



Notes on the lichen genus *Lecania* (Ramalinaceae) in Iran, with the description of a new *Arthonia* species (Arthoniaceae)

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With 3 figures

Abstract: Based on an examination of 40, mostly recent, *Lecania* specimens from Iran and a study of the literature, 17 species are accepted for the country. A key is provided and, for each species, a short description and notes are given. The poorly understood names *Lecania brachyspora* and *L. rechingiana* were revised and turned out to be synonyms of *Lecania polycycla* and *Lecidea varians*, respectively. Two undescribed species were discovered: the lichenicolous *Arthonia lecaniicola* and the saxicolous *Lecania triseptatoides*. Formal descriptions for both are provided. *Lecidea varians* is newly recorded from Iran.

Key words: crustose lichens, checklist, taxonomy, ecology, biodiversity.

Introduction

Lecania is a genus of inconspicuous, although not necessarily, small micro lichens belonging to the family Ramalinaceae. Its taxonomy is not as well understood as might be expected in view of the frequency of some of the species in temperate Europe, but is receiving increasing attention in recent decades. Mayrhofer (1988) revised the saxicolous species occurring in Europe, whereas the saxicolous *Lecania* species in the Benelux were treated by van den Boom (1992). Further recent treatments have become available for the species in, e.g., the Sonoran Desert area (van den Boom & Ryan 2004) and Great Britain (Fletcher et al. 2009).

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A phylogenetic study by Reese Naesborg et al. (2007) confirmed the inclusion of *Lecania* in Ramalinaceae but found that the genus is not monophyletic. A detail study of the core group, the *L. cyrtella* group (Reese Naesborg 2008), demonstrated a need for considerable taxonomic modifications at species level. Also Kondratyuk et al. (2014) discussed the taxonomy of the genus and proposed a new genus, *Oxnerella*, for a species fitting in *Lecania* on morphological grounds but not supported as such by DNA. Resl et al. (2016), however, found a phylogenetic affinity of *Oxnerella* with *Rinodina*, but with much uncertainty.

The semi-desert areas of SE Europe and SW Asia have attracted the attention of lichenologists due to their unusual *Lecania* species. *Lecania ephedrae* Elenkin was described from the Ukrainian steppe (Elenkin 1905), *L. sipmanii* was discovered on willows along the Euphrat, in Syria (van den Boom & Zedda 2000) and *Lecania makarevicziae* M.Haji Moniri et al. was discovered recently in Iran (Haji Moniri et al. 2016). Thus the availability of a reasonable set of specimens from Iran was a welcome opportunity to study the diversity of *Lecania* of this part of the world in more detail.

The first survey of *Lecania* species for Iran was provided by Szatala (1957) who treated eight species and offered a key. The treatment of the genus for the former Soviet Union (Makarevich 1971) mentions only one species from Iran, *L. ochronigra*. Since then Sohrabi & Alstrup (2007) recorded one additional species, *L. dubitans*, and Sohrabi & Sipman (2007) three additional species, namely *L. fuscella*, *L. triseptata* and *L. turicensis*. The checklist of lichens and lichenicolous fungi of Iran (Seaward et al. 2008) listed eleven species. Most recently, Haji Moniri et al. (2014) reported six species and Haji Moniri et al. (2016) described the new species *Lecania makarevicziae*. Thus all together eighteen different *Lecania* species were reported so far from Iran. In the presented study, one additional species, *Lecania triseptatoides* van den Boom & M.Haji Moniri, and one lichenicolous fungus on *Lecania*, *Arthonia lecaniicola* van den Boom & M.Haji Moniri, are described. Sixteen further *Lecania* species are accepted as occurring in Iran. The poorly understood names *Lecania brachyspora* and *L. rechingiana* are revised. For all accepted species short descriptions are presented. A key is provided to the *Lecania* and *Oxnerella* species known from Iran, it also includes additional species known from neighbouring countries, that can be expected in Iran.

Study area

Iran is a large country in SW Asia, covering ca. 1.6 million km². It is situated between 25–39°N and 44–61°E and is bordered in the north by the Caspian Sea and in the south by the Persian Gulf and the Gulf of Oman. With some exceptions, it has a very dry climate with hot summers, which are hardly tempered by the high mean elevation of the country, large parts being situated well over 1000 m. Much of the country is covered by desert and steppe. Even the mountains, which reach to over 5000 m and receive snow in winter, are mostly covered by steppe. More humid, wooded areas are found mainly on the N-side of the mountains along the Caspian coast and in the mountains in the west and northwest (Keihan 1931). The genus *Lecania* can be expected to have a considerable diversity in Iran because it is known to occur also in dry and hot areas (e.g., the Sonoran Desert, van den Boom & Ryan 2004). However, so far only very limited parts of Iran have been explored lichenologically.

Material and methods

Forty specimens of *Lecania* from Iran were examined. Most were collected by the second author in 12 localities in the north-eastern part of Iran. Voucher specimens are kept in the herbarium of M.Haji Moniri (abbreviated as 'Hm') with some duplicates in the private herbarium of P. van den Boom (hb. v.d. Boom). Eleven additional Iranian specimens from B were included.

The specimens were examined in the usual way with stereomicroscope and compound microscope. Sections were mounted in tap water and stained with Lugol solution. The standard spot tests were used for study of the chemistry and all material in this study reacts negative. No TLC was done, because the species found in Iran are known to contain no lichen substances (van den Boom & Ryan 2004, Reese Naesborg 2008, Fletcher et al. 2009). Epithecium and sometimes the hymenium contain a red-brown or brown pigment that reacts K+ reddish.

New species

Arthonia lecaniicola van den Boom & M.Haji Moniri **sp. nov.**

Figs 1, 2

Mycobank No.: MB 823748

DIAGNOSIS: Lichenicolous fungus producing dark brown ascomata in the hymenia of *Lecania triseptata* (Vain.) Zahlbr.; apothecia 0.15–0.7 mm diam., dark brown to black; disc plane or somewhat convex; hypothecium hyaline; epithecium pale to medium brown, or olive-brown, without crystals, K-; paraphysoids abundant, branched and sometimes anastomosing, 2–3.5 µm wide; asci 8-spored, 45–65 × 20–27 µm, ascospores 1-septate, ellipsoid to often slightly clavate, hyaline, 14–22 × 5–8 µm, with slightly wider upper locule.

TYPE: IRAN, Golestan, GORGAN DISTRICT, Shah Kuh-e-Bala, c. 33 km S of Gorgan, along minor road to Shahrud, 36°33.69'N, 5°33.68'E, alt. 2600 m, 28 October 2007, leg. H.Sipman 55273, M.Sohrabi, U.Søchting & R.Zare (holotype, B; isotype, IRAN, hb v.d. Boom).

DESCRIPTION: Lichenicolous, non-lichenized fungus without visible thallus, not gall inducing, producing ascocarps in the hymenium of *Lecania triseptata*. Apothecia abundant, the actual apothecia evidently filling the host discs immarginate, epruinose, somewhat darkening the host disc, 0.15–0.7 mm diam.; hypothecium hyaline; epithecium pale to medium brown or olive-brown, without crystals, K- (brown colour becoming paler or disappearing), KI-; hymenium 65–80 µm high, hyaline, KI-; subhymenium thin, hyaline; paraphysoids abundant, branched and sometimes anastomosing, 2–3.5 µm wide, tips not distinctly or slightly widened, up to 3–4.5 µm wide, hyaline to sometimes pale brownish or with an olivaceous tinge; asci broadly clavate to subspherical, 8-spored, 45–65 × 20–27 µm, with a thick apical wall and a wide ocular chamber, KI- to sometimes KI+ very pale bluish; ascus wall KI-; ascospores ellipsoid to often slightly clavate, hyaline, not turning grey when old, 1-septate, 14–22 × 5–8 µm, with equal locules or the upper locule slightly wider, with a thin episporic I+ red, c. 0.5 µm thick, not darkening when degenerating. Pycnidia not observed.

ETYMOLOGY: The new species forms a dark brown spot on the apothecium discs of *Lecania triseptata*, mostly covering it completely.

DISTRIBUTION AND ECOLOGY: Known only from the type locality in Iran. It was found lichenicolous on apothecia of *Lecania triseptata* growing on wood of *Juniperus excelsa*.

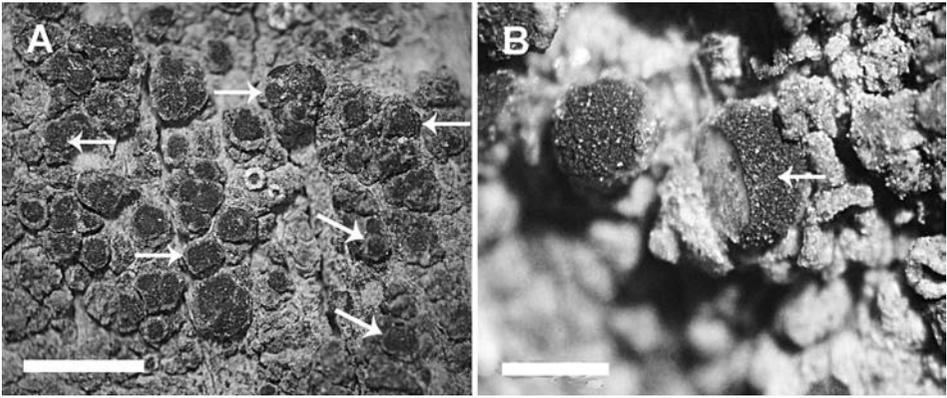


Fig. 1. *Arthonia lecaniicola* holotype. A. habitus; B. section through infested host apothecium. Scale: A = 2 mm; B = 0.5 mm. Note that the apothecia of *Lecania triseptata* are intermixed with those who are infested by the new *Arthonia* (see arrows).

NOTES: The new species is very easily overlooked and mistaken for the hymenium of *Lecania*, even the bicellular ascospores are *Lecania*-like. The *Arthonia* replaces the host hymenium. However, the ascus shape, iodine reaction and branched paraphysoids are very different. It is impossible to recognize the new species without making a section through the apothecium. According to Lawrey & Diederich (2017), no lichenicolous *Arthonia* species is known from *Lecania* species. *Arthonia clemens* (Tul.) Th. Fr. shows some similarities due to its 1-septate, hyaline ascospores and a hyaline hypothecium. However, its ascospores of c. $9\text{--}15 \times 3\text{--}5 \mu\text{m}$ (Clauzade et al. 1989) are clearly smaller than in the new species and it grows on apothecia of *Lecanora* spp. Another similar species, *Arthonia apotheciorum* (A. Massal.) Almq., deviates equally by its smaller ascospores of $9\text{--}15 \times 3\text{--}5 \mu\text{m}$, and is known only from members of the *Myriolecis dispersa* group (Coppins & Aptroot 2009).

The host of *A. lecaniicola*, *Lecania triseptata*, is known to grow lichenicolous on *Caloplaca* species of the *C. polycarpoides* group (Steiner & Poelt 1987), at least when young. However, in the type specimen of *A. lecaniicola*, the *C. polycarpoides* group is in small fragments present only and the most evidently associated lichen is a *Myriolecis* sp.

***Lecania triseptatoides* van den Boom & M.Haji Moniri sp. nov.**

Fig. 3

Mycobank No.: MB 823749

DIAGNOSIS. – Thallus saxicolous, thin, grey-brown, areolate; areoles 0.5–2 mm wide; apothecia often crowded, 1–6 per areole, lecanorine, sessile to slightly stalked, up to 0.4–0.8 mm in diam., excipulum with prosoplectenchymatous hyphae; epithecium violet-brown; hypothecium hyaline; paraphyses not conglutinated, apices up to 9 μm wide, dark-brown pigmented; asci clavate, $35\text{--}50 \times 14\text{--}17 \mu\text{m}$, *Bacidia*-type, 8-spored; ascospores 3-septate, straight to curved, $12\text{--}18 \times 5\text{--}6 \mu\text{m}$.

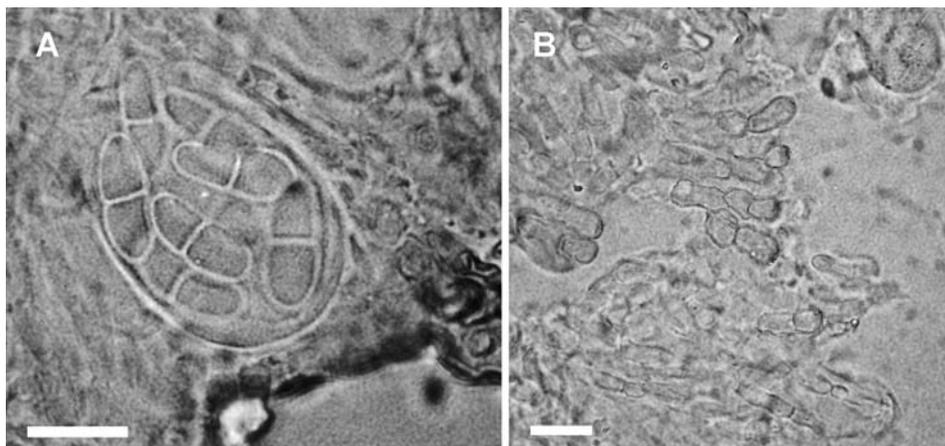


Fig. 2. *Arthonia lecaniicola* holotype. A. ascus with ascospores; B. paraphysoids. Scale: A = 20 μ m; B = 10 μ m.

TYPE: IRAN, TEHRAN PROVINCE, 7 km NE Damavand, Rooh-afza, 35°43'58"N, 52°05'30"E, alt. 2000 m, 5 September 2015, leg. F.Hosseini s.n. (holotype, B).

DESCRIPTION: Thallus saxicolous, thin, areolate; areoles 0.5–2 mm, upper surface uneven, not corticated, pale brown to grey-brown, matt; apothecia often crowded, 1–6 per areole, lecanorine, sessile to slightly stalked, up to 0.4–0.8 mm in diam.; margin pale grey or brownish grey, up to 50 μ m wide, becoming nearly excluded when old; disc medium brown to dark brown, epruinose, plane to slightly convex; excipulum with prosoplectenchymatous, hyphae, lumina c. 2–2.5 μ m wide, dark brown pigmented at the outer edge; epithecium violet-brown, epipsamma not present, K- or K+ dark brown; hypothecium hyaline, hyphae intricate; paraphyses not conglutinated, simple to often branched in upper part, often constricted at septa in upper part, (1.5–)2–2.5 μ m wide, apices up to 9 μ m wide, dark brown pigmented; asci clavate, 35–50 \times 14–17 μ m, *Bacidia*-type, 8-spored; ascospores 3-septate, straight to curved, sometimes slightly constricted at septa, 12–18 \times 5–6 μ m; pycnidia not observed. Spot test all negative. Secondary metabolites none detected.

ETYMOLOGY: The epithet refers to the similarity of the species to *Lecania triseptata*.

DISTRIBUTION AND ECOLOGY: Known only from the type locality in Iran. Growing on calcareous rock, associated with *Acarospora* sp. and *Lecanora* sp.

NOTES: *Lecania triseptatoides* is most similar to *L. triseptata*, a lichenicolous species on corticolous *Caloplaca* species, at least when young (Steiner & Poelt 1987). In our specimen no *Caloplaca* is present, and *L. triseptatoides* grows directly on calcareous rock together with *Acarospora* sp. and *Lecanora* sp. It further differs because a thallus like in *L. triseptata* is lacking and the apothecia have a more brownish tinge instead of blackish brown as in *L. triseptata*. The excipulum of the new species contains prosoplectenchymatous hyphae which are rather loose, instead of conglutinated

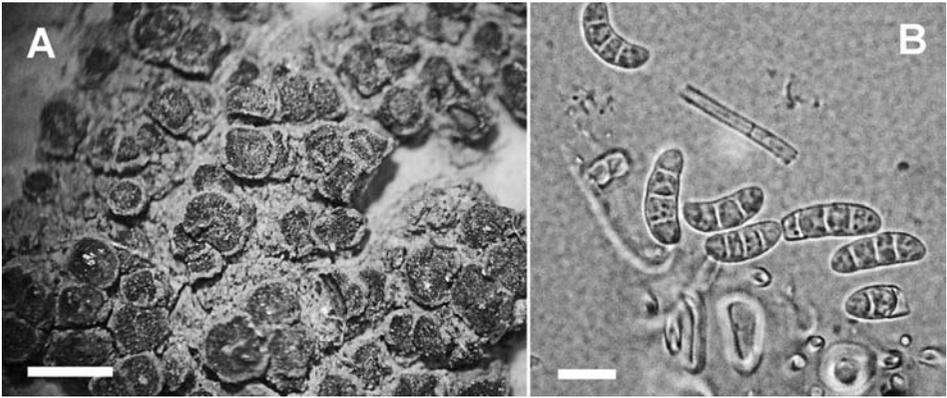


Fig. 3. *Lecania triseptatoides* holotype. A. habitus; B. ascospores. Scale: A = 1 mm; B = 10 μ m.

paraplectenchymatous cells as in *L. triseptata*. The ascospores in *L. triseptata* are 3.5–5.5 μ m wide and in the new species 5–6 μ m. *L. nylanderiana* var. *ochracea* has rather similar ascospores but differs in having an ochraceous thallus and adnate, pruinose apothecia up to 1 mm diam. (Szatala 1940).

Key to the *Lecania* species in Iran and surroundings

Three further species known from neighbouring countries, which can be expected in Iran, are included in this key without further treatment: *Lecania erysibe* (Ach.) Mudd, *L. ferganae* Oxner and *L. sipmanii* van den Boom & Zedda. The *Lecania*-like *Oxnerella safavidiorum* is also keyed out.

- | | | |
|---|--|--------------------------|
| 1 | Ascospores (1–)3(or more)-septate | 2 |
| 1 | Ascospores (0–)1-septate | 10 |
| 2 | Thallus saxicolous | 3 |
| 2 | Thallus corticolous, lignicolous or lichenicolous | 4 |
| 3 | Ascospores fusiform, straight; paraphyses conglutinated, simple or sparingly branched, apices up to 5 μ m wide | <i>L. nylanderiana</i> |
| 3 | Ascospores elongate, often curved; paraphyses not conglutinated, simple or branched in upper part, apices up to 9 μ m wide | <i>L. triseptatoides</i> |
| 4 | Thallus lichenicolous | 5 |
| 4 | Thallus corticolous or lignicolous | 6 |
| 5 | Thallus lichenicolous on <i>Caloplaca polycarpoides</i> or <i>C. lobulata</i> , at least when young | <i>L. triseptata</i> |
| 5 | Thallus lichenicolous on calcicolous <i>Placidium</i> sp. | <i>L. ferganae</i> |
| 6 | Apothecia white-pruinose; thalline margin relatively thick | 7 |
| 6 | Apothecia epruinose; thalline margin thin or inconspicuous | 9 |
| 7 | Apothecia up to 0.8 mm diam.; asci 8–16-spored | <i>L. fuscella</i> |
| 7 | Apothecia up to 1.5(–2.5) mm diam.; asci 8-spored | 8 |

8	Thallus warted; apothecia up to 1.5 mm diam.; ascospores 15–18 × 4.5–5.5 μm, 3-septate	<i>L. makarevicziae</i>
8	Thallus smooth to slightly uneven; apothecia (0.5–)0.7–1.6(–2.5) mm in diam.; ascospores 14–28 × 2.5–3 μm, 3–5-septate	<i>L. ephedrae</i>
9	Thallus granular; ascospores 14–28 × 2.5–3 μm, 3–5-septate.....	<i>L. subfuscula</i>
9	Thallus smooth; ascospores 12–15 × 4–5 μm, 3-septate	<i>L. koerberiana</i>
10	Thallus saxicolous	11
10	Thallus corticolous	18
11	Thallus blastidiate.....	<i>L. erysibe</i>
11	Thallus lacking blastidia.....	12
12	Ascospores ellipsoid, not constricted at septum.....	13
12	Ascospores constricted at septum, with globose cells.....	15
13	Thallus warted; apothecia plane, epruinose, 0.3–0.5 mm diam.....	<i>L. inundata</i>
13	Thallus areolate; apothecia convex, often pruinose, up to 0.8 mm diam.....	14
14	Thallus relatively thick; apothecia slightly white-pruinose.....	<i>L. turicensis</i>
14	Thallus thin; apothecia heavily white-pruinose.....	<i>L. subcaesia</i>
15	Thallus mainly ochraceous; apothecia slightly white or bluish pruinose.....	16
15	Thallus mainly grey-brown to dark brown; apothecia epruinose	17
16	Apothecia immersed in thallus, mainly slightly white pruinose	<i>L. ochronigra</i>
16	Apothecia sessile, mainly bluish pruinose.....	<i>Oxnerella safavidiorum</i>
17	Apothecia dark brown-black; ascospores 4.5–5.5 μm wide; paraphyses often branched.....	<i>L. polycycla</i>
17	Apothecia reddish brown to black; ascospores 5.5–7.5 μm wide; paraphyses mostly simple	<i>L. flavescens</i>
18	Ascospores strongly constricted at septum.....	19
18	Ascospores not constricted at septum.....	20
19	Thallus lichenicolous on <i>Caloplaca</i> ; areoles flat.....	<i>L. bullata</i>
19	Thallus corticolous; areoles verrucose.....	<i>L. sipmanii</i>
20	Ascospores curved.....	<i>L. dubitans</i>
20	Ascospores straight.....	<i>L. cyrtella</i>

Annotated species list

***Lecania bullata* Oxner**

Journ. Inst. Bot. Acad. Sci. R. S. S. Ukraine 20 (28): 122 (1939).

SYNONYM: *Lecania diplococca* M.Steiner & Poelt

DIAGNOSTIC CHARACTERS: Thallus corticolous, thin, areolate; areoles 0.2–0.3 mm wide, flat, whitish to dusty whitish, often invisible, growing on *Caloplaca polycarpoides* and *C. holocarpa* agg.; apothecia 0.3–0.5 mm in diam., sessile, dispersed; disc flat to slightly convex, blackish brown to black; margin light grey; epithecium reddish brown; paraphyses not conglutinated, simple, with swollen apical cells up to 5(–6) μm wide, brown-walled; asci 8-spored; ascospores 1-septate, strongly constricted at the septum (diplococcoid), 8–11(–12) × 4.5–6 μm.

NOTES: Reported before by Haji Moniri et al. (2014) as *Lecania diplococca* M.Steiner & Poelt. For further notes see van den Boom & Khodosovtsev (2004), who synonymized *Lecania diplococca*.

SPECIMENS EXAMINED: NORTHERN KHORASAN PROVINCE. 10 km route of Bojnurd-Esfarāyen, Gharebashlou, 37°22'57"N, 57°52'57"E, 1285 m, 1.5.2015, leg. M.Haji Moniri 3247 & M.Torabian (hb. Hm); 5 km route of Bojnurd-Esfarāyen, Asadli, 37°29'N, 57°35'E, 1820 m, mountain steppe with scattered trees, 3.5.2013, leg. M.Haji Moniri 3075 (B); 13 km S of Bojnurd, Mahnan, 37°21'55"N, 57°18'47"E, 900 m, 17.3.2015, leg. M.Haji Moniri 3248 & M.Torabian (hb. Hm; hb. v.d. Boom). RAZAVI KHORASAN PROVINCE. 30 km NW Mashhad, Kang valley, 1725–1843 m, 10.2007, leg. N.Noferesti & M.Tavakoli 2204, 2377 (B; hb. Hm; hb. v.d. Boom); Kalat, Ortokand, 36°36'N, 59°53'E, 1400 m, gardens with fruit trees near waterfall, 9.10.2012, leg. M.Haji Moniri 2523 & R.Valikhani (hb. Hm); 45 km route of Quchan to Dargaz, Kalatechenar, 37°29'N, 59° 7'E, 950 m, wide valley with gardens, 13.12.2013, leg. M.Haji Moniri 3131 (hb. Hm).

Lecania cyrtella (Ach.) Th. Fr.

Lichenogr. Scand. I: 294 (1871).

DIAGNOSTIC CHARACTERS: Thallus corticolous, very thin, rather smooth to finely scurfy, whitish to pale grey, matt to shiny; apothecia up to 0.5 mm diam., sessile, abundant and often crowded; disc flat to convex, pale grey, pale pink to reddish brown; margin very thin, smooth to crenulated; epithecium pale brown, red-brown or dark brown; paraphyses rather strongly conglutinated, simple, tips pale to brownish, 2–3(–4) μm wide; asci 8-spored; ascospores 1-septate, narrowly ellipsoid, 10–16 \times 3–4.5 μm .

NOTES: The only other Iranian record so far, from Mazandaran, is presented by Seaward et al. (2008).

SPECIMEN EXAMINED: EAST AZERBAIJAN PROVINCE. Kaleybar district, Arasbaran, 11 km S of Asheqlu along road to Aynalu, 1250 m, on *Carpinus* base, 5.11.2007, leg. H.Sipman, M.Sohrabi, U.Søchting & M.R.Asef (B, IRAN).

Lecania dubitans (Nyl.) A.L.Sm.

A Monograph of the British Lichens 1: 351 (1918).

DIAGNOSTIC CHARACTERS: Thallus corticolous, thin, smooth, whitish to pale grey; apothecia up to 0.6 mm diam., sessile; disc flat to convex, pale to medium brown, sometimes dark brown or blackish; margin thin, whitish grey to brown; epithecium brown or red-brown; paraphyses strongly conglutinated, simple, apices swollen, up to 5 μm wide, dark brown pigmented; asci 8-spored; ascospores 1-septate, curved (allantoid), 12–17 \times 4–6 μm .

NOTES: Only one earlier Iranian record exists, by Sohrabi & Alstrup (2007), included in Seaward et al. (2008).

SPECIMEN EXAMINED: EAST AZERBAIJAN province. Kaleybar district, c. 4 km from Kalibar town, Arasbaran forest, 1750–2000 m, 19.8.2005, leg. M.Sohrabi 4564 (hb. Sohrabi, hb. v.d. Boom).

Lecania ephedrae Elenkin

Bull. Jard. Impér. Botan. St. Petersb. 5(3): 2 (1905).

DIAGNOSTIC CHARACTERS: Thallus corticolous, thin, continuous to slightly cracked or areolate, whitish grey, dusty grey to yellowish grey; hypothallus often present, whitish

grey; apothecia 0.7–1.6 mm diam., sessile; disc urceolate to flat, rarely slightly convex, brown to brown-black, without pruina or more rarely slightly white-pruinose; margin dusty grey, initially well developed, persistent; epithecium reddish brown; paraphyses weakly conglutinated in a hyaline, gelatinous matrix, simple to rarely sparingly branched or forked, apical cells abruptly swollen, often globose, 4–9 µm wide, often with dark reddish brown apical caps; asci 8-spored; ascospores 3(–4)-septate, mostly slightly to strongly curved, rarely straight, mostly slightly constricted at the septa, 14–17 × 4–6(–7) µm.

NOTES: New to Iran. Van den Boom & Khodosovtsev (2004) present a description and records from eastern Europe (Russia, Ukraine) and an isolated location in Russian Asia (East Sayani).

SPECIMENS EXAMINED: KHORASAN REGION. Mohammad Reza Shah Wild Life Park, Almehr, 1600 m, *Artemisia* cushionplant steppe along the hillsides just S of the side station, 4.8.1972, leg. Pertti Uotila 19191 (B). RAZAVI KHORASAN PROVINCE. 34 km SW Dargaz, Cherlagh Valley, 37°28'N, 58°50'E, 1070 m, 28.8.2013, leg. M.Haji Moniri 3119, 3124 & Z.Alizadeh (hb. Hm; hb. v.d. Boom).

Lecania flavescens Lyng

Rep. Norw. Novaya Zemlya Exp. 1921, No. 43: 1–129 (1928).

DIAGNOSTIC CHARACTERS: Thallus calcicolous, thin, areolate, ochraceous, grey brownish to dark brown; apothecia up to 0.5 mm diam., sessile, scattered; disc reddish brown to black, flat to slightly convex; margin small, grey; epithecium reddish brown; paraphyses not conglutinate, simple, apices strongly swollen, up to 8.5 µm wide, dark reddish brown pigmented; asci 8-spored; ascospores 1-septate, strongly constricted at septum, 11–14 × 6–7.5 µm.

NOTES: This species was first reported by Haji Moniri et al. (2014). The collection of Noferesti (2388) has relatively large apothecia, up to 0.9 mm diam., but all other characters fit well with the description of this species in Mayrhofer (1988).

SPECIMENS EXAMINED: RAZAVI KHORASAN PROVINCE. Kalat, Ortokand, on calcareous rock, 1400 m, 9.10.2012, leg. M.Haji Moniri 3079 (hb. Hm, B); W of Mashhad: Kang valley, on calcareous rock, 1766 m, 27.7.2007, leg N.Noferesti 2388 (B).

Lecania fuscella (Schaer.) Körb.

Syst. Lich. German. 122 (1855).

DIAGNOSTIC CHARACTERS: Thallus corticolous, thin, granular, pale grey-white; apothecia up to 0.8 mm diam., sessile; disc plane, brown to brown-black, usually slightly white pruinose; margin thin; epithecium pale to deep red-brown or brown-violet; paraphyses strongly conglutinated, simple or forked, apices slightly swollen; asci 8–16-spored; ascospores 3-septate, fusiform-ellipsoid, 12–23 × 4–7 µm.

NOTES: This species was already reported by Sohrabi & Sipman (2007) and included in Seaward et al. (2008).

SPECIMEN EXAMINED: KHORASAN REGION. Mohammad Reza Shah Wild Life Park, Almehr, 1600 m, *Artemisia* cushionplant steppe along the hillsides just S of the side station, 4.8.1972, leg. Pertti Uotila 19133a (B).

Lecania inundata (Körb.) M. Mayrhofer

Studia Geobot. 7: 111 (1987).

DIAGNOSTIC CHARACTERS: Thallus calcicolous, knobby to subsquamulose, with thick areolae, grey-brown to dull greenish; apothecia 0.3–0.5 mm in diam., sessile, often clustered; disc plane or somewhat convex, orange to dark brown or brown-black, rarely slightly white-pruinose; margin usually conspicuous; epithecium pale orange, reddish brown to dark brown; paraphyses conglutinated, especially in the upper part, simple, hardly or slightly swollen towards tips, the apical cell brownish pigmented; asci 8-spored; ascospores 1-septate, straight, not constricted at the septum, $12\text{--}18 \times 5.5\text{--}6.5 \mu\text{m}$.

NOTES: New to Iran. This species is not listed by Seaward et al. (2008).

SPECIMEN EXAMINED: TEHRAN PROVINCE. Kanegomeg, on rock, 31.8.2003, leg. T.Valadbeigi s.n. (B).

Lecania koerberiana J.Lahm

in Körber, Parerga Lichenol.: 68 (1859).

DIAGNOSTIC CHARACTERS: Thallus corticolous, thin, smooth, whitish to pale grey or pale brown; apothecia up to 0.6 mm diam., sessile; disc flat to convex, reddish brown to dark brown or blackish; margin thin, grey to brown; epithecium dark reddish brown, sometimes with a violet tinge; paraphyses weakly conglutinated, simple to rarely branched in upper part, apices 4–7 μm wide, brown pigmented; asci 8-spored; ascospores 3-septate, often slightly curved, $12\text{--}15 \times 4\text{--}5 \mu\text{m}$.

NOTES: A recent record was published by Sohrabi & Alstrup (2007), while the species is listed in the checklist (Seaward et al. 2008) basing mainly on older collections cited by Szatala (1957). Since the species was recorded several times by different authors, we accept it without restudy of specimens.

Lecania makarevicziae M.Haji Moniri, P. van den Boom et S.Y.Kondr.

Acta Botanica Hungarica 58 (1–2): 70 (2016).

DIAGNOSTIC CHARACTERS: Thallus corticolous, knobby, squamulose or bullate, grey to pale or dull greenish, rarely blastidiate; blastidia indistinct; apothecia 0.5–1.5 mm in diam. clearly constricted at base; disc plane or somewhat concave, dark brown or violet-brown, often white-pruinose; margin relative thick, especially in young apothecia; epithecium brownish; paraphyses weakly conglutinate, simple, with distinctly swollen apices, 4–6 μm wide, pale to dark brown to blackish; asci (2–)8-spored; ascospores (1–2–)3-septate, hyaline, somewhat curved or straight, with slight constrictions at the septa, $15\text{--}18 \times 4.5\text{--}5.5 \mu\text{m}$.

NOTES: Recently described and recorded from scattered localities in Iran and Turkmenistan (Haji Moniri et al. 2016).

SPECIMEN EXAMINED: NORTHERN KHORASAN PROVINCE. 6 km route of Bojnurd–Esfarāyen, toward Mt. Saluk, Hesarhosseini, mountain steppe with rock outcrops, 37°18'N, 57°12'E, 1783 m, 7.6.2012, leg. M.Haji Moniri 3059 (hb. Hm).

Lecania nylanderiana A.Massal.

Sched. critic. (Veronae) 8: 152 (1856).

DIAGNOSTIC CHARACTERS: Thallus calcicolous, thin, areolate; areoles sharply angled, white grey to pale brown; apothecia up to 0.6(–0.8) mm diam., sessile, crowded; disc flat, rarely convex, reddish brown to often blackish; margin well developed, white-pruinose; excipulum with netted, radiating, thread-like hyphae in a gelatinous matrix; epithecium with dark brown parts; paraphyses often simple but sometimes distinctly branched, swollen towards the apices, up to 5 μm wide, apically slightly to dark brown pigmented; asci 8-spored; ascospores 3-septate, ellipsoid to fusiform-ellipsoid, 12–16(–18) \times 4–5 μm .

NOTES: This species is listed in the checklist of Seaward et al. (2008) and also reported by Haji Moniri et al. (2014) and Szatala (1940). Szatala (1940) gives also a description of *L. nylanderiana* var. *ochracea*. This variety has a different color of the thallus, ochraceous, apices of paraphyses up to 10 μm wide, apothecia adnate, up to 1 mm diam., ascospores 12–21 \times 4–7 μm .

Lecania ochronigra J.Steiner

Annal. Mycolog. 8L 236 (1910).

DIAGNOSTIC CHARACTERS: Thallus calcicolous, forming irregular patches to 1 cm wide, thin, rimose-areolate; areoles 0.3–0.5 mm wide, bright to reddish ochraceous to yellowish brown; apothecia up to 0.7(–1.5) mm diam. immersed to slightly emergent; disc plane to slightly convex, bluish grey-black to black, epruinose or with whitish to bluish grey pruina; margin concolorous with thallus; epithecium dark brown; paraphyses simple, apices up to 9 μm wide; ascospores 1-septate, constricted at septum, 8–12(–15) \times (3.5–)5 μm .

NOTES: The holotype is from the prov. Sharud–Bustam in Iran. The recently described *Oxnerella safavidiorum* S.Y.Kondr., B.Zarei-Darki, L.Lököset J.-S.Hur has a considerable similarity to *L. ochronigra* (Kondratyuk et al. 2014), but has a better developed thallus, the apothecia are sessile (vs immersed apothecia), clearly convex (vs slightly convex), with bluish-pruinose disc (vs bluish grey-pruinose), its epithecium is blackish (vs dark brown) and it grows on siliceous rock.

Lecania polycycla (Anzi) Lettau

Hedwigia 52: 199 (1912).

NEW SYNONYM: *Lecania brachyspora* Müll. Arg.

Müll. Arg. J. (1880) Les lichens d’Egypte, Enumeratio lichenum Aegyptiacorum. Rev. Mycol. (Toulouse) 2: 38–83. Type: EGYPT, desert of El Galala, on calcareous rock, 1877, Schweinfurth, G. A., s.n. (G! holotype).

DIAGNOSTIC CHARACTERS: Thallus calcicolous, crustose, granulose or rimose-areolate, thin, c. 0.2 mm thick, grey-brown to olive brown to blackish, epruinose; prothallus sometimes present; apothecia up to 0.6 mm diam., adnate to broadly sessile; disc dark brown to black, epruinose, plane to slightly convex; margin thin, whitish grey, often

becoming excluded; excipulum prosoplectenchymatous; epithecium dark brown, rarely with a greenish tinge; paraphyses not conglutinated, simple to often branched in upper part, apices up to 8 µm wide and dark brown pigmented; asci 8-spored; ascospores 1-septate, slightly constricted at septum, 8.5–12 × 4.5–5.5 µm.

NOTES: The holotype of *Lecania brachyspora* held in G is a very small collection with few black apothecia, mostly c. 0.3 mm diam., containing a thin, whitish grey thalline margin; one apothecium is 0.6 mm wide and contains 1-septate ascospores, slightly constricted at the septum. It is clearly the same as *L. polycycla*, a saxicolous species from calcareous rocks. *Lecania brachyspora* was listed by Seaward et al. (2008).

SPECIMENS EXAMINED: RAZAVI KHORASAN PROVINCE. Boshruieh, Khanik, 1150 m, 13.3.2002, leg. M.Haji Moniri & M.Joharchi 1425 (B); Eslamieh, Taft, leg. Esmailzadeh Hosseini, S.A., 70 m, 12.4.2010 (B); 25 km NW Mashhad, Noghondar, 36°64'23"N, 59°64'67"E, 1300 m, 15.10.2010, leg. M.Jandaghi 2450 (hb. Hm); W of Torbat-e Heidarieh, Baig, Rudmaajan, 35°27'N, 58°51'E, 1550 m, gardens with fruit trees near waterfall, 26.11.2011, leg. M.Haji Moniri 3098 & F.Hooshmand (hb. Hm); 6 km SW Torqabe, Dareh-e Arghavan, 36°17'02"N, 59°19'47"E, 1460 m, 16.11.2014, leg. M.Homayounmehr s.n. (hb. Hm). NORTHERN KHORASAN PROVINCE. 5 km route of Bojnurd-Esfarāyen, Asadli, 37°29'N, 57°35'E, 1820 m, mountain steppe with scattered trees, 3.5.2013, leg. M.Haji Moniri 3107 (hb. Hm). YAZD PROVINCE. Shir Kuh, 2685 m, leg. Esmailzadeh Hosseini, S.A., 66 m, 2.5.2010 (B).

Lecania subcaesia (Nyl.) B. de Lesd.

Recherch. Lich. Dunquerque 1 (suppl.): 104 (1914).

DIAGNOSTIC CHARACTERS: Thallus calcicolous, thin to inconspicuous, whitish, white-grey; apothecia up to 1 mm diam., sessile; disc flat to convex, dark reddish brown to black, strongly white-pruinose; margin thin, white, often becoming excluded; epithecium dark reddish brown to dark brown; paraphyses conglutinated, simple, swollen towards the apices, up to 6 µm wide, apical cells dark brown pigmented; asci 8-spored; ascospores 1-septate, ellipsoid, 10–14 × (3–)4.5–6 µm.

NOTES: This species is listed in the checklist of Seaward et al. (2008) basing on a record of *Lecania albariella* var. *subcaesia* by Steiner (1896). It is a poorly understood species which is closely related to *L. turicensis* and differs mainly in the very thin thallus and heavily pruinose apothecia. Since the species was recorded several times by different authors, we accept it without restudy of specimens.

Lecania subfuscula (Nyl.) S.Ekman

Opera Botanica 127: 134 (1996).

DIAGNOSTIC CHARACTERS: Thallus lignicolous, granular, green-white to pale buff; apothecia 0.2–0.6 mm diam., sessile, crowded; disc flat to convex, pink to grey-brown or black; margin brownish but sometimes remaining pale; epithecium olivaceous grey to pink-brown; paraphyses conglutinated, simple, apices up to 5 µm wide and brown pigmented; asci 8-spored; ascospores 3(–5)-septate, narrowly fusiform to bacilliform, 14–28 × 2.5–3 µm.

NOTES: This species was published for the first time for Iran by Haji Moniri et al. (2014).

SPECIMEN EXAMINED: RAZAVI KHORASAN PROVINCE. Mashhad, between Zoshk and Kang, 36°20'N, 59°11'E, 2200 m, rocky slope with scarce low vegetation, 26.3.2003, leg. M.Haji Moniri 1606 (hb. Hm).

Lecania triseptata (Vain.) Zahlbr.

Cat. Lich. Univ. 5: 748 (1928).

DIAGNOSTIC CHARACTERS: Thallus lichenicolous, thin, grey or endokapylic on species of the *Caloplaca polycarpoides* group; apothecia 0.3–1.0 mm diam., sessile to stalked, scattered to crowded; disc brownish black, epruinose; margin persistent, somewhat granular, becoming rather thin; excipulum paraplectenchymatous; epithecium dark brown; paraphyses not conglutinated, simple, apices up to 8 µm wide and dark brown pigmented; asci 8-spored; ascospores 3-septate, straight, or curved, 14–18 × 3.5–5.5 µm. One specimen (F.Hosseini s.n.) has ascospores of c. 20 µm length, some of which are strongly curved.

NOTES: This species is listed by Seaward et al. (2008) and descriptions are presented by Steiner & Poelt (1987) and van den Boom & Khodosovtsev (2004).

SPECIMENS EXAMINED: SEMNAN PROVINCE. Damghan district, 23 km SE of Shahrud, 1500 m, 26.10.2007, leg. H.Sipman 55160, M.Sohrabi, U.Søchting & R.Zare (B, IRAN); *ibid.*, 80.5 km S of Shahrud, along road to Torud, 1180 m, leg. H.Sipman 55166, M.Sohrabi, U.Søchting & R.Zare (B, IRAN). RAZAVI KHORASAN PROVINCE. W of Torbat-e Heidarieh, Baig, Rudmaajan, 35°27'N, 58°51'E, 1550 m, gardens with fruit trees near waterfall, 26.11.2011, leg. M.Haji Moniri 3074, 3098 & F.Hooshmand (B); 6 km SW Torqabe, Dareh-e Arghavan, 36°17'02"N, 59°19'47"E, 1460 m, 16.9.2014, leg. M.Homayounmehr s.n. (hb. Hm; hb. v.d. Boom). NORTHERN KHORASAN PROVINCE. 10 km route of Bojnurd-Esfarayen, Gharebashlou, 37°22'57"N, 57°52'57"E, 1285 m, 1.5.2015, leg. M.Haji Moniri 3107 & M.Torabian (hb. Hm). TEHRAN PROVINCE. 7 km NE Damavand, Rooh-afza, 35°43'58"N, 52°05'30"E, 2000 m, 5.9.2015, leg. F.Hosseini s.n. (hb. Hm).

Lecania turicensis (Hepp) Müll. Arg.

Mém. Soc. Phys. Genève 16: 386 (1862).

DIAGNOSTIC CHARACTERS: Thallus calcicolous, granular to areolate; areoles sharply angled, whitish, white-grey to reddish white; apothecia up to 0.8 mm diam., sessile, crowded; disc flat, rarely convex, reddish brown to often blackish, white-pruinose; margin thin, white, often becoming excluded; epithecium reddish brown to dark brown; paraphyses conglutinated, simple, swollen towards the apices, up to 6 µm wide, apical cells (1–3) dark brown pigmented; asci 8-spored; ascospores 1-septate, ellipsoid to fusiform-ellipsoid, 10–14 × 4.5–6 µm.

NOTES: This species is listed in the checklist of Seaward et al. (2008) basing on older records as *Lecania albariella* and one recent record by Sohrabi & Sipman (2007). Since the widespread species was recorded several times by different authors, we accept it without restudy of specimens.

Excluded name

Lecania rechingeriana Szatala

Mycobank No.: MB 823998

Szatala, Ö. (1940): In: K.H.Rechinger et al., Ergebnisse einer botanischen Reise nach dem Iran. – Analen des naturhistorischen Museum in Wien 50: 521–533.

TYPE: IRAN, MAZANDERAN PROVINCE, Kaspische Küste, zwischen Lahidjan und Calus, an Baumstäben, 1937, leg. K.H.Rechinger s.n. (W! lectotype, designated here).

DIAGNOSTIC CHARACTERS: Thallus corticolous, thin, warted-rimose, with an irregular surface, pale grey to greyish beige; prothallus black; apothecia up to 0.25 mm diam., sessile, crowded in groups of 2–6; disc flat to weakly convex, ochre to reddish brown, sometimes slightly white-pruinose; margin thin, poorly developed, often becoming excluded; epithecium yellowish to reddish brown; paraphyses, branched and anastomosing, slightly swollen towards the apices, up to 4 µm wide, apical cells brownish pigmented; asci 8-spored; ascospores simple, broadly ellipsoid, 8–11 × 5–6 µm. Chemistry: Thallus KC+ orange (xanthone(s) present).

NOTES: Examination of the two syntypes of *Lecania rechingeriana* revealed that it is not a *Lecania* but conspecific with *Lecidea varians* Ach. (syn. *Lecidea exigua* Chaub.). The ascospore size agrees with the description by Szatala (1940), c. 8–10 × 5.5–6 µm; however, the ascospores are clearly simple instead of 1-septate as in the original description. *Lecidea varians* is not mentioned in the checklist of Iran (Seaward et al. 2008) and thus a new record for Iran.

Lecidea varians Ach.

Syn. Meth. Lich.: 38 (1814).

NEW SYNONYM: *Lecania rechingeriana* Szatala

ADDITIONAL SPECIMEN EXAMINED: IRAN, GILAN PROVINCE, zwischen Pehlevi und Resht, auf Weidenrinde, 1937, leg. K.H.Rechinger s.n. (W!, paralectotype).

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