A contribution to the lichen-forming and lichenicolous fungi flora of Armenia

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Abstract

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Twenty-one lichen-forming and two lichenicolous fungi species are reported as new to Armenia. Four of these, *Arthopyrenia cerasi*, *Chaenothecopsis treicheliana*, *Melaspilea ochrothalamia* and *Punctelia jeckeri*, are new for the whole of SW Asia. One genus, *Bacidina*, is also new for Armenia. Short discussions are added for *Anaptychia roemeri*, *Arthopyrenia cerasi*, *Bacidia polychroa*, *Caloplaca polycarpoides*, *Candelariella antennaria*, *C. lutella*, *Chaenothecopsis treicheliana*, *Cladonia rei*, *Lecanora impudens*, *Melaspilea ochrothalamia*, *Pertusaria constricta*, *Punctelia jeckeri* and *Stigmidium congestum*. The lichenicolous fungus *Chaenothecopsis treicheliana*, earlier considered as a synonym of *C. hospitans*, is confirmed to be a separate species.

Additional key words: new records, *Ascomycetes*, SW Asia

Introduction

Until now 441 taxa of lichenized fungi (Harutyunyan & al. 2011; Gasparyan & Sipman 2013) and only one species of lichenicolous fungi, *Cercidospora melanophthalmae* Nav.-Ros. & al. (Calatayud & al. 2013) have been reported for Armenia. During a recent lichenological survey in the temperate deciduous forests of Arzakan-Meghradzor State Sanctuary (Kotayk Province), Gyulagarak State Sanctuary (Lori Province), Dilijan National Park (Tavush Province) and in the xerophytic open forests of Vayots Dzor Province, the first author collected several additional lichens and lichenicolous fungi. Of these, we report here 21 species of lichenized fungi as well as two lichenicolous fungi.

Material and methods

The specimens were all collected by A. Gasparyan from April to September 2013. The morphological and anatomical characters were examined with a stereomicroscope (Wild Heerbrugg M3A, Switzerland) and a compound microscope (Zeiss Axioskop, Germany). The standard spot tests (K, C, KC, P) and the UV-light fluorescence test were used. The lichen substances were analysed by thin-layer chromatography (TLC) with solvents A, B' and C following Orange & al. (2010). The specimens are kept in B and in the private herbarium of W. von Brackel ("herb. IVL").

Results and Discussion

The newly reported species are treated below in alphabetical order. The specimens are listed and occasional comments on characteristics, ecology, distribution and TLC results are added.

List of species

Anaptychia roemeri Poelt

This species was collected in the arid region of Vayots

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Dzor Province. *Anaptychia roemeri* resembles *A. desertorum* (Rupr.) Poelt by its prostrate thallus without soralia but differs by its narrower lobes (0.4–0.6 mm) and raised, furcate lobe tips with hyaline apical spines (Urbanavichus 2008). The species was first reported from Afghanistan (Poelt & Wirth 1968) and is also known from Iran (Seaward & al. 2004; Moniry & al. 2005), Kyrgyzstan, Mongolia and Tajikistan (Urbanavichus 2008).

Specimen examined — Armenia: Vayots Dzor Province: old road to the city Jermuk, 39°45'N, 45°36'E, 2087 m, on bark of *Pyrus fedorovii* Kuth., 14 Jul 2013, *V-13-3* (B).

Arthopyrenia cerasi (Schrad.) A. Massal.
Arthopyrenia cerasi is new to SW Asia. The species is also known from the Russian Caucasus (Urbanavichus 2010).

Specimen examined — Armenia: Tavush Province: Dilijan National Park, road to the city Dilijan, 40°41'N, 44°51'E, 1679 m, on bark of tree, 25 Aug 2013, *D-13-10-4* (B).

Bacidia polychroa (Th. Fr.) Körb.
Bacidia polychroa has declined strongly in W Europe since the 19th century (Coppins & Aptroot 2009; Wirth & al. 2013) and is evidently a sensitive species. Therefore its status in Armenia is worth closer attention. It might be an indicator of ecological continuity.

Specimen examined — Armenia: Tavush Province: Dilijan National Park, village Aghavnavank, 40°43'N, 45°06'E, 1153 m, on bark of tree, 25 Aug 2013, *D-13-3* (B).

Bacidina chloroticula (Nyl.) Vězda & Poelt
Bacidina chloroticula is the first species of the genus *Bacidina* reported from Armenia.

Specimen examined — Armenia: Tavush Province: Dilijan National Park, road to the village Fioletovo, 40°43'N, 44°48'E, 1394 m, on bark of tree, 25 Aug 2013, *D-13-9-6* (B).

Caloplaca polycarpoides (J. Steiner) M. Steiner & Poelt
This species is widely distributed in the arid open forests of Vayots Dzor Province. *Caloplaca polycarpoides* frequently occurs together with *Candelariella antennaria* Räsänen on the bark of trunks and twigs of deciduous broad-leaved trees. The species is also known from Iran (Seaward & al. 2004) and Asia (Kondratyuk & al. 2004).

Specimens examined — Armenia: Vayots Dzor Province: road to the village Herher, 39°42'N, 45°31'E, 1414 m, on bark of *Pyrus* sp., 14 Jul 2013, *V-13-7* (B); road to the Noravank Monastery, 39°42'N, 45°12'E, 1227 m, on bark of *Pyrus caucasica* Fed., 14 Jul 2013, *V-13-4* (B) [filed as *Candelariella antennaria*].

Candelariella antennaria Räsänen
Candelariella antennaria has been mistaken in the past for *C. aurella* (Hoffm.) Zahlbr., from which it can be separated most easily by being exclusively corticolous (Westberg & Sohrabi 2012). It was found in Armenia mostly in arid, temperate regions on the bark of trunks and twigs of deciduous broad-leaved trees (see also *Caloplaca polycarpoides*). The species has a wide distribution and is known from North and South America, SW Asia, Australia as well as Europe (Westberg 2007a; Westberg & Sohrabi 2012).

Specimens examined — Armenia: Vayots Dzor Province: road to the village Herher, 39°42'N, 45°31'E, 1414 m, on bark of *Pyrus* sp., 14 Jul 2013, *V-13-7* (B) [filed as *Caloplaca polycarpoides*]; road to the Noravank Monastery, 39°42'N, 45°12'E, 1227 m, on bark of *Pyrus caucasica* Fed., 14 Jul 2013, *V-13-4* (B). — Kotayk Province: Arzakan-Meghradzor State Sanctuary, village Artavaz, 40°36'N 44°34'E, 1754 m, on twig, 28 Apr 2013, *H-13-15* (B).

Candelariella lutella (Vainio) Räsänen
This widespread species was found in the C and N regions of Armenia. It has also been reported from Turkey (Breuss & John 2004), Iran (Westberg & Sohrabi 2012) and the Russian Caucasus (Urbanavichus 2010). The related polysporous species *Candelariella xanthostigma* (Pers. ex Ach.) Lettau is also widely distributed in the temperate deciduous forests in Armenia, but it is easy to distinguish from *C. lutella* by its continuous granular thallus (Westberg 2007b). The identification was confirmed by M. Westberg (Sweden) from a photograph.

Specimens examined — Armenia: Tavush Province: Dilijan National Park, road to the city Dilijan, 40°41'N, 44°51'E, 1669 m, on bark of tree, 25 Aug 2013, *D-13-8* (B); Dilijan National Park, village Aghavnavank, 40°43'N, 45°06'E, 1220 m, on twig, 25 Aug 2013, *D-13-4-1* (B); Dilijan National Park, village Aghavnavank, 40°43'N, 45°06'E, 1144 m, on twig, 25 Aug 2013, *D-13-2* (B). — Kotayk Province: Arzakan-Meghradzor State Sanctuary, road to the village Hankavan, 40°36'N, 44°37'E, 1720 m, on bark of tree, 28 Apr 2013, *H-13-22* (B).

Chaenothecopsis treicheliana (Stein) Kalb
Parasitic or parasymbiontic on *Lecanora* sp. on bark.

Apothecia scattered or in small groups, on the thallus and rarely on the apothecia of the host, short-stalked, 120–200 µm high. Capitulum black, epruinose, lenticular to hemispherical, 100–200 µm in diam. Epithecium indistinct. Hypothecium brown. Excipulum brown, composed of intertwined hyphae. Stalk short, 40–60 µm wide, 50–100 µm high, black above and pale in the lower part, epruinose, in section brownish, paler towards the base. Asci 40–50 × 3–4 µm, cylindrical with a thickened apex penetrated by a blunt canal, widened in mature asci. Ascospores uniseriately arranged in the ascus, obliquely orientated. Ascospores non-septate, greyish brown when young, medium to dark brown when mature, narrowly ellipsoid, minutely verruculose, (4.5–)5.3–6.9(–7.5) × (2.5–)2.6–3.1(–3.5) µm, length/width = (1.5–)1.8–2.5(–3) (no. = 50). All parts of the ascomata K-.

The specimen corresponds well to the protologue given by Stein (Hellwig 1885), who described *Chaenothecopsis treicheliana* as small, capitulum lenticular, up to 200 µm wide, matt black, the stalk whitish, ascospores non-septate, "rauchgrau" (smoky grey), 5–9 × 2–4 µm.

Tibell & Ryman (1995) did not recognize *Chaenothecopsis treicheliana* as a distinct species and presumed it might be a synonym of *C. hospitans* (Th. Fr.) Tibell. However, *C. hospitans* shows a faint K+ reaction of the ascomata, and its stalk and ascospores are distinctly bigger (7.8–9.6 × 3.9–5 µm).

Chaenothecopsis treicheliana was known so far from Poland (Hellwig 1885) and Austria (Kalb 1982; Breuss 1989); it is new to SW Asia.

Specimen examined — Armenia: Tavush Province: Dilijan National Park, road to Lake Parz, 40°45'N, 44°55'E, 1278 m, on *Lecanora* sp. on bark of tree, 25 Aug 2013, *D-13-1-2* (B, herb. IVL 6864).

Cladonia rei Schaerer

TLC: homosekikaic and fumarprotocetraric acids present. Our specimen thus belongs to chemotype I, which is dominant in C Europe (Dolnik & al. 2010). The species has also been reported from Turkey (Yazıcı 2006) and Iran (Ahti & Sohrabi 2006).

Specimen examined — Armenia: Lori Province: Gyulagarak State Sanctuary, road to the village Gargar, 40°55'N, 44°26'E, 1831 m, on stone, 15 Aug 2013, *P-13-3a* (B).

Collema furfuraceum (Arnold) Du Rietz

Specimen examined — Armenia: Kotayk Province: Arzakan-Meghradzor State Sanctuary, village Aghavnadzor, 40°34'N, 44°41'E, 1708 m, on bark of tree, 8 Aug 2013, *H-13-1-1* (B).

Lecania naegelii (Hepp) Diederich & Van den Boom

Specimens examined — Armenia: Tavush Province: Dilijan National Park, road to the city Dilijan, 40°41'N, 44°51'E, 1618 m, on bark of tree, 25 Aug 2013, *D-13-11a* (B); Dilijan National Park, road to Lake Parz, 40°45'N, 44°55'E, 1278 m, on bark of tree, 25 Aug 2013, *D-13-1-9*, *D-13-1-11* & *D-13-1-16* (B).

Lecanora compallens Herk & Aptroot

Specimen examined — Armenia: Tavush Province: Dilijan National Park, road to Lake Parz, 40°45'N, 44°55'E, 1278 m, on bark of tree, 25 Aug 2013, *D-13-1-20* (B).

Lecanora impudens Degel.

Lecanora impudens is very close to *L. allophana* (Ach.) Nyl. and differs by its well-defined, rounded soralia and granular soredia (Ryan & al. 2001). The identification of our specimen is provisional because it lacks ascocarps, but its thallus cortex is K+ yellow. The species has been recorded from Turkey (Güvenç & al. 2006).

Specimen examined — Armenia: Kotayk Province: Arzakan-Meghradzor State Sanctuary, village Arzakan, 40°29'N, 44°36'E, 1667 m, on bark of tree, 3 Aug 2013, *H-13-4-3* (B).

Lecanora thysanophora R. C. Harris

Specimens examined — Armenia: Tavush Province: Dilijan National Park, road to the Haghartsin Monastery, 40°48'N, 44°52'E, 1487 m, on bark of tree, 25 Aug 2013, *D-13-6-2* (B); Dilijan National Park, village Haghartsin, 40°44'N, 44°57'E, 1335 m, on bark of tree, 25 Aug 2013, *D-13-4* (B).

Melanelixia glabratula (Lamy) Sandler & Arup

Specimen examined — Armenia: Tavush Province: Dilijan National Park, village Haghartsin, 40°44'N, 44°57'E, 1343 m, N, bark of tree, 25 Aug 2013, *D-13-2-4*, *D-13-2-8* (B).

Melanelixia subaurifera (Nyl.) O. Blanco & al.

Specimens examined — Armenia: Tavush Province: Dilijan National Park, village Haghartsin, 40°44'N, 44°57'E, 1343 m, on bark of tree, 25 Aug 2013, *D-13-2-8* (B) [filed as *Melanelixia glabratula*]. — Kotayk

Province: Arzakan-Meghradzor State Sanctuary, village Artavaz, 40°36'N, 44°34'E, 1756 m, on bark of tree, 28 Apr 2013, *H-13-7* (B).

Melaspilea ochrothalamia Nyl.
Melaspilea ochrothalamia was collected only in the forests of Dilijan National Park. The species was previously known from Europe (Etayo & al. 1993; Van den Boom & Masselink 1999) and it is new for SW Asia.

Specimens examined — Armenia: Tavush Province: Dilijan National Park, road to the Haghartsin Monastery, 40°48'N, 44°52'E, 1487 m, on bark of tree, 25 Aug 2013, *D-13-6-1* (B); Dilijan National Park, road to Lake Parz, 40°45'N, 44°56'E, 1057 m, on bark of tree, 25 Aug 2013, *D-13-03-06* (B).

Peltigera ponojensis Gyeln.

Specimen examined — Armenia: Lori Province: Gyulagarak State Sanctuary, road to the village Gargar, 40°55'N, 44°26'E, 1831 m, on soil and stone, 15 Aug 2013, *P-13-03* (B).

Pertusaria constricta Erichsen
This species has a restricted range, being found mainly in the European Alps, with a range extension into Turkey and the Caucasus mountains.

Specimen examined — Armenia: Tavush Province: Dilijan National Park, village Haghartsin, 40°44'N, 44°57'E, 1343 m, on bark of tree, 25 Aug 2013, *D-13-2-14* (B).

Punctelia jeckeri (Roum.) Kalb
TLC: atranorin and lecanoric acids present. *Punctelia jeckeri* is new to SW Asia. It has been reported from the Russian Caucasus (Urbanavichus 2010).

Specimen examined — Armenia: Tavush Province: Dilijan National Park, road to the Haghartsin Monastery, 40°48'N, 44°52'E, 1487 m, on bark of tree, 25 Aug 2013, *D-13-06-09a* (B).

Stigmidium congestum (Körb.) Triebel
Stigmidium congestum is a widespread species (Europe, Africa, New Zealand); in Asia it was known until now only from Turkey (Roux & Triebel 1994) and S Siberia (Urbanavichus 2010).

Specimen examined — Armenia: Kotayk Province: Arzakan-Meghradzor State Sanctuary, village Arzakan, 40°29'N, 44°36'E, 1667 m, on *Lecanora chlarotera* Nyl., 3 Aug 2013, *H-13-4-4* (B).

Usnea articulata (L.) Hoffm.
TLC: protocetraric acid present.

Specimen examined — Armenia: Tavush Province: Dilijan National Park, road to the Haghartsin Monastery, 40°48'N, 44°52'E, 1509 m, on bark of tree, 25 Aug 2013, *D-13-7* (B).

Variolaria trachythallina (Erichsen) Lendemer & al.

Specimen examined — Armenia: Tavush Province: Dilijan National Park, road to the Haghartsin Monastery, 40°48'N, 44°52'E, 1487 m, on bark of tree, 25 Aug 2013, *D-13-6-3* (B).

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