



Taxonomic structure of the lichen biota of the minor Caucasus within Azerbaijan

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Abstract

This article reflects the data of the taxonomical structure of the lichen flora of the Minor Caucasus within Azerbaijan identified during the research. A general taxonomic analysis was carried out at the level of families and genera. As the result of lichenological studies, the lichens composition of 696 species of lichens of 180 genera 58 families and 22 orders was determined. The main volume of species diversity is accounted for by 13 orders; the leading order is the order *Lecanorales* which includes 249 species. In the family spectrum, 15 families are represented by 542 species, and in the generic spectrum, 15 genera including 297 species are dominant according to the number of species. The basis of lichen flora is composed of polymorphic families and genera typical of the lichen flora of moderate Holarctic. 12 species: *Aspicilia candida* (Anzi) Hue, *Baeomyces rufus* (Huds.) Rebert., *Cladonia farinacea* (Vain.) A. Evans, *C. mitis* Sandst., *Enchylium ligerinum* (Hy) Otálora, Jørgensen et Wedin, *Lecidea confluens* (Weber) Ach., *Ochrolechia frigida* (Sw.) Lynge, *Parmelia fraudans* Nyl., *Physconia perisidiosa* (Erichsen) Moberg, *Rinodina boleana* Giralt., *Tuckermanopsis chlorophylla* (Willd.) Hale, *Umbilicaria proboscidea* (L.) Schrad. are new for the lichen biota of Azerbaijan.

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Introduction

The minor Caucasus represents a huge mountainous structure situated in 3 republics of Transcaucasia – Azerbaijan, Armenia, Georgia. Within Azerbaijan, the Minor Caucasus overlays the southwestern and western parts of Azerbaijan, comprises a series of ridges and meadows, is a mountainous area with complex structure. The characteristic of relief of the Minor Caucasus is its vertical zonation. Within its slopes, 5 vertical zones are marked: alpine, midland, piedmont, flat and lowland. Its highest peaks have an altitude of about 4000 m. (Gadjyev *et al.*, 1990). The territory of the Minor Caucasus has rare and rich flora. In the lowland up to a height of 200 meters deserted, semiarid and wetland kinds of plants are developed; on plains at the foot of mountains at a height of 200 to 700, sometimes 1200 meters annual and perennial xerophytic plants and bushes are spread, and at 1200-1800 meters deciduous forests of *Quercus* L., *Fagus* L., *Carpinus* Decne, as well as *Acer* L., *Tilia* L., *Alnus* Mill., *Populus* L., *Salix* L., *Ulmus* L. and other trees are located.

The objective of the research was examination and determination of the taxonomical structure of the lichen flora of the Minor Caucasus and by the same token compilation of the active version of the inventory of herbarium specimens of the lichens of the Minor Caucasus, considering modern nomenclatural revisions and literary data. At the moment specimens are stored in the lichen bryological herbarium of the Institute of Botany of Azerbaijan National Academy of Sciences (BAK).

Material and methods

The research was performed in the regions of the Minor Caucasus within Azerbaijan. The basis of the paper was made from the original material collected in the territory of the Minor Caucasus in various years (1981-1990, 1993-2020) and literary data (Barkhalov, 1969, 1983; Alverdiyeva, 2003-2004, 2006-2007; Alverdiyeva and Novruzov, 2014; Novruzov, 2004; Bayramova, 2007; Ganbarov, 2007; Pashayev, 2008). Collection, herborization and establishment of lichens were carried out under generally accepted

lichenological methodology (Oxner, 1974). Traditional methods of taxonomical, biomorphological, and ecological analyses were used in the work. The taxonomical analysis of the lichen flora was carried out based on the taxonomic classification of the section *Ascomycota* according to "The flora of the lichens of Russia" (Andreyev *et al.*, 2014), "A checklist of the lichen flora of Russia" (Urbanavichus, 2010), etc. (Lumbsch and Huhndorf, 2010; Ertz and Tehler, 2011; Nordin *et al.*, 2011; Thell *et al.*, 2012; Arup *et al.*, 2013; Andreyev *et al.*, 2014). During the biomorphological analysis works of lichenologists (Golubkova, 1983) were used.

Results and discussion

The flora of lichens of the Minor Caucasus within Azerbaijan numbers 696 species, 2 subspecies from which 12 species: *Aspicilia candida* (Anzi) Hue, *Baeomyces rufus* (Huds.) Rebert., *Cladonia farinacea* (Vain.) A. Evans, *C. mitis* Sandst., *Enchylium ligerinum* (Hy) Otálora, Jørgensen et Wedin, *Lecidea confluens* (Weber) Ach., *Ochrolechia frigida* (Sw.) Lynge, *Parmelia fraudans* Nyl., *Physconia perisidiosa* (Erichsen) Moberg, *Rinodina boleana* Giralt., *Tuckermanopsis chlorophylla* (Willd.) Hale, *Umbilicaria proboscidea* (L.) Schrad. are new for lichen biota of Azerbaijan. All diversity of the lichen flora is related to division *Ascomycota* of 7 classes, 22 orders, 58 families and 180 genera. The basis of the lichen flora with the largest species diversity are representatives of class *Lecanoromycetes*, combining 596 species (87% of the total number of species), 145 genera, 43 families, 13 orders. Class *Eurotiomycetes* includes 45 species (6.46%), 11 genera, 3 families, 3 orders, *Arthoniomycetes* 32 species (3.96%), 10 genera, 4 families, 1 order, *Lichenomycetes* 8 species (1.38%), 4 genera, 2 families, order, *Dothidiomycetes* 11 species (0.69%), 7 genera, 4 families, 2 order, *Coniocybomycetes* 3 species (0.34%), 2 genera, 1 family, 1 order, *Leotiomycetes* 1 species (0.17%), 1 genus, 1 family (Table 1). It was established that the main volume of taxonomic diversity is accounted for by 13 orders: *Lecanorales*, *Peltigerales*, *Caliciales*, *Pertusariales*, *Teloschistales*, *Verrucariales*,

Lecideales, *Acarosporales*, *Arthoniales*, *Ostropales*, *Umbilicariales*, *Lichinales*, *Rhizocarpales* which in total makes 611 species (89% of the total number of species). The leading position from them is held by lichens order *Lecanorales* comprised of 249 species from 53 genera and 11 families. Analysis of the family spectrum showed that the largest families by the

number of species are: *Parmeliaceae*, *Lecanoraceae*, *Cladoniaceae*, *Physciaceae*, *Ramalinaceae*, *Teloschistaceae*, *Verrucariaceae*, *Lecideaceae*, *Megasporaceae*, *Acarosporaceae*, *Collemataceae*, *Peltigeraceae*, *Arthoniaceae*, *Pertusariaceae*, *Umbilicariaceae*, which contain over 11 species (Table 1).

Table 1. The systematic structure of the lichen flora of the Minor Caucasus (within Azerbaijan).

Class	Order	Family	Genus (number of species)		
<i>Arthoniomycetes</i> O.E. Erikss. & Winka	<i>Arthoniales</i> Henssen ex D. Hawksw. & O.E. Erikss	<i>Arthoniaceae</i> Reichenb.ex Reichenb.	<i>Arthonia</i> Ach. (14)		
			<i>Arthothelium</i> A. Massal. (2)		
		<i>Chrysostrichaceae</i>	<i>Chrysostrich</i> Mont. (2)		
		<i>Opegraphaceae</i>	<i>Opegrapha</i> Ach.(8)		
		<i>Roccellaceae</i> Chevall.	<i>Dendrographa</i> (1)		
			<i>Enterographa</i> Fée (1)		
			<i>Lecanactis</i> Körb. (1)		
			<i>Rocella</i> DC. (1)		
			<i>Arthoniales</i> , genus incertae sedis	<i>Alyxoria</i> Gray (1)	
			<i>Zwackhia</i> Körb. (1)		
<i>Coniocybomycetes</i> Prieto et Wedin	<i>Coniocybales</i> Prieto et Wedin	<i>Coniocybaceae</i> Rchb.	<i>Chaenotheca</i> (2)		
			<i>Sclerophora</i> (1)		
<i>Dothidiomycetes</i> O.E. Erikss. & Winka	<i>Pleosporales</i> Luttr. ex M. E. Barr	<i>Arthopyreniaceae</i> Walt. Watson	<i>Arthopyrenia</i> A. Massal.(3)		
		<i>Pleomassariaceae</i> D. Hawksw.	<i>Peridiotelia</i> D. Hawksw. (1)		
	families incertae sedis	<i>Strigulaceae</i> Zahlbr.	<i>Strigula</i> Fr. (1)		
		<i>Naetrocymbaceae</i> Höhn.ex R.C. Harris	<i>Leptorhphis</i> Körb. (1)		
			<i>Naetrocymbe</i> Körb. (2)		
	N/A	genus incertae sedis	<i>Mycoglaena</i> Höhn. (1)		
		<i>Mycomicrothelia</i> Keissl. (1)			
<i>Eurotiomycetes</i> O. E. Erikss. & Winka	<i>Pyrenulales</i> Fink ex D. Hawksw. & O. E. Erikss.	<i>Pyrenulaceae</i> Rabenh.	<i>Pyrenula</i> Ach. (3)		
			<i>Verrucariales</i> Mattick ex D. Hawksw. & O. E. Erikss.	<i>Catapyrenium</i> Flot. (2)	
	<i>Clavascidium</i> Breuss (1)				
	<i>Dermatocarpon</i> Eschw. (2)				
	<i>Endocarpon</i> Hedw. (4)				
	<i>Endopyrenium</i> Flot. (8)				
	<i>Placidiopsis</i> Beltr. (2)				
	<i>Staurothete</i> Norman (3)				
	<i>Thelidium</i> A. Massal. (2)				
	<i>Verrucaria</i> Schrad. (17)				
	<i>Mycocaliciales</i> Tibell et Wedin	<i>Mycocaliciaceae</i> A.F.W. Schmidt	<i>Chaenothecopsis</i> Vain. (1)		
<i>Lecanoromycetes</i> O. E. Erikss. & Winka	<i>Acarosporales</i> Reeb, Lutzoni & Cl. Roux	<i>Acarosporaceae</i> Zahlbr.	<i>Acarospora</i> A. Massal. (18)		
			<i>Glypholecia</i> Nyl. (1)		
			<i>Myriospora</i> Nägeli ex Uloth (1)		
			<i>Pleopsidium</i> Körb. (1)		
			<i>Sarcogyne</i> Flot. (2)		
			<i>Sporostatia</i> A.Massal. (2)		
			<i>Caliciales</i> Bessey	<i>Buellieaceae</i> Zahlbr.	<i>Amandinea</i> M. Choisy ex Scheid et H. Mayrhofer (1)
					<i>Buellia</i> De Not. (5)
					<i>Dimelaena</i> Norman (1)
					<i>Diplocia</i> A. Massal. (1)
<i>Diplotomma</i> A. Massal. (3)					

	<i>Caliciaceae</i> Chevall.	<i>Calicicum</i> Pers. (5)
		<i>Cyphelium</i> Ach. (1)
	<i>Physciaceae</i> Zahlbr.	<i>Anaptychia</i> Körb.(4)
		<i>Heterodermia</i> Trevis.(1)
		<i>Hyperphyscia</i> Müll.Arg. (1)
		<i>Phaeophyscia</i> Moberg. (6)
		<i>Physcia</i> (Schreb.) Michx. (14)
		<i>Physconia</i> Poelt (4)
		<i>Rinodina</i> (Ach.) Gray (19)
		<i>Tornabea</i> Østh. (1)
<i>Candelariales</i> Miadl., Lutzoni & Lumbsch	<i>Candelariaceae</i> Hakul.	<i>Candelaria</i> (1)
		<i>Candelariella</i> Müll. Arg. (6)
<i>Lecanorales</i> Nannf.	<i>Cladoniaceae</i> Zenker	<i>Cladonia</i> P. Browne (45)
		<i>Pycnothelia</i> (Ach.) Dufour. (1)
	<i>Hymeneliaceae</i> Körb.	<i>Tremolecia</i> M. Choisy.(1)
	<i>Lecanoraceae</i> Körb.	<i>Bryonora</i> Poelt (1)
		<i>Frutidella</i> Kalb. (1)
		<i>Lecanora</i> Ach. in Luyken (42)
	<i>Parmeliaceae</i> Zenker	<i>Lecidella</i> Körb.(4)
		<i>Protoparmelia</i> M.Choisy (Thell et al.). (1)
		<i>Rhizoplaca</i> Zopf (3)
		<i>Alectoria</i> Ach. in Luyken (2)
		<i>Allocetraria</i> Kurok. & M.J.Lai (1)
		<i>Bryoria</i> Brodo et D. Hawksw. (10)
		<i>Cetraria</i> Ach. (3)
		<i>Cetrariella</i> Kärnefelt et A. Thell (1)
		<i>Cetrelia</i> W..L.Culb.& C.F. Culb. (1)
		<i>Cornicularia</i> (Schreb.) Hoffm. (4)
		<i>Evernia</i> Ach. in Luyken (3)
		<i>Flavocetraria</i> Kärnefelt et A. Thell (2)
		<i>Flavoparmelia</i> Hale (2)
		<i>Flavopunctelia</i> (Krog) Hale (2)
		<i>Hypogymnia</i> (Nyl.) Nyl. (3)
		<i>Hypotrachyna</i> (Vain.) Hale (1)
		<i>Imshaugia</i> S. L. F. Mey (1)
		<i>Melanelia</i> Essl. (2)
		<i>Melanelixia</i> O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. et Lumbsch. (1)
		<i>Melanohalea</i> O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. et Lumbsch. (5)
		<i>Montanelia</i> Divakar, A. Crespo, Wedin et Essl. (1)
		<i>Parmelia</i> Ach. (10)
		<i>Parmelina</i> Hale (3)
		<i>Parmotrema</i> A. Massal. (4)
		<i>Pleurosticta</i> Petr. (1)
		<i>Pseudevernia</i> Zopf (1)
		<i>Punctelia</i> Krog (2)
		<i>Tuckermannopsis</i> Gyeln. (1)
		<i>Usnea</i> Dill. ex Adans. (13)
		<i>Vulpicida</i> J.-E. Mattsson et M. J. Lai

		(2)
		<i>Xanthoparmelia</i> (Vain. Hale (4)
	<i>Pilocarpaceae</i> Zahlbr.	<i>Felhanerta</i> Vezda (1)
		<i>Micarea</i> Fr. (1)
		<i>Tapellaria</i> Müll.Arg (1)
	<i>Psoraceae</i> Zahlbr.	<i>Psora</i> Hoffm. (3)
	<i>Ramalinaceae</i> C. Agardh	<i>Bacidia</i> De Not. (11)
		<i>Biatora</i> Ach. (3)
		<i>Cliostomum</i> Fr. (1)
		<i>Lecania</i> A. Massal. (11)
		<i>Ramalina</i> Ach. (12)
		<i>Toninia</i> A. Massal. (7)
	<i>Scoliciosporaceae</i> Hafellner	<i>Scoliciosporum</i> A. Massal. (1)
	<i>Sphaerophoraceae</i> Fr.	<i>Sphaerophorus</i> Pers. (1)
	<i>Stereocaulaceae</i> Chevall.	<i>Lepraria</i> Ach. (2)
		<i>Squamarina</i> Poelt (4)
		<i>Stereocaulon</i> Hoffm. (5)
<i>Lecanorales</i> , genera incertae sedis	<i>Tephromelataceae</i> Hafellner	<i>Tephromela</i> M. Choisy (1)
<i>Lecideales</i> Vain.	<i>Lecideaceae</i> Chevall.	<i>Bellemerea</i> Hafellner et Cl. Roux (1)
		<i>Bilimbia</i> De Not. (3)
		<i>Clauzadea</i> Hafellner et Bellem. (1)
		<i>Lecidea</i> Ach. (19)
		<i>Mycobilimbia</i> Rehm (1)
		<i>Porpidia</i> Körb. (3)
		<i>Romjularia</i> Timdal (1)
<i>Leprocaulales</i> Lendemer et Hodkinson	<i>Leprocaulaceae</i> Lendemer et Hodkinson	<i>Leprocaulon</i> Nyl. (1)
<i>Peltigerales</i> Walt. Watson	<i>Collemtaceae</i> Zenker	<i>Blennothallia</i> Trevis. (1)
		<i>Collema</i> F. H. Wigg. (9)
		<i>Enchylium</i> (Ach.) Gray (5)
		<i>Lathargium</i> (Ach.) Gray (1)
		<i>Leptogium</i> (Ach.) Gray (4)
		<i>Rostania</i> Trevis. (1)
		<i>Scytinium</i> (Ach.) Gray (3)
	<i>Pannariaceae</i> Tuck.	<i>Fuscopannaria</i> P.M. Jörg. (1)
		<i>Moelleropsis</i> Gyeln. (1)
		<i>Pannaria</i> Delise ex Bory (1)
		<i>Parmeliella</i> Müll. Arg. (1)
		<i>Protopannaria</i> (Gyeln) P.M. Jörg. et S. Ekman (1)
	<i>Placynthiaceae</i> A. E. Dahl	<i>Placynthium</i> (Ach.) Gray (1)
		<i>Pterygium</i> Nyl. (3)
	<i>Vahliellaceae</i> Wedin, P. M. Jörg. et S. Ekman	<i>Vahliella</i> P. M. Jörg. (2)
	<i>Lobariaceae</i> Chevall.	<i>Lobaria</i> (Schreb.) Hoffm. (4)
	<i>Nephromataceae</i> Wetmore ex J. C. David et D.	<i>Nephroma</i> Ach. In Luyken (4)
	<i>Peltigeraceae</i> Dumort.	<i>Peltigera</i> Willd. (17)
		<i>Solorina</i> Ach. (4)
<i>Rhizocarpales</i> Miadl et al.	<i>Catillariaceae</i> Hafellner	<i>Catillaria</i> A. Massal. (1)
	<i>Rhizocarpaceae</i> M. Choisy ex Hafellner	<i>Rhizocarpon</i> Ramond ex DC. (9)
<i>Teloschistales</i> D. Hawksw. et O. E. Erikss.	<i>Teloschistaceae</i> Zahlbr.	<i>Athallia</i> Arup, Fröden et Söchting (3)
		<i>Blastenia</i> A. Massal. (1)

		<i>Calogaya</i> Arup, Fröden et Söchting (3)
		<i>Caloplaca</i> Th. Fr. (19)
		<i>Fulgensia</i> A. Massal. et De Not. (2)
		<i>Gyalolechia</i> A. Massal. (2)
		<i>Leproplaca</i> (Nyl.) Hue (2)
		<i>Polycauliona</i> Hue (3)
		<i>Rufoplaca</i> Arup, Söchting et Fröden (1)
		<i>Rusavskia</i> S. Y. Kondr. et Kärnefelt (2)
		<i>Seiophora</i> Poelt (1)
		<i>Teloschistes</i> Norman (2)
		<i>Variospora</i> Arup, Fröden et Söchting (1)
		<i>Xanthomendoza</i> S. Y. Kondr. et Kärnefelt (1)
		<i>Xanthoria</i> (Fr.) Th. Fr. (3)
<i>Baeomycetales</i> Lumbsch, Hundorf et Lutzoni	<i>Baeomycetaceae</i> Dumort.	<i>Baeomyces</i> Pers. (2)
<i>Ostropales</i> Nannf.	<i>Coenogoniaceae</i> (Fr.) Stizenb.	<i>Coenogonium</i> Ehrenb. (1)
		<i>Tricharia</i> Fée (1)
	<i>Graphidaceae</i> Dumort.	<i>Diploschistes</i> Norman (6)
		<i>Graphis</i> Adans. (3)
		<i>Gyalectidium</i> Müll. Arg. (1)
		<i>Phaeographis</i> Müll. Arg. (1)
		<i>Thelotrema</i> Ach. (1)
	<i>Gyalectaceae</i> Stizenb.	<i>Gyalecta</i> Ach. (5)
	<i>Phlyctidaxae</i> Poelt et Vezda	<i>Phlyctis</i> (Wallr.) Flot. (2)
	<i>Porinaceae</i> Rchb.	<i>Porina</i> Ach. (3)
	<i>Stictidaceae</i> Fr.	<i>Sticta</i> Pers. (1)
<i>Pertusariales</i> M. Choisy ex D. Hawksw. et O. E. Erikss.	<i>Ikmadophilaceae</i> Triebel	<i>Thamnolia</i> Ach. ex Schaer. (1)
	<i>Megasporaceae</i> Lumbsch	<i>Aspicilia</i> A. Massal. (16)
		<i>Circinaria</i> Link. (8)
		<i>Lobothallia</i> (Clauzade et Cl. Roux) Hafellner (3)
		<i>Megaspora</i> (Clauzade et Cl. Roux) Hafellner et V. Wirth (1)
	<i>Ochrolechiaceae</i> R. C. Harris ex Lumbsch et I. Schmitt	<i>Ochrolechia</i> A. Massal. (4)
	<i>Pertusariaceae</i> Körb.	<i>Pertusaria</i> DC. (19)
<i>Trapeliales</i> Hodkinson et Lendemer	<i>Trapeliaceae</i> M. Choisy ex Hertel	<i>Placynthiella</i> Elenkin (1)
		<i>Rimularia</i> Nyl. (1)
		<i>Xylographa</i> (Fr.) Fr. (2)
<i>Ostromycetidae</i> , families incertae sedis	<i>Schaereriaceae</i> M. Choisy ex Hafellner	<i>Schaereria</i> Körb. (1)
<i>Umbilicariales</i> J.C. Wei et Q. M. Zhou	<i>Fuscideaceae</i> Hafellner	<i>Maronea</i> A. Massal. (1)
	<i>Umbilicariaceae</i> Chevall.	<i>Umbilicaria</i> Hoffm. (13)
<i>Leotiomycetes</i> O. E. Erikss. et Winka	families incertae sedis	<i>Thelocarpaceae</i> Zukai
		<i>Thelocarpon</i> Nyl. (1)
<i>Lichenomycetes</i> Reeb, Lutzoni et Cl. Roux	<i>Lichinales</i> Henssen et Büdel ex D. Hawksw. et O. E. Eriksson	<i>Lichinaceae</i> Nyl.
		<i>Heppia</i> Nägeli ex A. Massal. (2)
		<i>Peccania</i> A. Massal. ex Arnold (2)
		<i>Psorotichia</i> A. Massal. (1)
		<i>Peltulaceae</i> Büdel
		<i>Peltula</i> Nyl. (3)
Total: 7	22	58
		180 (696)

These 15 families combine 542 species which makes up 78% of the total number, i.e. the major part of the species diversity of the lichen flora which may be accounted for by the environmental plasticity of their representatives growing on various substrata and various ecological conditions.

The majority of representatives of these families are widely spread and are typical for temperate floras of Holarctics. Of the rest 38 families, 108 species refer, that is 19% of the total number. Dominating the position of family *Lecanoraceae*, *Physciaceae*, *Teloschistaceae* in the lichen flora of the Minor Caucasus emphasizes specifics of the flora of the arid region. The abundance of representatives of families *Parmeliaceae* combining a significant number of epiphytic lichens, as well as *Cladoniaceae*, *Peltigeraceae*, characterizes its relevance to lichens of nemoral and boreal types of forest floras of Holarctics. A large quantity of species of family *Verrucariaceae*, *Lecideaceae*, *Rhizocarpaceae*, *Umbilicariaceae* in the characterized lichen flora underlines its mountainous origin. By the present time the lichen flora of the Minor Caucasus numbers 180 genera. The generic coefficient (average number of species in a genus) is 3.65%. A significant share in the lichen flora is introduced by the 15 largest genera in which the number of species is over 11 (Table 1). They combine 256 species that makeup 44.2% of the total number of species. 51 genera contain by 2-3 species, 81 genera are one-species. Most of the representatives of genus *Cladonia* – are species widely spread in taiga zone, but also encountered in deciduous forests and the Arctics, areas of some steppe species cover arid regions. Species of genera *Lecanora*, *Acarospora*, *Aspicilia*, *Caloplaca* are characteristic of mountainous and arid territories. *Lecidea*, *Pertusaria*, *Umbilicaria*, *Verrucaria* are characteristic of mountainous regions. Species of genera *Peltigera* are spread in boreal floras. Representatives of genus *Arhonia*, *Lecania* and *Ramalina* are characteristic for both nemoral deciduous forests and mountainous, arid and other landscapes. Representatives of genus *Usnea* are

mostly spread in coniferous and deciduous mountainous forests. The taxonomic analysis showed that the quantitative characteristics of the systematic structure reflect a degree of heterogeneity of territory and diversity of natural conditions.

During biomorphological analysis, crustose, foliose and fruticose lichens were marked out. It was established that in the spectrum of life forms crustose species prevail (59%), foliose make up 27%, fruticose 14%. Analysis of the distribution of lichens by ecological groups showed that in the studied lichen flora epiphytic lichens are represented by the highest number of species - 281 species, which is connected with the diversity of forest ecotopes. A little less, epilithic lichens – 269 species, epigey lichens are represented by a significantly lesser number - 146 species.

Conclusion

In the result of conducted work, we identified the taxonomical structure of the lichen flora of the Minor Caucasus. The outcome of the research shows that the lichens composition consists of 696 species of lichens of 180 genera 58 families and 22 orders, where 12 species are new for the lichen biota of Azerbaijan: *Aspicilia candida* (Anzi) Hue, *Baeomyces rufus* (Huds.) Rebent., *Cladonia farinacea* (Vain.) A. Evans, *C. mitis* Sandst., *Enchylium ligerinum* (Hy) Otálora, Jørgensen et Wedin, *Lecidea confluens* (Weber) Ach., *Ochrolechia frigida* (Sw.) Lynge, *Parmelia fraudans* Nyl., *Physconia perisidiosa* (Erichsen) Moberg, *Rinodina boleana* Giralt., *Tuckermanopsis chlorophylla* (Willd.) Hale, *Umbilicaria proboscidea* (L.) Schrad.

References

- Alverdiyeva SM.** 2003. New species for the lichen flora of Gadabay region. Working Knowledge **1**, 43-46.
- Alverdiyeva SM.** 2004. Lichens of Gadabay region. Proceedings of the Institute of Botany of Azerbaijan National Academy of Sciences **25**, 261-264.

- Alverdiyeva SM.** 2006. To the lichen flora of Dashkasan region. Proceedings of the Institute of Botany of Azerbaijan National Academy of Sciences **26**, 12-13.
- Alverdiyeva SM.** 2007. Species composition of lichens of the south- western part of the Minor Caucasus. Proceedings of the Institute of Botany of Azerbaijan National Academy of Sciences **27**, 142-145.
- Alverdiyeva SM, Novruzov VS.** 2014. Check-list of lichens of Azerbaijan. Baku: Elm Press, p 1-240.
- Andreyev MP, Ahti T, Voytsekhovich AA, Gagarina LV, Gerasimova YuV, Himelbrant DE, Davydov EA, Konoreva LA, Kuznetsova ES, Makryi TV, Nadeina OV, Randlane T, Saag A, Sokolova IV, Stepanchikova IS, Urbanavichus GP, Voytsekhovich AA.** 2014. Handbook The lichen flora of Russia (biology, ecology, diversity, distribution and methods to study lichens). Moscow - St. Petersburg: KMK Scientific Press, p 1-392.
- Arup U, Søchting U, Frödén P.** 2013. A new taxonomy of the family *Teloschistaceae*. Nordic Journal of Botany **31**, 16-83.
<https://doi.org/10.1111/j.1756-1051.2013.00062.x>
- Barkhalov SHO.** 1969. Foliose and fruticose lichens of Azerbaijan. Baku: Elm Press, p 1-308.
- Barkhalov SHO.** 1983. Lichen flora of the Caucasus. Baku: Elm Press, p 1-338.
- Bayramova AA.** 2007. The flora of lichens of the north-eastern part of the Minor Caucasus and protection of gene pool. PhD thesis, Baku, p 1-170.
- Ertz D, Tehler A.** 2011. The phylogeny of *Arthoniales* (*Pezizomycotina*) inferred from nucLSU and RPB2 sequences. Fungal Diversity **49** (1), 47-71.
<http://dx.doi.org/10.1007/s13225-010-0080-y>
- Gadjiyev VD, Aliyev VA, KuliyeV VSh, Vagabov ZV.** 1990. Alpine vegetation of the Minor Caucasus. Baku: Elm Press, p 1-212.
- Ganbarov DSH.** 2007. Ground lichens of Nakhchivan Autonomous Republic and their tracer features. PhD thesis, Baku, p 1-145.
- Golubkova NS.** 1983. Analysis of the flora of lichens of Mongolia. Leningrad: Nauka Press, p 1-248.
- Lumbsch HT, Huhndorf SM.** 2010. Part One. Outline of *Ascomycota* – 2009. Myconet. Fieldiana: Life and Earth Sciences, p. 1-42.
<https://doi.org/10.3158/1557.1>
- Novruzov EA.** 2004. Epiphytic synusia of the Garayaz State Preserve and agro ecosystems, issues of use in ecological monitoring. PhD thesis, Baku, p. 1-57.
- Oksner AN.** 1974. Determiner of lichens of the USSR **2**, 260-286.
- Nordin A, Moberg R, Tønsberg T, Vitikainen O, Dalsätt Å, Myrdal M, Snitting D, Ekman S.** 2011. Santesson's Checklist of Fennoscandian lichen-forming and lichenicolous fungi. Version 29 April 2011. (accessed 09.XII.2020).
<http://130.238.83.220/santesson/home.php>
- Pashayev TY.** 2008. Lichen flora of Nakhchivan Autonomous Republic. PhD thesis, Baku, p 1-178.
- Thell AA, Crespo PK, Divakar I, Kärnefelt I, Leavitt SD, Lumbsch HT, Seaward MRD.** 2012. A review of the lichen family *Parmeliaceae* – history, phylogeny and current taxonomy. Nordic Journal of Botany **30**(6), 641-664.
<https://doi.org/10.1111/j.1756-1051.2012.00008.x>
- Urbanavichus GP.** 2010. A checklist of the lichen flora of Russia. St Petersburg: Nauka Press, p. 1-194.