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Structural Features of Seeds *Allium Protensum* Wendelbo and *A. Suworowii* Regel in the Introduction of Botanical Garden (Uzbekistan)

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Abstract: ***First studied the morphological and anatomical structure of the seeds Allium protensum Wendelbo and A. suworowii Regel in the conditions of introduction of the Tashkent Botanical Garden of the Academy Sciences of Uzbekistan. Identified diagnostic features of this species: the largest seeds, thick inner integument, relatively long and large cells of the endosperm were noted in A. protensum, which indicates a more adaptable and wide distribution in the natural habitat of this species. The species A. suworowii is dominated by the following signs, as; small seeds, a thin layer of the inner integument; thickest parenchymal cells; relatively short and small cells of the endosperm, which shows a narrow distribution in the natural habitat of the species, relative views A. protensum.***

Keywords: morphology, anatomy, seed, introduction, *A. protensum, A. suworowii*

1. Introduction

The genus *Allium* L., numbering 750-800 species [1], is widely distributed in Eurasia and America.Bows grow in different types of biomes and play a different role in plant communities. The variety of habitat conditions affected their structural organization and types of functioning. The taxonomic significance of the shape of the seeds for a long time did not pay attention. For the first time this criterion (among numerous others) was used by S. Zakhariadi [2] for the systematic treatment of bows. Later Z.N. Filimonova [4], who studied Central Asian species, divided them according to the morphology of the seeds into four groups.

A number of more than 20 types of onions are widely used by the local population for food. Unreasonable and exorbitant fees have led to the depletion anddrastic reduction range of many of them. Such species as *A. rosenbachianum, A. stipitatum, A. suworowii* and others are included in the "Red Book of the Tajik SSR", as they are annually harvested in very large quantities and are subject to great danger of complete destruction. In this regard, it is necessary to raise the issue of the complete prohibition of the harvesting of these species of onions in order to preserve them in the natural environment.

Species of the genus Allium except for natural habitats were also studied in unregulated conditions of cultivated phytocenosis (Tashkent Botanical Garden), where they settled 30-40 years ago beyond the limits of pre-existing exposures [4].All studied species are bulbous geophytes with an ephemeroid rhythm of development. According to the life form, they belong to onion-like non-compacting monocentric bows [5].

The material was mainly species of the genus Allium from the subgenus *Melanocrommyum*, a systematic accessory is given by FO Khasanov [6].In Uzbekistan, there are over 30 species of Allium, among which there are food, medicinal and a large number of decorative representatives [7, 8, 9, 10, 11, 12].

A.T. Abdullaeva [13] studied the anatomical structure of the seeds of *Allium stipitatum* Regel and *A. giganteum* Regel under the conditions of introduction of the Tashkent Botanical Garden, while the structural diagnostic features of these species were revealed.

The anatomical structure of the seeds of the species *Allium protensum* and *A. suworowii* under the conditions of introduction of the Tashkent Botanical Garden has not been studied. This determines the relevance and novelty of our research. The aim of our study is to study the morpho-anatomical structure of the seed of *A. protensum* and *A. suworowii* and to determine the diagnostic features of these species.

2. Study Area and Data Analysis

The object of the study is perennial monocotyledonous plants *Allium protensum* and *A. suworowii* from the family Amaryllidaceae.

The material was collected from the exposition of rare introduced plants of the Botanical Garden named after Acad. N.F. Rusanova at the Institute of Botany of the Academy of Sciences of Uzbekistan. Simultaneously with the morphological description, seeds were fixed in 70^0 ethanol and softening solution (alcohol, glycerin and distilled water, ratio - 1:1:1) for anatomical study. Transverse sections of the seeds are made serially. Preparations prepared by hand were stained with methylene blue followed by sealing in glycerol-gelatin [14]. The preparations were sketched using a RA-6 *MBI-3* drawing machine. Microphotographs are made with a computer micro photoset with a digital camera of the brand *ES70* from *Samsung* and A123 from the company *Canon* under the microscope *Motic* B1-220A-3. Statistical processing of quantitative data was carried out according to

generally accepted criteria [15, 16] using a personal computer (MS-*Excel* program).

3. Results and Discussion

***Allium protensum*anatomical characteristics**

The *A. protensum* fruit is a triangular box, almost spherical, containing up to 6 seeds. Seeds are vertical, oblong-obovate, wrinkled, black, shiny, 3-4 mm long (Figure 1). Ovary 3-nested. The ovules in each nest for 2 to 6 seeds, anamythrophic, bicuspid, tenuinocellate [17].

The seed on the transverse section is round, ribbed, with a diameter of 2139.7±11.2 μm. Seed skin consists of outer integument and inner integument; exotest is the protective layer of the seminal rind: the scalloped outer walls are filled with melanin-containing inclusions, forming a melanin crust with a thickness of 32.2±1.0 μm. The outer integument consists of 5 layers of parenchyma (46.4±4.4 μm), sometimes uniserial. The inner integument is made up of two layers of spindle-shaped cells 9.6±0.3 μm thick, which are difficult to distinguish at a thin cut and can be perceived as a cuticular interlayer between the tissues.In the mature seed, only the tissue of the outer integument is preserved, the inner integument usually disintegrates after fertilization. Endosperm consists of large, isodiametric cells, multilayered; most of the endosperm wall consists of thickened porous membranes. The nucleus of the endosperm is more prominent. The embryo is small, cylindrical, somewhat curved, almost equal in length to the seed, in its cage contains spare fats (Figure 2, table).

***Allium protensum*anatomical characteristics**

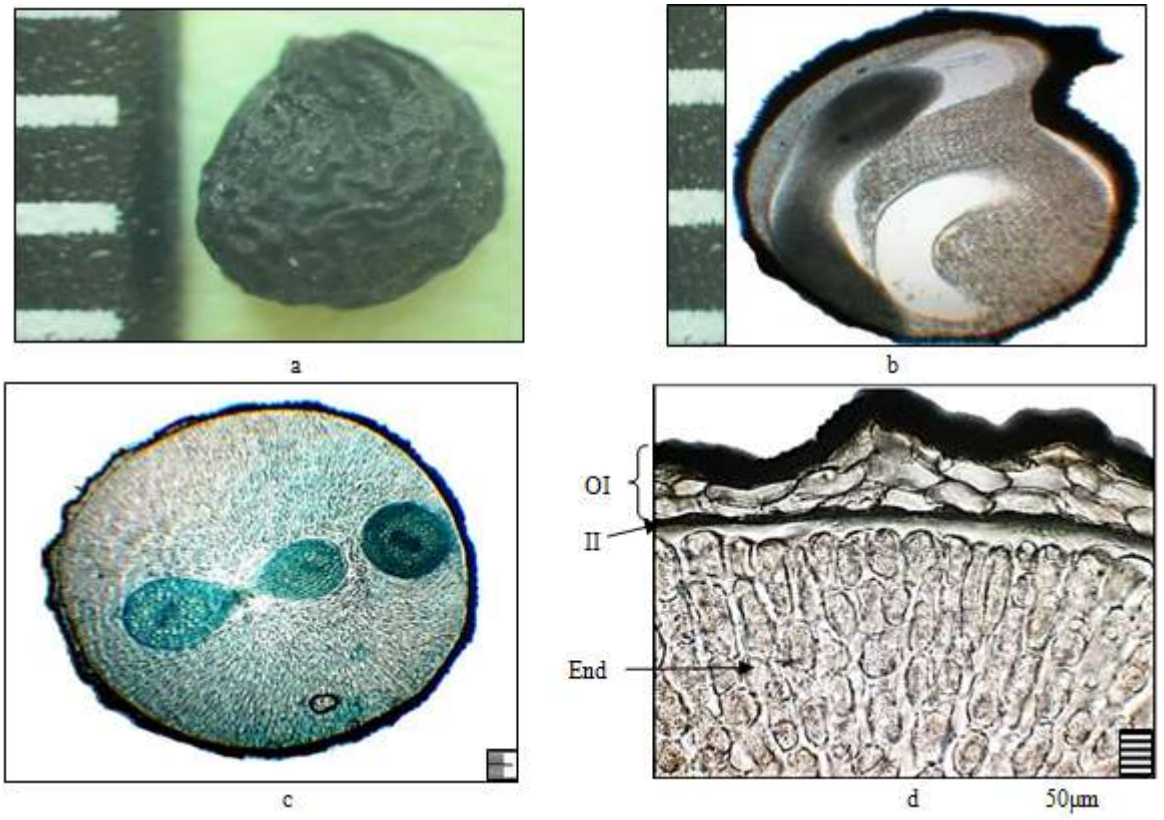
The*A. suworowii* fetus is a broad-shaped capsule. The seed is vertical, polyhedral, flat-convex; black, matte, length 3,5-4,5 mm. Ovary 3-nested. The ovules in each nest are 2 to 6, anamythrophic, bicuspid, tenuinocellate (Figure 3).

On the transverse section, the form of *A. suworowii* seeds is oval-polygonal, flat with a diameter of 1633.9±12.7 microns. Seed skin consists of 2 integuments, outer integument from 4 layers of large, oval parenchymal cells with a thickness of 88.7±6.5 μm, inner integument of 2 layers of narrow, tangentially elongated cells.

The thickness of the outer integument is 34.5±1.7 μm, filled with melanin-containing inclusions and forms a melanin crust. The innermost layers of the internal integument, along with its internal epidermis, are obliterated, becoming a homogeneous film that forms part of the cuticle.

The thickness of the inner integument is 6.42±0.2 μm. The internal epidermis of the internal integument is lined with a well-marked cuticle. In the mature seed, only the tissue of the outer integument is preserved, the inner integument usually disintegrates after fertilization.

Endosperm consists of large, elongated, tightly closed cells with significantly thickened cell walls, consisting of 6-12 rows and containing protein. Cells of endosperm with prominent nucleoli. Embryo small cylindrical, somewhat curved, is almost equal to the length of the endosperm contained in its cell replacement fat, the spine and a small gemmule occupies a smaller portion thereof (Figure 3, 4; Table.).



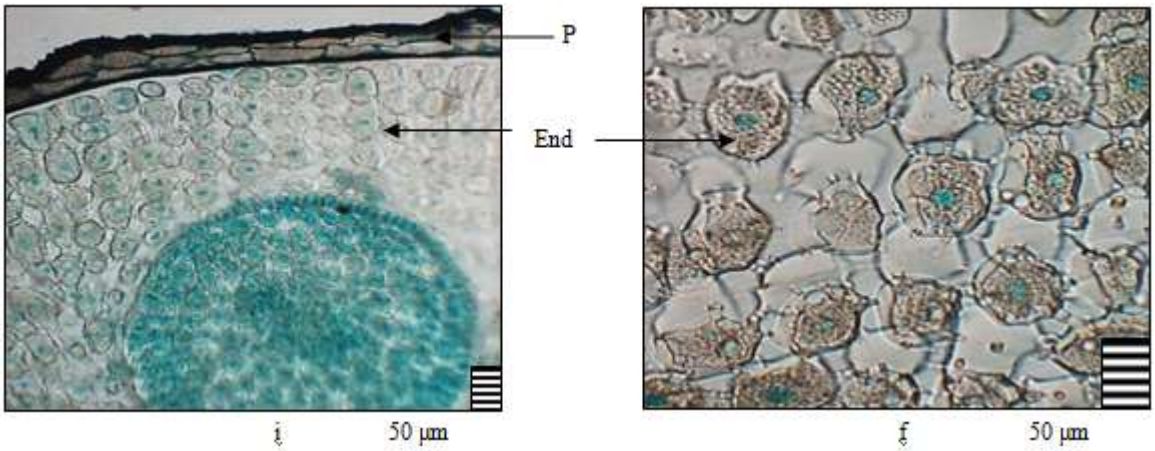


Figure 1: Structure of the seed of *Allium protensum* (photo): a– general appearance of the seed; b – longitudinal (scheme) and c – transverse section (scheme); d– detail; i, f– endosperm; d-f– cross section. **Legend:** II - inner integument, OI - outer integument, P – parenchyma, End - endosperm.

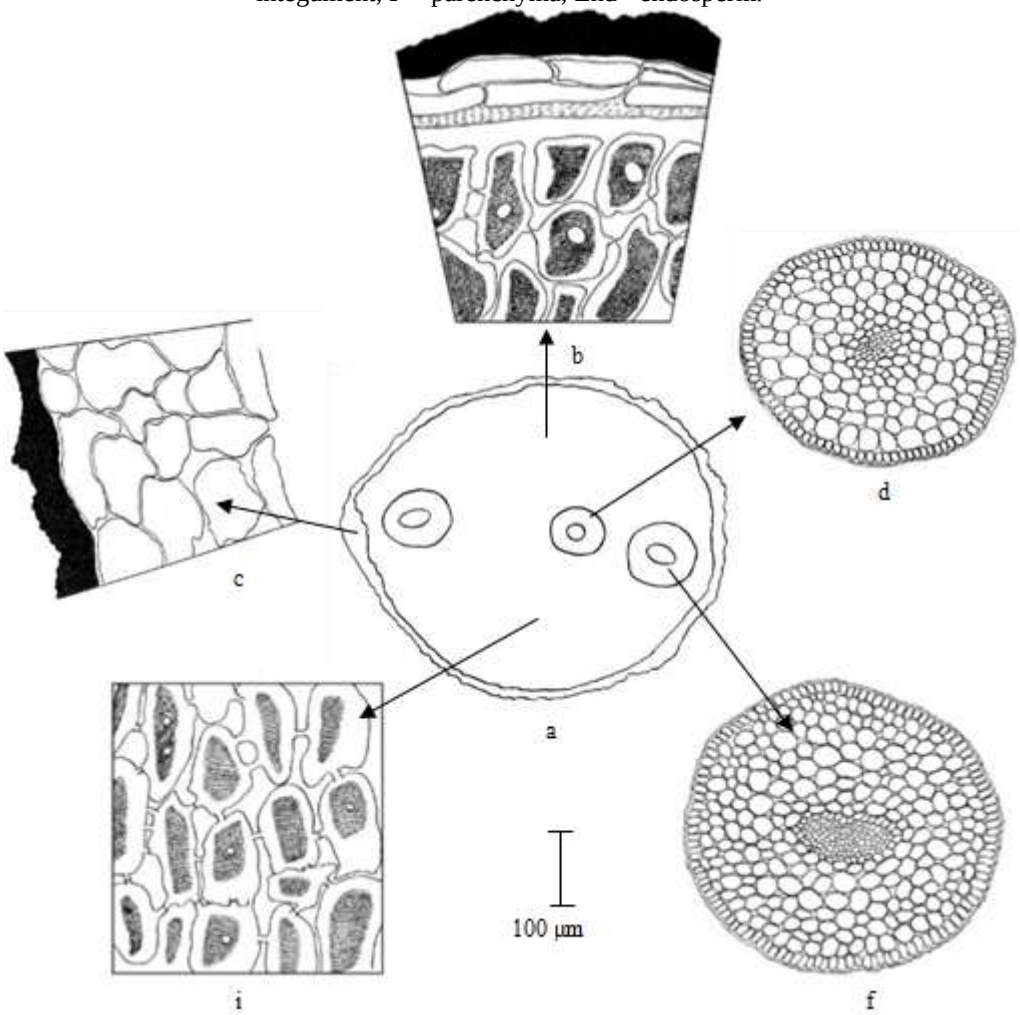


Figure 2: Structure of the seed of *Allium protensum*: a– scheme of the seed; b– detail; c– seminal rind; d– gemmule; i– endosperm; f– cotyledon.

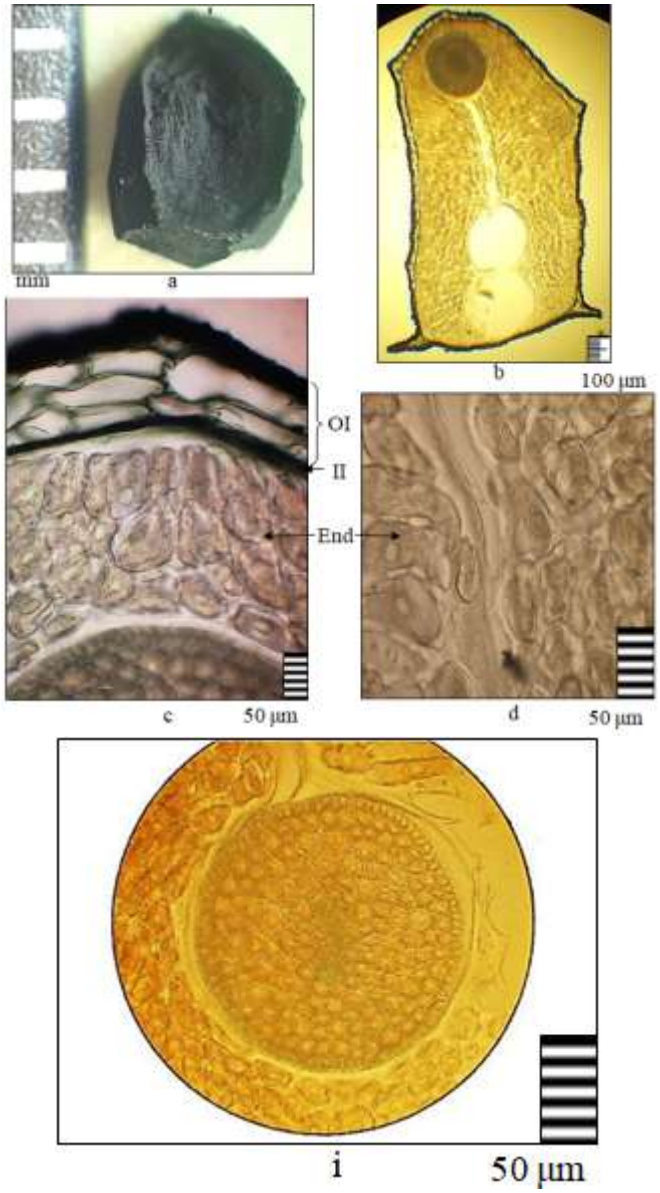


Figure 3: Structure of the seed of *Allium suworowii* (photo): a – generalviewof seeds; b – scheme of the seed, c– detail; d – endosperm; i – spine.Legend: II – inner integument, OI –outer integument, End - endosperm.

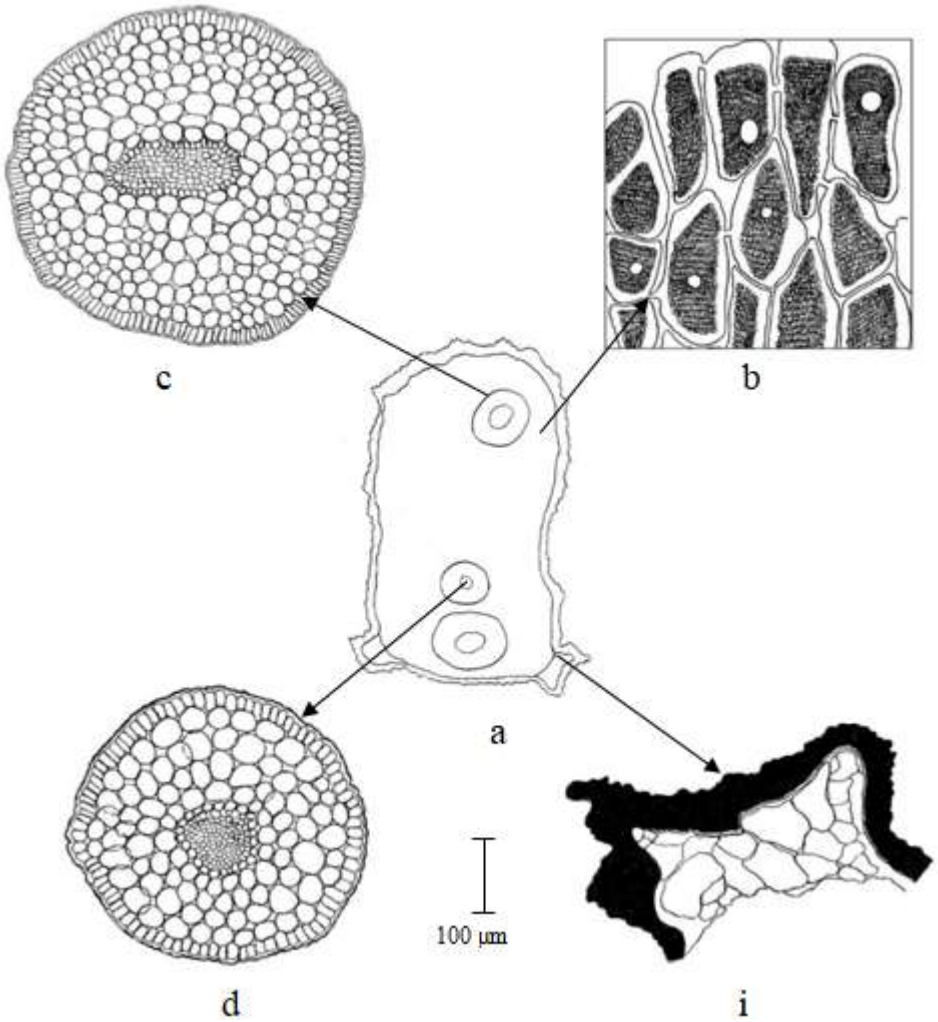


Figure 4: Structure of the seed of *Allium suworowii*: a – scheme of the seed; b –endosperm; c – cotyledon; d– gemmule; i–seed peel.

Proceeding from the obtained results of the study of the anatomical structure of the *A. protensum* and *A. suworowii* seeds, the characteristic diagnostic features for these species were revealed: the seeds consist of outer, – innerinteguments, and endosperm; the outer wall of the integument has melanin and forms a powerful melanin crust; the external integument preserves the cellular structure - the parenchyma; inner integument - good cuticle; The endosperm is clearly expressed with relatively large nuclei; The embryo is cylindrical equal to the length of the endosperm.

The studied species of the genus Allium are more similar in the anatomical structure of the seed, but some of the following characteristics differ: the shape and size of the seeds, endosperm cells, density in the location of endosperm cells, the size of the embryo; the number of pores between cells, the thickness of the melanin crust and parenchymal cells.

On the basis of the biometric analysis of the quantitative indices of the *A. protensum* and *A. suworowii*, the following prevailing characteristics are characteristic of this genus (Table).

Table: Structural indicators seeds *Allium protensum* and *A. suworowii*

Signs		Species	
		A. protensum	*A. suworowii*
Diameter of seed, µm		2139,75±11,2	1633,9±12,7
The thickness of the integument, µm	outer	32,2±1,0	34,5±1,7
	inner	9,6±0,3	6,42±0,2
Thickness of parenchymal cells, µm		46,4±4,4	88,7±6,5
Endosperm cells, µm	length	83,4±2,5	76,8±2,2
	width	40,6±1,3	34,5±0,5

Note: Underlined values significantly differ from A. suworowii.

The largest seeds are found in *A. protensum*, small in *A. suworowii*; the thickness of the outer integument in both species is almost the same, however, the layer of inner integument is thicker in *A. protensum* than in *A. suworowii*; the thickest parenchymal cells were noted in *A. suworowii*, the thin ones in *A. protensum*; relatively long and large endosperm cells were noted in *A. protensum* than in *A. suworowii*.

4. Conclusion

Thus, for the first time studied the morphological and anatomical structure of the seed of Allium protensum and A.

suworowii in the conditions of introduction of the Tashkent Botanical Garden and discovered the diagnostic features of these species: the largest seeds, thick inner integument, relatively long and large endosperm cells was observed in A. protensum, that indicating more fitness and widespread in the natural habitat of this species (Pamir-Alai, Zeravshan ridge Tahtakaracha pass the vicinity of the village Amankutan).The species A. suworowii is dominated by the following symptoms, as; small seeds, a thin layer of the inner integument; the thickest parenchymal cells; relatively short and small endosperm cells, which shows a narrow distribution in natural habitats (Pamir-Alai, Malguzar Ridge, east of Bakhmalsai settlement) of this species, compared to A. protensum.

5. Acknowledgements

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