# Morphological and anatomical investigations of *Vicia truncatula Fish. ex Bieb.*

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## ABSTRACT

**Introduction:** Micromorphological research of vegetative bodies of *Vicia truncatula Fish. ex Bieb.* as a source of a sum of diosmetine biozides (flavicine) with high antioxidant hepatoprotective and endothelial-protective activities. We have identified the main diagnostic signs of vegetative bodies which can be used when standard documentation on medicinal vegetable raw materials compile. **Materials and Methods:** The objects of the study were collected in North Caucasus (Russia) in June 2013-2014. Materials morphological study herbarium specimens were stored in the herbarium fund the Department of Botany (acronym PGFA). Materials micromorphological study were temporary slides are the root, leaf, stem and flowers. **Results:** The morphological results were compared with the Flora of the USSR. Anatomical characters of leaves and stems of the species were observed to be similar to the usual features of genus Vicia anatomy. All results are supported by photographs. The stomatal apparatus belongs to anomocytic and paracytic types, simple multicellular hairs. **Conclusion:** we would like to note that these investigations are one of the phases of *Vicia truncatula Fish. ex Bieb*. examination and the medicinal plant is considered to be a perspective source of flavicine. The morphological and anatomical research obtained data can be used in standard documentation for medicinal vegetable raw material compiling.

**Key words:** Anatomy, Morphological and Anatomical investigations, Morphology, *Vicia truncatula Fish. ex Bieb*.

## INTRODUCTION

This work is a fragment of the morphological and anatomical studies of promising resurnyh flora of the North Caucasus.[1] The target of our study is morphological and anatomical research of Wicky succise (*Vicia truncatula Fish. ex Bieb*). This species is widespread all over the Ciscaucasia; it is also considered as an endemic of the West and East Ciscaucasia.[2,3]

For the last years, some studies have showed the perspective of Wicky succise use as a source of a biologically active agent. The sum of diosmetine biozides, containing in the herb, tentatively called *flavicine*, has a strong antioxidant effect. It showed high hepatoprotective activity if there is an acute and chronic four-chloride trophopathic hepatitis. It improves anti-inflammatory, antiproliferative, antithrombotic and hypolipidemic functions of endothelium in different pathologic processes including diabetes. It normalizes NO-synthazes activity and blood hemostasis balance as well.[3,5-7]

Raw materials were collected on the south-west slopes of Mashuk Mountain (in Pyatigorsk) in the period from June 2013 to 2014. *Vicia truncatula Fish. ex Bieb.* life form is a perennial, climbing herb with a large quite curved rhizome. (Figure 1) The system of adventitious root is typical; sprouts are elongated, uprighted or quite ascending, which are branched higher of middle. It has unparipinnate leaf, petiolated leaflet. The epiphyll form is oval or elliptical, the top of leaflet has a sharp tip, the edge is integral, and the base is round. The leaf has very narrow stipules. Inflorescences are botryoid and simple; the cluster consists

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**Figure 1: Morphological description of *Vicia truncatula Fish. ex Bieb.***

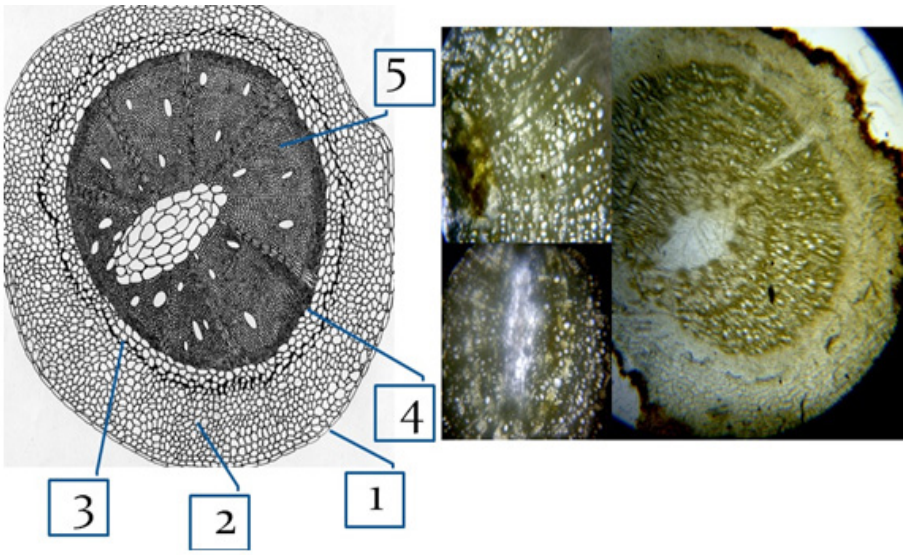


**Figure 2: The anatomic structure of *Vicia truncatula Fish. ex Bieb*. root.**

of 7-13 flowers. The calyx is campaniform, and the teeth are unequal. The low teeth are lanceolate and theyare shorter than the tube. The high teeth are very short and they are connivent. The color of corolla is primrose and it isn't covered by fibres a lot with size about 13-16 mm. The androceum consists of 10 stamens. Gyneceum monocarpic. The fruits are black elongated beans; they are short-cut to the tops.

## MATERIAL AND METHODS

In carrying out morphological studies revealed as morphological characteristics. Micromorphological research of vegetative bodies was carried out with the help of a well-known technique.

## RESULTS

The morphological structure of this type is the study of life forms, type of root system, structure of leaves, inflorescences and flowers.

### The cross cut of a root

The root has a secondary structure and it consists of two blocks. The first one is an investing tissue and the secondone is a central cylinder. The investing tissue is presented by a periderm. The central cylinder consists of

pericycle, phloem and xylem. Pericycle is presented by parenchymatous cells which are situated on several layers.

The phloem is laid in the form of a ring. It consists of thin-walled cells which are situated very tightly to each other. The cambium settles down inside from phloem in some layers. It presented by little live cells with a rectangular shape. Xylem occupies the primary part of the roots cross cut and consists of thick-walled rounded vessels and parenchymatous cells. (Figure 2)

## The cross cut of a stem

The stem has asecondary structure and it consists of three blocks. The first one is an investing tissue, the second one is a cortex and the third one is a central cylinder. The investing tissue ispresented by an epidermis with the collenchyme under the epidermis. The collenchyme is formed by oval cells with irregular thickening of cellular wall. (Figure 3)

The central cylinder consists of sclerenchyme, phloem, cambium, xylem and parenchyme of the pith. The sclerenchyme is placed on the separate area over the phloem. The phloem consists ofsieved tubes and cells companions. The xylem consists of vessels. The parenchyme of the pith consists of big cells with a thin cellular wall.

## The cross cut of a leaf plate

The leaf is dorsoventral, amphistomatic. The leaf plate

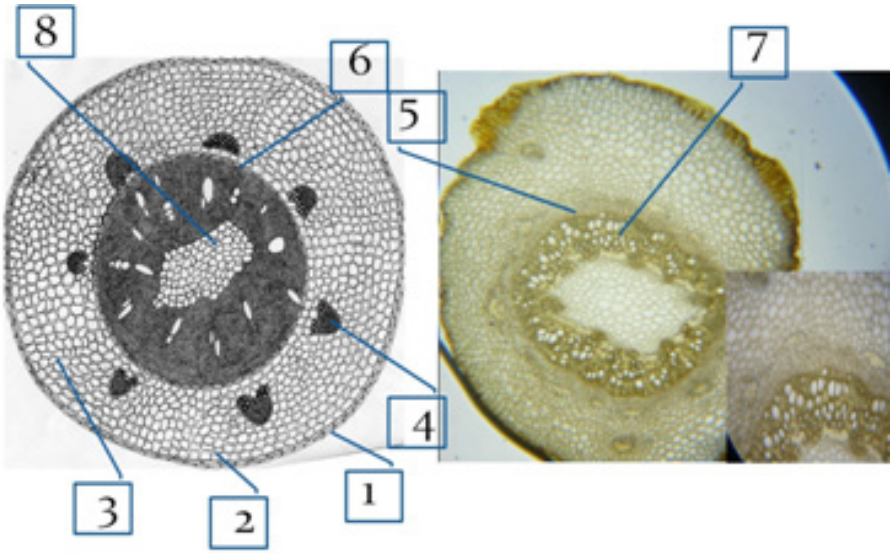


**Figure 3: The anatomic structure of *Vicia truncatula Fish. ex Bieb*. stem**

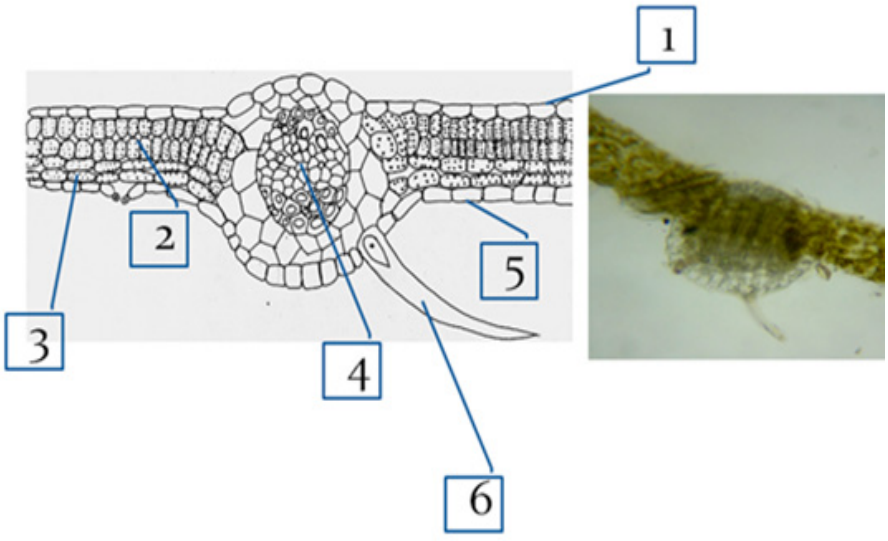


**Figure 4: The anatomic structure of *Vicia truncatula Fish. ex Bieb*. leaf**

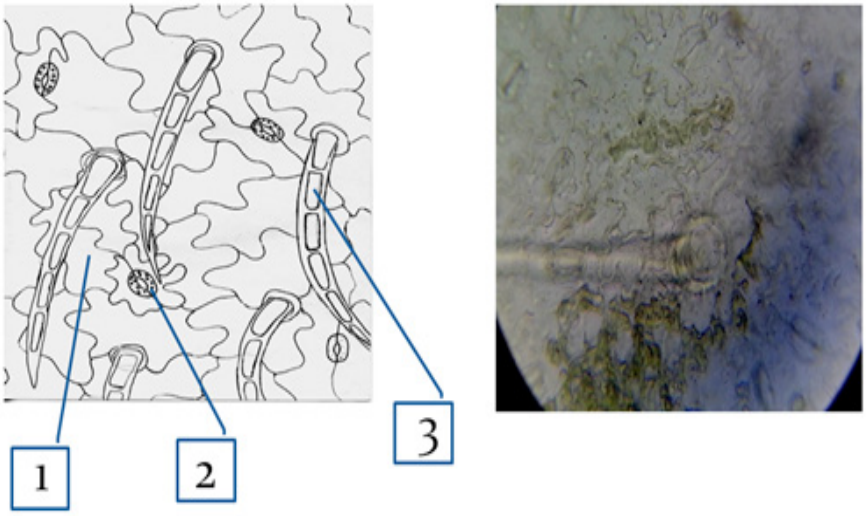


**Figure 5: The structure of the lower epidermis of *Vicia truncatula Fish. ex Bieb*. leaf plate**

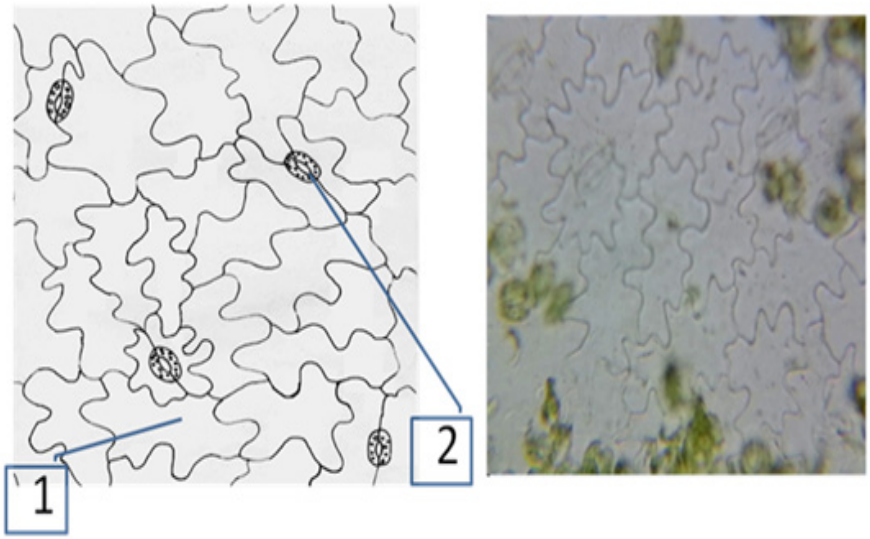


**Figure 6: The structure of the upper epidermis of *Vicia truncatula Fish. ex Bieb*. leaf plate**

consists of an investing tissue, mesophylland conducting bundle. The investing tissue and epidermis are presented by the epidermis cells. Mesophyll is presented by a palisade type and a spongy type. The mesophyll palisade settles on two layers under the top layer of epidermis. The spongy mesophyll settles on two layers between the mesophyll palisade and alow top of epidermis. The spongy mesophyll is presented by live parenchyma cells. The carrying-out system has aclustered type. (Figure 4)

## The structure of bottom epidermis of leaf plate

The main cells of bottom epidermis have strongly twisting anticlinal walls. The stomatal apparatus belongs to anomocytic type. It has thick covering by simple multicellular hairs. (Figure 5)

## The structure of upper epidermis of leaf plate

The epidermis main cells represent wavy anticlinal walls. The stomatal apparatus belongs to anomocytic and paracytic types. (Figure 6)

## The cross cut of a petiole of a leaf

The petiole has a saddle-type shape on the top and triangularshape on the bottom. There is an epidermis on the outside which consists of unicellular hairs. There is a collenchyme under the epidermis which consists of several layers. Chlorenchyme is disposed father. It consists of small cells withathin cellular wall withchloroplasts. There are five open collateral carrying-out bunches inside the petiole. Bunches are presented by sclerenchyme, phloem,

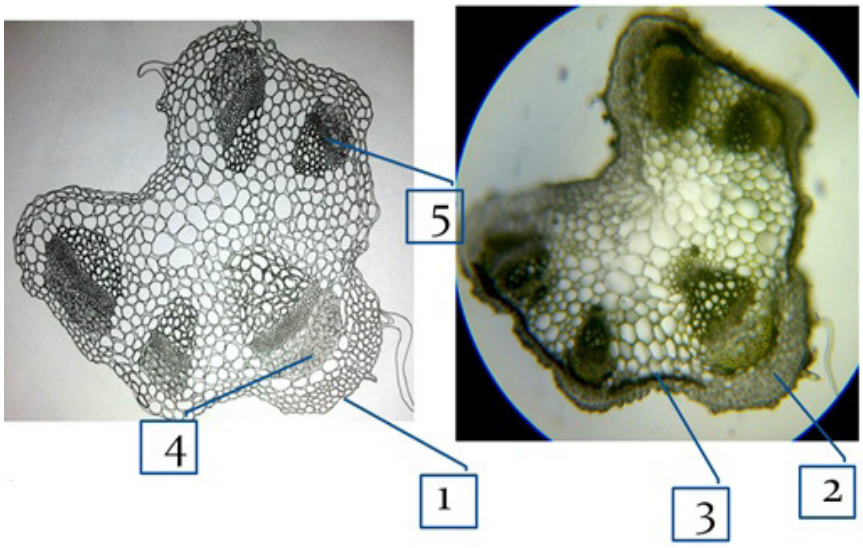


**Figure 7: The anatomic structure of *Vicia truncatula Fish. ex Bieb*. leaf petiole**

cambium, xylem. (Figure 7)

## DISCUSSION

Morphological, micromorphological and anatomical characteristics of *Vicia truncatula Bieb*. were examined in this study. There are a few information about morphological properties of in the Flora of USSR and Vascular Plants of Russia and Adjacent States. Results of comparison of morphological properties both genus are presented.

## CONCLUSION

In conclusion we would like to note that these investigations are one of the phases of *Vicia truncatula Fish. ex Bieb*. examination and the medicinal plant is considered to be a perspective source of flavicine. The morphological and anatomical research obtained data can be used in standard documentation for medicinal vegetable raw materialcompiling.

## CONFLICT OF INTEREST

When performing this research conflicts of interest did not arise, since all of the authors have conducted research work comprehensively.

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## REFERENCES

1. Dajronas JV, Serebryanaya FK, Zilfikaro IN. Comparative Morphological and Anatomical Study of Onosma caucasica Levin. ex M. Pop. and Onosma sericea Willd. (Boraginaceae Juss.) Phcog J. Sep-Oct 2014; 6(5): p.22-29. DOI: 10.5530/pj.2014.5.5.
2. Cherepanov SK. Vascular Plants of Russia and Adjacent States (the Former USSR). New York: Cambrige University Press; 1995. -p. 144-9.
3. Takhtadzhian AL. Flowering Plants. New York: Springer; 2009. p. 238-47.
4. Tyurenkov IN, Voronkov AV. Action flavizine and other flavonoids on carbohydrate and lipid metabolism in animals with diabetes. Pharmacy 2013; 7: 39-41.
5. Dorkina EG. the Influence of the therapeutic application of dry extract *Vicia truncatula* on NADP - GSH - dependent system of rat liver in chronic alcoholism. Dorkina Experimental and clinical pharmacology 2010; 73(4): 35–7.
6. Tyurenkov IN, Voronkov AV, Sliezans AA. Influence flavizine on vasodilating and antitrombotic endothelial function in animals with experimental diabetes mellitus. Sliezans and others Experimental and clinical pharmacology 2010; 73(12): 17–20.
7. Tyurenkov IN. Voronkov AV, Sliezans AA. The influence of flavonoids on the main parameters of hemostasis and blood antitrombotic endothelial function in diabetes mellitus. Sliezans and others Pharmacy 2012; 4: 34-6.