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Original Article

A Checklist of the Lichenized and Lichenicolous Fungi of Razavi Khorasan Province, NE Iran

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ABSTRACT

The lichenized and lichenicolous mycota of Razavi Khorasan Province, northeastern Iran, remains comparatively underexplored despite the considerable environmental and biogeographical diversity of the Khorasan-Kopet Dagh region. Here, we present an updated checklist based on a critical synthesis of published records, examination of available herbarium material, and recent field collections made in the province. The revised checklist comprises 287 taxa belonging to 95 genera and 24 families. Published names and author citations were critically evaluated, synonymous records were consolidated under currently accepted names, and doubtful or unverifiable records were treated separately. Twenty-five taxa are newly reported from Razavi Khorasan Province, of which *Kiliasia sculpturata* is also reported for the first time from Iran. The new provincial records include *Arthonia radiata*, *Bacidia laurocerasi*, *B. rubella*, *Bagliettoa calciseda*, *B. marmorea*, *Circinaria hoffmanniana*, *C. scabridula*, *C. sphaerothallina*, *Graphis scripta*, *Lecanora chlarotera*, *L. thysanophora*, *Lecidella elaeochroma*, *Lepra albescens*, *Lepraria vouauxii*, *Lobothallia cernohorskyana*, *Opegrapha niveoatra*, *O. vulgata*, *Punctelia borreri*, *P. subrudecta*, *Pyrenodesmia erodens*, *Ramalina farinacea*, *Variospora aurantia*, *Verruculopsis beltraminiana*, *Xanthocarpia epigaea*, and *Kiliasia sculpturata*. Substrate associations were not mutually exclusive; saxicolous taxa formed the largest component of the checklist (185 taxa; 64.5%), followed by corticolous (59; 20.6%), terricolous (36; 12.5%), muscicolous (18; 6.3%), lichenicolous (17; 5.9%), and lignicolous taxa (3; 1.0%). Herbarium-voucher accessibility has also been reassessed and annotated throughout the checklist. Based on taxonomic studies of *Megasporaceae* in Iran, we propose the new combination *Aspiciliella lazarenkoi* (Oxner) Sohrabi. Ten taxa are excluded from the accepted checklist because their records are doubtful, misidentified, outdated, or otherwise insufficiently verifiable. This synthesis provides an updated baseline for future taxonomic, ecological, and biogeographical studies of lichens in northeastern Iran.

KEYWORDS

Aspiciliella, Herbarium specimens, Iranian mycota, Kopet Dagh flora, Lichen biodiversity.

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INTRODUCTION

The Khorassan-Kopet Dagh (KK) floristic province, situated within the Irano-Turanian region and extending across northeastern Iran and southern Turkmenistan, represents an important biogeographical unit in Southwest and Central Asia. Its complex topography, considerable climatic heterogeneity, and diverse geological settings have contributed to the development of a rich and distinctive flora (Memariani et al. 2016a, Memariani 2020). The biogeographical significance of the KK is further enhanced by its position at the interface of several phytogeographical regions, a feature that has contributed to its high floristic diversity and notable levels of plant endemism (Memariani et al. 2016b, Noroozi et al. 2019).

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The Central Kopet Dagh constitutes a major mountainous section of the KK floristic province in northeastern Iran. Its pronounced elevational and topographical variation provides a wide range of habitats and environmental conditions supporting a diverse vascular-plant flora (Memariani 2020). Biogeographically, the Central Kopet Dagh represents an important transitional zone between the Caspian, Central Asian (Turanian), and Central Iranian floristic regions. This geographical position, together with its environmental heterogeneity, has resulted in a distinctive floristic composition characterized by a substantial component of endemic plants (Memariani et al. 2016b).

Razavi Khorasan Province encompasses a substantial part of the central and eastern Kopet Dagh and includes a broad range of landscapes and habitats associated with marked variation in elevation, climate, geology, and substrate (Memariani et al. 2016a). Arid and semi-arid landscapes, including desert plains, gravelly areas, and exposed rocky substrates, occur alongside montane and high-elevation habitats with markedly different environmental conditions. Such environmental heterogeneity provides a potentially diverse range of substrates and microhabitats for lichenized and lichenicolous fungi. Nevertheless, in contrast to the relatively well-documented vascular-plant flora of the region, its lichen biota has received considerably less attention.

The Hezar Masjed Mountains form a prominent part of the Kopet Dagh system in Razavi Khorasan Province and contribute substantially to the topographical and ecological heterogeneity of the region. Rocky outcrops, exposed mountain slopes, valleys, and high-elevation habitats provide a variety of environmental conditions potentially suitable for diverse lichen communities. The floristic distinctiveness and high level of plant endemism documented for the Kopet Dagh and adjacent mountainous areas further emphasize the biological importance of this region (Memariani et al. 2016b).

Despite the recognized phytogeographical significance of the Khorassan-Kopet Dagh, its lichen biota remains comparatively poorly documented. The earliest published records of lichens from northeastern Iran were provided by Szatala (1940, 1957). Lichenological investigations in the Kopet Dagh on the Turkmenistan side were subsequently continued by Dzhuraeva (1978). These early contributions provided an initial basis for documenting the lichen diversity of this extensive mountain system.

During the past two decades, knowledge of the lichenized and lichenicolous fungi of northeastern Iran has gradually increased through floristic, taxonomic, and distributional studies. Records relevant to Razavi Khorasan Province and adjacent parts of northeastern Iran have been reported in a series of publications, including Seaward et al. (2004, 2008), Haji Moniri et al. (2005, 2009a, 2010, 2011b, 2014, 2016), Haji Moniri and Sipman (2009, 2011, 2017), Haji Moniri and Kukwa (2009), Haji Moniri (2010, 2018), Haji Moniri and Kamyabi (2010), and Breuss and Haji Moniri (2017). Further contributions to the knowledge of the lichen biota of the region have been made by Kondratyuk et al. (2013a, 2014), Kamyabi et al. (2023), and Baradaran et al. (2023).

These studies have considerably expanded our knowledge of the lichen biota of northeastern Iran. However, the available information remains dispersed across publications produced over several decades, and a synthesis of the records from Razavi Khorasan Province is therefore needed. Bringing these data together, with the results of more recent investigations, provides an opportunity to assess the current state of knowledge, identify major gaps in sampling and taxonomic coverage, and establish a more coherent basis for future lichenological research in the region.

Given the phytogeographical importance, environmental heterogeneity, and high plant diversity and endemism of the Khorassan-Kopet Dagh floristic province, improved documentation of its lichen biota is particularly relevant. The present study therefore compiles published records of lichenized and lichenicolous fungi from Razavi Khorasan Province and integrates them with records obtained from recent investigations. The resulting account aims to provide an updated synthesis of the currently known lichen diversity of the province, document new and noteworthy records, and provide a baseline for future taxonomic, ecological, and biogeographical studies of lichens in northeastern Iran.

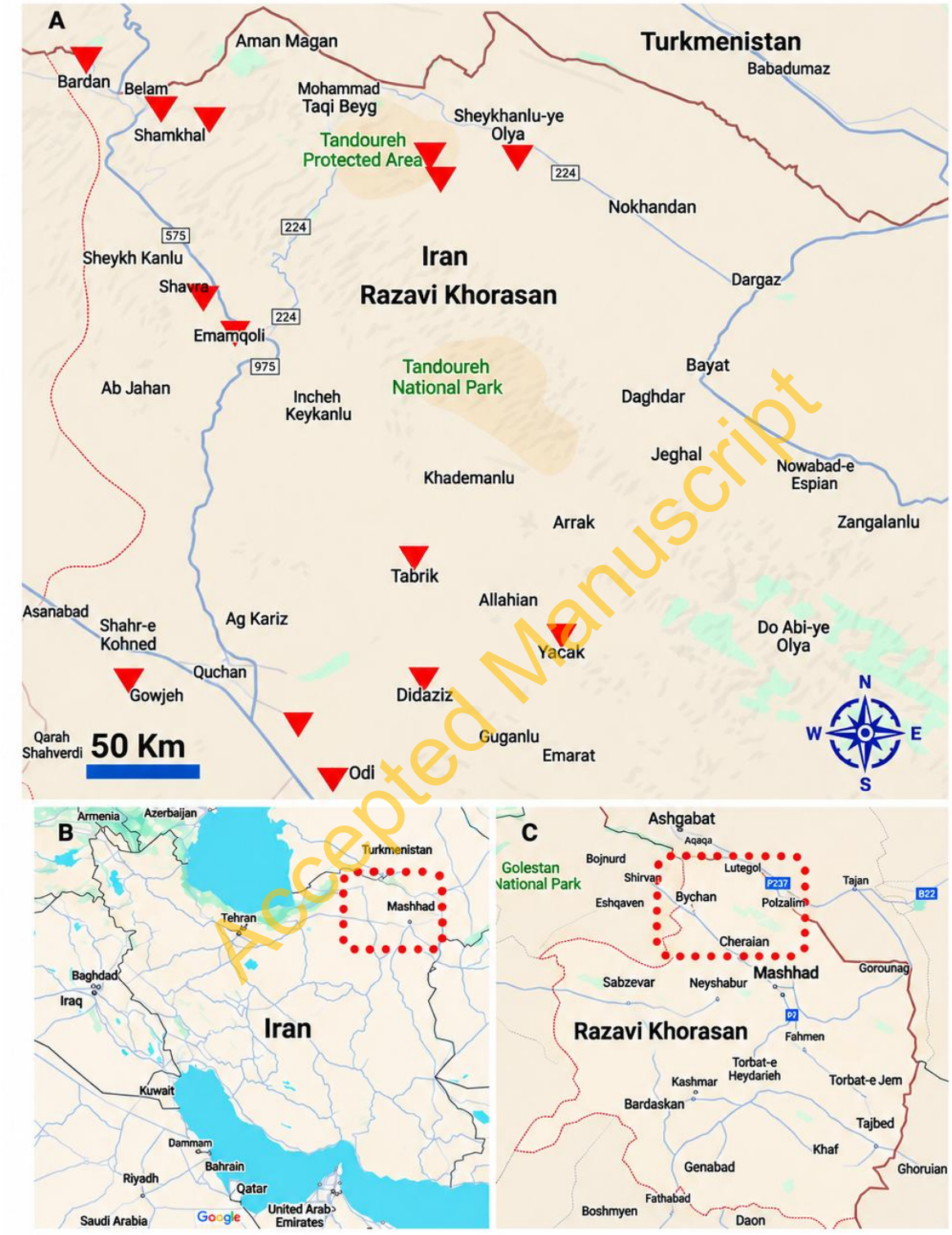
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MATERIALS AND METHODS

Study area

Northeastern Iran comprises the historical region of Khorasan, covering approximately 299,231 km² and extending between 30°21′–38°17′ N and 55°28′–61°20′ E. The region is currently divided administratively into three provinces: North Khorasan, Razavi Khorasan, and South Khorasan. Biogeographically, most of the region belongs to the Irano-Turanian floristic region. In Takhtajan's (1986) phytogeographical system, its northern and mountainous parts are assigned to the Khorasan Subprovince of the Armeno-Iranian Province within the Western Asiatic Subregion. The present study focuses specifically on Razavi Khorasan Province, which occupies a substantial part of northeastern Iran and includes extensive portions of the central and eastern Kopet Dagh mountain system. The geographical position of the province and the distribution of the newly sampled localities are shown in Fig. 1.

Razavi Khorasan Province encompasses a wide range of landscapes and habitats characterized by pronounced variation in elevation, climate, geology, and substrate. Arid and semi-arid plains, gravelly areas, desert landscapes, and extensive exposed rocky surfaces occur alongside montane and high-elevation habitats. The Kopet Dagh and Hezar Masjed mountain systems contribute substantially to this topographical and ecological heterogeneity and provide a broad range of potential substrates and microhabitats for lichenized and lichenicolous fungi.



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Fig. 1. Geographical location of the study area in Razavi Khorasan Province, northeastern Iran. (A) Distribution of newly sampled sites, indicated by red triangles, across the study area, including locations within and around Tandoureh National Park and the adjacent protected areas. (B) Location of Razavi Khorasan Province within Iran (dotted outline). (C) Enlarged view of the province showing the main sampling region (dotted outline).

Field sampling and data sources

Field sampling was conducted in Quchan County, Razavi Khorasan Province, in 2021, at several localities, including Abshuri village, Berder village (Asalmeh), Daroongar village, Dizavand village, Doorbadam village, Emam Quli village, Jafarabad village, Nowroozi village, Rahman Quli village (Cherik Valley), Shamkhal Valley, Sharak village, Tabarak village, and Yadak village. See (Fig. 1). During this fieldwork, the first author collected a total of 148 lichen specimens from different habitats. Following preliminary examination and preparation, 100 specimens (67.6%) were considered suitable for taxonomic investigation and were prepared as standard herbarium specimens for subsequent identification. The remaining 48 collections (32.4%), which were unsuitable for preparation as standard herbarium specimens, were excluded from further study. The 100 prepared specimens were deposited in the ICH Herbarium at the Museum of Iranian Lichens, Tehran.

In addition to the newly collected material, the present study is based on a critical compilation of published records and examination of available herbarium material. Herbarium material associated with previous records was traced, where possible, in TARI, IRAN, and FUMH, as well as in other herbaria or collections cited in the original publications. Accession numbers and herbarium information are provided in the checklist whenever such information was available.

Published records were compiled from the relevant floristic, taxonomic, and lichenological literature concerning Razavi Khorasan Province and adjacent areas of northeastern Iran. Whenever possible, published records were evaluated by reference to corresponding voucher specimens or accessible duplicate material. Information on locality, substrate, collector, collection number, and herbarium deposition was recorded when available.

Specimen examination and identification

Herbarium specimens were documented, curated, and stored following standard practices for lichen collections (Obermayer 2002). Available specimens were examined using standard morphological and anatomical methods. Macromorphological characters of the thallus and reproductive structures were examined under a stereomicroscope, and anatomical characters were studied from hand-cut sections using a compound microscope. Identification was based on relevant taxonomic literature and identification keys, including Malcolm and Galloway (1997), Ryan et al. (2002), Nash et al. (2002, 2007), Temina et al. (2005), Smith et al. (2009), Dobson (2011) and additional taxon-specific references cited in the checklist.

Standard chemical spot tests were applied when required for identification. Thin-layer chromatography (TLC) was additionally performed for selected specimens when information on secondary metabolites was necessary to confirm their identity. The morphological, anatomical, ecological, and chemical characters obtained from the specimens were considered together in reaching the final identification.

Nomenclature and validation of records

The nomenclature of all taxa included in the checklist was critically evaluated. Scientific names and author citations were checked against Index Fungorum (CABI 2009) and MycoBank (Crous et al. 2024), and author abbreviations follow Brummitt and Powell (1992). Earlier records published under synonymous or superseded names were reconciled with currently accepted names. Synonyms referring to the same taxonomic entity were consolidated under a single accepted name to avoid duplicate counting in the final checklist.

Particular attention was given to the reliability and verifiability of previously published records. Records supported by accessible voucher specimens or verifiable duplicate material were retained when their identity could be confirmed. When the original voucher material was unavailable, the record was evaluated on the basis of the information provided in the original publication, the reliability of the identification, available duplicate material, and its consistency with current taxonomic concepts.

The nomenclature of all taxa included in the checklist was critically evaluated, with particular attention to names used in earlier Iranian lichenological literature. Historical records were traced under the names originally used in the respective publications and were subsequently reconciled with the nomenclature adopted in the present study. Earlier combinations, superseded names, and relevant synonyms were identified and updated to their currently accepted or otherwise taxonomically appropriate names on the basis of current nomenclatural databases and recent taxonomic treatments. Where appropriate, the earlier name used in Iranian literature is indicated in parentheses or under synonymy in the checklist to facilitate comparison with historical records and to ensure their traceability. Records referring to the same taxonomic entity under different names were consolidated under a single accepted name to avoid duplicate counting. Each nomenclatural change was evaluated individually, and names were not synonymized solely based on identical or similar specific epithets. Taxonomically or nomenclaturally uncertain records were retained for separate evaluation rather than being automatically assigned to an accepted taxon.

Records, for which the identity could not be adequately verified, including those based on unavailable material, insufficient diagnostic information, uncertain determinations, or problematic taxonomic interpretations, were not incorporated uncritically into the accepted checklist. Such records were treated separately, and the reasons for their exclusion or uncertain status are provided in the section **Excluded or doubtful taxa**. This approach was adopted to distinguish verifiable records from those requiring further confirmation.

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Checklist structure and ecological data

For each accepted taxon, available information was compiled using the following abbreviations: **P**, photobiont; **E**, ecological habit; **S**, substrate association; **LR**, literature records; **D-K**, distribution in Razavi Khorasan Province; **RHS**, reported herbarium specimens; **SA**, specimen accessibility status; and **ME**, material examined.

Ecological and substrate information was compiled from examined specimens and, where appropriate, from reliable published records. Substrate associations were classified principally as saxicolous, corticolous, or terricolous, with additional associations including muscicolous, lichenicolous, and lignicolous occurrences. These categories were **not treated as mutually exclusive**, because a taxon may occur on more than one substrate. Consequently, taxa recorded from multiple substrates were assigned to each applicable substrate category rather than being forced into a single ecological class.

Locality information was standardized as far as possible to provide consistent geographical terminology throughout the checklist. Coordinates associated with examined collections are presented in decimal degrees, with latitude (N) preceding longitude (E).

RESULTS

LIST OF TAXA

Acarospora bella (Nyl.) Jatta, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri 2010; **D-K**: Mashhad County; **RHS**: TARI and SBUH; **SA**: No accessible herbarium specimen in Iran.

A. bullata Anzi, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Szatala 1957, Haji Moniri 2010, Haji Moniri et al. 2009a, Haji Moniri et al. 2011b, Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Mashhad, Torghabeh, Kashmar, Torbat-e Heydariyeh (Koh-e-Bizg) and Neishabour counties; **RHS**: 2292, 2143, 2356 duplicates in B, TARI and SBU; **SA**: No accessible herbarium specimen in Iran.

A. cervina A. Massal., **E**: Epilithic and Saxicolous, on calcareous rock; Calcicolous, on limestone; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri et al. 2014, Sayyad et al. 2016a, Haji Moniri and Sipman 2011, Haji Moniri 2025; **D-K**: Kashmar, Neishabour, Mashhad, Kalat, Dargaz counties; **RHS**: 1436c FUMH with duplicates in B, 1812 B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan Abshuri village, 37.533, 58.421, 1488 m., on rock, M. Shokouhnam [MSH041b, MSH033─ ICH]. Quchan Rahman Quli village, Cherik valley, 37.401, 58.315, 954 m., on rock, M. Shokouhnam [MSH016 ─ ICH].

A. glaucocarpa (Ach.) Körb., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri 2010; **D-K**: Mashhad County; **RHS**: TARI and SBUH; **SA**: No accessible herbarium specimen in Iran.

A. impressula Th. Fr., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri 2010, Haji Moniri 2014; **D-K**: Mashhad, Torghabeh counties; **RHS**: No voucher indication; **SA**: No accessible herbarium specimen in Iran.

A. laqueata (Stizenb.) Stizenb., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri and Sipman 2011, Haji Moniri 2018; **D-K**: Dargaz County; **RHS**: 1879 B, TARI and SBUH; **SA:** No accessible herbarium specimen in Iran.

A. lavicola J. Steiner, **E**: Epilithic and Saxicolous, on calcareous rock, Saxicolous, on siliceous rocks; **LR**: Seaward et al. 2008, Haji Moniri 2025; **D-K**: Torghabeh County; **RHS**: 1553 MRDS 114049 in Liverpool Museum (LIV); **SA:** No accessible herbarium specimen in Iran.

A. macrospora (Hepp ex A. Massal.) Bagl., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri 2010, Haji Moniri et al. 2011b, Haji Moniri 2025; **D-K**: Mashhad County; **RHS**: 2219, 2368, duplicates in B, TARI and SBUH; **SA**: No accessible herbarium specimen in Iran.

A. modenensis H. Magn., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2008, Haji Moniri 2025; **D-K**: Torbat-e Heydariyeh County; **RHS**: 2372 TARI and TSB.

A. stapfiana (Müll. Arg.) Hue, **E**: Epilithic and Saxicolous, on calcareous rock; Lichenicolous: lichens; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri et al. 2005, Haji Moniri 2025; **D-K**: Kashmar, Torbat-e jam, Mashhad counties; **RHS**: 1429a, 1442 FUMH and duplicates in B; **SA**: No accessible herbarium specimen in Iran.

A. strigata (Nyl.) Jatta, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri et al. 2014, Haji Moniri 2010, Haji Moniri 2025; **D-K**: Chenaran, Kashmar, Torbat-e Jam and Mashhad counties; **RHS**: 1519, 1436c FUMH and duplicates in B; **SA**: No accessible herbarium specimen in Iran.

A. veronensis A. Massal., **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Szatala 1957, Seaward et al. 2004, Seaward et al. 2008; **D-K**: Chenaran County; **RHS**: W; **Note**: The sample was collected by Karl Heinz Rechinger, but no additional reports were received from Khorasan. Additional studies are necessary to confirm the occurrence of this species in Khorasan.

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Anamylopsora pulcherrima (Vain.) Timdal, **E**: Epilithic and Saxicolous, on calcareous rock, Calcicolous, on limestone; **LR**: Seaward et al. 2008, Haji Moniri and Sipman 2009, Haji Moniri 2025; **D-K**: Chenaran County; **RHS**: 1516 MRDS; 1908 FUMH and B; **SA**: No accessible herbarium specimen in Iran.

Anaptychia ciliaris (L.) Körb. ex A. Massal., **E**: Epiphytic; **S**: Corticolous: on the bark of trees; **LR**: Haji Moniri and Sipman 2009, Haji Moniri and Sipman 2011, Haji Moniri 2009, Haji Moniri 2025; **D-K**: Dargaz and Salehabad County; **RHS**: TARI and SBUH; **SA**: No accessible herbarium specimen in Iran.

A. desertorum (Rupr.) Poelt, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2005, Haji Moniri et al. 2011b, Haji Moniri and Sipman 2011, Haji Moniri 2014, Haji Moniri 2018, Haji Moniri 2025; **D-K**: Gonabad, Torghabeh, Mashhad, Torbat-e Jam, Kalat and Dargaz counties; **RHS**:1871, 1875, 1875b FUMH duplicates in B, 2147, 2345 duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Sharak village, 37.263, 58.282, 1681 m., on rock, M. Shokouhnam [MSH019 ─ ICH].

A. elbursiana (Szatala) Poelt, (Fig. 2 A); **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri 2010, Haji Moniri et al. 2011b, Haji Moniri 2025; **D-K**: Torghabeh and Mashhad counties; **RHS**: 2209, 2243, 2286, 2145, 2171,2396, duplicates in B, 2160, 2210, 2346 B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Village Doorbadam village, 37.292, 58.281, 1595 m., on moss, M. Shokouhnam [MSH008─ ICH]; Quchan, Rahman Quli village, Cherik valley, 37.401, 58.315, 954 m., on moss, M. Shokouhnam [MSH015 ─ ICH]; Quchan, Abshuri village, 37.533, 58.421, 1488 m., on rock, M. Shokouhnam [MSH088b ─ ICH].

A. roemeri Poelt, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri et al. 2005, Haji Moniri et al. 2014, Haji Moniri 2010, Haji Moniri and Sipman 2011, Haji Moniri 2025; **D-K**: Chenaran, Torghabeh, Mashhad, Saleh abad and Dargaz counties; **RHS**: 1731, 1764, 1506a FUMH duplicates in B; **SA**: No accessible herbarium specimen in Iran.

A. ulothrichoides (Vain.) Vain., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Szatala 1940, Szatala 1957, Seaward et al. 2004, Haji Moniri 2025; **D-K**: Torbat-e Jam and Saleh abad counties; **RHS**:1463 FUMH; **SA**: No accessible herbarium specimen in Iran.

Anema prodigulum (Nyl.) Henssen, **P**: Cyanobacteria, coccaceous (e.g. *Gloeocapsa*); **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Baradaran et al. 2020; **D-K**: Torghabeh County; **RHS**: No duplicate indication; **SA**: No accessible herbarium specimen in Iran.

Arthonia lapidicola (Taylor) Branth & Rostr., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri and Sipman 2009, Haji Moniri and Sipman 2017, Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Torbat-e Heidarieh, Dargaz and Torbat-e Jam counties; **RHS**: 1841c, 1665 FUMH and duplicates in B; **SA**: No accessible herbarium specimen in Iran.

A. mediella Nyl., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Baradaran et al. 2023; **D-K**: Mashhad County; **RHS**: 12176 TARI; **SA**: No accessible herbarium specimen in Iran.

A. radiata (Pers.) Ach., (Fig. 2 B); **E**: Epiphytic; **S**: Corticolous: on the bark of trees; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan, Shamkhal valley, 37.357, 58.273, 1479 m, on bark, M. Shokouhnam [MSH069b─ ICH].

Aspicilia cinerea (L.) Körb., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2011b, Haji Moniri 2025; **D-K**: Torghabeh and Mashhad counties; **RHS**: 1408, 2308, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

A. oxneriana O.B. Blum, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri and Sipman 2009, Haji Moniri et al. 2009a, Haji Moniri 2018, Haji Moniri 2025; **D-K**: Dargaz and Kashmar counties; **RHS**:1850, 1852, 2049 FUMH and duplicates in B; **SA**: No accessible herbarium specimen in Iran; **Note**: It appears that the species was once considered rare and endangered in the USSR according to Borodin et al. (1978). However, Chakimov et al. (1986) and Sohrabi and Sipman (2007) suggested that its distribution range is larger than previously thought. It also exists in temperate regions in Central Asian countries such as Tajikistan, Turkmenistan (Dzhuraeva 1978), and Uzbekistan.

A. polychromoides (J. Steiner) Hue, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008; **D-K**: Mashhad County; **RHS**: No voucher indication; **SA**: No accessible herbarium specimen in Iran.

A. subcalcarea (Müll. Arg.) Szatala, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Szatala 1957; **D-K**: Chenaran CountyCounty; **RHS**: W; **SA**: No accessible herbarium specimen in Iran; **Note**: The sample was collected by Karl Heinz Rechinger, but no additional reports were received from Khorasan; additional studies are necessary to confirm its occurrence in Khorasan.

Aspiciliella lazarenkoi (Oxner) Sohrabi, comb. nov. MycoBank MB 865788. Basionym: *Aspicilia lazarenkoi* Oxner, *Bull. Jard. Bot. Kieff.* 10: 87 (1929), MB 377639. **E:** Epilithic and Saxicolous, on calcareous rock; **LR:** Seaward et al.

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2008, Haji Moniri 2025; **D-K:** Torghabeh County; **RHS:** 1582 (MRDS 113308); **SA:** No accessible herbarium specimen in Iran.

Athallia inconnexa (Nyl.) S.Y. Kondr. & Lőkös, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Sayyad et al. 2016a; **D-K**: Dargaz County; **RHS**: No voucher exists; **SA**: No accessible herbarium specimen in Iran.

Bacidia laurocerasi (Delise ex Duby) Zahlbr., (Fig. 2 C); **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan, Shamkhal valley, 37.357, 58.273, 1479 m., M. Shokouhnam [MSH049, MSH065 ─ ICH]. Quchan Doorbadam village, 37.292, 58.281, 1543 m., on bark, M. Shokouhnam [MSH093 ─ ICH]. Quchan, Berder village, Asalmeh, 37.374, 58.212, 1684 m., on bark, Acc. Spp. *Lecanora thysanophora*, M. Shokouhnam [MSH092 b ─ICH].

B. rubella (Hoffm.) A. Massal., (Fig. 2 D); **E**: Epiphytic; **S**: Corticolous: on the bark of trees; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan, Shamkhal valley, 37.357, 58.273, 1479 m., on bark, M. Shokouhnam [MSH077─ ICH].

Bagliettoa calciseda (DC.) Gueidan & Cl. Roux, **E**: Endolithic; **S**: Saxicolous, on calcareous rock; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan Emam Quli village, 37.234, 58.311, 1681 m, on rock, M. Shokouhnam [MSH044 ─ ICH].

B. marmorea (Scop.) Gueidan & Cl. Roux, (Fig. 2 E); **E**: Endolithic; **S**: Saxicolous, on calcareous rock; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan, Shamkhal valley, 37.357, 58.273, 1479 m, on rock, M. Shokouhnam [MSH046a, MSH052 ─ ICH]. Quchan, Rahman Quli village, Cherik valley, 37.401, 58.315, 954 m., on rock, M. Shokouhnam [MSH067 ─ ICH].

Bibbya lutosa (Ach.) Kistenich, Timdal, Bendiksby & S.Ekman, **E**: Epigeic; **S**: Terricolous, on clay soil; **LR**: Hassanzadeh Bashtian et al. 2019; **D-K**: Neishabour County; **RHS**: No voucher indication; **SA**: No accessible herbarium specimen in Iran.

Blennothallia crispa (Weber ex F.H. Wigg.) Otálora, P.M. Jørg. & Wedin; **E**: Epigeic; **S**: Terricolous, on clay soil, Muscicolous: on tree mosses; **LR**: Hassanzadeh Bashtian et al. 2019; **D-K**: Neishabour County; **RHS**: The published references do not mention any indication of the sample number; **SA**: No accessible herbarium specimen in Iran. **Note:** The occurrence of this species in Khorasan cannot be confirmed, as no voucher specimen has been deposited in the FUMH Herbarium. Further studies will be necessary to verify its presence.

B. furfureola (Müll. Arg.) Otálora, P.M. Jørg. & Wedin, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Torbat-e Jam County; **RHS**: 1685 duplicate in B; **SA**: No accessible herbarium specimen in Iran.

Calogaya biatorina (A. Massal.) J. Steiner, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri 2010, Haji Moniri et al. 2009a, 2011b; Sayyad et al. 2016a, Haji Moniri and Sipman 2011, Haji Moniri 2025; **D-K**: Mashhad, Torghabeh, Dargaz and Kashmar counties; **RHS**: 2293, 2148, 2352, duplicates in B, 1842 B; 2050 FUMH; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Dizavand village, 37.053 N, 58.618 E, 1387 m., on rock, M. Shokouhnam [MSH101a ─ICH].

C. decipiens (Arnold) Arup, Frödén & Søchting, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2011b, Haji Moniri et al. 2014, Haji Moniri 2010, Haji Moniri 2025; **D-K**: Mashhad, Neishabour, Torghabeh counties; **RHS**: 2272, 2285, 2202, 2392, duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Abshuri village, 37.533, 58.421, 1488 m, on rock *Pyrenodesmia variabilis*, M. Shokouhnam [MSH007─ICH]; Quchan Tabarak village, 37.111, 58.434, 1554 m., on soil, M. Shokouhnam [MSH023 ─ ICH]; Quchan, Sharak village, 37.263, 58.282, 1681 m., on rock, M. Shokouhnam [MSH031 ─ ICH]; Quchan, Emam Quli village, 37.234, 58.311, 1681 m, on rock, M. Shokouhnam [MSH085a ─ ICH]; Quchan, Rahman Quli village, Cherik valley, 37.401, 58.315, 954 m., on rock, M. Shokouhnam [MSH026 ─ ICH].

C. decipiens **subsp.** ***esorediata*** M. Haji Moniri & Vondrák **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri 2025; **D-K**: Mashhad; **RHS:** The published references do not mention any indication of the sample number; **SA**: No accessible herbarium specimen in Iran.

C. persica (J. Steiner) M. Steiner & Poelt, **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri et al. 2011b, Haji Moniri et al. 2014, Haji Moniri 2010, Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Torbat-e Heidarieh, Mashhad, Dargaz and Torghabeh counties; **RHS**: 2195, 2378, duplicates in B, 3074 B; **SA**: No accessible herbarium specimen in Iran.

C. polycarpoides (J. Steiner) M. Steiner & Poelt, **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri and Sipman 2009, Haji Moniri et al. 2014, Haji Moniri 2018, Haji Moniri 2025; **D-K**: Dargaz and Kalat counties; **RHS**: 2523, 3075 duplicates in B; 1872 FUMH and duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Dizavand village, 37.368, 58.364, 1387 m., on bark, M. Shokouhnam [MSH004 ─ ICH].

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C. saxicola (Hoffm.) Nordin **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Zokaei and Abedi 2000, Zokaei 2003, Haji Moniri et al. 2014; **D-K**: Mashhad County; **RHS**: 3027, no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

C. schistidii (Anzi) Zahlbr., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Torghabeh County; **RHS**: 1542, no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

C. zoroasteriorum (S.Y. Kondr. et al.) Haji Moniri & Vondrák, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Kondratyuk et al. 2013a, Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Torbat-e Heydariyeh; **RHS**: 2481, 3081 duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Caloplaca albovariegata (B. de Lesd.) Wetmore, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Torbat-e Heydariyeh County; **RHS**: 3097, no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

C. cerina (Hedw.) Th. Fr., **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri et al. 2011b, Haji Moniri et al. 2014, Haji Moniri 2010, Haji Moniri and Sipman 2011; **D-K**: Mashhad and Torghabeh Counties; **RHS**: 1971, 2404, duplicates in B; 1916,1948, 2008; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Tabarak village, 37.111, 58.434, 1554 m., on bark, M. Shokouhnam [MSH070 ─ ICH].

C. kudratovii S.Y. Kondr., Zarei-Darki & Hur, **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Kondratyuk et al. 2013a, Kondratyuk et al. 2018, Haji Moniri and Sipman 2017; **D-K**: Torqabeh County; **RHS**: 3135 duplicates in B; **SA**: No accessible herbarium specimen in Iran.

C. juniperina Tomin (Syn: *Opeltia juniperina* (Tomin) S.Y. Kondr. & Lőkös), **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Vondrák et al. 2012, Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 3113, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

C. molariformis I.V. Frolov, Vondrák, Nadyeina, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Torbat-e Heydariyeh and Torbat-e Jam counties; **RHS**: 3101 duplicates in B and herb. Vondrak; 3084 duplicates in B and herb. Vondrak; **SA**: No accessible herbarium specimen in Iran.

C. monacensis (Leder.) Lettau, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Quchan County; **RHS**: 3129, no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

C. schoeferi Poelt, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2008, Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Torbat-e Heydariyeh and Torbat-e Jam counties; **RHS**: 2385 B and duplicates in TARI; 1670; **SA**: No accessible herbarium specimen in Iran.

C. scythica Khodos. & Søchting, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 3116, no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

C. sororicida M. Steiner & Poelt, **E**: Epilithic and Saxicolous, on calcareous rock, Saxicolous, on schist; **LR**: Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Torbat-e Jam County; **RHS**: 3085, no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

Candelaria concolor (Dicks.) Stein, **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri 2009, Haji Moniri 2010; **D-K**: Mashhad County; **RHS**: 3003 FUMH and duplicates in H and NBM; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Berder village, Asalmeh, 37.374, 58.212, 1684 m., on bark, M. Shokouhnam [MSH050 ─ICH].

C. pacifica M. Westb. & Arup, **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Mashhad County; **RHS**: 1606, no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

Candelariella aggregata M. Westb., **E**: Epiphytic or Epigeic; **S**: Terricolous on soil mosses or plant debris; **LR**: Westberg and Sohrabi 2012**;** **D-K**: Torbat-e Heydariyeh; **RHS**: 2387 B and TARI; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Berder village, Asalmeh, 37.374, 58.212, 1684 m., on mosses, M. Shokouhnam [MSH011 ─ ICH]; Quchan, Tabarak village, 37.111, 58.434, 1554 m., on mosses, M. Shokouhnam [MSH081b, MSH042b ─ ICH].

C. antennaria Räsänen, **E**: Epiphytic; **S**: Corticolous: on bark of tree; **LR**: Haji Moniri et al. 2011a and 2014, Haji Moniri and Sipman 2017, Haji Moniri 2018, Haji Moniri 2025; 2448, no duplicate indication; **D-K**: Torbat-e Heidarieh, Dargaz and Mashhad counties; **RHS**: 2481, 2448, 3074 duplicate in B; **SA**: No accessible herbarium specimen in Iran.

C. aurella (Hoffm.) Zahlbr., **E**: Epilithic and Saxicolous,Epilithic and Saxicolous, on calcareous rock, Corticolous: on bark of trees; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri et al. 2005, Haji Moniri et al.2009a, Haji

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Moniri et al. 2011b, Haji Moniri et al.2014, Haji Moniri and Sipman 2009, Haji Moniri and Sipman 2011, Haji Moniri 2009, Haji Moniri 2010, Sayyad et al. 2016a, Haji Moniri 2025; **D-K**: Torghabeh, Mashhad, Dargaz, Nishapur, Kalat, and Kashmar counties; **RHS**: 1841c FUMH and duplicate in B; 3005, 1497b FUMH and duplicates in NBM; 3055,1548, 3041, 3035, 3064, 3076, 1838, 2245, 2152, 2345 B; 2053 FUMH and 1606, 113215 MRDS; **SA**: No accessible herbarium specimen in Iran.

C. medians (Nyl.) A.L. Sm., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2009a, Sayyad et al. 2016a, Haji Moniri 2025**; D-K**: Kashmar County; **RHS**: 2059 FUMH and duplicates in B; **SA**: No accessible herbarium specimen in Iran.

C. oleaginescens Rondon, **E**: Epilithic and Saxicolous, on animal bones; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Dargaz and Neishabour counties; **RHS**: 3055, no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

C. rhodax Poelt & Vězda, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2008, Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Gonabad and Torbat-e Jam counties; **RHS**: 3134; 2297 B and duplicates in TARI; **SA**: No accessible herbarium specimen in Iran.

C. rosulans (Müll. Arg.) Zahlbr., **E**: Epilithic and Saxicolous, on calcareous rock, Saxicolous, on siliceous rocks; **LR**: Haji Moniri et al. 2014, Haji Moniri 2010, Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Torbat-e Jam, Mashhad and Torghabeh counties; **RHS**:1425, 3077 duplicates in B; **SA**: No accessible herbarium specimen in Iran.

C. viae-lacteae G. Thor & V. Wirth, (Fig. 2 F); **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri et al. 2011a, Haji Moniri 2025; **D-K**: Torghabeh, Quchan counties; **RHS**: 245, no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Dizavand village, 37.368, 58.364, 1387 m., on bark *Xanthomendoza fulva*, M. Shokouhnam [MSH006 ─ ICH]. Quchan, Emam Quli village, 37.234, 58.311, 1681m., on bark, M. Shokouhnam [MSH013 ─ ICH]. Quchan, Doorbadam village, 37.292, 58.281, 1595 m., on bark *Xanthomendoza fulva*, *Lecanora hagenii*, M. Shokouhnam [MSH014 ─ ICH]. Quchan, Abshuri village, 37.533, 58.421, 1488 m., on bark, M. Shokouhnam [MSH087 ─ ICH].

C. vitellina (Hoffm.) Müll. Arg., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2009a, Haji Moniri et al. 2011b, Haji Moniri et al. 2014, Haji Moniri 2010, Haji Moniri 2014, Gholamhosseinian et al. 2020, Haji Moniri 2025; **D-K**: Torbat-e Jam, Kashmar, Mashhad, Torghabeh and Sarakhs counties; **RHS**: 1250; 2055 FUMH and duplicates in B; 2263, 2391 duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Cercidospora macrospora (Uloth) Hafellner & Nav.-Ros, **S**: Lichenicolous fungus: parasitic on lichens; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 1820d, no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

Circinaria calcarea (L.) A. Nordin, Savić & Tibell, (Syn.: *Aspicilia calcarea* (L.) Körb) **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Szatala 1957, Haji Moniri 2010, Haji Moniri et al. 2009a, Haji Moniri et al. 2011b, Haji Moniri et al. 2014, Haji Moniri 2025, Sayyad et al. 2016a; **D-K**: Mashhad, Kashmar and Torghabeh counties; **RHS**: 2047 FUMH and duplicates in B; 2317 B, 2308; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Nowroozi village 37.643, 58.323, 1513 m., on calcareous rock, M. Shokouhnam [MSH080a ─ ICH].

C. contorta (Hoffm.) A. Nordin, Savić & Tibell, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Sayyad et al. 2016a, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 1819a, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

***C. elmorei* s. lat.** (E.D. Rudolph) Owe-Larss., A. Nordin & Sohrabi, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Szatala 1957, Haji Moniri et al. 2011b, Haji Moniri et al. 2017, Kondratyuk et al. 2015, Haji Moniri 2025 (as *Aspicilia desertorum*); **D-K**: Torghabeh County, Kashmar County; **RHS**: 2209, 2243, 2286, 2147, 2345, 2145, 2171, 2396 duplicates in B; **SA**: No accessible herbarium specimen in Iran.

C. hoffmanniana (S. Ekman & Fröberg ex R. Sant.) A. Nordin, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan; **ME**: Quchan, Abshuri village 37.533, 58.421, 1488 m., on rock, M. Shokouhnam [MSH088a ─ ICH].

C. mansourii (Sohrabi) Sohrabi, **E**: Epigeic; **S**: Terricolous, on soil-like substrates; **LR**: Gholamhosseinian et al. 2020, Gholamhosseinian et al. 2021; **D-K**: Sarakhs County; **RHS**: ICH. **ME**: Khorasan, Razavi, Mashhad, Mashhad-Sarakhs Road, ca. 9 km. from Mazdavand village towards Sarakhs, East side of the Road, GPS: 36.195973 N, 60.573863 E, 850 m., 20 March 2018, on calcareous soil, A. Gholamhosseinian [(AG4) ─ICH].

C. sphaerothallina (J. Steiner) Sohrabi, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan- Daroongar village, 37.302, 59.037, 1366 m., on rock, M. Shokouhnam [MSH072b ─ ICH]; Quchan, Rahman Quli village, Cherik valley, 37.401, 58.315, 954 m., on rock, Mahin Shokouhnam [MSH028b ─ ICH]; Quchan, Tabarak village, North direction of Tabark, 37.111, 58.434, 1554 m., M. Shokouhnam

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[MSH027 ─ ICH]. Mashhad, Mashhad-Sarakhs Road, ca. 9 km. from Mazdavand village towards Sarakhs, East side of the Road, GPS: 36.195973 N, 60.573863 E, 850 m., 20 March 2018, on sandstone and calcareous rocks, A. Gholamhosseinian [AG12 ─ ICH].

C. scabridula (H. Magn.) Sohrabi, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan, Yadak village, 37.729, 58.534, 1717 m., on rock, M. Shokouhnam [MSH086 a, b ─ ICH]; Quchan, Abshuri village, 37.533, 58.421, 1488 m., on rock, M. Shokouhnam [MSH089a ─ ICH]; Quchan, Emam Quli village, 37.234, 58.311, 1681 m., on rock, M. Shokouhnam [MSH030 ─ ICH].

Cladonia pyxidata (L.) Hoffm., **E**: Epigeic; **S**: Terricolous, on clay soil; **LR**: Haji Moniri and Sipman 2009, Haji Moniri 2009, Haji Moniri 2018; **D-K**: Dargaz County; **RHS**: 1846 FUMH and duplicates in B; 3000 FUMH and duplicates in NBM; **SA**: No accessible herbarium specimen in Iran.

Collema subflaccidum Degel., **E**: Epiphytic; **S**: Muscicolous: on tree mosses; **LR**: Haji Moniri and Sipman 2009, Haji Moniri 2009, Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Torbat-e Jam, Mashhad and Torbat-e Heidarieh counties; **RHS**: 1924 FUMH and duplicates in B; 3014 FUMH and duplicates in NBM; 1720 duplicates in herb. M. Schultz; **SA**: No accessible herbarium specimen in Iran.

Dermatocarpon miniatum (L.) W. Mann, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Szatala 1957, Seaward et al. 2004, Seaward et al. 2008, Zokaei and Abedi 2000, Haji Moniri et al. 2005, Haji Moniri et al. 2009a, Haji Moniri et al. 2011b, Zokaei and Khazai 1999, Haji Moniri and Sipman 2009, Valikhani and Haji Moniri 2013, Sayyad et al. 2016a, Haji Moniri 2025; **D-K**: Torbat-e Jam, Torghabeh, Kashmar and Dargaz and Mashhad counties, Neishabour County; **RHS**: 1955, 1886, 1937, 857, 1858, 1859, 2056, 2082, 1432a. Duplicates in FUMH, 1470a FUMH, 2260, 2155, 2343, duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Doorbadam village 37.292, 58.281, 1543 m., on rock, M. Shokouhnam [MSH029 ─ ICH]. **Note**: We do not recognize *D. miniatum* var. *cirsodes* and *D. miniatum* var. *complicatum* as distinct varieties; instead, we treat them as synonyms of *D. miniatum* pending molecular evidence that may support their taxonomic distinction. In the absence of robust molecular and phylogenetic evidence demonstrating that these taxa represent independently evolving lineages, we consider it premature to recognize them at species rank. Their taxonomic status should be reassessed when adequate molecular data, preferably including reliably identified and type-relevant material, become available.

Dimelaena oreina (Ach.) Norman, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Seaward et al. 2008, Zokaei 2002, Zokaei 2003, Haji Moniri 2010, Haji Moniri 2014, Haji Moniri et al. 2009a, Haji Moniri et al. 2011b, Haji Moniri 2025; **D-K**: Mashhad, Torghabeh and Kashmar counties; **RHS**: 2314, 2400, duplicates in B, 2057, 2057 FUMH and duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Tabarak village, 37.111, 58.434, 1554 m., on rock, M. Shokouhnam [MSH090 a, c ─ ICH].

Diploschistes diacapsis (Ach.) Lumbsch, **E**: Epigeic; **S**: Terricolous, on clay soil; **LR**: Haji Moniri et al. 2014; **D-K**: Kalat County; **RHS**: 1656, 1957a duplicates in B; **SA**: No accessible herbarium specimen in Iran.

D. scruposus (Schreb.) Norman, **E**: Epilithic and Saxicolous, on calcareous rock, Saxicolous, on siliceous rocks; **LR**: Haji Moniri et al. 2011a, Haji Moniri and Sipman 2011, Haji Moniri 2025; **D-K**: Torghabeh County; **RHS**: 1944, 2440 duplicate in B; **SA**: No accessible herbarium specimen in Iran.

Diplotomma alboatrum (Hoffm.) Flot., **E**: Epiphytic sometimes Epilithic; **S**: Corticolous: on bark of trees, Saxicolous, on calcareous rock; **LR**: Haji Moniri 2010, Haji Moniri et al. 2011a, 2011b, Sayyad et al. 2016a, Haji Moniri 2025; **D-K**: Torghabeh, Kalat and Mashhad counties; **RHS**: 2288, 2307, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

D. epipolium (Ach.) Arnold, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri 2010, Sayyad et al. 2016a; **D-K**: CountyMashhad County; **RHS**: No voucher and no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

D. hedinii (H. Magn.) P. Clerc & Cl. Roux, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Torbat-e Jam, Mashhad and Dargaz counties; **RHS**: 1642, 1646, 3078, 1838, 3028 some duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Abshuri village, 37.533, 58.421, 1488 m., on rock, Acc. spp.: *Diplotomma hedinii, Pyrenodesmia erodens*, M. Shokouhnam [MSH033─ICH].

D. pharcidium (Ach.) M. Choisy, **E**: Epiphytic, sometimes Lignicolous; **S**: Corticolous: on bark of trees or dead wood; **LR**: Haji Moniri and Sipman 2011, 2017, Haji Moniri 2025; **D-K**: Torbat-e Heidarieh and Dargaz counties; **RHS**: 1836 duplicate in B; **SA**: No accessible herbarium specimen in Iran.

D. venustum Körb., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri et al. 2005, Haji Moniri 2010, Haji Moniri 2025; **D-K**: Daregaz, Neishabour, Kashmar and Mashhad counties; **RHS**: 1496a, 1436b B and duplicates in FUMH; **SA**: No accessible herbarium specimen in Iran.

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Enchylium coccophorum (Tuck.) Otálora, P.M. Jørg. & Wedin, **E**: Epigeic; **S**: Terricolous, on mosses, soil, and plant debris; **LR**: Hassanzadeh Bashtian et al. (2019 as *Collema coccophorum*); **D-K**: Binaloud County; **RHS**: No voucher and no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

E. polycarpon (Hoffm.) Otálora, P.M. Jørg. & Wedin, **E**: Epigeic; **S**: Terricolous, on clay soil; **LR**: Haji Moniri and Sipman 2009, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 1870a FUMH and duplicates in B; **SA**: No accessible herbarium specimen in Iran.

E. tenax (Sw.) Gray, **E**: Epigeic; **S**: Terricolous, on clay soil; **LR**: Seaward et al. 2008, Zokaei and Abedi 2000, Haji Moniri et al. 2011b, 2014, Haji Moniri 2010, Gholamhosseinian et al. 2020, Hassanzadeh Bashtian et al. 2019, Haji Moniri 2025; **D-K**: Mashhad, Torbat-e Jam, Torghabeh, Neishabour and Sarakhs counties; **RHS**: 2177, 1702, 1704, 1887 duplicates in herb. M. Schultz; 2324, 3031 duplicates in B; **SA**: No accessible herbarium specimen in Iran except for Gholamhosseinian et al. 2020. **ME**: Khorasan, Razavi, Mashhad, Mashhad-Sarakhs Road, ca. 9 km. from Mazda-vand village towards Sarakhs, East side of the Road, GPS: 36.195973 N, 60.573863 E, 850 m., 20 March 2018, on calcareous soil, A. Gholamhosseinian, [(AG3) ─ ICH].

Endocarpon pusillum Hedw., **E**: Epigeic; **S**: Saxicolous, on calcareous rock; Terricolous, on mosses and soil; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri et al. 2005, Haji Moniri 2010, Gholamhosseinian et al. 2020, Haji Moniri 2025; **D-K**: Mashhad, Torbat-e jam and Sarakhs counties; **RHS**: 1433b B and duplicates in FUMH; **SA**: No accessible herbarium specimen in Iran.

Endococcus macrosporus (Hepp ex Arnold) Nyl., **S**: Lichenicolous fungus: parasitic on lichens; **LR**: Haji Moniri et al. 2009b, Haji Moniri 2025; **D-K**: Mashhad County; **RHS**: 2362 FUMH; **SA**: No accessible herbarium specimen in Iran.

E. verrucosus Hafellner, **S**: Lichenicolous fungus: parasitic on lichens; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Mashhad County; **RHS**: 1618, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

Farnoldia jurana (Schaer.) Hertel, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri et al. 2005, Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Mashhad and Chenaran counties; **RHS**: 1503, no duplicate material indicated; 1528a FUMH and duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Flavoplaca microthallina (Wedd.) Arup, Frödén & Søchting, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2009a, Gholamhosseinian et al. 2020, Haji Moniri 2025; **D-K**: Kashmar and Sarakhs counties; **RHS**: 2051, 2153 FUMH and duplicates in B; **SA**: No accessible herbarium specimen in Iran.

F. polycarpa (A. Massal.) Arup, Frödén & Søchting, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Sayyad et al. 2016a; **D-K**: Dargaz County; **RHS**: No voucher and no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

Glypholecia scabra (Pers.) Müll. Arg., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri et al. 2005, Haji Moniri et al. 2009a, 2010, Haji Moniri et al. 2011b, 2014, Sayyad et al. 2016a, Haji Moniri 2025; **D-K**: Mashhad, Neishabour, Dargaz, Torghabeh and Kashmar counties; **RHS**: 1455, 1791, 2058, 2080 FUMH and duplicates in B; 2257, 2156, 2349 duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME:** Quchan, Tabarak village, 37.111, 58.434, 1554 m., on rock, M. Shokouhnam [MSH003 ─ICH].

Graphis scripta (L.) Ach., (Fig. 3 A); **E**: Epiphytic; **S**: Corticolous: on the bark of trees; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan- Shamkhal valley, 37.357, 58.273, 1479 m., on bark, M. Shokouhnam [MSH054 ─ ICH]. Quchan, Berder village, Asalmeh, 37.374, 58.212, 1684 m., on bark, M. Shokouhnam [MSH059a─ ICH]. Quchan, Doorbadam village, 37.292, 58.281, 1543 m., on bark, M. Shokouhnam [MSH094─ICH]. Quchan, Emam Quli village, 37.234, 58.311, 1681 m., on bark, M. Shokouhnam [MSH098b ─ ICH].

Gyalolechia bracteata (Hoffm.) Räs., **E**: Epigeic; **S**: on soil; **LR**: Haji Moniri et al. 2011b, Haji Moniri 2025; **D-K**: Torghabeh County; **RHS**: 2201 duplicates in B and FUMH; **SA**: No accessible herbarium specimen in Iran.

Gyalolechia diplococca (Hoffm.) A. Massal., **E**: Epigeic; **S**: Terricolous, on mosses, soil and plant debris; **LR**: Haji Moniri 2010, Haji Moniri et al. 2011b, Haji Moniri 2025; **D-K**: Mashhad and Torghabeh and Kalat counties; **RHS**: 2255, 2201, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

G. fulgens (Sw.) Søchting, Frödén & Arup, **E**: Epigeic; **S**: Muscicolous: on soil; **LR**: Seaward et al. 2008, Zokaei 2003, Haji Moniri and Sipman 2009, Haji Moniri 2010, Haji Moniri 2018, Sayyad et al. 2016a, Haji Moniri et al. 2011b, Hasanzadeh Bashtian et al. 2019, Haji Moniri 2025; **D-K**: Dargaz, Torghabeh, Mashhad and Neishabour counties; **RHS**: 1885, 1818 FUHM duplicates in B, 2309, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

G. fulgida (Nyl.) Søchting, Frödén & Arup, **E**: Epigeic; **S**: Terricolous, on mosses, soil and plant debris; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Torbat-e Jam County; **RHS**: 1670, no duplicate material indicated; **SA**: No

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accessible herbarium specimen in Iran; **ME**: Quchan, Nowroozi village 37.054, 58.422, 1513 m., on calcareous soil, M. Shokouhnam, Acc. spp.: *Gyalolechia subbracteata* and *Lobothallia farinosa*, on rock, M. Shokouhnam [MSH082a, b ─ ICH].

G. subbracteata (Nyl.) Søchting, Frödén & Arup, **E**: Epigeic; **S**: Muscicolous: on soil mosses, Terricolous, on clay soil; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri et al. 2005, Haji Moniri et al. 2011b, Haji Moniri et al. 2014, Haji Moniri 2010, Sayyad et al. 2016a, Gholamhosseinian et al. 2020, Gholamhosseinian et al. 2021, Haji Moniri 2025; **D-K**: Mashhad, Torbat-e jam, Torghabeh, and Sarakhs counties; **RHS**: 1622, 1434a, 2262, 2370 duplicates in B and FUMH; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Tabarak village, 37.311, 58.434, 1554 m., on soil, M. Shokouhnam [MSH005 ─ICH]; Quchan, Berder village, Asalmeh, 37.374, 58.212, 1684 m., on moss, M. Shokouhnam [MSH032 ─ ICH]; Quchan, Nowroozi village 37.643, 58.323, 1513 m., on calcareous soil, M. Shokouhnam M, *Gyalolechia fulgida* and *Lobothallia farinosa,* M. Shokouhnam [MSH082a ─ ICH].

Involucropyrenium waltheri (Kremp.) Breuss, **E**: Epilithic and Saxicolous, on calciferous rocks; **LR**: Baradaran et al. 2023: **D-K**: CountyMashhad County; **RHS**: 12179 TARI; **SA**: No accessible herbarium specimen in Iran.

Kiliasia granulosa (Szatala) Timdal (**Syn:** *Toninia weberi* Timdal) **E**: Epigeic; **S**: Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Neishabour County; **RHS**: 3055, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

K. sculpturata (H. Magn.) Kistenich, Timdal, Bendiksby & S. Ekman, **E**: Epilithic and Saxicolous, on calciferous rocks and terricolous on soil; **LR**: New to Iran; **D-K**: Quchan County; **ME**: Quchan, Doorbadam village, 37.292, 58.281, 1543 m., on rock, M. Shokouhnam [MSH039 ─ ICH].

Lathagrium auriforme (With.) Otálora, P.M. Jørg. & Wedin; **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri et al. 2005, Haji Moniri et al. 2011b, Haji Moniri et al. 2014, Haji Moniri and Sipman 2009, Haji Moniri 2010, Haji Moniri 2025; **D-K**: Mashhad, Torbat-e jam, Kalat, Dargaz, Torghabeh counties; **RHS**: 1435a, 1925B duplicates in FUMH; 2506, 1819a, 2299, 2180, 1874, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

L. cristatum (L.) Otálora; **E**: Epilithic and Saxicolous, on calcareous rock, Muscicolous: on soil mosses; **LR**: Haji Moniri and Sipman 2009, Haji Moniri et al. 2014, Haji Moniri 2010, Haji Moniri 2018, Haji Moniri 2025; **D-K**: Dargaz, Kalat, Mashhad, and Torbat-e Jam counties; **RHS**: 2011, 1868a, 1822, 2376, 2367, 2506, 1687, 1884, 1959a some duplicates in B and herb. M. Schultz; **SA**: No accessible herbarium specimen in Iran.

Lecaimmeria cupreoatra (Nyl.) C.M. Xie (Syn: *Bellemerea cupreoatra* (Nyl.) Clauzade & Cl. Roux,), **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Szatala 1957, Szatala 1940 "1939", Seaward et al. 2004, Seaward et al. 2008; **D-K**: Torbat-e Heydariyeh (Koh-e-Bizg); **RHS**: W; **SA**: No accessible herbarium specimen in Iran. **Note:** The sample was collected by Karl Heinz Rechinger, but no additional reports were received from Khorasan; additional studies are necessary to confirm its occurrence in Khorasan.

L. iranica (Valadb., Sipman & Rambold) C.M. Xie, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri and Sipman 2017; **D-K**: Torbat-e Jam County; **RHS**: 3138, no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

Lecania bullata Oxner, **S**: lichenicolous fungus on *Caloplaca*; **LR**: Van Den Boom and Haji Moniri 2018, Haji Moniri and Sipman 2017; **D-K**: Kalat, Mashhad and Quchan counties; **RHS**: 2204, 2377, 2523, 3131 duplicates in v.d. Boom; **SA**: No accessible herbarium specimen in Iran.

L. cyrtella (Ach.) Th. Fr., **E**: Epiphytic; **S**: Corticolous: on the bark of trees; **LR**: Van Den Boom and Haji Moniri 2018, Haji Moniri et al. 2011b, Haji Moniri 2025; **D-K**: Torghabeh County; **RHS**: 2450, no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

L. diplococca M. Steiner & Poelt, **E**: Epiphytic; **S**: Corticolous: on the bark of trees; **LR**: Van Den Boom and Haji Moniri 2018, Haji Moniri 2025; **D-K**: Torghabeh, Kalat and Quchan County; **RHS**: 2450, 2377 duplicates in B and v.d. Boom; **SA**: No accessible herbarium specimen in Iran.

L. ephedrae Elenkin, **E**: Epiphytic; **S**: Corticolous: on the bark of *Ephedra* spp. shrubs; **LR**: Van Den Boom and Haji Moniri 2018; **D-K**: Dargaz County; **RHS**: 19191 B; 3119, 3124 duplicates in v.d. Boom; **SA**: No accessible herbarium specimen in Iran.

L. flavescens Lynge, **E**: Epiphytic; **S**: Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Van Den Boom and Haji Moniri 2018, Haji Moniri 2025; **D-K**: Kalat and Dargaz counties; **RHS**: 2388, 3079 duplicates in B; **SA**: No accessible herbarium specimen in Iran.

L. makarevicziae M. Haji Moniri, P. van den Boom et S. Y. Kondr., **E**: Epiphytic; **S**: Corticolous: on the bark; **LR**: Haji Moniri et al. 2016, Haji Moniri 2025; **D-K**: Torghabeh; **RHS**: No voucher and no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

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L. nylanderiana A. Massal., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Van Den Boom and Haji Moniri 2018, Haji Moniri 2025; **D-K:** Chenaran and Dargaz counties; **RHS**: 1535, no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

L. polycycla (Anzi) Lettau, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Dargaz, Neishabour and Torbat-e Heidarieh counties; **RHS**: 1425 duplicates in B; **SA**: No accessible herbarium specimen in Iran.

L. safavidiorum (S.Y. Kondr., Zarei-Darki, Lőkös & Hur) S.Y. Kondr., Lőkös & Hur, (Syn: *Oxnerella safavidiorum* S.Y. Kondr., Zarei-Darki, Lőkös & Hur,), **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Kondratyuk et al. 2014, Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Kadkan and Kalat counties; **RHS**: 3107, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

L. subfuscula (Nyl.) S. Ekman, **E**: Epiphytic; **S**: on mosses, soil and plant debris; **LR**: Haji Moniri et al. 2014, Van Den Boom and Haji Moniri 2018, Haji Moniri 2025; **D-K**: Mashhad and Torghabeh counties; **RHS**: 1606, no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

L. triseptata (Vain.) Zahlbr., **S**: Lichenicolous fungus: parasitic on lichens; **LR**: Haji Moniri et al. 2014, Van Den Boom and Haji Moniri 2018, Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K:** Torbat-e Heidarieh, Torghabeh and Dargaz counties; **RHS**: 3074, 3080, 3098 duplicates in B; v.d. Boom and B; **SA**: No accessible herbarium specimen in Iran.

Lecanora agardhiana Ach., **E**: Epiphytic; **S**: Saxicolous, on siliceous rocks; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: chenaran and Dargaz Countries; **RHS**: 1761 duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Emam Quli - North emam Quli, GPS: 37.234, 58.311, 1681m., on rock, M. Shokouhnam [MSH030 ─ ICH].

L. albellula (Nyl.) Th. Fr., **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri 2018; **D-K**: Dargaz County; **RHS**: No voucher and no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

L. allophana Nyl., **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri et al. 2011a, Haji Moniri 2025; **D-K**: Noghondar, Mashhad County; **RHS:** 2439 no duplicate indication; **SA**: No accessible herbarium specimen in Iran; **ME**: Shamkhal valley, 37.357, 58.273, 1479 m., on bark, M. Shokouhnam [MSH045 ─ICH]; Quchan, Tabarak village, 37.111, 58.434, 1554 m., on bark, M. Shokouhnam [MSH070 ─ ICH].

L. argopholis (Ach.) Ach., **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Haji Moniri 2010, Haji Moniri et al. 2011a, 2011b, Haji Moniri 2025; **D-K**: Torghabeh and Mashhad counties; **RHS**: 2249, duplicates in B; 2438, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

L. campestris (Schaer.) Hue, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Haji Moniri 2010, Haji Moniri et al. 2011b, Haji Moniri 2025; **D-K**: Mashhad and Torghabeh counties; **RHS**: 2311, 4401, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

L. chlarotera Nyl., **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: This study, new to Razavi Khorasan**; D-K**: Quchan County; **ME**: Quchan, Shamkhal valley, 37.357, 58.273, 1479 m., on bark, M. Shokouhnam [MSH053 ─ ICH].

L. marginata (Schaer.) Hertel & Rambold, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri 2025; **D-K**: Chenaran County; **RHS**: 1532b B and FUMH; **SA**: No accessible herbarium specimen in Iran.

L. persimilis (Th. Fr) Nyl., **E**: Epiphytic; **S**: corticolous: on bark of trees; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Torbat-e Heidarieh County; **RHS**: 2481, 3081 duplicates in B; **SA**: No accessible herbarium specimen in Iran.

L. thysanophora R.C. Harris, **E**: Epiphytic; **S**: corticolous: on bark of trees; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan, Berder village, Asalmeh, 37.374, 58.212, 1684 m., on bark, Acc. Spp. *Bacidia laurocerasi*, M. Shokouhnam [MSH092a,b, ─ICH].

L. umbrina (Ach.) A. Massal., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri 2010; **D-K**: Mashhad County; **RHS**: No voucher and no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

Lecidea atrobrunnea (Ramond ex Lam. & DC.) Schaer., **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Haji Moniri et al. 2011a, Haji Moniri et al. 2014, Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Mashhad, Torbat-e Jam and Torghabeh counties; **RHS**: 1560, 2437 no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

L. promixta Nyl., **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Torqabeh and Mashhad counties; **RHS**: 3109, 3138, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

L. tessellata Flörke, **E**: Epilithic and Saxicolous, on calcareous rock, Saxicolous, on siliceous rocks; **LR**: Haji Moniri 2010, Haji Moniri 2018, Haji Moniri et al. 2009a, Haji Moniri et al. 2011b, Sayyad et al. 2016a, Haji Moniri and Sipman

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2011, Haji Moniri 2025; **D-K**: Mashhad, Dargaz, Quchan, Torghabeh and Kashmar counties; **RHS**: 2063 FUMH and duplicates in B; 1843a, 1853, 2323, 2163, 2183, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Lecidella asema (Nyl.) Knoph & Hertel, **E**: Epilithic; **S**: Lignicolous: growing on decorticate dead wood, Terricolous, on clay soil, Saxicolous, on siliceous rocks; **LR**: Seaward et al. 2008, Haji Moniri 2025; **D-K**: Neishabur County; **RHS**: 2231 TARI and duplicates in TSB; **SA**: No accessible herbarium specimen in Iran.

L. carpathica Körb., **E**: Epilithic and Saxicolous, on calcareous rock, Saxicolous, on siliceous rocks; **LR**: Seaward et al. 2008, Haji Moniri and Sipman 2009, 2011, Haji Moniri et al. 2010, Haji Moniri et al. 2009a, 2011b, Sayyad et al. 2016a, Haji Moniri 2025; **D-K**: Dargaz, Mashhad, Kashmar, Quchan and Torghabeh counties; **RHS**: 1849a, 1744, 2064, 2083B and duplicates in FUMH; 2304, 2207, 2355, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

L. elaeochroma (Ach.) M. Choisy, **E**: Epiphytic; **S**: Corticolous: on bark of trees **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan, Berder village, Asalmeh, 37.374, 58.212, 1684 m., on bark, M. Shokouhnam [MSH056 ─ ICH]; Quchan, Tabarak village, 37.111, 58.434, 1554 m., on bark, M. Shokouhnam [MSH070 ─ ICH].

L. patavina (A. Massal.) Knoph & Leuckert, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Szatala 1957, Seaward et al. 2004, Seaward et al. 2008; **D-K**: Dargaz County; **RHS**: W, no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran; **Note**: The sample was collected by Karl Heinz Rechinger, but no additional reports were received from Khorasan; additional studies are necessary to confirm its occurrence in Khorasan.

L. stigmatea (Ach.) Hertel & Leuckert, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Haji Moniri et al. 2014, Haji Moniri and Sipman 2011, Haji Moniri 2025; **D-K**: Mashhad and Dargaz counties; **RHS**: 1555, 1794, 1833, 1830, 1834, 1843b duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Tabarak village, 37.111, 58.434, 1554 m., on rock, M. Shokouhnam [MSH027 ─ ICH]. Quchan, Dizavand village, 37.368, 58.364, 1387 m., on rock, M. Shokouhnam [MSH099a ─ ICH].

Lepra albescens (Huds.) Hafellner, **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Khorasan, Razavi, Quchan- Shamkhal valley, GPS: 37.357, 58.273, 1479 m., on bark, M. Shokouhnam [MSH048 ─ ICH].

Lepraria vouauxii (Hue) R.C. Harris, **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan, Abshuri village, 37.533, 58.421, 1488 m., on bark, M. Shokouhnam [MSH066 ─ ICH].

Leproplaca cirrochroa (Ach.) Arup, Frödén & Søchting, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2008, Zokaei 2003; **D-K**: Mashhad County; **RHS**: No voucher and no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

Lichinella stipatula Nyl.; **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Mashhad County; **RHS**: 2434 duplicates in herb. M. Schultz; **SA**: No accessible herbarium specimen in Iran.

Lobothallia cernohorskyana (Clauzade & Vězda) A. Nordin, Cl. Roux & Sohrabi, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan, Jafarabad village 37.040, 58.372, 1330 m., on rock, M. Shokouhnam [MSH103 ─ ICH]; Quchan, Nowroozi village 37.643, 58.323, 1513 m., on calcareous rock, M. Shokouhnam [MSH080b ─ ICH].

L. controversa Cl. Roux & A. Nordin (Syn: ***Lobothallia farinosa*** (Nyl.) A. Nordin, Savić & Tibell,), **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Sayyad et al. 2016a, Haji Moniri 2025; **D-K**: Boshruieh, Quchan County; **RHS**: 1408 B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Nowroozi village 37.643, 58.323, 1513 m., Acc. Sp.: *Gyalolechia fulgida* and *G. subbracteata*, on calcareous rock, M. Shokouhnam [MSH082 ─ ICH].

L. praeradiosa (Nyl.) Hafellner, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2011b, 2014, Haji Moniri 2010, 2025; **D-K**: Mashhad and Torghabeh counties; **RHS**: 1585; 2241 duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Megaspora rimisorediata Valadbeigi & A. Nordin, **E**: Epiphytic occasionally on other substrates; **S:** Corticolous: on bark of trees; Saxicolous: on calcareous rock; Humicolous: growing on organic debris; Muscicolous: on tree, soil or rock mosses; **LR**: Haji Moniri et al. 2014, Haji Moniri et al. 2017, Haji Moniri and Sipman 2017, Zakeri et al. 2016, Haji Moniri 2018; **D-K**: Dargaz and Quchan counties; **RHS**: B; 3035; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Yadak village, 37.729, 58.534, 1717 m., on bark Acc. Sp: *Xanthomendoza fulva*, M. Shokouhnam [MSH010, MSH043 ─ ICH]; Quchan, Sharak village, 37.263, 58.282, 1681 m., on moss, M. Shokouhnam [MSH018─ ICH]; Quchan, Tabarak village, 37.111, 58.434, 1554 m., on bark, M. Shokouhnam [MSH070 ─ ICH].

Melanohalea exasperata (De Not.) O. Blanco et al., **E**: Epiphytic; **S**: Corticolous: on bark of trees, Muscicolous: on tree mosses; **LR**: Szatala 1940 "1939", Szatala 1957, Seaward et al. 2004, Seaward et al. 2008; **D-K**: Torbat-e Heydariyeh; **RHS**: W, no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran. **Note**: The sample was

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collected by Karl Heinz Rechinger, but no additional reports were received from Khorasan; additional studies are necessary to confirm its occurrence in Khorasan.

M. exasperatula (Nyl.) O. Blanco et al., **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Mashhad County; **RHS**: 1618, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

Muellerella erratica (A. Massal.) Hafellner & V. John., **S**: Lichenicolous fungus: parasitic on lichens; **LR**: Haji Moniri et al. 2014 as *M. pygmaea* var. *athallina* (Müll. Arg.) Triebel, Haji Moniri 2025; **D-K**: Dargaz and Torbat-e Jam counties; **RHS**: 1665; 1801a, 1838 duplicates in B; **SA**: No accessible herbarium specimen in Iran.

M. lichenicola (Sommerf. ex Fr.) D. Hawksw., **S**: Lichenicolous fungus: parasitic on lichens; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 1761, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

M. pygmaea var. ***pygmaea*** (Körb.) D. Hawksw., **S**: Lichenicolous fungus: parasitic on lichens; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Mashhad, Dargaz and Neishabour counties; **RHS**: 1768, 1553, 3055, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

M. ventosicola (Mudd) D. Hawksw., **S**: Lichenicolous fungus: parasitic on lichens; **LR**: Haji Moniri et al. 2014 as *M. pygmaea* var. *ventosicola* (Mudd) Triebel, Haji Moniri 2025; **D-K**: Mashhad, Dargaz and Torbat-e Jam counties; **RHS**: 1553; 1768; 1768; 1768; 3055 1665; 1801a duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Myriolecis agardhiana (Ach.) Śliwa, Zhao Xin & Lumbsch, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Szatala 1957, Haji Moniri et al. 2014, Haji Moniri 2010, Sayyad et al. 2016a **D-K**: Chenaran, Dargaz and Mashhad counties; **RHS**: 1761 duplicates in B; 3041; 1534 B and duplicates in FUMH; **SA**: No accessible herbarium specimen in Iran.

M. albescens (Hoffm.) Śliwa, Zhao Xin & Lumbsch, **E**: Epilithic and Saxicolous, on calcareous rock, Saxicolous, man made substrate, mortar, cement, concrete or brick; **LR**: Haji Moniri and Sipman 2017; **D-K**: Torbat-e Heidarieh and Torbat-e Jam counties; **RHS**: No voucher indication, duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Emam Quli village, 37.234, 58.311, 1681 m., on rock, M. Shokouhnam [MSH057 ─ ICH].

M. crenulata (Hook.) Śliwa, Zhao Xin & Lumbsch, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri et al. 2011b, Haji Moniri et al. 2014, Haji Moniri 2010, Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Gonabad, Neishabour, Dargaz, Torghabeh, Mashhad, Kashmar and Torbat-e Heidarieh counties; **RHS**: 3055, 1768, no duplicate indication; 2322, 2190, 2348, duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan. Rahman Quli village, 37.274 N, 58.294 E, 954 m., on rock, M. Shokouhnam [MSH016b ─ ICH].

M. dispersa (Pers.) Śliwa, Zhao Xin & Lumbsch (**Syn**: *Lecanora dispersa* (Pers.) Röhl.), **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri 2010, Haji Moniri 2018, Sayyad et al. 2016a, Haji Moniri et al. 2011b, Haji Moniri and Sipman 2011, 2017, Haji Moniri 2025; **D-K**: Torghabeh, Kashmar and Quchan County; **RHS**: 2276, 2169, 2347, 1913, duplicates in B; 1774; 2008; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan Tabarak village, 37.111, 58.434, 1554 m., on rock, M. Shokouhnam [MSH042b ─ ICH]; Quchan, Jafarabad- village, 37.040, 58.372, 1330 m., on rock, M. Shokouhnam [MSH060 ─ ICH]; Quchan, Emam Quli, 37.234, 58.311, 1681m., on rock , M. Shokouhnam [MSH030 ─ ICH]; Quchan, Abshuri village, 37.533, 58.421, 1488 m., on rock, M. Shokouhnam [MSH041a─ ICH]; Quchan Rahman Quli, Cherik valley, 37.401, 58.315, 954m., on rock, M. Shokouhnam [MSH036a ─ ICH].

M. hagenii (Ach.) Śliwa, Zhao Xin & Lumbsch, **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri and Sipman 2017; **D-K**: Dargaz County; **RHS**: No specimen number, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

M. invadens (H. Magn.) Śliwa, Zhao Xin & Lumbsch, **E**: Epilithic and Saxicolous, on calcareous rock, Lichenicolous lichen: on other lichens; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 1833, 3064, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

M. juniperina (Śliwa) Śliwa, Zhao Xin & Lumbsch, **E**: Epiphytic; **S**: Lignicolous: growing on decorticated dead wood; **LR**: Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 3121, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

M. perpruinosa Fröberg ex Śliwa, Zhao Xin & Lumbsch, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Dargaz and Torbat-e Heidarieh counties; **RHS**: 1768, 1769, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

M. semipallida (H. Magn.) Śliwa, Zhao Xin & Lumbsch, **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri et al. 2014, Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Torbat-e Jam and Torqabeh counties; **RHS**: 3078, duplicates B; **SA**: No accessible herbarium specimen in Iran.

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M. zosterae (Ach.) Śliwa, Zhao Xin & Lumbsch, **E**: Epilithic and Saxicolous, on calcareous rock, Lignicolous: growing on decorticate dead wood, Muscicolous: on soil mosses; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Mashhad County; **RHS**: 1548, 1606, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

Opegrapha niveoatra (Borrer) J.R. Laundon, (Fig. 3 B); **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan, Shamkhal valley, 37.357, 58.273, 1479 m., on bark, M. Shokouhnam [MSH069a, MSH073 ─ ICH]; Quchan, Emam Quli village, 58.234 N, 37.311 E, 1681 m., on bark, M. Shokouhnam [MSH098a, b ─ ICH].

O. pulvinata Rehm, **S**: parasitic on lichens; **LR**: Valikhani and Haji Moniri 2013, Haji Moniri 2025; **D-K**: Kalat County; **RHS**: 2501, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

O. vulgata (Ach.) Ach., **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan, Berder, village Asalmeh, 37.374, 58.212, 1684 m., on bark, Acc. Sp.: *Graphis scripta*, M. Shokouhnam [MSH071─ICH].

Parmelia sulcata Taylor, **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri 2018; **D-K**: Dargaz County; **RHS**: No voucher and no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

Peccania coralloides (A. Massal.) A. Massal., **P**: Cyanobacteria, coccaceous (e.g. *Gloeocapsa*); **E**: Epilithic and Saxicolous, on calcareous rock, Terricolous, growing on or (at least partially) within the ground; **LR**: Seaward et al. 2008, Haji Moniri et al. 2011b, 2014, Haji Moniri 2010, Haji Moniri 2025; **D-K**: Chenaran and Mashhad counties; **RHS**: 2142 herb. M. Schultz, 2346 duplicate in B; **SA**: No accessible herbarium specimen in Iran.

P. terricola H. Magn., **P**: Cyanobacteria, coccaceous (e.g. *Gloeocapsa*); **E**: Epigeic; **S**: Terricolous, on clay soil; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K:** Mashhad County; **RHS**: 2436 duplicates in herb. M. Schultz; **ME**: Quchan-Village Jafarabad village, 37.040, 58.372, 1330 m, on soil, M. Shokouhnam (MSH037─ICH].

Peltigera monticola Vitik., **E**: Epigeic; **S**: Humicolous, growing on organic debris, Muscicolous: on soil mosses, Terricolous, on clay soil; **LR**: Seaward et al. 2008, Haji Moniri and Sipman 2009, 2011, Haji Moniri 2009, 2010, 2018, 2025, Haji Moniri et al. 2011b; **D-K**: Torbat-e Jam, Dargaz and Mashhad counties; **RHS**: 2009, 2010, 1911, 3012, 2228 FUMH and duplicates in B; H and NBM; 3013 FUMH and duplicates in H and NBM; 1883, 2238, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

P. ponojensis Gyeln., **E**: Epigeic; **S**: Humicolous, growing on organic debris, Muscicolous: on soil mosses, Terricolous, on clay soil; **LR**: Seaward et al. 2008, Haji Moniri 2025; **D-K**: Chenaran County; **RHS**: 1514 [MRDS 114029]; **SA**: No accessible herbarium specimen in Iran.

P. praetextata (Flörke ex Sommerf.) Zopf, **P**: Cyanobacteria (e.g. *Nostoc*, *Scytonema*); **E**: Epigeic; **S**: Humicolous, growing on organic debris, Muscicolous: on soil mosses, Terricolous, on clay soil; **LR**: Haji Moniri and Sipman 2009, 2011, Haji Moniri 2010, 2018, Haji Moniri et al. 2011b, Haji Moniri 2025; **D-K**: Dargaz, Torghabeh and Saleh abad counties; **RHS**: 1880, 1881, 1883, 1767, 1699, FUMH and duplicates in B, 2266, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

P. rufescens (Weiss) Humb., **E**: Epigeic; **S**: Humicolous, growing on organic debris, Muscicolous: on soil mosses, Terricolous, on clay soil; **LR**: Haji Moniri and Sipman 2009, Haji Moniri 2009, 2025; **D-K**: Dargaz County; **RHS**: 1761 FUMH and duplicates in B; 3011 FUMH and duplicates in H and NBM; **SA**: No accessible herbarium specimen in Iran.

Phaeophyscia ciliata (Hoffm.) Moberg, **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri 2018; **D-K**: Dargaz County; **RHS**: No voucher and no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Shamkhal valley, 37.357, 58.273, 1479 m., on bark, M. Shokouhnam [MSH053 ─ ICH].

P. nigricans (Flörke) Moberg, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri 2010, 2025, Haji Moniri et al. 2011b; **D-K**: Mashhad and Torghabeh counties; **RHS**: 2169 duplicates in B; **SA**: No accessible herbarium specimen in Iran.

P. orbicularis (Neck.) Moberg, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri and Sipman 2017, Haji Moniri 2018, 2025; **D-K**: Quchan, Kalat and Dargaz counties; **RHS**: 2514, 3082, duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Yadak village, 37.729, 58.534, 1717 m., on bark, M. Shokouhnam [MSH062, MSH002, ICH]; Quchan, Shamkhal valley, 37.357, 58.273, 1479 m., on bark, M. Shokouhnam [MSH053 ─ ICH].

Physcia adscendens (Th. Fr.) H. Olivier, **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri and Sipman 2009, 2011, 2017, Haji Moniri 2018; **D-K**: Dargaz County; **RHS**: 1957 B and duplicates in FUMH; duplicates in B; **SA**: No accessible herbarium specimen in Iran.

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P. aipolia (Ehrh. ex Humb.) Fürnr., **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri et al. 2011a, Haji Moniri 2018; **D-K**: Torghabeh and Mashhad and Dargaz counties; **RHS**: 2441, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

P. albinea (Ach.) Nyl., **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Haji Moniri 2010, Haji Moniri et al. 2011b, Haji Moniri 2025; **D-K**: Torghabeh and Mashhad counties; **RHS**: 2307, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

P. biziana (A.Massal.) Zahlbr., **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 3083, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

P. dimidiata (Arnold) Nyl., **E**: Epilithic and Saxicolous, on calcareous rock, Saxicolous, on siliceous rocks; **LR**: Haji Moniri and Sipman 2009, Haji Moniri 2018, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 1929, 1856, 1755 FUMH and duplicates in B; **SA**: No accessible herbarium specimen in Iran.

P. stellaris (L.) Nyl., **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri and Sipman 2011, 2017, Haji Moniri 2018; **D-K**: Dargaz and Saleh abad counties; **RHS**: 1740, 1952, no duplicate indication; 1988a, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

P. tenella (Scop.) DC., **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri and Sipman 2009, Haji Moniri 2010, 2018, Haji Moniri et al. 2011b, Haji Moniri 2025; **D-K**: Dargaz and Mashhad counties; **RHS**:1786 FUMH and duplicates in B; 2360, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

P. tribacia (Ach.) Nyl., **E**: Epiphytic; **S**: Corticolous: on bark of trees, Saxicolous, on siliceous rocks; **LR**: Haji Moniri 2010, 2018, Haji Moniri et al. 2011b, Haji Moniri and Sipman 2011, Haji Moniri 2025; **D-K**: Torghabeh, Mashhad and Dargaz counties; **RHS**: 2313, 2222, 2347, 1856, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Physciella chloantha (Ach.) Essl., **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 3126, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Placidium pilosellum (Breuss) Breuss, **E**: Epigeic; **S**: Humicolous, growing on organic debris, Muscicolous: on soil mosses; **LR**: Seaward et al. 2004, 2008, Haji Moniri et al. 2005, Haji Moniri and Sipman 2011, Haji Moniri 2025; **D-K**: Chenaran and Mashhad counties; **RHS**: 1523 B and duplicates in FUMH; 1845, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

P. rufescens (Ach.) A. Massal., **E**: Epigeic; **S**: Humicolous, growing on organic debris, Muscicolous: on soil mosses, Terricolous, on clay soil; **LR**: Haji Moniri and Sipman 2017; **D-K**: Torbat-e Jam County; **RHS**: 3140, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

P. squamulosum (Ach.) Breuss, **E**: Epigeic; **S**: Terricolous, on clay soil; **LR**: Haji Moniri 2010, Haji Moniri et al. 2011b, Haji Moniri 2025; **D-K**: Kalat, Torghabeh and Mashhad counties; **RHS**: 2275, 2199, 2397, duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Jafarabad village, Jafarabad, 37.040, 58.372, 1330 m., on soil *Peccania terricola*, *Toninia sedifolia*, M. Shokouhnam (MSH037), [ICH]. Quchan, Nowroozi village, 37.643, 58.323, 1513 m., on soil, M. Shokouhnam [MSH078─ICH].

Placopyrenium ariyanense Haji Moniri & Breuss, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Breuss and Haji Moniri 2017, Haji Moniri 2025; **D-K**: Torghabeh; **RHS**: LI – holotype, hb. Haji Moniri – isotype); **SA**: No accessible herbarium specimen in Iran.

P. canellum (Nyl.) Gueidan & Cl. Roux, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Baradaran et al. 2023; **D-K**: Torghabeh; **RHS**: 12180 TARI; **SA**: No accessible herbarium specimen in Iran.

Polyblastia albida Arnold, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 1761, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Polycauliona candelaria (L.) Frödén, Arup & Søchting, **E**: Epiphytic; **S**: Corticolous: on bark of trees, Corticolous: growing on the bark of trees or shrubs.; **LR**: Haji Moniri 2009, 2010, 2018, Haji Moniri et al. 2011b, Haji Moniri 2025; **D-K**: Mashhad, Torghabeh and Dargaz counties; **RHS**: 3004 FUMH and duplicates in H and NBM; 2221, 2361, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Polysporina urceolata (Anzi) Brodo, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 1838, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

Protoparmelia placentiformis (J. Steiner) Poelt, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Seaward et al. 2004, 2008, Szatala 1940 "1939", Szatala 1957, Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Torbat-e Heydariyeh (Koh-e-Bizg), Mashhad and Daregaz counties; **RHS**: 1498, duplicates in B; **SA**: No accessible herbarium specimen in Iran; **Note**: It should be noted that the first sample of this species in Iran was collected by Karl Heinz Rechinger, but

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there have been no additional reports from Khorasan since 1957 except for the one mentioned in Haji Moniri (2014). Therefore, additional studies are necessary to re-confirm the occurrence of this species in Khorasan.

Protoparmeliopsis garovaglii (Körb.) Arup, Zhao Xin & Lumbsch, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Haji Moniri et al. 2009a, 2011b, et al. 2014, Haji Moniri 2010, 2014, 2025; **D-K**: Mashhad, Torghabeh, Kashmar and Quchan counties; **RHS**: 2061, 2081 FUMH and duplicates in B; 2251, 2387, 2182, 2351, duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Tabarak village, 37.111, 58.434, 1554 m., on rock, M. Shokouhnam [MSH102 ─ ICH].

P. muralis (Schreb.) M. Choisy, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Zokaei 2002, 2003, Haji Moniri et al. 2005, Haji Moniri et al. 2009a , 2011b, Zokaei and Khazai 1999, Haji Moniri and Sipman 2009, Haji Moniri and Sipman 2017, Haji Moniri 2009, Haji Moniri 2010, Haji Moniri 2014, Sayyad et al. 2016a, Nakhaei and Zokaei 2009, Haji Moniri 2025; **D-K**: Neishabour, Quchan, Dargaz, Mashhad, Torghabeh and Kashmar counties; **RHS**: 1469a, 2023, 1815, 2084, 2062 FUMH and duplicates in B; 3022 FUMH and duplicates in H and NBM; 2270, 2158, 2359 duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Tabarak village, 37.111, 58.434, 1554 m., on rock, M. Shokouhnam [MSH009 ─ ICH].

P. peltata (Ramond) Arup, Zhao Xin & Lumbsch, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Haji Moniri et al. 2009a, Haji Moniri et al. 2011b, Haji Moniri et al. 2014, Haji Moniri 2010, Haji Moniri 2025; **D-K**: Mashhad, Torghabeh, Kashmar counties; **RHS**: 1557, 1668, 2262 FUMH and duplicates in B; 2252, 2263, 2188, 2372, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

P. usbekica (Poelt) S.Y. Kondr., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri and Sipman 2009, Haji Moniri et al. 2011b, Haji Moniri et al. 2014, Haji Moniri 2010, Haji Moniri 2025; **D-K**: Torghabeh, Dargaz and Mashhad counties; **RHS**: 1848b FUMH and duplicates in B;1820d, 2206, 2399, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

P. versicolor (Pers.) M. Choisy, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008; **D-K**: Quchan, Neishabour counties; **RHS**: 1469a, FUMH and duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Tabarak village, 37.111, 58.434, 1554 m., on rock M. Shokouhnam [MSH042b ─ ICH]. **Note**: Since the synonymy between *Protoparmeliopsis versicolor* and *P. muralis* (Schreb.) M. Choisy has not yet been clearly resolved; we prefer to treat *P. versicolor* as a separate species for the time being. Final confirmation will depend on obtaining clear molecular data to elucidate their relationship.

Psora decipiens (Hedw.) Hoffm., **E**: Epigeic; **S**: Terricolous, on clay soil, Terricolous, on calcareous Soil; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri et al. 2005, Haji Moniri et al. 2011b, Haji Moniri 2010, Gholamhosseinian et al. 2020, Hassanzadeh Bashtian et al. 2019, Nakhaei and Zokaei 2009, Haji Moniri 2025; **D-K**: Mashhad, Torghabeh, Sarakhs, Neishabur, Kashmar and Torbat-e jam counties; **SA**: No accessible herbarium specimen in Iran; **RHS**: 1433a FUMH and duplicates in B; 2272, 2285, 2202, 2392, 2297, 2389, duplicates in B; **ME**: Quchan. Yadak village. 37.729, 58.534, 1717 m., on soil, *Caloplaca epigea*, *Megaspora rimisorediata*, M. Shokouhnam [MSH043 ─ ICH].

P. rubiformis (Wahlenb. ex Ach.) Hook., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Kalat County; **RHS**: 1662, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

P. vallesiaca (Schaer.) Timdal, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2008, Haji Moniri 2025; **D-K**: Torghabeh and Kalat counties; **RHS**: 1625, 1662, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

Punctelia borreri (Sm.) Krog, **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan, Berder village, Asalmeh, 37.374, 58.212, 1684 m., on bark, M. Shokouhnam [MSH091─ ICH].

P. subrudecta (Nyl.) Krog, **E**: Epilithic; **S**: Corticolous: on bark of trees; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan, Shamkhal valley, 37.357, 58.273, 1479 m., on bark, M. Shokouhnam [MSH047─ ICH].

Pyrenodesmia aegyptiaca (Müll. Arg.) J. Steiner, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Neishabour, Mashhad, Dargaz and Torqabeh counties; **RHS**: 1480, 1646, 1619, 3041, no duplicate indication; 1838, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

P. alociza (A. Massal.) Mig., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri et al. 2014, Haji Moniri 2005, Haji Moniri 2010, Haji Moniri 2025; **D-K**: Dargaz, Kalat and Mashhad counties; **RHS**: 1497a FUMH and duplicates in B; **SA**: No accessible herbarium specimen in Iran.

P. atroalba (Tuck.) I.V. Frolov & Vondrák, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Baradaran et al. 2023 as *Caloplaca atroalba* (Tuck.) Zahlbr; **D-K**: Mashhad County; **RHS**: 12175 TARI; **SA**: No accessible herbarium specimen in Iran.

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P. chalybaea (Fr.) Müll. Arg., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri et al. 2005, Haji Moniri et al. 2014, Haji Moniri 2010, Haji Moniri and Sipman 2011, Haji Moniri 2025; **D-K**: Neishabour and Dargaz counties; **RHS**: 1496a FUMH and duplicates in B; 3055, 1828, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

P. diphyodes (Nyl.) M. Choisy, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Neishabour County; **RHS**: 1484, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

P. erodens (Tretiach, Pinna & Grube) Søchting, Arup & Frödén, **E**: Endolithic; **S**: Saxicolous, on calcareous rock; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan, Abshuri village, 37.533, 58.421, 1488 m., On rock, Acc. spp.: *Diplotomma hedinii*, *Acarospora cervina*, M. Shokouhnam [MSH033─ICH].

Pyrenodesmia micromontana (I.V. Frolov, Wilk & Vondrák) Hafellner & Türk, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Baradaran et al. 2023; **D-K**: Bakharz County; **RHS**: 12176 TARI; **SA**: No accessible herbarium specimen in Iran.

P. microstepposa (I.V. Frolov, Nadyeina, Khodos. & Vondrák) Hafellner & Türk, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Baradaran et al. 2020; **D-K**: Mashhad and Torghabeh counties; **RHS**: No voucher and no duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

P. transcaspica (Nyl.) S.Y. Kondr., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri et al. 2005, Haji Moniri et al. 2014, Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Neishabour, Chenaran, Dargaz. Torbat-e Jam, Gonabad and Kalat counties; **RHS**: 1820d in B; **SA**: No accessible herbarium specimen in Iran.

P. variabilis (Pers.) Müll. Arg., **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Haji Moniri and Sipman 2009, 2011, 2017, Haji Moniri et al. 2009a, Haji Moniri et al. 2011b, Haji Moniri et al. 2014,, Sayyad et al. 2016a, 2011b, Haji Moniri 2010, Haji Moniri 2014, Haji Moniri 2025; **D-K**: Dargaz, Quchan, Torbat-e Jam, Mashhad, Neishabour, Torghabeh, Kashmar and Kalat counties; **RHS**: 1820, 1790, 1797a, 2052, 2074, 1790b, 1842a B; 1820d, 1987, 2196, 2279, 2149, 2388 duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Tabarak village, 37.111, 58.434, 1554 m., on rock, M. Shokouhnam [MSH081a ─ ICH].

Ramalina farinacea (L.) Ach., (Fig. 3 C); **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan, Shamkhal valley, 37.357, 58.273, 1479 m., on bark, M. Shokouhnam [MSH074, MSH076 ─ICH].

Rhizocarpon disporum (Naeg. ex Hepp) Müll. Arg., **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri and Kamyabi 2010, Haji Moniri 2010, Haji Moniri 2011b, Haji Moniri 2014, Haji Moniri 2025; **D-K**: Mashhad, Kalat, Torbat- e Jam, Neishabour and Torghabeh counties; **RHS**: 2416, 2422, 2441, 2448, 2458, 2303, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

R. geminatum Körb., **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Szatala 1940 "1939" and 1957, Haji Moniri et al. 2005, Haji Moniri et al. 2009a, Haji Moniri et al.2009b, Haji Moniri 2009, Haji Moniri 2010, Haji Moniri 2011b, Haji Moniri 2025; **D-K**: Kashmar, Mashhad, Kalat, Torbat-e Heydariyeh (Koh-e-Bizg) and Torghabeh counties; **RHS**: 1436a, 2066 FUMH and duplicates in B; 3007 FUMH and duplicates in H and NBM; 2363, 2364 2371, 2346, 2405, 2393, 2403, 408, 2425, 2462, 2449, 2449. 2439, 2452, 2435 FUMH and duplicates in MSC and NBM; 2291, 2164, 2358, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

R. geographicum (L.) DC., **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Seaward et al. 2004, Seaward et al. 2008, Zokaei and Abedi 2000, Haji Moniri and Sipman 2009, Haji Moniri 2009, 2010, Haji Moniri et al. 2005, 2009a, 2009b, 2011b, 2014, **D-K**: Neishabour, Salehabad, Mashhad, Dargaz, Torghabeh, Kashmar, Kalat and Torbat- e Jam counties; **RHS**: 1436a, 1737 FUMH with duplicates in B; 30005, 3007 FUMH and duplicates in H and NBM; 2415, 2416, 2417, 2419, 2385, 2394, 2395, 2397, 2401, 2402, 2407, 2408, 2409, 2360, 2361, 2369, 2370, 2373 2378, 2379, 2380, 2362, 2347, 2353, 2454, 2421, 2422, 2424, 1540, 2437, 2435, 2444, 2463, 2426, 2430, 2431, 2459 FUMH and duplicates in MSC and NBM; 2274, 2189, 2371, duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Tabarak village, 37.111, 58.434, 1554 m., on rock, M. Shokouhnam [MSH090b ─ ICH].

R. intermediellum Räsänen, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Kalat County; **RHS**: 1659, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

R. lecanorinum Anders, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Seaward et al. 2008, 2005, Haji Moniri 2010; **D-K**: Mashhad County; **RHS**: 1663 FUMH and duplicates in B; **SA**: No accessible herbarium specimen in Iran.

R. macrosporum Räsänen, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Haji Moniri et al. 2009b, 2010, Haji Moniri 2025; **D-K**: Mashhad County; **RHS**: 2425b, duplicates in NBM; 2425b FUMH and duplicates in MSC and NBM; **SA**: No accessible herbarium specimen in Iran.

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R. saurinum (W.A. Weber) Bungartz, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Haji Moniri et al. 2009b, Haji Moniri 2025; **D-K**: Mashhad County; **RHS**: 2352, 2342, 2420, 2354, 2376, 2432, 2433, 2434 FUMH and duplicates in MSC and NBM; **SA**: No accessible herbarium specimen in Iran.

R. viridiatrum (Wulfen) Körb., **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Seaward et al. 2004, 2008, Haji Moniri et al. 2005, 2009a, 2011b, 2014, Haji Moniri and Kamyabi 2011, Haji Moniri 2010, Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Kashmar, Mashhad, Torbat-e Jam and Torghabeh counties; **RHS**: 1436c FUMH with duplicates in B; 1571, 2354 duplicates in hb. Kukwa, 2372, 2375, 2377, 2383. 2389, 2391, 2392, 2406, 2413, 2414, 2355, 2354, 2355, 2356, 2357, 2358, 2359, 2345, 2348, 2350, 2422, 2457, 2427, 2428, 2429. 2436, 2442, 244, 2445, 2467, 2468, 2469, 2470, 247I, 2450, 2429, 2460, 2461, 2466, 2475, 2474, 2476, 2477 FUMH and duplicates in MSC and NBM. 2289, 2165, 2353 duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Rhizoplaca chrysoleuca (Sm.) Zopf, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Nakhaei and Zokaei 2009; **D-K**: CountyMashhad County; **RHS**: No voucher and duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

R. melanophthalma (Ramond) Leuckert & Poelt, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Seaward et al. 2004, Seaward et al. 2008, Szatala 1957, Haji Moniri et al. 2005, 2009a, 2011b, 2014, Haji Moniri 2010, 2014, Haji Moniri and Sipman 2017, Nakhaei and Zokaei 2009, Haji Moniri 2025; **D-K**: Neishabour, Mashhad, Kashmar, Torbat-e Jam, Torghabeh counties; **RHS**: 1471, 1618, FUMH with duplicates in B; 2254, 2166, 3250 duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Tabarak village, 37.111, 58.434, 1554 m., on rock, M. Shokouhnam [MSH090a ─ ICH].

Rinodina afghanica M. Steiner & Poelt, **E**: Epiphytic; **S**: Corticolous: on twigs of trees, Lichenicolous: Lichenicolous lichen; **LR**: Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 3121, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

R. bischoffii (Hepp) A. Massal., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, 2008, Haji Moniri et al. 2005, 2014, Haji Moniri 2010, Haji Moniri and Sipman 2017, Gholamhosseinian et al. 2020, 2021, Haji Moniri 2025; **D-K**: Chenaran, Dargaz, Torbat-e Heidarieh, Sarakhs and Sabzevar counties; **RHS**: 1522 FUMH with duplicates in B; 1751a, 1801a, 1809, 1836a, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

R. colobina (Ach.) Th. Fr., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 3127, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

R. dubyana (Hepp) J. Steiner, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri and Sipman 2011; **D-K**: Dargaz County; **RHS**: 1790a, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

R. gennarii Bagl., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri 2010; **D-K**: Torghabeh County; **RHS**: No voucher and duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

R. guzzinii Jatta, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri and Sipman 2011, Haji Moniri and Sipman 2017; **D-K**: Dargaz, County; **RHS**: 3046, no duplicate indication; 1842a, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

R. immersa (Körb.) J. Steiner, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Dargaz CCounty; **RHS**: 1790b, 1836a no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

R. lecanorina (A. Massal.) A. Massal., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Neishabour County; **RHS**: 3055, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

R. mayrhoferi A. Crespo, **E**: Epilithic; **S**: Corticolous: on bark; **LR**: Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 3129, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

R. milvina (Wahlenb.) Th. Fr., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Torghabeh County; **RHS**: 2432, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

R. straussii J. Steiner, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Szatala 1957, Haji Moniri et al. 2014, Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Dargaz and Torbat-e Jam counties; **RHS**: 1835, duplicates in B; **SA**: No accessible herbarium specimen in Iran; **Note**: Access to re-examine sample number 1835, as mentioned in Haji Moniri et al. (2014) and Haji Moniri and Sipman (2017), has not been granted. It is important to note that the first sample of this species in Razavi Khorasan province was collected by Karl Heinz Rechinger, and there has been only a single report from Khorasan since 1957, as noted in Haji Moniri and Sipman (2017). Therefore, additional studies are necessary to confirm the occurrence of this species in Khorasan.

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R. zwackhiana (Kremp.) Körb., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri and Sipman 2011, Haji Moniri 2025; **D-K**: Dargaz and Neishabour counties; **RHS**: 1475, duplicates in herb. Giralt;1840a; **SA**: No accessible herbarium specimen in Iran.

Romjularia lurida (Ach.) Timdal, **E**: Epilithic and Saxicolous, on calcareous rock, Terricolous, on clay soil; **LR**: Haji Moniri and Sipman 2009, Haji Moniri and Sipman 2011; **D-K**: Dargaz County; **RHS**: 2014 FUMH with duplicates in B; 1939 FUMH with duplicates in B; 2020, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Rusavskia elegans (Link) S.Y. Kondr. & Kärnefelt, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Seaward et al. 2004, 2008, Szatala 1940 "1939", Szatala 1957, Haji Moniri et al. 2005, 2009a, 2011b, 2014, Haji Moniri 2010, 2014, Haji Moniri and Sipman 2011, Nakhaei and Zokaei 2009, Haji Moniri 2025; **D-K**: Mashhad, Kalat, Neishabour, Torghabeh, Dargaz, Kashmar, Torbat-e Heydariyeh (Koh-e-Bizg) and Chenaran counties; **RHS**: 1491, 2075, 3055, 1578, 1795, 3051, 2316, 2216, 2394, duplicates in B and FUMH; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Daroongar village, 37.302, 59.037, 1366 m., on rock, M. Shokouhnam [MSH072a ─ ICH].

Sarcogyne cyclocarpa (Anzi) J. Steiner, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Torbat-e Jam County; **RHS**: 1768, 1836b, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

S. privigna (Ach.) A. Massal., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2008, Haji Moniri et al. 2014, Gholamhosseinian et al. 2020, Haji Moniri 2025; **D-K**: Neishabur, Dargaz and Sarakhs counties; **RHS**: 1795, 3062, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

S. regularis Körb., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri and Sipman 2009, Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 1930, 1986 FUMH with duplicates in B;1838, 3041, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

Schaereria fuscocinerea (Nyl.) Clauzade & Cl. Roux, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri and Sipman 2017, Haji Moniri 2025; **D-K**: Torbat-e Jam County; **RHS**: 3148, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

Scytinium gelatinosum (With.) Otálora, P.M. Jørg. & Wedin, **P**: Cyanobacteria, filamentous (e.g. *Nostoc*, *Scytonema*); **E**: Epiphytic; **S**: Corticolous: on bark of trees, Muscicolous: on soil mosses, on tree mosses; **LR**: Haji Moniri and Sipman 2009, Haji Moniri 2018, 2025; **D-K**: Dargaz County; **RHS**: 1868 FUMH with duplicates in B; **SA**: No accessible herbarium specimen in Iran.

S. lichenoides (L.) Otálora, P.M. Jørg. & Wedin, **E**: Epiphytic; **S**: Corticolous: on bark of trees, Humicolous, growing on organic debris, Muscicolous: growing on mosses on soil, or occasionally on mosses on trees; **LR**: Haji Moniri and Sipman 2009; **D-K**: Dargaz County; **RHS**: 1922 FUMH with duplicates in B; **SA**: No accessible herbarium specimen in Iran.

S. plicatile (Ach.) Otálora, P.M. Jørg. & Wedin, **P**: Cyanobacteria (*Scytonema*); **E**: Epilithic and Saxicolous, on calcareous rock, Muscicolous: on rock mosses; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Torbat-e Jam County; **RHS**: 1706, 1736, duplicate in herb. M.Schultz; **SA**: No accessible herbarium specimen in Iran.

Seirophora austroarabica (Sipman) Frödén, **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri and Sipman 2011, Haji Moniri 2018; **D-K**: Dargaz County; **RHS**: 1747, 1871b, 1890, 1933, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

S. blumii S.Y. Kondr. & Moniri, **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Kondratyuk et al. 2013a, 2013b, 2018, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: duplicate material indicated in TARI and KW-L; **SA**: No accessible herbarium specimen in Iran.

S. contortuplicata (Ach.) Frödén, (Fig. 3 D) **E**: Epilithic and Saxicolous, on calcareous rock, Terricolous, on clay soil; **LR**: Seaward et al. 2008, Haji Moniri and Sipman 2009, Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Neishabour, Kashmar, Dargaz counties; **RHS**: 1801, 1758, FUMH with duplicates in B ; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Jafarabad village, 37.040, 58.372, 1330 m., on rock, M. Shokouhnam [MSH038 ─ ICH].

S. lacunosa (Rupr.) Frödén; **E**: Epilithic and Saxicolous, on calcareous rock, Terricolous, on clay soil; **LR**: Haji Moniri and Seaward 2005, Haji Moniri 2025; **D-K**: Torbat-e Jam and Torghabeh counties; **RHS**: 1738a MRDS; **ME**: Quchan, Nowroozi village, 37.643, 58.323, 1513 m., on moss, M. Shokouhnam [MSH079 ─ ICH].

S. orientalis Frödén, **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri and Sipman 2011, Haji Moniri 2018; **D-K**: Dargaz County; **RHS**:1878, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Squamarina cartilaginea (With.) P. James, **E**: Epilithic and Saxicolous, on calcareous rock, Terricolous, on clay soil; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri et al. 2005, Haji Moniri et al. 2011b, Haji Moniri 2010, Haji Moniri 2025; **D-K**: Kalat and Torghabeh counties; **RHS**: 1653 FUMH with duplicates in B; 2315, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

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S. concrescens (Müll. Arg.) Poelt, **E**: Epilithic; **S**: Terricolous, on clay Soil; **LR**: Haji Moniri and Sipman 2009, Haji Moniri 2018, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 1884a FUMH with duplicates in B; **SA**: No accessible herbarium specimen in Iran.

S. lentigera (Weber) Poelt, **E**: Epigeic; **S**: Terricolous, on clay soil; **LR**: Seaward et al. 2004, 2008, Haji Moniri et al. 2005, Haji Moniri 2010, Hassanzadeh Bashtian et al. 2019, Haji Moniri 2025; **D-K**: Torghabeh, Neishabur and Mashhad counties; **RHS**: 1537 FUMH with Hassanzadeh Bashtian et al. (2019) which lacks the sample number; **SA**: No accessible herbarium specimen in Iran; **Note**: Confirmation of this species in Khorasan is not possible as no voucher sample has been deposited in the FUMH Herbarium; therefore, future sampling will require suitable documentation**.**

Staurothele drummondii (Tuck.) Tuck., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Abkouh et al. 2022; **D-K**: Mashhad County; **RHS**: No voucher and duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

S. frustulenta Vain., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Abkouh et al. 2022; **D-K**: Chenaran County; **RHS**: No voucher and duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

S. lecideoides B. de Lesd., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Abkouh et al. 2022; **D-K**: Quchan County; **RHS**: No voucher and duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

S. polygonia B. de Lesd., **E**: Epilithic and Saxicolous, on granitic rock; **LR**: Abkouh et al. 2022; **D-K**: Torghabeh County; **RHS**: No voucher and duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

S. rufa (A. Massal.) Zschacke, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Abkouh et al. 2022; **D-K**: Chenaran County; **RHS**: No voucher and duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

Stigmidium cerinae Cl. Roux & Triebel, **S**: parasitic on lichens; **LR** Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 1809, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

S. glebarum (Arnold) Hafellner, **S**: parasitic on lichens; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Torbat-e Jam County; **RHS**: 1723, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Tephromela atra (Huds.) Hafellner, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Torbat-e Jam County; **RHS**: 1665, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Thallinocarpon nigritellum (Lettau) P.M. Jørg., **P**: Cyanobacteria; **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2011b; **D-K**: Torghabeh County; **RHS**: 2200, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Thalloidima candidum (Weber) A. Massal., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri et al. 2005, 2011b, Haji Moniri 2010, Haji Moniri and Sipman 2011, Gholamhosseinian et al. 2020, Haji Moniri 2025; **D-K**: Sarakhs, Dargaz, Torghabeh, Kashmar and Kalat counties; **RHS**: 1492 FUMH with duplicates in B; 2955, 2259, 1817, duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Dizavand village, 37.368, 58.364, 1387 m., on soil, M. Shokouhnam [MSH021 ─ ICH].

T. diffractum (A. Massal.) A. Massal., (**Syn.:** *Toninia diffracta* (A. Massal.) Zahlbr.) **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2004, Seaward et al. 2008, Zokaei 2002, Haji Moniri et al. 2005, Haji Moniri et al. 2011b, Haji Moniri and Sipman 2009, 2011, Haji Moniri 2010, 2025; **D-K**: Kashmar, Dargaz, Salehabad and Torghabeh counties; **RHS**: 1453a, 1938, 1862, 1863, 1807 FUMH with duplicates in B; 2258, 2167, 2344, 1712, duplicates in B; **SA**: No accessible herbarium specimen in Iran. **ME**: Quchan, Dizavand village, 37.368, 58.364, 1387 m., on soil, M. Shokouhnam [MSH035 ─ ICH].

T. physaroides (Opiz) Kistenich et al., **E**: Epigeic; **S**: terricolous mosses, plant debris and soil; **LR**: Seaward et al. 2004, 2008, Haji Moniri et al. 2005, Haji Moniri 2025; **D-K**: Kalat County; **RHS**: 1480a FUMH with duplicates in B; **SA**: No accessible herbarium specimen in Iran.

T. sedifolium (Scop.) Kistenich, Timdal, Bendiksby & S. Ekman, **E**: Epigeic; **S**: Humicolous, growing on organic debris, Muscicolous: on soil mosses, Terricolous, on clay soil; **LR**: Seaward et al. 2004, 2008, Haji Moniri et al. 2005, Haji Moniri and Sipman 2009, Haji Moniri 2018, 2025; **D-K**: Kalat and Dargaz counties; **RHS**: 1480a, 1861, 1863a, 1866 FUMH with duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Thyrea confusa Henssen; **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2008, Haji Moniri 2025; **D-K**: Chenaran and Sabzevar counties; **RHS**: 2147 B and duplicates in TARI; 1509 MRDS 113224 sub *Peccania coralloides;* **SA**: No accessible herbarium specimen in Iran.

T. massata (Tuck.) Herre, **E**: Epilithic and Saxicolous, on siliceous rocks and terricolous on soil; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Dargaz and Torghabeh counties; **RHS**: 1646, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

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T. taurica (Szatala) Oxner, **E**: Epigeic; **S**: Terricolous, on clay soil; **LR**: Seaward et al. 2008, Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Kalat and Chenaran counties; **RHS**: 1657, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Toniniopsis aromatica (Sm.) Kistenich, Timdal, Bendiksby & S. Ekman, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2011a; **D-K**: Kalat County; **RHS**: 2453, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

Variospora aurantia (Pers.) Arup, Søchting & Frödén, (Fig. 3 E); **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan, Doorbadam village, 37.292, 58.281, 1543 m., on rock, M. Shokouhnam [MSH075 ─ ICH].

Verrucaria aethiobola Wahlenb. ex Ach., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Kamyabi et al. (2023b as *V. cataleptoides* (Nyl.) Nyl.); **D-K**: No proper locality information in the publication; **RHS**: 12182 TARI; **SA**: No accessible herbarium specimen in Iran.

V. ahtii Pykälä, Launis & Myllys, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Kamyabi et al. (2023); **D-K**: No proper locality information in the publication; **RHS**: 12182 TARI; **SA**: No accessible herbarium specimen in Iran.

V. dolosa Hepp., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Kamyabi et al. (2023); **D-K**: No proper locality information in the publication; **RHS**: 12185 TARI; **SA**: No accessible herbarium specimen in Iran.

V. hochstetteri Fr., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Kamyabi et al. (2023); **D-K**: No proper locality information in the publication; **RHS**: 12184 TARI; **SA**: No accessible herbarium specimen in Iran.

V. latericola Erichsen, **S**: Lichenicolous fungus: on lichens; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Chenaran County; **RHS**: 1535, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

V. nigrescens Pers., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri 2010, Kamyabi et al. 2020; **D-K**: Kalat, Chenaran, Torghabeh, Mashhad, Fariman and Torbat-e Jam counties; **RHS**: LI1, LI11, L12, L21, L22, L26, SI1,SI2, SI3, SI4, SI5, 119, SI6, SI7, SI8, SI9, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

V. muralis Ach., **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Kamyabi et al. (2023); **D-K**: No proper locality information in the publication; **RHS**: 12183 TARI; **SA**: No accessible herbarium specimen in Iran; **Note**: The publication lacks precise locality data, which hinders verification of the species occurrence and prevents a meaningful assessment of its distribution within Khorasan Province.

V. viridicans Servit, **E**: Epilithic; **S**: Calcicolous, on limestone; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 1820d, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Verrucula elegantaria (Zehetl.) Nav.-Ros. & Cl. Roux, **S**: Lichenicolous fungus: parasitic on lichens; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 1768, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Verruculopsis beltraminiana (A. Massal.) Cl. Roux, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan, Rahman Quli village, Cherik valley, 37.401, 58.315, 954 m., on rock, M. Shokouhnam [MSH020a, MSH036b ─ ICH].

V. lecideoides (A. Massal.) Gueidan & Cl. Roux, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri 2010, Haji Moniri et al. 2011b, Haji Moniri et al. 2014 as *V. miniatum* (Hepp) Krzewicka, Baradaran et al. 2023 as *V. 'minutum'* [= *minuta*] (Hepp.) Krzewicka, Haji Moniri 2025; **D-K**: Torghabeh and Kashmar counties; **RHS**: 1646, 2398 duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Xalocoa ocellata (Fr.) Kraichak, Lücking & Lumbsch, (Fig. 3 F); **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri and Sipman 2011, Haji Moniri 2025; **D-K**: Kalat and Quchan Counties; **RHS**: 1888 duplicates in B; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Shamkhal valley, 37.587, 58.456, 1479 m., on rock, M. Shokouhnam [MSH051─ ICH].

Xanthocarpia crenulatella (Nyl.) H. Olivier, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 1819a duplicates in B; **SA**: No accessible herbarium specimen in Iran.

X. epigaea (Søchting, Huneck & Etayo) Frödén, Arup & Søchting, **E**: Epigeic; **S**: Terricolous, on clay soil, Terricolous, on calcareous soil; **LR**: This study, new to Razavi Khorasan; **D-K**: Quchan County; **ME**: Quchan. Yadak village. 37.729, 58.534, 1717 m., on soil, M. Shokouhnam [MSH043 ─ ICH].

Xanthomendoza fallax Søchting, Kärnefelt & S.Y. Kondr., **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Haji Moniri et al. 2011a, Haji Moniri 2018; **D-K**: Torghabeh County; **RHS**: 2449, no duplicate indication; **SA**: No accessible herbarium specimen in Iran.

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X. fulva (Hoffm.) Søchting, Kärnefelt & S.Y. Kondr., **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri and Sipman 2009, Haji Moniri et al. 2014, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 1786 FUMH; 1786 B; **ME**: Quchan, Abshuri village, 37.533, 58.421, 1488 m., on bark, M. Shokouhnam [MSH012 ─ICH].

X. trachyphylla (Tuck.) Frödén, Arup & Søchting, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Seaward et al. 2004, 2008, Zokaei and Khazai 1999, Haji Moniri et al. 2014, Sayyad et al. 2016a, Haji Moniri 2025; **D-K**: Dargaz, Kashmar and Mashhad counties; **RHS**: 1442 duplicate in B and FUMH; **SA**: No herbarium specimen in FUMH in Iran.

Xanthoparmelia perrugata (Nyl.) O. Blanco, A. Crespo, Elix, D. Hawksw. & Lumbsch, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Seaward et al. 2004, Seaward et al. 2008, Haji Moniri 2025; **D-K**: Kashmar County; **RHS**: 1436a B; 1436a FUMH; **SA**: No accessible herbarium specimen in Iran.

X. verruculifera (Nyl.) O. Blanco, A. Crespo, Elix, D. Hawksw. & Lumbsch, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Haji Moniri 2010, Haji Moniri et al. 2011b, Haji Moniri 2025; **D-K**: Torghabeh County; **RHS**: 2250, 2386, 2215, duplicates in B; **SA**: No accessible herbarium specimen in Iran.

Xanthoria parietina (L.) Th. Fr., **E**: Epiphytic; **S**: Corticolous: on bark; **LR**: Haji Moniri 2025**; D-K**: Dargaz County; **RHS**: No voucher and duplicate material indicated; **SA**: No accessible herbarium specimen in Iran; **ME**: Quchan, Berder village, Asalmeh, 37.374, 58.212, 1684 m, on bark, M. Shokouhnam [MSH068 ─ ICH].

EXCLUDED TAXA

In reviewing the lichen records from Razavi Khorasan, several species have been excluded from the updated checklist. This decision is based on critical issues such as misidentification, lack of proper specimen documentation, absence of herbarium or fungarium deposition, and instances where images attached to records do not correspond to the identified taxa. Furthermore, some exclusions were necessary due to outdated or incorrect taxonomic interpretations that no longer align with current scientific standards. To ensure the accuracy and reliability of the regional lichen flora, only records supported by verifiable specimens, reliable identifications, and updated taxonomy have been retained.

Acarospora anatolica H. Magn., **E**: Epilithic and Saxicolous, on calcareous rock, **LR**: Haji Moniri 2010, Haji Moniri et al. 2009a, 2011b, 2014b; **D-K**: Torghabeh, Mashhad, Kashmar counties; **RHS**: 2043 FUMH; 2248 B; 2218 B; 2348 B; 2379 B; TARI and SBUH; **SA**: No accessible herbarium specimen in Iran; **Note**: The image corresponding to *A. anatolica* in HAJI MONIRI 2010 page 304 is identical to *A. bullata*.

Caloplaca citrina B. de Lesd., **E**: Epilithic and Saxicolous, on calcareous rock or corticolous, on bark of trees, **LR**: Hasanzadeh Bashtian et al. 2019; **D-K**: Neishabour County; **RHS**: No voucher indication; **Note**: It is not possible to confirm the occurrence of this species in Khorasan as no voucher sample has been deposited in the FUMH Herbarium; future studies will be needed for its confirmation.

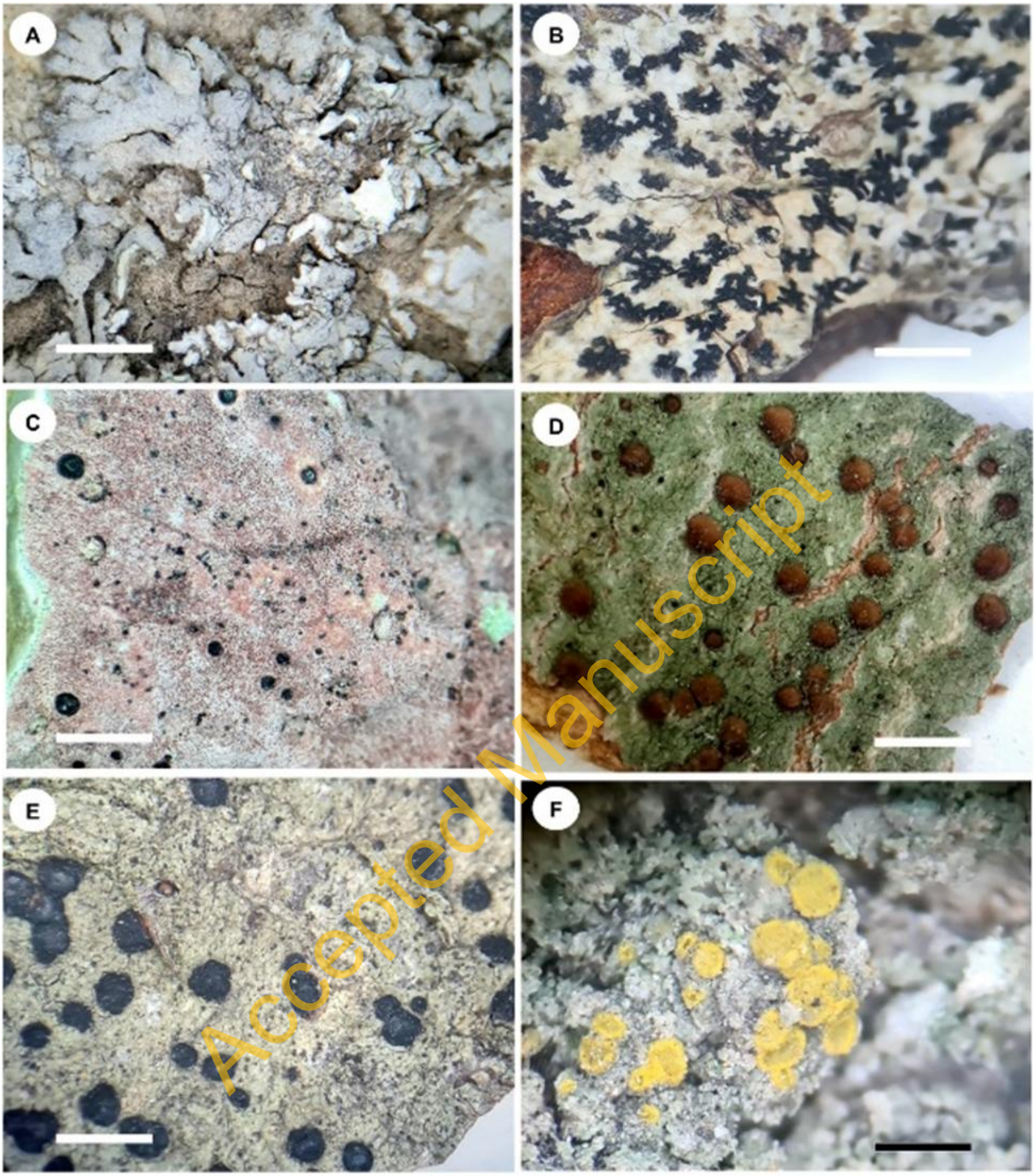
Cetraria oakesiana Tuck., **E**: Epilithic; **S**: Corticolous: on bark of trees, on soil; Saxicolous, on calcareous rock; **LR**: Zokaei and Khazai 1999, Zokaei 2002, see also notes in Seaward et al. 2008; **D-K**: Mashhad County; **RHS**: No voucher and duplicate material indicated; **SA**: No accessible herbarium specimen in Iran; **Note**: The record of *Cetraria oakesiana* in Khorasan Province by Zokaei and Khazai (1999: 91) and later by Zokaei (2002: 1, 6) is untenable. Notably, Zokaei (2002: 1, 3) also cites the same specimen under Lecanora muralis, and the accompanying photograph clearly depicts Protoparmeliopsis muralis rather than *Cetraria oakesiana*. This inconsistency strongly suggests a misidentification.

Flavopunctelia darrowii (J.W. Thomson) Hale, **E**: Epilithic; **S**: Corticolous: on the bark of trees; **LR**: Seaward et al. 2008, Haji Moniri et al. 2005, Haji Moniri 2005, 2025; **D-K**: CountyMashhad County; **RHS**: There is no voucher specimen, so this record appears to be dubious (See Seaward et al. 2008); **SA**: No accessible herbarium specimen in Iran.

Lecanora conferta (Fr.) Grognot, **E**: Epilithic and Saxicolous, on calcareous rock, Saxicolous, man-made substrate, mortar, cement, concrete or brick; **LR**: Seaward et al. 2008, Zokaei 2002, Zokaei 2003; **D-K**: CountyMashhad County; **RHS**: No voucher and duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

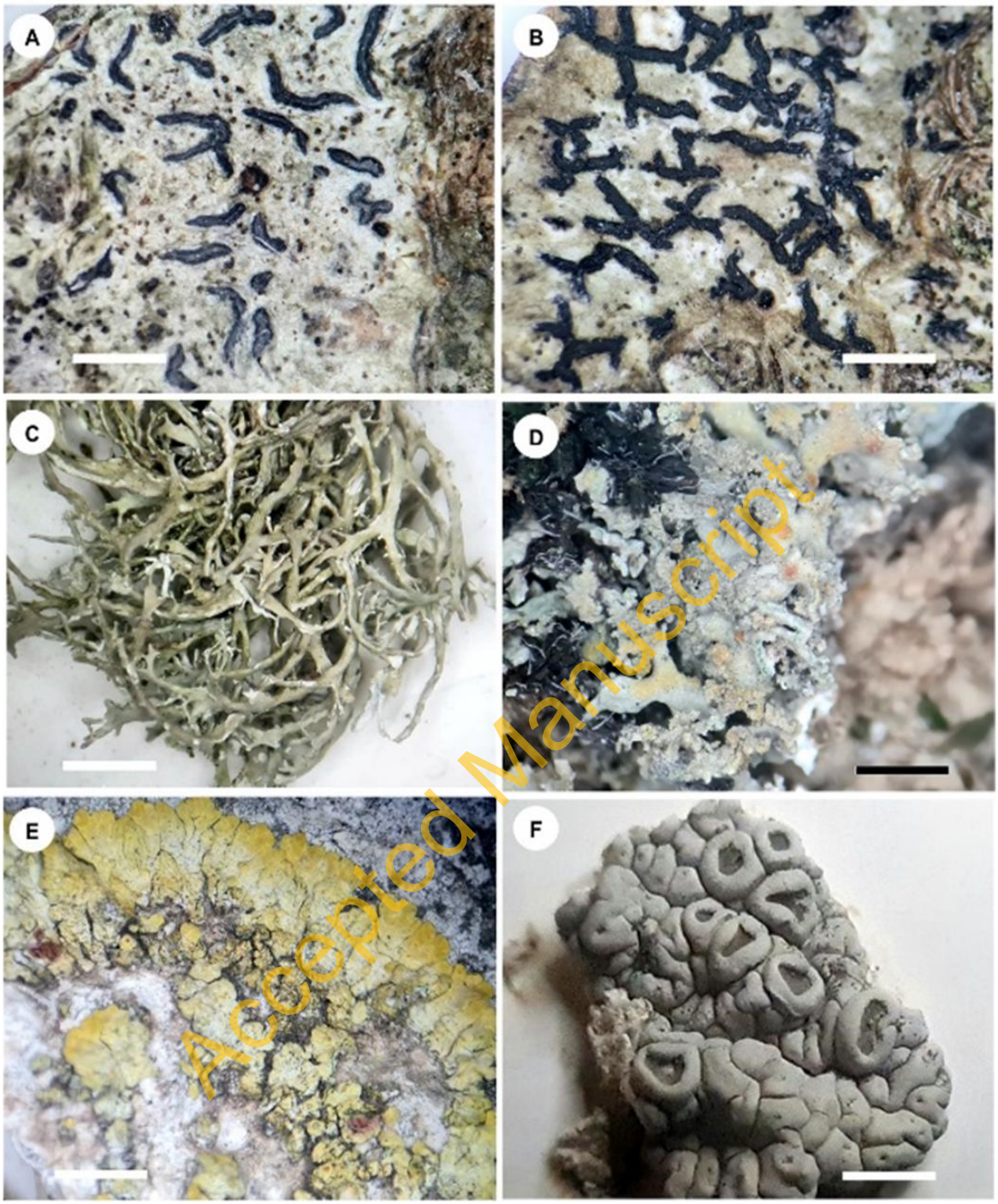
Megaspora iranica Haji Moniri & S.Y. Kondr., **E**: Epiphytic; **S**: Corticolous: on bark of trees; **LR**: Haji Moniri et al. 2017, Kondratyuk et al. 2017, Haji Moniri 2025; **D-K**: Dargaz County; **RHS**: 3138, no duplicate indication; **SA**: No accessible herbarium specimen in Iran; **Note**: No DNA sequences of *Megaspora iranica* have been deposited in GenBank. Although the species was described by Haji Moniri et al. (2017), no DNA barcode or sequence data were provided in the publication, despite a phylogenetic tree being presented. The absence of such data raises further doubts about the reliability of the article. Moreover, the figure included more closely resembles *M. cretacea* Gasparyan, Zakeri and Aptroot, and no physical specimen is currently available. It is recommended that DNA data be obtained to clarify the taxonomic status of this species.

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Fig. 2. Noteworthy lichen species recorded from the study area: (A) *Anaptychia elbursiana*, (B) *Arthonia radiata*, (C) *Bagliettoa marmorea*, (D) *Bacidia rubella*, (E) *Bacidia laurocerasi*, (F) *Candelariella viae-lacteae*. Scale bars: (A, B, E, F) = 2 mm, (C) = 3 mm, (D) = 1 mm.



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Fig. 3. (A) *Graphis scripta*, (B) *Opegrapha niveoatra*, (C) *Ramalina farinacea*, (D) *Seirophora contortuplicata*, (E) *Variospora aurantia*, (F) *Xalocoa ocellata*. Scale bars: (A, B) = 2 mm, (C, D) = 5 mm, (E, F) = 3 mm.

Rhizocarpon umbilicatum (Ramond) Flagey, **E**: Epilithic and Saxicolous, on calcareous rock; **LR**: Seaward et al. 2008, Zokaei 2002, Zokaei and Abedi 2000, Zokaei and Khazai 1999; **D-K**: Mashhad County; **RHS**: No voucher and duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

Toninia rosulata (Anzi) H. Olivier, **E**: Epilithic and Saxicolous, on calciferous rocks and terricolous on soil; **L**: Seaward et al. 2008, Zokaei and Khazai 1999, Zokaei 2003; **D-K**: Mashhad County; **RHS**: No voucher indication; **SA**: No accessible herbarium specimen in Iran.

Xanthoparmelia lineola (E.C. Berry) Hale, **E**: Epilithic and Saxicolous, on acidic rocks; **LR**: Seaward et al. 2008, Zokaei and Khazai 1999; **D-K**: Mashhad County**; RHS**: No voucher and duplicate material indicated; **SA**: No accessible herbarium specimen in Iran.

X. psoromifera (Hale) Hale, **E**: Epilithic and Saxicolous, on siliceous rocks; **LR**: Seaward et al. 2008, Zokaei and Khazai 1999; **D-K**: Mashhad County; **RHS**: No voucher and duplicate material indicated; **SA**: No accessible herbarium specimen in Iran

DISCUSSION

The present study provides the first consolidated account of the lichenized and lichenicolous fungi reported from Razavi Khorasan Province (KRP), northeastern Iran, a region situated largely within the Khorasan-Kopet Dagh floristic province of the Irano-Turanian region. Based on a critical synthesis of published records, examination of available herbarium material, and recent collections made by the first author, 287 taxa are documented, including 25 taxa newly reported from Razavi Khorasan, one of which, *Kiliasia sculpturata*, is also newly reported from Iran. This represents a substantial increase in the documented lichen diversity of the province and provides an updated baseline for further taxonomic, ecological, and biogeographical investigations.

The number of taxa currently documented from Razavi Khorasan should, however, be regarded as provisional. The province encompasses considerable topographical and environmental heterogeneity, including the Kopet Dagh mountain system, montane habitats approaching 3000 m elevation, steppe vegetation, arid and semi-arid landscapes, rocky outcrops, and locally developed woodland habitats. Given this diversity of habitats and substrates, substantial areas remain insufficiently investigated for lichens, and additional fieldwork is likely to increase the number of recorded taxa. The present checklist should therefore be interpreted as a synthesis of current knowledge rather than a complete inventory of the provincial lichen biota.

Published lichen checklists from Kerman and Zanjan provinces (Sohrabi et al. 2010, 2019) provide a basis for preliminary comparisons with the lichen biota of Razavi Khorasan. The currently standardized datasets show that 14.6% and 12.5% of the taxa recorded from Razavi Khorasan are shared with Kerman and Zanjan, respectively, representing 71.2% and 64.3% of the corresponding provincial checklists. Earlier information from Razavi Khorasan was based largely on historical collections and records incorporated into broader treatments of the Iranian lichen biota, particularly those of Szatala (1957) and Seaward et al. (2004, 2008). A more detailed comparison of species richness and taxonomic overlap among the three provinces is presented below (Fig. 5).

Substrate associations provide a useful ecological characterization of the known lichenized and lichenicolous biota of Razavi Khorasan Province (Fig. 4A). Because individual taxa may occur on more than one substrate, substrate categories were treated as non-mutually exclusive. Saxicolous taxa constitute the largest component, with 185 taxa (64.5% of the checklist), followed by corticolous taxa with 59 (20.6%) and terricolous taxa with 36 (12.5%). Additional substrate associations include 18 muscicolous taxa (6.3%), 17 lichenicolous taxa (5.9%), and three lignicolous taxa (1.0%). The predominance of saxicolous taxa is consistent with the extensive availability of exposed rocky substrates and montane habitats throughout much of the province, whereas the smaller corticolous component may partly reflect the more restricted distribution of woodland and suitable woody vegetation within this predominantly dry and mountainous landscape.

The photobiont composition of the checklist of the Razavi Khorasan province shows a similarly pronounced pattern (Fig. 4B). Taxa associated with green algae other than trentepohlialean algae constitute the dominant component, comprising 252 of the 287 recorded taxa (87.8%). This group encompasses much of the taxonomic diversity recorded in the province, including representatives of such prominent genera as *Lecanora*, *Lecidea*, *Rhizocarpon*, *Xanthoparmelia*, and *Physcia*. Cyanobacterial photobionts occur in 21 taxa (7.3%), represented particularly by cyanolichen genera such as *Peltigera*, *Scytinium*, *Enchylium*, *Lathagrium*, and *Peccania*. Examples include *Peltigera praetextata*, *Scytinium lichenoides*, *Enchylium tenax*, and *Lathagrium cristatum*. In contrast, 10 taxa (3.5%) lack a photobiont and represent non-lichenized lichenicolous fungi, including members of *Cercidospora*, *Endococcus*, *Muellerella*, and *Stigmidium*. Only four taxa (1.4%) are associated with trentepohlialean photobionts, including *Arthonia radiata*, *Graphis scripta*, *Opegrapha niveoatra*, and *O. vulgata*. The strong predominance of non-trentepohlialean green-algal photobionts therefore represents a characteristic feature of the currently known lichenized and lichenicolous biota of Razavi Khorasan Province. These proportions should nevertheless be interpreted cautiously where photobiont identity has been inferred from established taxonomic information rather than determined directly from the specimens examined in the present study.

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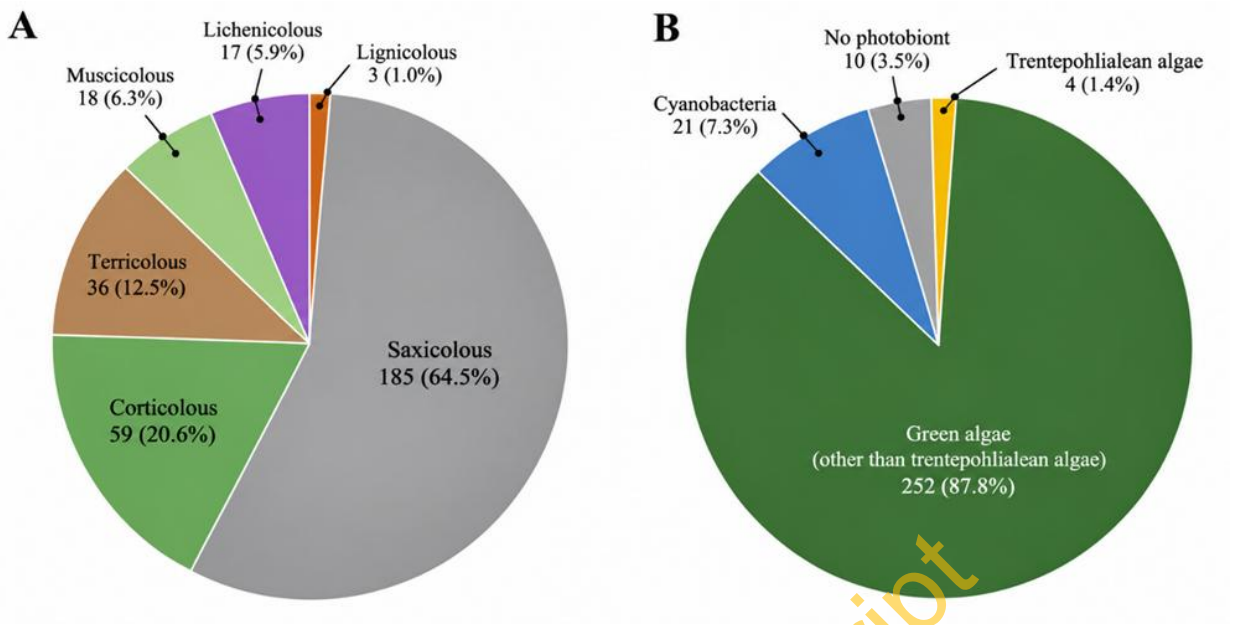


Fig.4. Substrate associations and photobiont composition of lichenized and lichenicolous fungi recorded from Razavi Khorasan Province, Iran. (**A**) Distribution of taxa among non-mutually exclusive substrate categories, showing the strong predominance of saxicolous taxa; (**B**) Distribution of taxa according to photobiont type, showing the predominance of green-algal photobionts other than trentepohlialean algae, with smaller contributions from cyanobacterial and trentepohlialean photobionts and from non-lichenized lichenicolous fungi lacking a photobiont.

The known lichen biota of Razavi Khorasan includes a substantial number of species with broad distributions across Central Asia, the Caucasus, Eastern Europe, Afghanistan, China, Mongolia, Pakistan and Turkmenistan. This pattern suggests a notable Eurasian and Central Asian component in the provincial lichen biota, consistent with the geographical position of northeastern Iran. The apparent prominence of this component should, however, be interpreted cautiously, because widespread and taxonomically well-known species are generally more likely to be collected, identified, and reported than poorly known or geographically restricted taxa.

A preliminary comparison with the lichen biota of Turkmenistan further suggests a biogeographical connection between Razavi Khorasan and the neighbouring Central Asian region. Earlier lichenological information from Turkmenistan, particularly the Central Kopet Dagh, is available in the literature (e.g., Dzhuraeva 1978). However, for the present comparison, we used a more comprehensive unpublished checklist of the lichen-forming, lichenicolous, and allied fungi of Turkmenistan compiled and maintained by the corresponding author in a personal research database. This database incorporates historical records, including those available in the earlier literature, together with additional records and subsequent taxonomic and nomenclatural information, and therefore provides a broader basis for comparison than the earlier published sources alone. As this dataset has not yet been formally published, it should be regarded as a working compilation rather than a finalized national checklist.

After preliminary reconciliation of older combinations and synonyms with the nomenclature adopted in the present study, 102 species were found to be shared between the Turkmenistan dataset and Razavi Khorasan, corresponding to approximately 35.5% of the 287 species recognized from Razavi Khorasan. This substantial overlap is consistent with the geographical continuity of the Kopet Dagh mountain system across northeastern Iran and southern Turkmenistan and suggests a considerable shared component between the lichen biotas of the two regions.

The comparison should nevertheless be regarded as preliminary. The unpublished Turkmenistan dataset incorporates records from historical literature and retains numerous names requiring further nomenclatural and taxonomic evaluation, while some records and their underlying sources remain to be verified. Consequently, neither the final number of accepted taxa in Turkmenistan nor the exact degree of similarity between the two lichen biotas can yet be determined with confidence. The figures presented here should therefore not be interpreted as a definitive floristic comparison. Nevertheless, the currently observed overlap provides additional support for a shared Eurasian, particularly Central Asian, component in the lichen biota of northeastern Iran and highlights the Kopet Dagh as an important transboundary system for future taxonomic and biogeographical investigation.

A comparison with the published checklist of Afghanistan (Mayrhofer et al. 2023), after reconciliation of synonymous and older taxonomic combinations, revealed 94 species shared with Razavi Khorasan, corresponding to approximately 32.8% of the 287 species recognized in the province. This substantial overlap is consistent with the geographical proximity and ecological continuity between northeastern Iran and Afghanistan and further supports a significant Central and Southwest Asian component in the lichen biota of Razavi Khorasan.

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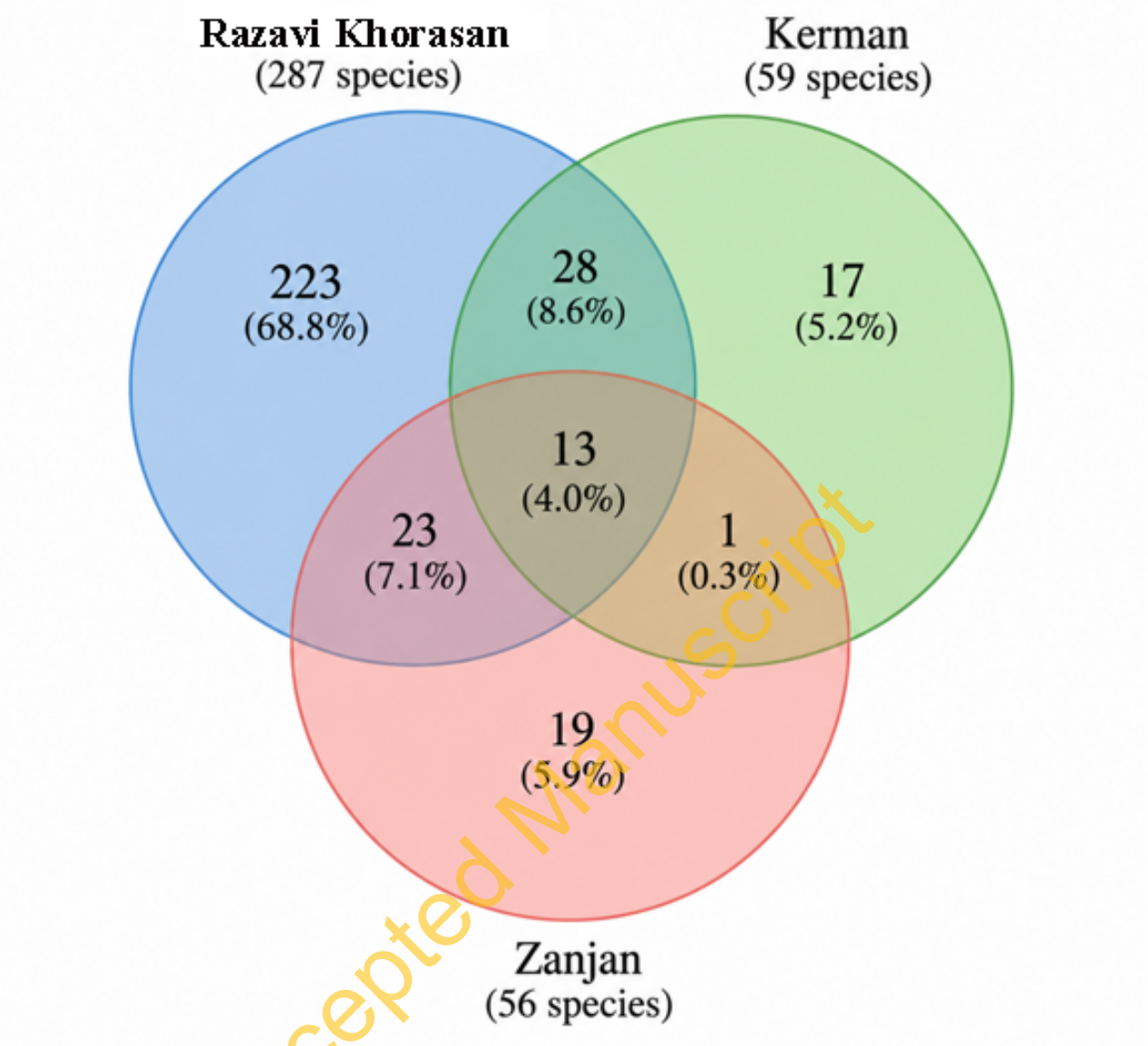
Several species show potentially informative biogeographical patterns. Widespread Eurasian taxa, including *Ramalina farinacea* and *Peltigera praetextata*, occur in Razavi Khorasan and contribute to the broadly distributed component of the provincial lichen biota. In contrast, the distribution and taxonomic status of some taxa reported mainly from Southwest and Central Asia remain insufficiently understood. In particular, names based on Iranian type material may require further taxonomic reassessment, and apparently restricted distributions should not necessarily be interpreted as evidence of endemism. Future integrative studies combining morphological, chemical, and molecular data may clarify whether some of these taxa represent genuinely restricted species or are conspecific with more widely distributed taxa.

Other distributional patterns are also noteworthy. The occurrence of taxa with broad but markedly disjunct distributions, including some species of *Seirophora*, highlights the biogeographical complexity of the Iranian lichen biota. *Seirophora contortuplicata* is particularly notable for its unusual and highly disjunct distribution, with records from central and southern Europe, Central Asia, northwestern Africa, Greenland, and the intermountain regions of western North America (Rosentreter and McCune, 1996; Nash et al., 2004). Such distributional patterns highlight the potential importance of Iran, particularly its northeastern regions, for investigating broader patterns of lichen distribution and biogeographical connectivity across Eurasia and adjacent regions.

Based on a standardized comparison of the available lichen checklists from Razavi Khorasan, Kerman, and Zanjan provinces, Razavi Khorasan shows the highest recorded diversity, with 287 species, compared with 59 species in Kerman and 56 species in Zanjan. A total of 41 species are shared between Razavi Khorasan and Kerman, 36 between Razavi Khorasan and Zanjan, and 14 between Kerman and Zanjan. Thirteen species are common to all three provinces: *Acarospora cervina*, *Calogaya biatorina*, *C. saxicola*, *Dermatocarpon miniatum*, *Glypholecia scabra*, *Lecidella carpathica*, *Myriolecis dispersa*, *Protoparmeliopsis muralis*, *P. peltata*, *Rhizocarpon geographicum*, *Rhizoplaca melanophthalma*, *Squamarina cartilaginea*, and *Xanthomendoza trachyphylla*. In addition, 223 species are recorded only from Razavi Khorasan, 17 only from Kerman, and 19 only from Zanjan, giving a combined total of 324 species across the three provincial datasets. These results indicate that, despite a recognizable shared component among the lichen biotas of the three provinces, Razavi Khorasan supports a substantially richer and more distinctive recorded assemblage. However, the markedly greater number of species documented from Razavi Khorasan should not be interpreted directly as evidence of intrinsically greater lichen diversity, because the three provincial inventories differ considerably in collecting intensity, geographical and habitat coverage, publication history, and taxonomic treatment. The available evidence nevertheless suggests that the lichen biota of Razavi Khorasan combines a broadly shared Iranian component with widespread Eurasian and Central Asian elements and taxa showing more unusual or disjunct distribution patterns. Consequently, biogeographical interpretations based on the present comparison should be regarded as preliminary and reassessed as additional standardized provincial inventories become available.

An additional limitation revealed by the present checklist concerns the accessibility and long-term curation of voucher material within Razavi Khorasan Province. For 71 of the 287 accepted taxa (24.7%), previously published records cite one or more specimens as deposited in the FUMH Herbarium at Ferdowsi University of Mashhad, yet the corresponding material was not accessible for direct examination during the present study. This is particularly significant because FUMH represents the principal university herbarium within the province and would be expected to provide an important local repository for documenting regional biodiversity. The inaccessibility of voucher material associated with nearly one-quarter of the currently recognized taxa limits the independent verification of earlier identifications and, in some cases, makes confirmation of published provincial records difficult. This pattern points to a substantial gap in the local curation, accessibility, and long-term documentation of lichen collections and suggests that the considerable lichenological research conducted in the province has not yet been matched by equivalent development of accessible provincial reference collections. Strengthening herbarium infrastructure, specimen curation, digitization, and the systematic deposition of voucher material in accessible institutional collections should therefore be regarded as an important component of future capacity building for lichenological research in Razavi Khorasan.

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Fig. 5. Venn diagram showing the taxonomic overlap among the lichen checklists of Razavi Khorasan, Kerman, and Zanjan provinces, Iran. Numbers within each section indicate taxa unique to each province or shared between two or all three provinces. The three checklists comprise 287, 59, and 56 taxa, respectively, with 13 taxa common to all three provinces and a total of 324 distinct taxa represented across the combined dataset.

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AUTHOR CONTRIBUTION

Mahin Shokouhnam: Investigation (fieldwork, sampling, and study area characterization), data curation, formal analysis, writing – original draft, writing – review and editing. Mohammad Sohrabi: Supervision, conceptualization, methodology, investigation, databasing and curation, validation, writing – review and editing. Farshid Memariani: Conceptualization, investigation, data curation, supervision, writing – review and editing. Mahdi Pordel: Methodology, supervision, writing – review and editing.

DATA AVAILABILITY

All data are available in the manuscript.

FUNDING

The authors declare that no financial support was received during this research.

DECLARATION

In this manuscript, there is nothing to declare and the authors declare no conflicts of interest.

ETHICAL APPROVAL

This article does not contain any studies with human participants or animals performed by any of the authors.

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قارچ شناسی ایران جلد ۱۳، شماره ۲، ۱۴۰۵

مقاله کامل

فهرستی از قارچ‌های گلسنگی و گلسنگ‌های استان خراسان رضوی، شمال شرق ایران

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چکیده

گلسنگ‌ها و قارچ‌های گلسنگ‌زی استان خراسان رضوی در شمال‌شرق ایران، با وجود تنوع چشمگیر محیطی و زیست‌جغرافیایی منطقه خراسان-کپه‌داغ، همچنان در مقایسه با ظرفیت‌های این منطقه کمتر مورد مطالعه قرار گرفته‌اند. در این پژوهش، فهرستی به‌روز از این قارچ‌ها بر پایه تلفیق و ارزیابی انتقادی گزارش‌های منتشرشده، بررسی نمونه‌های هرباریومی در دسترس و مجموعه‌های حاصل از نمونه‌برداری‌های اخیر در استان ارائه می‌شود. فهرست بازنگری‌شده شامل ۲۸۷ تاکسون متعلق به ۹۵ سرده و ۲۴ خانواده است. نام‌های منتشرشده و استنادهای مؤلفان به‌طور انتقادی بررسی شدند، گزارش‌های مترادف تحت نام‌های پذیرفته‌شده کنونی تلفیق گردیدند و رکوردهای مشکوک یا غیرقابل تأیید به‌طور جداگانه مورد بررسی قرار گرفتند. در مجموع، ۲۵ تاکسون برای نخستین بار از استان خراسان رضوی گزارش می‌شوند که از میان آن‌ها، *Kiliasia sculpturata* نخستین گزارش برای ایران نیز به شمار می‌رود. گزارش‌های جدید برای استان عبارت‌اند از: *Arthonia radiata*، *Bacidia laurocerasi*، *B. rubella*، *Bagliettoa calcisedа*، *B. marmorea*، *Circinaria hoffmanniana*، *C. scabridula*، *C. sphaerothallina*، *Graphis scripta*، *Lecanora chlarotera*، *Lecidella elaeochroma*، *L. thysanophora*، *Lepra albescens*، *Lepraria vouauxii*، *Lobothallia cernohorskyana*، *Opegrapha niveoatra*، *O. vulgata*، *Punctelia borreri*، *P. subrudecta*، *Pyrenodesmia erodens*، *Ramalina farinacea*، *Variospora aurantia*، *Verruculopsis beltraminiana*، *Xanthocarpia epigaea* و *Kiliasia sculpturata*. گروه‌های بستر زیستی هم‌پوشانی داشتند و انحصاری نبودند؛ تاکسون‌های سنگ‌زی با ۱۸۵ تاکسون (۶۴/۵٪) بزرگ‌ترین بخش فهرست را تشکیل دادند و پس از آن تاکسون‌های پوست‌درخت‌زی با ۵۹ تاکسون (۲۰/۶٪)، خاک‌زی با ۳۶ تاکسون (۱۲/۵٪)، خزه‌زی با ۱۸ تاکسون (۶/۳٪)، گلسنگ‌زی با ۱۷ تاکسون (۵/۹٪) و چوب‌زی با ۳ تاکسون (۱/۰٪) قرار گرفتند. وضعیت دسترسی به نمونه‌های شاهد نگهداری‌شده در هرباریوم‌ها نیز مجدداً ارزیابی شده و توضیحات مربوط به آن در سراسر فهرست گونه‌ها درج شده است. بر پایه مطالعات آرایه‌شناختی خانواده *Megasporaceae* در ایران، ترکیب نام‌گذاری جدید *Aspiciliella lazarenkoi* (Oxner) Sohrabi پیشنهاد می‌شود. ده آرایه به دلیل تردید در صحت گزارش‌ها، شناسایی نادرست، قدیمی‌بودن اطلاعات یا نبود شواهد کافی برای تأیید معتبر حضور آن‌ها، از فهرست آرایه‌های پذیرفته‌شده کنار گذاشته شده‌اند. این پژوهش تلفیقی، مبنایی علمی و به‌روز برای مطالعات آینده در زمینه آرایه‌شناسی، بوم‌شناسی و زیست‌جغرافیای گلسنگ‌ها در شمال‌شرق ایران فراهم می‌آورد.

واژگان کلیدی: تنوع زیستی گلسنگ، خراسان رضوی، فلور کپه داغ، قارچ‌های ایران، نمونه‌های هرباریومی، *Aspiciliell*.

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