

## The New Taxis of Ferns in the North East Section of the Lesser Caucasus

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### Abstract:

*During the expeditions in the north-eastern part of the Lesser Caucasus in 2014-2016 and based on the results analysis of the collected herbarium and descriptor information three species (*Polypodium interjectum* Shivas, *Polystichum illyricum* (Borb), Hahne, *Cystopteris anthriscifolia* Fomin), one botanical variety (*Polystichum aculeatum* var. *aristatum* (Christ) A. Askerov) and one new ecotype (*Adiantum capillus - veneris* L., "Dwarf plant -Ganja") has been identified. The article provides information on the three-dimensional spatial areas of the sites where these plants are found, the nomenclature of the taxon, morpho-biological variability and the nomenclature types.*

**Key words:** Lesser Caucasus, Systematics, Areal, *Adiantum*, *Polypodium*, *Polystichum*, *Cystopteris*

### INTRODUCTION

The northeastern part of the Lesser Caucasus (within Azerbaijan) is one of the richest regions of the Caucasus in terms of biodiversity. In this region of Azerbaijan there are many types of plant species. Various research has been carried out on flora and biodiversity of the Lesser Caucasus. Extensive

research has been carried out in this region on high mountain plants and high-spore plants (Asgarov, 1977, 1983, 2001, 2016) and many scientific articles have been published. However, systematic, ecobotanical features of the ferns in Lesser Caucasus have not been thoroughly investigated.

## **MATERIALS AND METHODS**

The materials used of the study are the materials collected during expeditions in the north-eastern part of the Lesser Caucasus in 2014-2016 and herbariums stored in the herbariums of the Institute of Botany (BAK) and the Institute of Genetic Resources (AGRI) of Azerbaijan National Academy of Sciences. The collected materials were analyzed in a cameral condition. In this study the comparative analysis of morphological, systematic and ecological methods were used. For clarification of nomenclature issues was addressed to International Botanical Code (2009) and the book published by Asgarov (2016). Macrotaxons were identified on the basis of some important sources of classification of ferns (Pichi-Sermolli, 1977, Smith et al., 2006; Maarten et al., 2011).

In the studying area to obtaining of ecological parameters the Diva-Gis system was used. Hipsometric altitude and area coordinates were measured by GPS model Garmin eTex 20.

## **RESULTS AND DISCUSSIONS**

The north-eastern part of the Lesser Caucasus is a geographical area called the North-East Plateau of the Lesser Caucasus (Azerbaijan's National Atlas, 2014) and is basically located in the "Small-scale Caucasian North" region of the "Botanical-geographical zoning" scheme of Azerbaijan (1950).

However, in the latter district, the southern border of the "KQ Shim." was slightly sought after and partly covered the central part of the Lesser Caucasus.

Our study area is bordered by areas 400-500 meters above sea level, which are characterized by wormwood, ephemeral-wormwood, wild-wormwood, desert and semi-desert plant species covering Kura plain from the north.

It extends from the East to the Murovdag Range by covering the boundaries of the Samukh and Goranboy administrative districts, in the south and south-west surrounded by Murovdag and Shahdag ranges; and in the west from the Shahdag range to the territory of the Kur River in the territory of Azerbaijan borders with Armenia.

Below there is information on the morphological and theological features of three species, one species diversity and 1 new ecotype for the first time discovered for the north-eastern part of the Lesser Caucasus as a result of the material collected from the research area in 2014-2016.

**Fam. – *Polypodiaceae* Bercht. et J. Presl**

**Gen. - *Polypodium* L.**

1. *P. interjectum* Shivas 1961, Journ. Linn. Soc., Bot. 58: 29; Valentine, 1964, Phil. Europ. 1:23; A. Bobr. 1974, Phil. euro. About USSR, 1:96; A. Askerov 1977, Bot. the magazine. 62: 1029 .; Kudryashova 2003, Consp. Fl. Cauc. 1: 156. - *P. vulgare* subsp. *prionoides* (Aschers.) Rothm. 1929, Mitt. Thur. Bot. Ver., N. F., 38: 106. - *P. vulgare* f. *prionoides* Aschers. 1896, in Aschers. u. Graebn. Syn. Mitteleurop. Phil. 1:94. - *P. vulgare* f. *attenuatum* Milde, 1867, Fil. Eur. Atl. : 92; Rzazade 1950, Fl. Az. 1: 40. - *P. serratum* auct. non Cauc.: Fomin 1934, Fl. USSR, 1: 89, p.p. - Intermediate c.

It is described in Europe (Scotland). Typus: "St. Cyrus, Kincardineshire, Scotland".

The root is covered by brown sequins. The leaves are longitudinal lens-shaped, the cuttings are rounded to the ends

of the segments, and 2-3 layers of dichotomic spines. The sorus are oval or elliptical and are not covered. Cellular ring cells are 10 to 20. The spor is bean formed.  $2n = 222$ .

It is often encountered epiphytic forms Mesophilic forest plant (basically peanut-forest) found in 20 - 40 cm altitude in July-August.

Facing such a species related to European-Mediterranean in Azerbaijan (Talish) for the first time was reported by Asgarov (1977). We have gathered around Goygol, Amirvar village of Dashkasan region and Aschik forest area of Tovuz in the Lesser Caucasus.

Geographic latitude and longitude, altitude (m): N40°47.462'; E 45°35.636'; H 1209.

It is often hybridized with *Polypodium vulgare* and generates the *P. x mantoniae* (Rothm.) Shivas hybrid (Asgarov, 2016).

**Fam. - *Dryopteridaceae* R. - C. Ching.**

**Gen. - *Polystichum* Roth, Emend. Schott.**

**2. *P. illyricum* (Borb.) Hahne** 1904, Allg. Bot. Zeitschr. 10: 103; A. Askerov 1977, Bot. the magazine. 62: 1027; A. Аксеров 2001, Ferns of the Caucasus:120; Kudryashova 2003, Consp. Phil. Cauc. 1: 164; A. Askerov 2016, Azerbaijan. plant world: 59. – *Aspidium illyricum* Borb. 1891, Oest. Zeit. 41: 354. - Illiriy c.

It is depicted in Europe.

The main morphological characters are transitional between *P. aculeatum* and *P. lonchitis*. The leaves are lens-shaped, 30-50 cm long, 4-9 cm wide. Trunks are short and grey and covered with lens-shaped. Segments are sloping, most triangular shapes, the veins in the leaves are fork-shaped. Sorus are at the end or in the middle of the arteries. Spors are not fully developed, often abortive (sterile).  $2n = 123$ .

It is a perennial, mesophytous plant found in 20 to 60 cm altitude, shady forests, up to the middle mountain range in July-September.

This kind of species belonging to the European-Caucasian type of species (Bobrov, 1974; Kudriashova, 2003) was collected from the Asrik forest area of Tovuz region and peanut forest form.

Geographic latitude and longitude, altitude (m): N40°47,462'; E 45°35.636'; H 1209.

It is a natural hybrid species between *P. aculeatum* and *P. lonchitis*.

**Divisio Polypodiophyta (Pteridophytas. str.)**

**Classis Polypodiopsida (Filicopsida)**

**Fam. – Athyriaceae Ching (Athyriaceae Alston, ed., Illeg.)**

**Gen. – Cystopteris Bernh., nom. cons.**

**3. *C. anthriscifolia* Fomin** 1911, Mater. Phil. Cauc.. 1, 1:15; Fomin 1913, Pter.. Phil. Cauc. : 15. - *C. fragilis* (L.) Bernh. 1805, Journ. Bot. (Est.) 1, 2:27, p. Kudryashova 2003, Consp. FF Kavk. 1: 162. - *C. filix-fragilis* var. *anthriscifolia* Luerss. Farnpfl. 457, f. 156; Isaev 1950, Fl. Az. 1:19. – Sharpleaf

It is depicted in Europe. Typus: In collibus Europae frigidioris.

It is depicted in Europe. Typus: In collibus Europae frigidioris.

The leaves are 2 times feather formed, hairy and grey and the last row segment is pinched and the veins are in the end of the segments. The sorus is located on both sides of the arteries; cover is oval, lens-shaped, swollen. The surface of the spor is periscope.  $2n = 168, 252$ .

It is a perennial, mesophytous plant at the height of 20-40 cm, in July-August, spreading in rocky cracks the woods. We had been gathered from Amirvan village of Dashkasan district, Asrik forest of Tovuz region, Ganja-Dashkasan highway, Bayan village and Khoshbulag settlement.

Geographic latitude and longitude, altitude (m): N40°30.594'; E 46° 20.494'; H 1086.

**4. *P. aculeatum* (L.) Roth** 1799, Tent. Fl. Germ.3, 1: 79; A. Askerov 1977, Bot. the magazine. 62: 1027; A. Аскеров 2001, Fens Caucasus: 115; Kudryashova 2003, Consp. Fl. Kavk. 1: 164. – *Polypodium aculeatum* L. 1753, Sp. Pl.: 1090. – *Polystichum lobatum* (Huds.) Bast 1809, Ess. Fl. Maine Loire: 367; Gross. 1939, Fl. Cauc., 2, 1:22; Isaev 1950, Fl.Az. 1: 28. - Sturdy c.Thistle

It is depicted in Europe. Typus: Herb. Linn. 1251/45.

This type of European origin is widespread in Azerbaijan and has several varieties, which Asgarov (2016) considered that var. *aristatum* (Christ) A. Askerov are less common among them.

*Polystichum aculeatum* var. *aristatum* (Christ) A. Askerov 1983, Note. systgeog (Tbilisi.), 39: 6; A. Askerov 2016 Azerbaijan. plant world: 60. – *Aspidium lobatum* var. *aristatum* Christ 1891, Schweiz Bot Ges. 1:85.

The leaf is covered with grey colored and there are 5 transmitters. The leaf is 2 times the feather formed, the narrower and tough. The last follow of the second row segments is larger (acroscopic) than others; the segments are soft, covered with hairs and their edges are sharp. The sorus are oval, located above the center of the veins, dental on the edge of the cover. The periscope of the spor is wrinkling, the wrinkles are short, narrow, high. Some of the signs are close to *P. kadyrovii* Askerov, which is depicted in Talish.

It is a perennial, mesophytes (mainly peanut forest form)plant, found in shady forests in the middle mountain range at the height of 25 to 100 cm, in July-September. It had been collected from the Asrik forest area of the Tovuz region in the study area.

Geographic latitude and longitude, altitude (m): N 40°47. 462'; E 45° 35.636'; H 1209

**Divisio Polypodiophyta (Pteridophyta s. str.)**

**Classis Polypodiopsida (Filicopsida)**

**Fam. Adiantaceae Newm.**

**Gen. Adiantum L.**

**5. A. capillus - veneris L.** 1753, Sp. Pl. : 1096; Gross. 1939, Fl. Cauc., 2, 1:34; Isaev 1950, FF. Az 1:38; A. Bobr. 1974, FF. euro. About USSR, 1:94; A. Аскеров 2001, Ferns Cauc: 58; Kudryashova 2003, Consp. FF Cauc. 1: 155. - Majestic a.Lady s hair.

It is depicted in South Europe. Typus: Herb. Linn. 1252/8, 9

The leaves are enlarged - length, 2 to 3 layers of feather forms - 10-35 cm long, bright green, elegant and the edges of the leaves is a covering function. It is covered with bare or light curtains, with a bright, black-brown colored. The last row segments are gentle, rounded - oval, covering sores. Sorus are long, located on the edge of the segments. Spor enter, radial symmetric.  $2n = 60$ .

It is a perennial, mesophytous plant found in the height of 30 cm (our discovery - up to 10 cm) humid places, in June-August.

Several small populations of this type belonging to the Southern Palearctic range are known from the Caucasus and Talish regions (Asgarov, 2001). For the first time from the research area, we have been gathered twice: around the city of Ganja, on the humid walls of the water well. The new ecotype of this species, "Dwarf plant - Ganja" was found in the Amirvar village of Dashkasan district, near the waterfall, and between the rocks and moss plants in 06. 09. 2015. This copy is typically selected by typical magnificent adiant copies, with a small size and relatively dry biotopes.

Geographic latitude and longitude, altitude (m): N40° 30. 594'; E 46° 20.494'; H 1086

It is a rare species. Although partially protected, populations outside the specially protected areas are in danger.

It is relic, decorative plant. It is used for greenery, especially for water pools and water fountains (Asgarov, 2016).

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