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THE ANATOMICAL STRUCTURE OF THE PRIMARY BARK STEM OF SOME SPECIES OF GENUS *CLIMACOPTERA* BOSCH. DIFFERENT ECOLOGICAL CONDITIONS

Duschanova G.M.*, Abdullaeyva A.T. and Abdinazarov S.H.

Institute of Gene Pool of Plants and Animals, Academy of Sciences, 232 a Bagishamol Str., Tashkent 100053, Republic of Uzbekistan

***Corresponding author*:** Duschanova G.M.

ABSTRACT: The structure of the primary bark of the stem at the 8 species of 4 sections Climacoptera growing in Mirzachul (*C. intricata, C. longistylosa*), Kyzylkum (*C. ferganica, C. lanata*), Ustyurt (*C. affinis, C. transoxana, C. turgaica, C. aralensis*). Allocated 2 groups of species: Remember to primary bark (*C. intricata, C. longistylosa, C. ferganica, C. lanata*), which is associated with the early completion of the life cycle and halomorphic with no conservative primary bark (*C. affinis, C. transoxana, C. turgaica, C. aralensis*), laying the phellogen that is associated with a longer life cycle and xeromorphic. The structure of the primary bark is more related to the environment than the sectional affiliation.

***Keywords*:** stem, primary bark, *Climacoptera*, Mirzachul, Kyzylkum, Ustyurt, adaptation.

INTRODUCTION

Primary bark - multifunctional part of the stem, to ensure the safety of the central cylinder, photosynthetic. It can contain such components collenchyma, pericyclic fibers, palisade cells, Kranz-cells, idioblast with crystals, tannin and other inclusions. These structures are found in desert species in various combinations (Butnik, Makhmudova, 2004; Butnik, Makhmudova, 2006).

The structure of the primary bark has a value in clarifying the taxonomy of phylogenetic level taxa and determines their adaptability. Primary stem bark is little study. In classical summary C.R. Metcalfe, L. Chalk (1957) noted that in a primary bark of some species of the family. *Chenopodiaceae* may be hlorenhima, sclerenchyma and slime cells. What type hlorenhima not specified. K. Esau (1980) indicates the presence of primary bark of chloroplasts collenchyma, sclerenchyma and the intercellular spaces.

Analysis of the primary bark structure of the genus Salsola Salsola for the purpose of inspection conducted section S. Rilke (1999). The author distinguishes 5 types of structural primary bark, of which 3 with Kranz-anatomy. Based on these features, as well morphology of the flower and the fruit *Salsola* section is divided into 4 new sections: Salsola, Sogdiana, Androssowia, Kali, as well a row of subsections.

A.A. Butnik, M. Mahmudova (2004; 2006) have described in the genus Salsola 10 types primary bark of stem of annual of shoots and allocated 2 groups: nonkranz and kranz.

Materials and methods

We studied the primary stem bark 8 species of the genus Climacoptera (Chenopodiaceae), growing under natural conditions - Mirzachul, Kyzylkum and Ustyurt (Uzbekistan) (Table 1).

Table 1. Ecology and areals species of the genus *Climacoptera* (Pratov, 1986)

N	Section	Species	Gathering place	Areal
1.	Ulotricha Pratov	C. ferganica (Drob.) Botsch.	Kyzylkum	Iran, Afghanistan, Central Asia, Dzungaria
2.	Brachyphylla Iljin ex Pratov	C. affinis (C. A. Mey.) Botsch.	Ustyurt	Central Asia, Dzungaria, Mongolia
3.	Amblyostegia Pratov	C. transoxana (Iljin) Botsch.	Ustyurt	Afghanistan, Central Asia
		C. turgaica (Iljin) Botsch.,	Ustyurt	Central Asia, Kazakhstan - Endemic.
		C. aralensis (Iljin) Botsch.	Ustyurt	
		C. intricata (Iljin) Botsch.	Mirzachul	
4.	Climacoptera Pratov	C. lanata (Pall.) Botsch.	Kyzylkum	Turkey, Iran, Afghanistan, Pakistan, North-East of Russia, Central Asia, Dzungaria
		C. longistylosa (Iljin) Botsch.	Mirzachul	Afghanistan, Central Asia, Kazakhstan

C. intricata and *C. longistylosa* grow in Mirzachul (Uzbekistan, Province Sirdarya) in compacted less saline soils, *C. ferganica* and *C. lanata* grow in South-western Kyzylkum (Uzbekistan, Province Buhora, Navoiy), *C. affinis, C. transoxana, C. turgaica* and *C. aralensis* grow in Ustyurt (Uzbekistan, Karakalpakstan, Province Miskin) on less compacted sandy loam, but more saline soils.

The collected material for the study fixed in 70 ° ethyl alcohol. Hand Held of the primary bark sections are made in different parts of the stem: vertex, middle and bottom. Preparations were stained with methylene blue and safranin followed by attaching a in glycerol-gelatin (Barykina, Chubatova, 2005). The average value of quantitative indicators of signs led out from 30-90 measurements. The statistical processing quantitative data conducted by B.A. Dospexov (1979) and G.N. Zaitsev (1991). The micrographs made with a digital camera "Canon".

Results and discussion

A comparison of the primary bark stem studied species *Climacoptera* identified the following indicators: the upper part of the stem in the area of 3-4 internodes from the apex of all species *Climacoptera* (except *C. turgaica* and *C. intricata*) densely pubescent 1-3- cell, single-row single-celled trachoma (T) on stem. Downiness thicker in *C. ferganica, C. transoxana* and *C. longistylosa*, less common in *C. affinis, C. aralensis* and *C. lanata*.

The stem is in the top of the thickest in C. longistylosa, thin at C. aralensis, among other species medium thickness. The epidermis (E) and hypodermis single row. Hypodermis (H) in *C. lanata, C. transoxana* and *C. longistylosa* presented subepidermal angled collenchyma (Col). In *C. ferganica, C. affinis, C. aralensis, C. turgaica* and *C. intricata* thin-walled parenchymal (Table 2;. Figure 1, 2, 3.).

Primary bark (B) in the upper part of the stem occupies a large part in *C. transoxana* (50,6% of the d-stem), *C. turgaica* (50,4%) and *C. affinis* (53,2%), less - in *C. longistylosa* (19.2%). Parenchymal cells bark the largest in *C. transoxana*, *C. aralensis*, petty in *C. longistylosa*. Number of rows of cells primary bark greater in C. lanata, less in *C. ferganica* and *C. aralensis* (Table. 2, Fig. 1, 2, 3).

In the middle the stem of pubescence density of decreases. The diameter of the middle part of the stem the largest in *C. affinis* and *C. transoxana*, small in *C. intricata* and *C. lanata*, in other species of medium size. Primary bark occupies the greatest part of the stem diameter in *C. ferganica* (28%), *C. lanata* (27%). A smaller thickness from the diameter stem bark of in *C. affinis* (10,9%) and *C. transoxana* (11,7%) (Fig. 1, 2, 3).

The cells of bark in the largest *C. ferganica, C. aralensis* and *C. longistylosa*, small in *C. affinis, C. turgaica*. Number of rows of cells of the primary bark greater in *C. transoxana* and *C. affinis*, in less *C. turgaica* and *C. aralensis* (Table. 2).

The stem in the thickest in the base of *C. affinis, C. transoxana* and *C. turgaica*, thin in *C. longistylosa*, in other species medium thickness. Primary bark occupies a large part of the diameter stem in *C. lanata* (27,6%), less - in *C. turgaica* (9,8%). The cells bark of larger in *C. lanata* and *C. intricata*, small in *C. affinis* and *C. transoxana*. Bark parenchyma The cells round or oval in *C. longistylosa, C. intricata, C. lanata* and *C. ferganica* (1), in the rumpled *C. affinis*, *C. transoxana, C. turgaica* and *C. aralensis* (Fig. 2, 3; Table 2).

Thus, the species of the genus Climacoptera on the structure of the primary cortex related to non-kranz group. By the degree of the preservation primary cortex into the ontogenesis plant identified 2 groups:

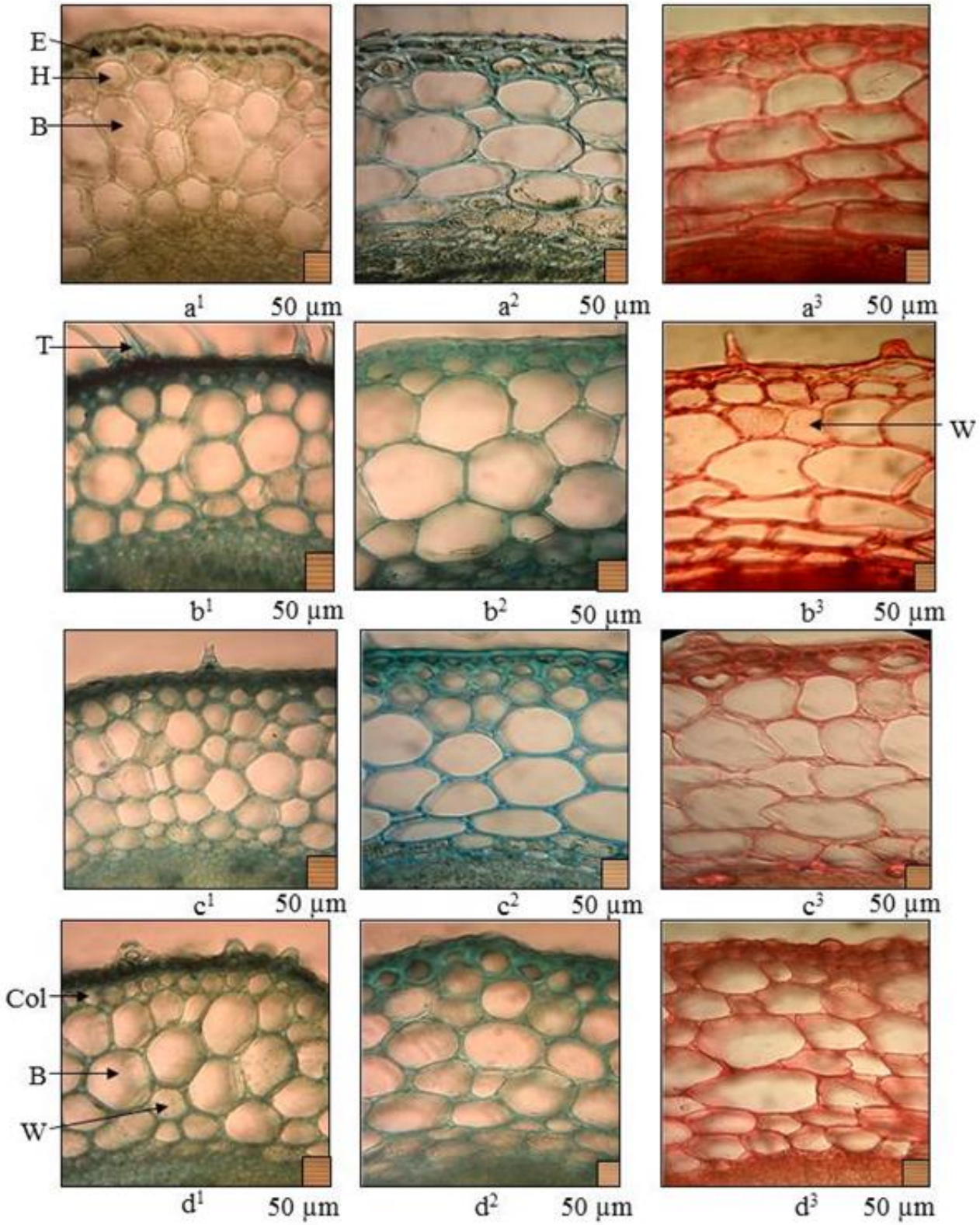

Figure 1. Continued primary cortex: the stem on tiers of escape species of the genus Climacoptera. a^1 - a^3 - *C. intricata*, b^1 - b^3 - *C. ferganica*, c^1 - c^3 - *C. lanata*, d^1 - d^3 - *C. longistilosa*. a^1 - b^1 - c^1 - d^1 - the top of the stem, a^2 - b^2 - c^2 - d^2 - the middle of the stem, a^3 - b^3 - c^3 - d^3 - the base of the stem. Key: B - bark cell, Col - collenchyma, E – epidermis, H - hypodermis, T - trachoma.

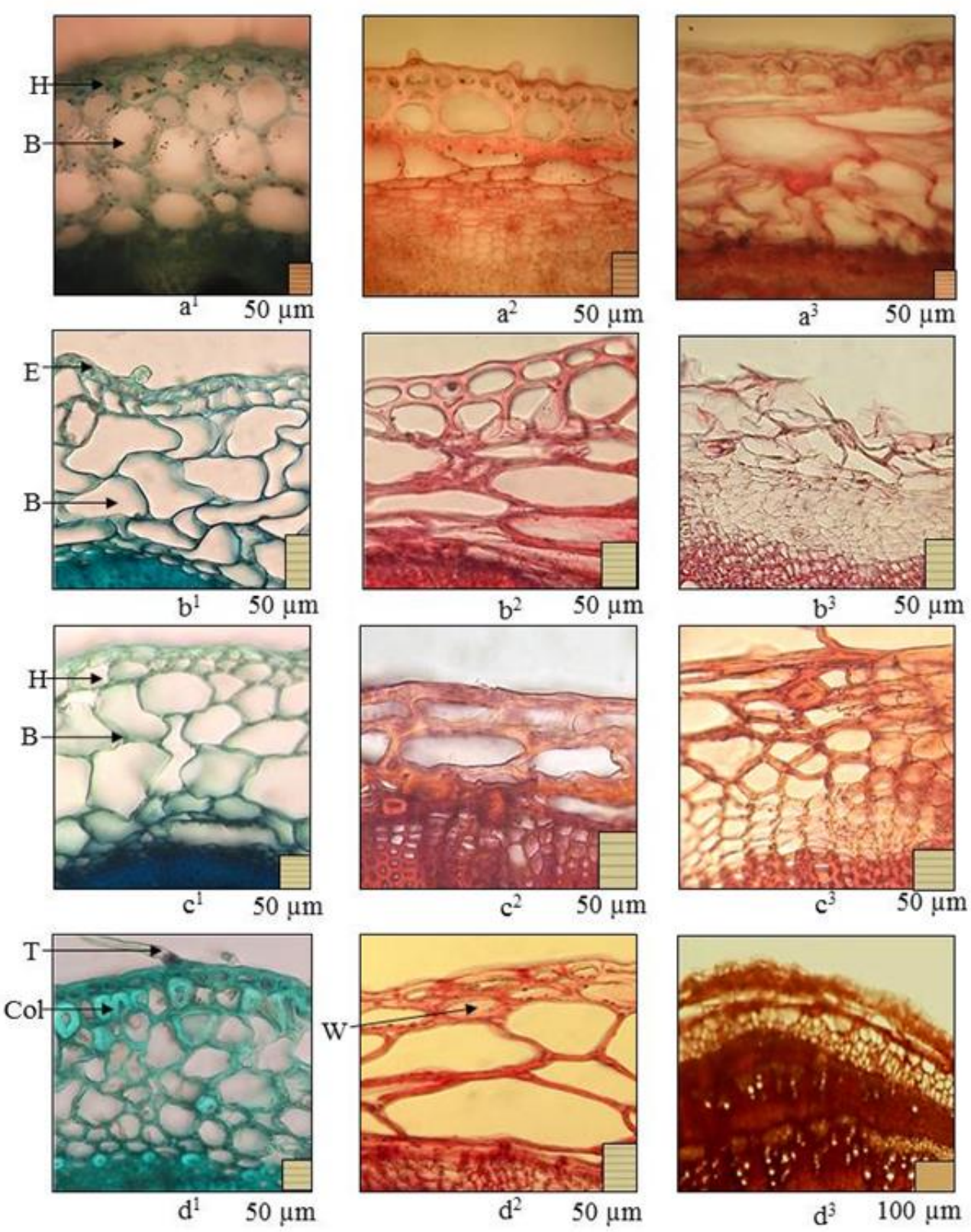

Fig. 2. Noconserved primary bark stem on tiers of escape species of the genus *Climacoptera*. a^1 - a^3 - *C. aralensis,* b^1 - b^3 - *C. affinis*, c^1 - c^3 - *C. turgaica,* d^1 - d^3 - *C. transxona.* a^1 - b^1 - c^1 - d^1 - the top of the stem, a^2 - b^2 - c^2 - d^2 - the middle of the stem, a^3 - b^3 - c^3 - d^3 - the base of the stem. Key: B - bark cell, Col - collenchyma, E – epidermis, H - hypodermis, T - trachoma.

Table 2. Quantitative indicators of structure of the primary bark stem of the genus Climacoptera (n = 30)

Indicator	*C. ferganica*	*C. affinis*	*C.transoxana*	*C. turgaica*	*C.aralensis*	*C. intricata*	*C. lanata*	*C.longistylosa*
Top								
D - of the stem, µm	1206,9±8,7	1105,1±3,9	1160,0±2,1	1131,1±2,3	1081,4±2,8	1108,1±6,4	1118,0±6,3	1403,0±15,7
The thickness of the bark , µm	189,5±2,8	293,7±2,5	389,2±2,0	285,3±1,6	257,8±3,2	185,6±2,5	234,7±1,7	134,9±1,3
% of d - of the stem	31,4	53,2	50,6	50,4	47,7	33,5	41,9	19,2
d - cells of the bark , µm	49,9±0,5	62,3±0,6	86,5±0,9	63,4±0,5	75,8±0,8	50,2±0,5	45,1±0,1	30,0±0,4
Number rows of cells of the bark	3,8±0,1	4,5±0,09	4,5±0,09	4,5±0,09	3,4±0,09	3,7±0,1	5,2±0,1	4,5±0,1
Medium								
D - of the stem, µm	1954,9±19,0	4314,4±14,7	3003,2±15,2	2826,4±14,6	2255,3±7,9	1851,5±8,3	1826,3±12,1	1946,9±7,8
The thickness of the bark , µm	270,6±3,8	235,7±1,6	176,0±1,9	234,9±1,1	212,0±1,7	232,7±1,8	246,4±1,9	227,4±3,6
% of d - of the stem	28,0	10,9	11,7	16,6	18,8	25,1	27,0	23,4
d - cells of the bark , µm	117,4±1,3	73,6±1,2	96,5±1,3	61,5±1,2	118,6±1,9	93,5±1,7	91,0±1,4	106,8±1,4
Number rows of cells of the bark	3,8±0,09	5,5±0,1	5,5±0,1	3,6±0,08	3,5±0,08	3,9±0,1	4,8±0,1	4,6±0,1
Bottom								
D - of the stem, µm	2091,5±12,5	6580,8±14,5	5139,5±14,1	5201,4±5,2	3220,9±4,7	2552,8±31,6	2582,1±15,7	1952,5±61,8
The thickness of the bark , µm	261,7±3,3	434,7±2,2	379,9±2,7	257,5±1,8	256,9±3,7	295,1±1,5	355,9±3,4	250,3±6,5
% of d - of the stem	25,0	13,2	14,8	9,8	16,0	23,1	27,6	25,3
d - cells of the bark , µm	102,7±2,7	88,3±1,2	80,0±1,3	95,4±1,2	116,1±1,0	123,7±2,3	140,0±1,6	74,3±1,6
Number rows of cells of the bark	4,5±0,1	5,5±0,1	5,5±0,1	3,8±0,09	3,6±0,08	4,3±0,1	4,6±0,1	4,5±0,1

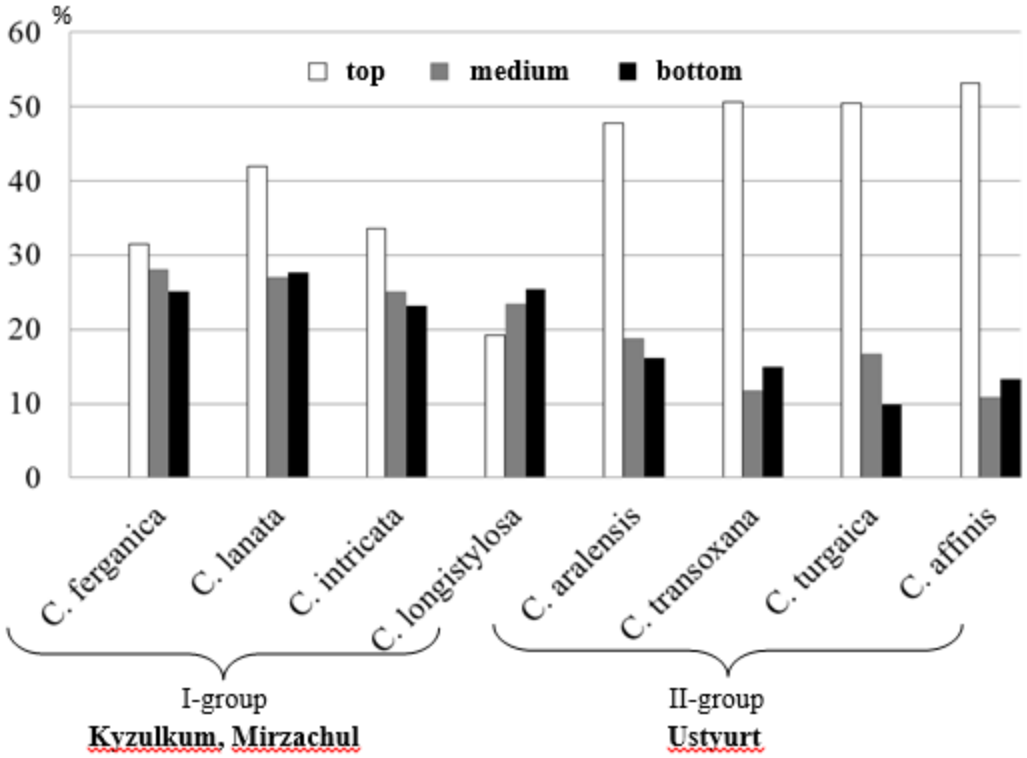

Figure 3. Ratio of the primary bark (%) to the diameter stem of species Climacoptera.

I. **Continued primary bark:** location of tissues are allocated by 3 type of structure:
1 - type: Bark consists of a single row of the epidermis, hypodermis, 4-5 rows of bark parenchyma consisting water bearing cells water bearing cells: section *Amblyostegia* Pratov (*C. intricata* (Iljin) Botsch.) (Fig. 1, a^1 - a^3).
2 - type: Bark consists of a single row of the epidermis, hypodermis, 4-5 rows of bark parenchyma with water bearing cells and large groups pericyclic fibers: Section *Ulotricha* Pratov (*C. ferganica* (Drobov) Botsch.) (Fig. 1, b^1 - b^3).

3 - Type: Bark consists of a single row of the epidermis, subepidermal angled collenchyma, 4-5 rows of bark parenchyma and water bearing cells: Section *Climacoptera* Pratov (*C. lanata* (Pall) Botsch..) (Fig. 1, c^1 - c^3), (*C . longistilosa* (Iljin) Botsch) (Fig. 1, d^1 - d^3).
Because the life cycle in these species (*C. intricata, C. ferganica, C. lanata, C. longistylosa*) ends early (early November), primary bark is retained by of the tiers stem (top, middle and bottom) in the ontogeny of the plants before the end of the growing season, which is also related to their halomorphic.

II. **No conserved primary cortex and forms a secondary cortex:** allocated by the location of fabrics 3 types of structure:
1 - type: Bark consists of a single row of the epidermis, hypodermis, 3-4 rows of bark parenchyma and water bearing cells: Section *Amblyostegia* Pratov (*C. aralensis* (Iljin) Botsch.) (Fig. 2, a^1 - a^3).
2 - type: Bark consists of a single row of the epidermis, hypodermis, 4-6 rows of bark parenchyma, water bearing cells and large groups pericyclic fibers: section *Brachyphylla* Iljin ex Pratov (*C. affinis* (CA Mey) Botsch..) (Fig. 2, b^1 - b^3), *Amblyostegia* (*C. turgaica* (Iljin) Botsch) (Fig. 2, c^1 - c^3).
3 - type: Bark consists of a single-row and double-row epidermis subepidermal angled collenchyma, 5-6 rows of bark parenchyma, water bearing cells and pericyclic fibers: *Amblyostegia* section (*C. transxona* (Iljin) Botsch.) (Fig. 2, d^1 - d^3).

The primary bark species of *Climacoptera* contains: hypodermis, collenchyma, water bearing cells, pericyclic fibers in different combinations. The primary bark is preserved until the end of the growing season (*C. intricata, C. ferganica, C. longistylosa, C. lanata*), which is related with earlier completion of life cycle and halomorphic.

The life cycle of in species of: *C. aralensis, C. affinis, C. turgaica, C. transoxana* ends later (late November). At the base of the stem primary bark is replaced by a secondary, which indicates that they xeromorphic. The structure of the primary cortex a more connected with ecology than sectional affiliations.

REFERENCES

1. Butnik A.A., Makhmudova M.M. The structure of the primary bark of stems of annual shoots of the genus Salsola // development of botanical science in Central Asia and its integration into production. Proceedings of the international scientific conference. Tashkent, 2004. P. 121-123.
2. Butnik A.A., Makhmudova M.M. Structure bark of stems of annual shoots of the genus Salsola // Baytenovskie reading - 2: Tr. S. Int. Conf. Memory prominent botanists of Kazakhstan. Alma-Ata, 2006, P. 134-136.
3. Metcalfe C.R., Chalk L. Anatomy of the Dicotyledons. Oxford: Clarendon Press Oxford, 1957. V. II. P. 725-1500.
4. Esau K. Anatomy of seed plants. Moscow: Mir, 1980. T. 2. 558 p.
5. Rilke S. Revision der Sektion *Salsola* s. l. der Gattung *Salsola* (*Chenopodiaceae*): mit 7 Tabellen. Stuttgart: Schweizerbart, 1999. 190 p.
6. Pratov U.P. Genus *Climacoptera* Botsch. Tashkent, 1986. 68 p.
7. Yusupova D.M., Streltsov L.F. The salt composition of the soil in the populations of species of the genus *Suaeda* in Kyzylkum and Mirzachul // Proceedings of the international scientific conference. The environmental problems of desertification in Uzbekistan. Tashkent, 2008. P. 209-211.
8. Makhmudov M., Makhmudova G. Kyzylkum desert and its ecological characteristics // Ecological Bulletin. Tashkent, 2011. № 119 (2). P. 50-52.
9. Takhtadzhyan A.L. Floristic region of the earth. Leningrad, 1978. 247 pp.
10. Pankov M.A. Reclamation soil science. Tashkent, 1974, pp 401-411.
11. Saribaev B.S. The flora and vegetation of the Ustyurt plateau and the prospects of their application: diss. ... dr. biol. sciences. Tashkent, 1994. 18-27 p.
12. Barykina R.P., Chubatova N.V. Large workshop in botany. Ecological anatomy of flowering plants. Moscow, 2005. 77 p.
13. Dospexov B.A. Methods of field experience. Moscow, 1979. 416 p.
14. Zaitsev G.N. Mathematics in experimental botany. Moscow, 1991. 296 p.