, excretion of waste substances, and so on. These cells can be re-activated, transform into meristem cells, and form different tissues when it is needed. Studies prove that vascular bundles are surrounded by a single layer of relatively large surrounding cells on the outside. These cells connect the bundle elements to the other cells of the stem and protect the bundle. Ground tissue has developed poorly in the stem.

As one of the main vegetative organs of the plants (except moss), the **root** has main functions such as combining the plant with substrate, absorbing water and nutrients, synthesizing organic matters from the ingredients, transferring them to the other organs of the plant and excreting some substances of the exchange processes, as well as some additional functions including storing nutrients and being a vegetative reproductive organ [2,6].

The root is circular in the transverse section (Picture 3). The root is surrounded by velamen (cover) consisting of 2-3 cell layers. Velamen also occurs in aerial roots of tropical orchids, rarely in thin roots which originate from root-like parts and develop horizontally. The plant absorbs water into its reservoirs when it is wet, and especially when it rains. Mesoderm has developed strongly in the root. These parenchymal cells become larger, rounder and less dense when they get close into the center, but they begin to become more dense and smaller, as they approach the endoderm. These cells are parenchyma, which stores the soil sugar and transmits to the center.



Picture 3 – *Orchis purpurea* Huds.

The Root Anatomy
1 – Cuticle, 2 – Velamen, 3 – Mesoderm,
4 – Endoderm, 5 – Phloem, 6 – Xylem

Endoderm is made up of a single layer of cells. It covers the central cylinder from the outside and acts as a protective nut, and also plays the role of mechanical support for the new shoots of the root among the rough ground particles [6]. Xylem rays in the root are of polyarch. Each ray has 3-5 water tubes. They do not start from the center; the center is covered with parenchyma. These cells are compactly located and small. Phloem is located in the form of islets among the rays.

It is obvious [1, 6, 8] from the studies that the representatives of the family Orchidaceae (commonly used for normal development) live together with the fungus, entering the symbiosis (mycorrhiza). Mycorrhiza was not observed in the study.

These properties, which have been discovered as a result of anatomical studies, are permanent signs for the species and can be considered as diagnostic features in the plant identification and valuable fluorogenetic data in the determination of evolutionary direction of the flowering plants.

References

1. Humbatov Z.İ. 2002. Plant morphology and anatomy. Ganca, 118.
2. Humbatov Z.İ., Aliev B.M., Alieva İ.F. 2015. Methods of teaching and research in Botany, Baku, 158.
3. Aliev B.M. 1993.The structure of node, depending on the arrangement of leaves in some Azerbaijan plants. Botanical journal, 2:65-68.
4. Aneli N.A. 1975. Atlas of leaf epidermis. Tbilisi, 108.
5. Korovkin O.A. 2008. Anatomy and morphology of plants. M.:“Mir”, 309.
6. Tutayug V.X. 1972. Anatomy and morphology of plants, M., 332.
7. Esau K.M. 1969. Anatomy of plants, 564.
8. Life of plants. 1980. M., 430.

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DOI:10.22192/ijarbs.2019.06.08.003	

How to cite this article:
Heydarova Rena Tahir. (2019). The anatomical structure of the *Orchis purpurea* Huds. Int. J. Adv. Res. Biol. Sci. 6(8): 24-28.
DOI: http://dx.doi.org/10.22192/ijarbs.2019.06.08.003