



Some lichens from Kashmar, NE Iran

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Abstract: The present paper is based on recent collection of lichens made between 2007-2008 on Kashmar in the central part of the Razavi Khorasan province. A total of 31 taxa of lichens are reported from three localities in the investigated area. Two species are new to Iran, eight species are new to the province.

Keywords: Lichenized fungi, Iran, New record

INTRODUCTION

The current lichen diversity of Iran remained poorly studied until recently (Szatala., 1940, 1957). Iran's first checklist has published in 2004 by Seaward et al. which includes 396 lichenized fungi. Of course in the revised mentioned checklist, 63 species have been recorded from Razavi_Khorasan province so far (Seaward *et al.*, 2008). Although it seems that there is more species in this zone based on the different climate, heights and the substrates. In the course of approach to better result in determination of the lichenized fungi in Razavi Khorasan, Kalate albalou countryside of Kashmar with a surface area of ca. 2/78 km², in the center of the province has been investigated in this study. Only a few data on lichen biodiversity are available for Kashmar (Hadjmoniry *et al.*, 2005). The area is located between 35°20'23.12" N and 58°26'27.2" E (Fig. 1), altitude range from 1380 to 2040 m. At the point of geomorphological, Alkaloid feldspar granite rocks predominated in this area which related to Oligocene period (Aghanabati, 2004). The average annual temperature and humidity are recorded 17/6 and 40% respectively. The vegetation in the area is steppic plants with *Juglans regia* L., the dominant wooden species (Rashed *et al.*, 1982-1987).

The present study which is the first taxonomic investigation of the lichen flora of Kalate albalou, has a primary objective: to provide a floristic account of the lichen and increase our knowledge of lichens in the province.

MATERIALS AND METHODS

During 2007–2008, more than 100 samples were collected from the three localities are listed below in the investigated area by the second author.

1. IRAN: Razavi_Khorasan province, Kashmar, Kalate albalou, 35°20'23.12" N and 58° 27' 45.2" E, 1440 m.

2. IRAN: Razavi_Khorasan province, Kashmar, Kalate albalou, 35°20'23.12" N and 58° 27' 15.2" E, 1560 m.

3. IRAN: Razavi_Khorasan province, Kashmar, Kalate albalou, 35°21'23.12" N and 58°26'27.2" E, 1850 m.

Due to the inadequacy of the literature available for identification about 40 samples could be identified to species level so far. The samples were identified by using anatomical and morphological techniques, usual chemical reagents. The study is based on a comprehensive evaluation of the literature mostly Purvis et al. 1992, Nash et al. 2002 and herbarium specimens. The 4-digit numbers indicate voucher specimens deposited in the first author's lichen collection, duplicated in FUMH⁺ with selected specimens in B.

Taxa reported: The Collection is representative of 31 species, 16 genera, 11 families including two new records to Iran (*) and eight to the province (**).

***Acarospora anatolica* H. Magn.

Thallus squamulose, *apothecium* usually less; *disc* 0.1–0.25 μm diam; *hymenium* 120–135 μm tall, upper part yellow-brown; *paraphyses* 0.1–1.5 μm thick; colorless; *asci* more than 200-spored, clavate, 95-110 × 17-20 μm; *ascospores* sometimes ellipsoid 3-5 × 2 μm.

Specimen Examined: 1: on Alkaloid feldspar granite rock, 2007, # 2043.

Acarospora bullata Anzi

Thallus crustose, pale brown, reddish-brown to dark brown, epruinose, orbicular, distinctly lobate at periphery, marginal lobes 1–2 mm long, 1 mm wide, at center rimulose-areolate; *apothecium* sunken in central areoles; *ascospores* ellipsoid, 3–4(-5) × 1.7 μm.

Specimen Examined: 1: on Alkaloid feldspar granite rock, 2007, # 2044.

Acarospora strigata (Nyl.) Jatta

Thallus squamulose, cracked-areolate, ± white or blue

⁺Ferdosi University Mashhad Herbarium

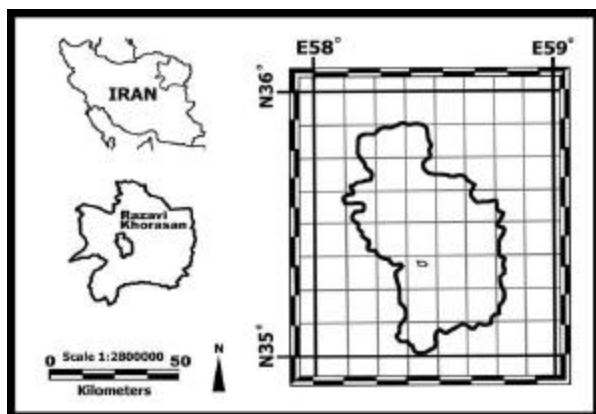


Fig. 1. Geomorphological area of Iran.

pruinose, *apothecium* scarce, 1–1.5 mm diam, 100–120 (–140) μm high; *asci* 100–200 spored, *ascospores* clavate, 3–4.5 \times 2–2.5 μm .

Specimen Examined: –2: on Alkaloid feldspar granite rock, 2007, # 2046.

***Aspicilia calcarea* (L.) Körb.**

Thallus crustose, rather thick, continuous or usually cracked-areolate, chalky or grey-white, more infrequently grayish; *ascomata* apothecia; *apothecium* \pm immersed, rounded or angular; *disc* black, not or slightly white-pruinose; *asci* 4-spored; *ascospores* 18–30 \times 14–27 μm , broadly ellipsoid to subglobose, with a thin perispore.

Specimen Examined: –3: on Alkaloid feldspar granite rock, 2008, # 2047.

***Aspicilia desertorum* (Krempelh.) Mereschk.**

Thallus crustose, thick to very thick, to 5 mm thick, light to dark-brown, muddy yellow, blackish olive, or rusty red, areolate; *apothecium* numerous, immersed, 1–4(10) per areole, large, (0.5)1–3.5(5.5–7) mm wide, rounded, older one usually shapeless, often bent; *disc* black, matt, bare, or finely white-pruinose, concave then flat or with flexuose surface; *asci* 1–4 spored; *ascospores* uniseriate, almost globose (31)15–22(28) μm .

Specimen Examined: –3: on Alkaloid feldspar granite rock, 2008, # 2048.

*****Aspicilia oxneriana* O.B. Blum**

Thallus foliose, monophylous, yellowish-olive, yellowish-brownish, or brownish-yellow above, lower surface of the thallus light brownish-yellow, smooth, sometimes with small pits, mostly in the center; *apothecium* numerous, 1–4(5) per areole, at first immersed, later emergent; *disc* black or blackish-brown, densely whitish pruinose, often cracked, rounded, at first concave, later flat to convex; *asci* cylindrical-clavate, (1)3–4(8)-spored; *ascospores* (16)21–29(31) μm , globose.

Specimen Examined: –3: on Alkaloid feldspar granite rock, 2008, # 2049.

***Caloplaca biatorina* (A. Massal.) J. Steiner**

Thallus crustose, lobed, yellow, orang-red, isidia and



Fig. 2. Thallus of *Caloplaca microthalina* (Wedd.) Zahlbr.

soredia absent, 1–1.5 wide; *ascomata* apothecia, *apothecium* lecanorine; *paraphyses* often swollen; *ascospores* 9–5 \times 16–9 μm , ellipsoid.

Specimen Examined: –2: on Alkaloid feldspar granite rock, 2007, # 2050.

****Caloplaca microthalina* (Wedd.) Zahlbr. (Fig. 2)**

Thallus of contiguous or often \pm scattered, small, individual microsquamules, yellowish orange; *ascomata* apothecia; *apothecium* to 1 mm diam, yellow-orange, at first, reduced or \pm crenulate when mature; *paraphyses* often with apical cell swollen; *ascospores* 12–15 \times 6–8 μm , ellipsoid, septum (1–)3 μm wide.

Specimens Examined: –2: on Alkaloid feldspar granite rock, 2007, # 2051, 2153.

*****Caloplaca variabilis* (Pers.) Müll. Arg.**

Thallus crustose, gery to deep grey or grayish brown; *apothecium* black, to 1 mm diam, scattered to crowded, \pm sessile, flat, becoming slightly convex; *epithecium* pale; *paraphyses* broadening and becoming rather stout towards the tips; *ascospores* 14–16 (–21) \times 7–9 μm , ellipsoid, septum 2–3(–5) μm wide.

Specimens Examined: –1: on Alkaloid feldspar granite rock, 2007, # 2052, 2074

***Candelariella aurella* (Hoffm.) Zahlbr.**

Thallus of scattered, yellow, to green- yellow, convex granules; *ascomata* apothecia; *apothecium* discrete, \pm regularly dispersed, yellow; *asci* 8-spored; *ascospores* 10–18 \times 5–6 μm , oblong, ellipsoid, straight or curved.

Specimen Examined: –3: on Alkaloid feldspar granite rock, 2008, # 2053.

****Candelariella medians* (Nyl.) A. L. Sm. (Fig. 3)**

Thallus placodioid, orbicular, radiating, yellow, citrine or grey- green yellow, the centre granular-areolate to minutely coralloid-isidiat; *apothecium* small, 0.3–1.2 mm diam, occasional, dull yellow, flat to slightly convex with a smooth to crenulate margin; *asci* 8-spored; *ascospores* 11–17 \times 4–6 μm , simple, occasionally 1-septate, rather variable, ellipsoid, oblong, tear-drop or slipper-shaped.

Specimens Examined: –2: on Alkaloid feldspar granite



Fig. 3. *Thallus* of *Candelariella medians* (Nyl.) A. L. Sm.

rock, 2007, # 2054, 2256, 2383.

*****Candelariella vitellina*** (Hoffm.) Müll. Arg.

Thallus yellow, orang to brown-orang, continuous and coarsely cracked or in scattered patches, usually rather thick, composed of nodular or squamulose granules; *apothecium* frequent, 0.5–1.5 mm diam, flat, margin prominent, persistent, smooth to crenulate; *disc* grayish yello, sometimes darkening when old; *asci* (12-)16- to 32-spored; *ascospores* 9–15 × 3.0–6.5 µm, simple to weakly 1-septat.

Specimen Examined: –3: on Alkaloid feldspar granite rock, 2008, # 2055.

Dermatocarpon miniatum (L.) W. Mann

Thallus foliose, single-lobed and attached to substratum by a usually central holdfast, or multi-lobed; *upper surface* reddish brown to grey-brown, grey-white pruinose; *lower surface* pale tan-brown, smooth or warted; *ascmata* perithecia; *asci* 50–67 × 9–12 µm, cylindrical; *ascospores* (8-)9–12(-14) × (4.5)5–6(-7) µm, ellipsoid or ovoid-ellipsoid.

Specimens Examined: –3: on Alkaloid feldspar granite rock, 2008, # 2056, 2082.

Dimelaena oreina (Ach.) Norman

Thallus thin to thick, placodioid, with radiate-plicate marginal lobes, areolate towards the center; surface greenish yellow due to usnic acid in the cortex; *ascmata* apothecia; *apothecium* black, lecanorine, innate or more usually adnate; *disc* black or or sometimes white-pruinose, plane to slightly convex; *asci* cylindrical, 8-spored; *ascospores* brown, 1-septat, 9–13 × 5–7 µm.

Specimen Examined: –2: on Alkaloid feldspar granite rock, 2007, # 2057.

Glypholecia scabra (Pers.) Müll. Arg.

Thallus foliose and umbilicate, white to gray, areolate; *apothecium* brown, sunken in the thallus; *asci* more than 8-spored; *ascospores* simple.

Specimens Examined: –1: on Alkaloid feldspar granite rock, 2007, # 2058, 2080.

Lecanora crenulata Hook

Thallus usually immersed and inconspicuous, more rarely areolate, pale grey; *ascmata* apothecia; *apothecium* constricted at the base slightly raised, often in small groups and then becoming angular by compression; *thalline exciple* well developed, persistent, white, regularly deeply crenate with 5–8 segments, *discs* rather variable in colour, reddish brown to yellowish or brownish-black, grey or blue-grey-pruinose; *epithecium* brownish or blue; *hymenium* 55–70 µm, yellow-brown above; *paraphyese* sparsely branched, apices capitate, the terminal cell brownish and swollen; *ascospores* 6–10(-15.5) × (4-)4.5–6(-7) µm.

Specimen Examined: –2: on Alkaloid feldspar granite rock, 2007, # 2059.

*****Lecanora dispersa*** (L.) Sommerf.

Thallus immersed or sometime consisting of scattered granules, white to pale grey; *apothecium* sessile, constricted below, *thalline exciple* well developed, persistent, entire to crenulate to contorted or flexuose; *discs* very variable in colour, pinkish brown to olivaceous brown, or pale yellowish or greenish grey, sometime white-pruinose; *epithecium* pale yellowish brown or brownish; *hypothecium* sometimes brownish; *paraphyese* branched, *asci* broadly clavate, short-stalked. *ascospores* (7-)8.5–14 × (3-)4–7 µm.

Specimen Examined: –3: on Alkaloid feldspar granite rock, 2008, # 2060.

Lecanora garovaglii (Körb.) Zahlbr

Thallus placodioid, 4–6 cm or more in diam, 0.5–2(3)mm thick in centre, distinctly rosetted, the lobe tips and occasionally edges frequently dark olivaceous to bluish black; *areoles* contiguous, irregular; *upper cortex* without dead algal cells, 15–50 µm thick; medulla whitish, or darkening towards lower side, very loose, becoming hollow in center; *lower surface* pale grey and arachnoid, or towards edges and tips smooth and strong to dark grayish to yellowish brown or green to black; *lowr cortex* 8–18 µm thick, ± continuous; *apothecium* scattered, to crowded towards thallus centre, *asci* narrowly clavate, 8-spored; *ascospores* hyaline, simple, ellipsoid to broadly ellipsoid or ovoid-globose, 8–12 × 5–6(7) µm.

Specimens Examined: –1: on Alkaloid feldspar granite rock, 2007, # 2061, 2081.

Lecanora muralis (Schreb.) Rabenh.

Thallus placodioid, rosettes, marginal lobes flat to concave; thallus centre sometimes areolate, greenish yellow to yellow brown, *apothecium* sessile, densely aggregated in the centre of the thallus; *thalline exciple* well developed, entire to crenulate or flexuose; *disc* yellow-brown to reddish brown, flat to slightly convex, not pruinose; *epithecium* pale yellowish or brownish; *paraphyese* mainly simple or sparsely branched above, apices not swollen or capitate; *asci* 30–40 × 8–12 µm; *ascospores* 9–15(-16) × (4-)5–7 µm.

Specimens Examined: -1: on Alkaloid feldspar granite rock, 2007, # 2062, 2084.

*****Lecidea tessellate*** Flörke

Thallus crustose, usually well developed, ± regular areolate to rimose-areolate, whitish grey to pale bluish grey, esorediate; *prothallus* black, obvious at the margin of the thalli or indistinct or lacking; *ascomata* apothecia; *apothecium* black, singular or in sometimes large and dense groups; *asci* clavate, 8-spored; *ascospores* hyaline, simple, broadly ellipsoid to oblong-ellipsoid.

Specimen Examined: -3: on Alkaloid feldspar granite rock, 2008, # 2063.

Lecidella carpathica Körb.

Thallus verrucose, usually well developed, white or pale to dark grey; *apothecium* immersed, at first flat, later becoming ± convex; *epithecium* partly greenish black, brownish tinged; *hypothecium* semi-opaque, bright red-brown; *ascospores* 10–16 × 6–8.5 µm.

Specimens Examined: -2, 1560 m, on Alkaloid feldspar granite rock, 2007, # 2064, 2083.

Psora decipiens (Hedw.) Hoffm.

Thallus squamulose, sometimes overlapping, adpressed, bright pink-red-brown, epruinose or partly white-pruinose, *apothecium* sessile, marginal, black, epruinose or ± white-yellow-pruinose; *ascospores* 11–18 × 6–8 µm.

Specimen Examined: -2: Alkaloid feldspar granite rock, 2007, # 2065.

Rhizocarpon geminatum Körb.

Thallus crustose; rounded, flat to convex gray areolate; on black prothallus which is visible among the areoles and sometimes at the margin of thallus. *apothecium* between or on thallus areoles; *disc* convex, black, epruinose. *asci* 2-spored; *ascospores* dark greenish brown, strongly muriform.

Specimens Examined: -3: Alkaloid feldspar granite rock, 2008, # 2066.

Rhizocarpon geographicum (L.) DC.

Thallus crustose, with angular, flat to convex scattered areoles; on or among a conspicuous black prothallus that is also visible at the margin of the thallus; surface yellow-green or bright yellow. *Apothecium* between areoles; *disc* round or angular, flat to slightly convex, black, epruinose. *asci* clavate, 8-spored; *ascospores* (20-)22-40(-46) × 10-19(-22) µm, dark greenish brown-black, moriform.

Specimen Examined: -3: Alkaloid feldspar granite rock, 2008, # 2067.

Rhizocarpon viridiatrum (Wulfen) Körb.

Thallus crustose; convex areolate; lichenicolous, surface matt, bright green; conspicuous prothallus. *apothecium* relatively large, on or between areoles; *disc* black, convex, rounded, epruinose; *asci* clavate, 8-spored; *ascospores* 12–24 × 7–13 µm, dark brown, moriform.

Specimen Examined: -3: Alkaloid feldspar granite rock, 2008, # 2068.

Rhizoplaca melanophthalma (Ramond) Leuckert & poelt
Thallus mostly 0.5–1.5 (-2.5) cm across, polyohyllous and often appearing squamulose or pulvinate; *upper surface* dull to shiny, occasionally ± pruinose, usually light to moderate greenish yellow; *lower surface* blue-black near edges, usually continuous, smooth to uneven or roughened; *ascomata* apothecia; *apothecium* immersed then sessile; *disc* concave to plane or undulate, yellowish brown to moderate brown, olive, or greenish to bluish black, epruinose or weakly to densely pruinose; *ascospores* ± ellipsoid to subglobose but rather variable in size and shape.

Specimen Examined: -2: Alkaloid feldspar granite rock, 2007, # 2069.

*****Rhizoplaca peltata*** (Ramond) Leuckert & poelt

Thallus to 3 cm across, distinctly umbilicate, usually monophyllous but sometimes strongly lobed; *upper surface* ± pale greenish yellow to yellow, continuous to strongly rimose, epruinose to partly pruinose, matt or slightly nitid, edges concolorous or blackened, sometime with thallospores; *lower surface* ± yellowish brown, to bluish black near edges, smooth to uneven, ± strongly cracked towards centre, with medulla showing through; *apothecium* usually common, to 2–3 mm diam, long remaining immersed to broadly adnate or at least adnate; *disc* concave then plane or sometimes convex, epruinose, orangish yellow to yellowish or reddish brown; *ascospores* ellipsoid to subglobose, 9–12 × 5–8 µm.

Specimen Examined: -3: Alkaloid feldspar granite rock, 2008, # 2070.

Toninia candida (Weber) Th. Fr.

Thallus squamulose; rosulate, marginal squamules weakly concave to weakly convex, forming more or less radiating lobes; *apothecium* up to 2 mm diam, weakly concave to weakly convex, persistently marginate, densely pruinose; *hypothecium* medium brown to dark reddish brown in upper part, paler in lower part; *hymenium* 60–70 µm high; *epithecium* gery; *ascospores* fusiform, 1-septate, 15–24 × 3–4 µm.

Specimen Examined: -3: Alkaloid feldspar granite rock, 2008, # 2071.

Toninia diffracta (A. Massal.) Zahlbr.

Thallus squamulose; *upper surface* grey, densely white-pruinose or more rarely partly not pruinose; *apothecium* black, weakly concave to weakly convex; *epithecium* grey; *hymenium* colourless to pale brown; *hypothecium* lower part brown, upper part dark brown, *ascospores* 14–20 × 3–5 µm, 1-septate, fusiform.

Specimen Examined: -3: Alkaloid feldspar granite rock, 2008, # 2072.

*****Verrucaria lecideoides*** Trevis.

Thallus cracked-areolate, gery to greyish brown; *prothallus* present or absent; algal layer 5–20 µm thick; *ascomata* perithecia; *perithecium* 1-2 per areole;

ascospores 5–9 × 14–20 µm

Specimen Examined: –3: Alkaloid feldspar granite rock, 2008, # 2073.

Xanthoria elegans (Link.) Th. Fr.

Thallus to 4 cm, forming ± regular pale orange to reddish orange rosettes; lobes ± uniformly 0.5–1 mm wide throughout their length, ± nodulose, contiguous or ± overlapping at centre, markedly plicate, strongly convex; *apothecium* usually abundant throughout the central area of thallus, with persistent thalline exciple; *ascospores* (9–)11 × 5–7(–9) µm, ellipsoid or ovoid.

Specimen Examined: –3: Alkaloid feldspar granite rock, 2008, # 2075.

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