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NEW TAXONS OF FERN (*DRYOPTERIS* ADANS. S. STR.) SPREAD OVER AZERBAIJAN REPUBLICA.M.Asgarov¹, Unal Akchay²

(Presented by Academician of ANAS T.H.Talibov)

The status of some taxons of Fern (*Dryopteris* Adans. s.str) type met over the Southern Caucasus (within Azerbaijan Republic) is discussed in the article. Giving the status to *D.talyschensis*, *D.schorapanensis*, *D.iranica*, *D.raddeana* taxons, considering the names *D.borreri*, *D.remota*, *D.assimilis* as priority is based on the scientific arguments as the result of literature, fund materials, as well as monitoring held by the authors in the nature and the herbarium materials gathered by them.

Keywords: fern, type, systematics, spore, scale

Introduction

Fern (*Dryopteris* Adans.) is a polymorph type and its species are spread over the most fitogeographical regions. This type is accepted in wider specter (sensu lata) at classic "Flora" and "Modifier" books [7, 10, 11] and such kind of genus as *Thelypteris* Schmidel, *Oreopteris* Holub, *Gymnocarpium* Newm., *Phegopteris* (C. Presl) Fee considered independent were included there. Most of pteridologists [2-6; 12-15] accept this type in the narrow sense. This type includes 270-300 species [5, 15] spread over the most continents of the world. The center of the species polymorphism of the type is considered Southern Eastern China and the eastern slopes of Himalayas. It is stated here that more than 175 species are met here [15].

According to the last investigations [1, 4], 15 species of this type are met in Azerbaijan Republic and 5 out of them are hybrids.

This type was worked out by R.Y.Rzazade in the work "Flora of Azerbaijan" [10]. He showed the spread of 8 species of Fern in Azerbaijan Republic. It coincides with the information given in the work "Flora of the Caucasus" by A.A.Grossheym [7]. But afterwards, only 5 out of the stated 8 species *Dryopteris borrieri* (Newm.) Newm., *D. filix – mas* (L.) Schott, *D. oreades* Fomin, *D. raddeana* Fomin, *D. carthusiana* (Vill.) H. P. Fuchs (= *D. spinulosa* (Sw.) Watt) were kept at the independent status, 3 species – *Dryopteris thelypteris* (L.) A. Gray, *D. oreopteris* (Ehrh.) Maxon, *D. robertiana* (Hoffm.) C. Chr.

were raised to the independent status *Thelypteris* Schmidel, *Oreopteris* Holub, *Gymnocarpium* Newm.

Phegopteris Fee.type and its *Ph. connectilis* (Michx.) Watt species was discovered for the first time for the flora of Azerbaijan during our expedition made to the western part of Great Caucasus - Zagatala region [4].

Further 6 species have been included in above mentioned 5 independent species of *Dryopteris* type of Azerbaijan Republic by the implemented investigations: *D. assimilis* S. Walker, *D. remota* (A. Br. ex Döll.) Druce, *D. pseudorigida* (Christ) Askerov, *D. caucasica* (A. Br.) Fr. – Jenk., *D. schorapanensis* Askerov., *D. iranica* Fr. – Jenk. Moreover, 5 natural types of hydrogen have been determined to the flora of the republic by these investigations [4, 14] : *D. x sarvelae* Fr. – Jenk. et Jermy (*D. expansa* x *D. carthusiana*); *D. x euxinensis* Fr. – Jenk. et Corley (*D. caucasica* x *D. filix – mas*); *D. x initialis* Fr. – Jenk. et Corley (*D. oreades* x *D. caucasica*); *D. x mantoniae* Fr. – Jenk. et Corley (*D. filix – mas* x *D. oreades*); *D. x tavelli* Rothm. (*D. filix – mas* x *D. borrieri*)

Materials and methods

The materials kept at the Herbarium of Botany Institute of Russia AS, Botany Institute (BAK) and Institute of Genetic resources (AGRI) of ANAS have been analyzed. Literature, internet resources, the results of the monitoring held by the author in the nature and col-

lected herbarium materials have been used. Comparative morphologic, systematic, botany and other methods have been used in the work.

Results and their analyses

The monograph of this type C. R. Fraser – Jenkins published some interesting articles upon different groups of this type [14]. But, there are some divergences in determination of the taxons of this type, the nomenclature of types and taxons inside the types, their systematic and especially, their real status. The status of some species of this type is analyzed and our opinions on them are submitted in this article.

***Dryopteris* Adans.** 1763, Fam. pl. 2:20, 551, nom. cons.

Typus: *Polypodium filix – mas* L. (= *Dryopteris filix – mas* (L.) Schott).

1.*D. talyschensis* (Askerov et A. Bobr.) Askerov et U. Akchay stat. et comb. nov. – *D. raddeana* var. *talyschensis* Askerov et A. Bobr. 1972, Бот. журн. 57, 10:1297. Holotypus: “Talysh, Lenkoran, prope pag. Alexeevka, in faucibus et silvis umbrosis, 25 VI 1970, fert., leg A. Askerov (BAK).”

It is close to the species *D. raddeana*, it is differed easily from it by being twice bigger of its row segments and light brown (it is in dark color at *D. raddeana*) color of it deeply cut (it is weakly divided at *D. raddeana*) scales available on the rhizomatous. The form of its leaves is oval in the length of 100-150 cm, width of 20-30 cm, it has long stalk. The segments of the first row are in the length of 15-20 cm, it has the form like scalpel, it has sharp tip, it is bended upwards. The segments of the second row have the form of scalpel or triangle, their edges are cleaved deeply, they have protuberances like auricles on both sides. This species distinguishes from *D. raddeana* by their ecologic features too. Thus, though that *D. raddeana* was widely spread mainly on plains, foothills and lower mountainous zones, forests like Hirkan, *D. talyschensis* met in shady beech, ear nut, hornbeam forests and forests along the rivers of middle and upper mountainous zones.

2.*Dryopteris schorapanensis* Askerov, 1978, news of Azerbaijan Academy of Sciences, biol. e. b. 4:4; Askerov, 2001, Fern. Caucasus: 152; Fraser-Jenkins, 1986, Bull. Br. Mus. nat. Hist. (Bot.) 14(3):212; id., 2007, Fern Gaz. 18(1):1-26. – *D. affinis* subsp. *persica* Fras.-Jenk., 1980, Willdenowia, 10:107.

Holotypus: Caucasus (“Western Georgia, Mesheti circle of the settlement Shorapan, 18. VII. 1968, Medvedyev” (TBI!)).

This species described by us known as natural hybrid (*D. borrieri* x *D. caucasica*) was researched by the monograph of the type K. Fraser Jenkins and other famous botanists by modern methods (as well as, molecular - genetic) and it was certified that it was a natural triploid species [14-15]. C. Fraser – Jenkins (l.c.) concerned the subspecies *D. affinis* subsp. *persica* Fr.-Jenk. described by himself as the synonym of this species.

3.*D. borrieri* (Newm.) Newm. ex Oberh. et Tavel in Tavel, 1937, Verh. Schweiz. Naturf. Ges. 118:153. – *Dryopteris filix-mas* var. *borrieri* Newm. 1854, Hist. Brit. Ferns, ed. 3, 4: 189; *D. borrieri* (Rouy ex Faur.) Krecz. ex Grossh. 1939, Flora of Caucasus, publishing house. 2, 1 : 12, comb. Invalid. etsuperfl.; Rzazade, 1950, Flora of Azerbaijan. 1: 22. – *D. paleacea* (Moore) Fomin, 1911, Material. Flora of Caucasus. 1, 1: 52; Gorssg. 1928, Flora of Caucasus. 1 : 7. – *D. mediterranea* Fomin. 1934, Flora of USSR, 1 : 35. – *D. pseudomas auct. non* (Wollston) Holubet Pouzar, 1967, Folia Geobot. Phytotax. (Praha) 3 : 330; Asgarov, 1977, Bot. J. 7: 1028. – *D. affinis auct. non* (Lowe) Fraser – Jenk. 1979, Fern Gaz. 12, 1 : 56; Asgarov, 2001, Fern of Caucasus. : 147.

Described from Europe.

Lectotypus: Britain, England, E. Newman, 1879 (BM).

Europe–Caucasus areal triploid, it is apomict, mesophile species. 2n = 123

It is spread over the shady zones of broad leaved forests on Talysh and Great Caucasus regions, upper mountainous zone from lowland. It was known only on the area of Lenkoran floristic region before [10]. We discovered it in Great Caucasus (Zagatala reserve, Jar village,

beech – hornbeam forest, 1000 m).

As it is seen from the nomenclature part of the species, this plant was given under different names. This species was named correctly for the first time by V. Krecz. ex Grossh., but, afterwards it was determined that the priority was given to other authors. *D. borrieri* (Newm.) Newm. This plant was called as *D. pseudomas*, *D. abbreviata* and other names in the scientific bibliography.

Investigating the monograph of the type C. R. Fraser-Jenkins (1986) suggested to accept this species as one of *D. affinis* subspecies of European origin: *D. affinis* (R. Lowe) Fras.-Jenk. subsp. *borrieri* (Newm.) Fras.-Jenk. This kind of epithet has been using from that time up to the present time [3, 4, 11]. We agree with the opinions of some researchers and consider it expedient to give the status of independent species to this plant under the name *D. borrieri* (Newm.) Newm [12, 14].

Really, it differs from *D. borrieri* *D. affinis* species (*D. affinis* subsp. *affinis*) by a number of morpho – biologic, cytologic, polinologic and anatomic signs. The leaf narrows, it is soft and without brilliance, the segments are separate from each other, their ends are blunt, the cover falls earlier at *D. borrieri*, it is triploid ($2n=123$), the leaves sharply narrow, they are hard and with brilliance, the segments are closely placed, their tips are sharp, the cover falls late at *D. affinis*, it is diploid ($2n=82$).

Besides, the areal of *D. affinis* type is met more in the northern countries on the area of Holarctic flora province. *D. borrieri* is mainly met in Central and Southern Europe.

4.D. iranica Fras. – Jenk., 2007, Fern, Gaz. 18,1:9.–for *Dryopteris affinis* subsp. *coriacea* Fras. – Jenk., 1980, Willdenowia 10:12-113. -*D. coriacea* (Fras. – Jenk.) Tzvel; News of the systematic higher plant., 2003, p. 17, nom. ambig. – non *Dryopteris coriacea* (Brause) Ching. - *D. wallichiana* subsp. *coriacea* (Fras. – Jenk.) Fras. – Jenk. (1986). - *D. affinis* subsp. *coriacea* var. *gigantea* Fras. – Jenk. 1980 l. c. :12-113

Holotype: Iran, Talesh, Gilan (above As-salem, S. of Siadun, Astara to Bandar-e Pahlavi), CRFJ 5933, 30 June 1977, in BM!, isotype: ditto, in BM!; paratypes: ditto, 5926-5932, 5934-5939, BM! NMW! H! G! FR! Cytotype: triploid apomict [14].

Raising this plant given in the subspecies status before [13] to the status of independent type was certified by our researches too.

General spreading: Northern Eastern Turkey, Southern Caucasus, the areas along the Caspian sea of Iran. Spreading over Azerbaijan: Hirkan type forests of Talysh (on the middle mountainous zone).

Main morphological signs: Its leaves narrow (more than *D. borrieri* type), it is hard and like skin, it is green in the winter, the teeth of the segments of the last row are bent a little. The stalk of the leaf is long, reddish – brown, sometimes black, it is covered by shining scales, the cover is with hard consistency and in yellowish grey colour. It is triploid, apomict-mesofit type $2n = 123$.

This species is close to the pantropic, apomict species *D. paleacea* (Sw.) Hand. Mazz from the phylogenetic point of view and may be, it was separated from it and had developed independently from the 3rd geologic period.

It is supposed that [14] the population of *D. paleacea* species on Himalayas has reached to Caucasus and this species was developed as the result of introgressive hybridization with *D. affinis* species.

The difference of species covered with reddish scales of this type has been discovered in Talish – *D. iranica* var. *rubiginosa* (Fomin) Askerov (= *D. affinis* subsp. *coriacea* var. *rubiginosa* (Fomin) Askerov [4]). This population of the type may be raised to higher status. But, an additional research is needed for it.

5.D. remota (A. Br. ex Döll.) Druce, 1908, List Brit. Pl. : 87; Asgarov, 1982, Report. AS of Azerbaijan SSR, 38, 9: 57; Fraser-Jenkins, 1986, Bull. Br. Mus. nat. Hist. (Bot.) 14(3):192; Asgarov, 2001, Fern of Caucasus. : 136. – *Aspidium remotum* A. Br. ex Döll, 1857, Fl. Bad. 1 : 29. – *Dryopteris kemulariae* Mikhel. 1963, System of geographic plants. (Tbilisi) 23 : 56. nom. superfl.

Described from the southern Western part

of Germany. Baden mountainous valley.

Europe – Caucasus, mesophile, apomict, triploid species ($2n = 123$).

It was discovered by us on Guba floristic region (around Susay village, left bank of Guruchay, Alder forest) of Great Caucasus in Azerbaijan Republic.

Spreading of this species on Caucasus was for the first time determined by A. Asgarov [4] as, it was determined that *D. kemulariae* species described by the Georgian botanist I. Mikeladze just to this type.

Main morphologic signs:

Its leaves are double feather – like, monomorphic, in the length of 120 cm, they are deep – green, thin, perispore falls early or doesn't develop, the segments of the last row are swollen, the edges are cut, fruit dots are small, formed in two rows, not joined among themselves, place near the branched veins. Indusium is kidney-shaped, in reddish – brown color, naked, the edges are with teeth, they are decomposed when they ripen. The scales on the stalks are like scalpels, they are brown, pointed on the tip, the number of the conductive piles of the scalpel is 5-7. Sporangium is brown.

This species was described for the first time as natural hybrid species, it was determined that its parent species were *Aspidium filix-mas* and *A. spinulosum*. Afterwards it was stated that there was hybrid between *Dryopteris affinis* and *D. expansa* species of this type. But the observations held by us on the population of this species in Caucasus under the natural conditions and biomorphological researches showed its similarity with *D. carthusiana* and *D. filix – mas* species and their fertility. Other researchers have also certified that this plant was really an independent, natural triploid apomict species. Even this author included this species to the independent section *Remotae* Fras.-Jenk in the monograph of this type [14]. *D. remota* was spread rarely in Eastern, Central and Southern and as well as Southern Asia. It is met in Ireland in the North, Southern Germany and in Caucasus in the East. The signs of *D. affinis* species is nearly unavailable in this species. Its signs are alike with *D. carthusiana*. It is sup-

posed that this species passed to apomixic form as the result of evolution and was stabilized as a species.

6. *D. assimilis* S. Walker, 1961, Amer: Journ. Bot. 48:607; A. Borv., 1974, Flora of the European part of USSR 1:82; Asgarov 1977, Bot.J. 7:1029; Chvelev 2003, news of the system of higher plant. ch.35:12. - ***D. expansa*** auct. non (C. Presl) Fr. – Jenk. et Jermy, 1977, Fern. Gaz. 11, 5:338; Asgarov, 2001, Fern of Caucasus. : 131.

Described from Europe (Scotland): “Ben Lamers, 1855, T. Moore” (K).

It is a diploid species having Palaearctic areal species and belonging to mesophile ecologic group ($2n = 82$).

It is hybridized with *D. carthusiana* species: (*D. x sarvelae* Fr. – Jenk. et Jermy).

Spread over Western and Central Caucasus, this species was discovered by us in Azerbaijan. It was collected on the upper mountainous zones and subalpine meadow, jungle of Caucasian rhododendron, forests and shrubberies on the western (Zagatala reserve, Sidlov span) of the Great Caucasus and northern part (around Goy-gol, Sarial mountain) of the Small Caucasus.

The plants under (acroscopic) the segments of the last row placed lower than the leaves are at the height of a meter, the rest are twice bigger, bent towards the land, the leaves are oval, like delta, in yellowish – green color, thin, with rare glans or naked; the fruit dots are located in the middle of veins, the cover is naked or with rare glands, the stalk is long, the cover on it is wide - oval or like scalpel, in light greyish color, usually in dark color, the number of conductive piles is 3.

This species was spread far from the Eastern Europe – in the Central and Northern Europe, as well as Siberia (Southern) and far East. In many cases this species was identified with the species *D. expansa* (C. Presl) Fras.-Jenk described from the Northern America. But sharp differences between these species were revealed as the result of study of the authentic copies of this species collected from Northern America in the Herbarium fund of Botany institute of Russia AS. Leaves grow pale and dry at an early autumn, the lowest segments are twice – three

times bigger than others, the edges of the segments of the last row are like cut with hairy glands (the leaves are green at *D. expansa*, the lowest segments differ from others very little, the segments of the last row are divided from the edges, there is no hairy gland on the leaves).

7.D. raddeana (Fomin) Fomin 1911, Fl. Cauc. Crit. I, 1:57. – *Nephrodium raddeanum* Fomin 1908, Monit. Jard. Bot. Tbilisi, 12:8.

Lectotypus: [5] (“Habitat in regione sylvatica provinciae Talysch prope lenkoran, ubi anno 1880 a D-re G. Radde detectum est. Ibidem: district lenkoran secus flum Wilash-tschai 8.5.1907 (spor). Legit Schelkownikov”) (TGM!).

The author of the protocol of this species A. Fomin stated in that protocol that this species was near to the species *D. pallida* from Southern palearctic areal origin. Afterwards, monographically researching the species *Dryopteris* Adans. Fraser Jenkins [14] considered *D. raddeana* species as the sub-species of *D. pallida* species while analyzing it critically – systematically [*D. pallida* subsp. *raddeana* (Fomin) Fraser - Jenkins]. We consider to keep *D. raddeana* species in the status of independent species as Hirkan endema.

REFERENCES

1. Talibov T., Novruzova E., Asgarov A. M. Taxons of ferns in the flora of Nakhchivan AR// News of Azerbai-

jan AS, unity of biologic and medical sciences., 2014, №2, pp. 102-106.

2. Asgarov A. M. *Pteridophyta* of Azerbaijan// Botany journal, 1977, №7, p. 1022-1030.

3. Asgarov A. M. Rare ferns of Caucasus and their protection// Botany journal, 1983, №6, p. 835 – 841.

4. Asgarov A. M. Fern – new Species of fern for the flora of Azerbaijan// The Reports of Academy of sciences of Azerbaijan SSR, 1984, № 8, p. 79-83.

5. Asgarov A. M. Ferns of Caucasus, Science, Baku, 2001, 244 p.

6. Bobrov A. E. *Dryopteris* Adans. Flora of the European part of USSR, Science, L. 1974, ch. 1.p. 68 – 99

7. Grossheim A.A. Type *Dryopteris* Adans. Flora of Caucasus, chapter I. Baku: Publishing house AzFan, 1939, p. 10-20

8. Kudryashova G. L. *Polypodiophyta*. Summary of the Flora of Caucasus. 2003, ch. 1, p. 152 – 172

9. Mikeladze I. A. Caucasian representatives of the type *Dryopteris* Adans. s. l. Tr. In-ta. AN SSSR, flora and system. 1967, ch. 25, issue. 1, p. 5-58,

10. Rzazade R. Y. Type *Dryopteris* Adans. Flora of Azerbaijan, chapter I. Baku: Academy of sciences of Az SSR, 1950, p. 20-26

11. Fomin A. V. Class Filicales. Flora of USSR. M. – JL, 1934, t. 1. p. 16 – 100

12. Shmakov A. I. (1999) Determiner of the ferns of Russia. Publishing house AGU, Barnaul, 108 p.

13. Asgarov A.M. Forest Ferns of the Caucasus, Its Systematic and Eco-Geographical Analysis., International Caucasian Forestry Symposium. Artvin-Turkey, 2013, p.258-264.

14. Fraser – Jenkins C. R. A monograph of *Dryopteris* (*Pteridophyta: Dryopteridaceae*) in the Indian subcontinent. Bull. Brit. Mus. Nat. Hist. (Bot.) 1986, Vol. 18, № 5, p. 323 – 477

15. Manton I. Problems of cytology and evolution in the *Pteridophyta*. 1950, Cambridge: University Press, 316 p.

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AZƏRBAYCAN RESPUBLİKASINDA YAYILAN AYIDÖŞƏYİ (*DRYOPTERIS* ADANS. S. STR.) CİNSİNİN YENİ TAKSONLARI

A.M.Əsgərov, Ünal Akçay

Məqalədə Cənubi Qafqazda (Azərbaycan respublikası daxilində) rast gəlinən Ayıdöşəyi (*Dryopteris* Adans. s.str.) cinsinin bəzi taksonlarının statusları təhlil edilir. Ədəbiyyat, fond materialları, eləcə də müəlliflərin təbiətdə apardıqları monitorinqlər və topladıqları herbəri materiallarının təhlili nəticəsində *D.talyschensis*, *D.schorapanensis*, *D.iranica*, *D.raddeana* taksonlarının növ statusunda verilməsi, *D.borreri*, *D.remota*, *D.assimilis* adlarının isə prioritet hesab edilməsi elmi dəlillərlə əsaslandırılır.

Açar sözlər: ayıdöşəyi, növ, sistematika, spor, pulcuq

**НОВЫЕ ТАКСОНЫ РОДА ЩИТОВНИК (*DRYOPTERIS* ADANS. S. STR.), РАСПРОСТРАНЕННЫЕ
В АЗЕРБАЙДЖАНСКОЙ РЕСПУБЛИКЕ****А.М.Аскеров, У.Акчай**

В статье анализируются статусы ряда таксонов рода *Dryopteris* Adans. (*Dryopteridaceae*) из флоры Южного Кавказа (в пределах Азербайджана). На основании критическо-систематического анализа материалов, собранных авторами в различных районах Азербайджана, а также изучения гербарных материалов - Гербарий Российской Федерации (LE), Азербайджанской Республики (БАК), считается целесообразным принять следующие растения на видовой статус - *D. talyschensis*, *D. schorapanensis*, *D. iranica*, *D. raddeana*, а названия *D. borrieri*, *D. remota*, *D. assimilis* учитывать приоритетными.

Ключевые слова: щитовник, вид, систематика, спор, чешуя